Mayor
Aaron Brockett

Council Members
Taishya Adams
Matt Benjamin
Lauren Folkerts
Tina Marquis
Ryan Schuchard
Nicole Speer
Mark Wallach
Tara Winer

Council Chambers
1777 Broadway
Boulder, CO 80302
May 16, 2024
6:00 PM

City Manager
Nuria Rivera-Vandermyde

City Attorney
Teresa Taylor Tate

City Clerk
Elesha Johnson

AGENDA FOR THE REGULAR MEETING OF THE BOULDER CITY COUNCIL

1. **Call to Order and Roll Call**
   - A. **Jewish American Heritage Month Declaration presented by Councilmember Marquis** *5 Min*
   - B. **Older Americans Month Declaration presented by Councilmember Schuchard** *5 Min*
   - C. **Remembering Los Seis Declaration presented by Mayor Pro Tem Speer** *5 Min*
2. **Open Comment**
3. **Consent Agenda**
   - A. **Consideration of a motion to accept the April 11, 2024 Special City Council Meeting Minutes**
   - B. **Consideration of a motion to accept the April 18, 2024 Regular City Council Meeting Minutes**
   - C. **Consideration of a motion to approve and authorize the city manager to enter into and execute four separate Intergovernmental Agreements, in substantially the same form as in Attachments A-D, between the City of Boulder and jurisdictions within the Boulder County region establishing a regional homeownership and rental compliance program administered by City of Boulder staff**
   - D. **Consideration of a motion to adopt the findings and conclusions of the Boulder City Council, as specified in this Agenda Memorandum dated May 16, 2024, for the disapproval of the designation of the Civic Area Historic District**
   - E. **Consideration of a motion to amend the Council Rules of Procedure Sec. II. Communication with Council, Sec. IV. Council Meeting Agenda and Sec. XVI. Rules of Decorum**
   - F. **Consideration of a motion to authorize the city manager to enter into a**

settlement agreement to resolve a lawsuit filed by Sina Goharjou in the amount of $125,000

G. Introduction, first reading and consideration of a motion to order published by title only Ordinance 8622, amending Title 9, “Land Use Code,” B.R.C. 1981, to simplify certain development review processes, and setting forth related details

H. Introduction, first reading and consideration of a motion to order published by title only, Ordinance 8632 approving annual supplemental appropriations to the 2024 Budget

I. Introduction, first reading, and consideration of a motion to order published by title only Ordinance 8633 amending Section 2-1-2, "Council Meetings," B.R.C. 1981 allowing for regular meetings once a month during the summer months; and setting forth related details

4. Call-Up Check-In

A. Concept Plan Review for a proposed Boulder Housing Partners redevelopment on 3.74 acres located at 6400-6570 Gunpark Drive and 6560 Spine Road with 23 townhomes in two buildings, 124 apartments in five buildings, and one community building. The site is largely undeveloped; two existing office buildings on the property would be demolished. Reviewed under case no. LUR2023-00060

5. Public Hearings

A. Second reading and consideration of a motion to amend and pass Ordinance 8629, repealing the “2020 City of Boulder Energy Conservation Code,” adopting by reference the “2024 City of Boulder Energy Conservation Code,” and amending Title 10, “Structures,” B.R.C. 1981, and other sections of the Boulder Revised Code in relation thereto, and setting forth related details

90 min - 30 min staff presentati min public hearing & Council discussio

6. Matters from the City Manager

A. Addressing Impacts of Gas-Powered Landscape Equipment

60 min - 15 min presentati / 45 min council discussio

7. Matters from the City Attorney

8. Matters from the Mayor and Members of Council

9. Discussion Items

10. Debrief

11. Adjournment

3:45 hrs

Additional Materials

Presentations

Item Updates

Information Items

A. Core Arterial Network (CAN) Update

Boards and Commissions

A. 01.22.24 WRAB Signed Minutes

B. 03.11.24 TAB Signed Minutes

Declarations

A. Memorial Day Declaration

Heads Up! Email

This meeting can be viewed at **www.bouldercolorado.gov/city-council.** Meetings are aired live on Municipal Channel 8 and the city's website and are re-cablecast at 6 p.m. Wednesdays and 11 a.m. Fridays in the two weeks following a regular council meeting.

Boulder 8 TV (Comcast channels 8 and 880) is now providing closed captioning for all live meetings that are aired on the channels. The closed captioning service operates in the same manner as similar services offered by broadcast channels, allowing viewers to turn the closed captioning on or off with the television remote control. Closed captioning also is available on the live HD stream on **BoulderChannel8.com**. To activate the captioning service for the live stream, the "CC" button (which is located at the bottom of the video player) will be illuminated and available whenever the channel is providing captioning services.

The council chambers is equipped with a T-Coil assisted listening loop and portable assisted listening devices. Individuals with hearing or speech loss may contact us using Relay Colorado at 711 or 1-800-659-3656.

Anyone requiring special packet preparation such as Braille, large print, or tape recorded versions may contact the City Clerk's Office at 303-441-4222, 8 a.m. - 5 p.m. Monday through Friday. Please request special packet preparation no later than 48 hours prior to the meeting.

If you need Spanish interpretation or other language-related assistance for this meeting, please call (303) 441-1905 at least three business days prior to the meeting. Si usted necesita interpretacion o cualquier otra ayuda con relacion al idioma para esta junta, por favor comuniquese al (303) 441-1905 por lo menos 3 negocios dias antes de la junta.

Send electronic presentations to email address: **CityClerkStaff@bouldercolorado.gov** no later than 2 p.m. the day of the meeting.

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Jewish American Heritage Month Declaration presented by Councilmember Marquis

PRIMARY STAFF CONTACT
Megan Valliere, (720) 665-4594

ATTACHMENTS:

Description

- **Jewish American Heritage Month Declaration**

Jewish American Heritage Month

May 2024

Jewish American Heritage Month is an annual celebration of Americans of Jewish faith who have helped weave the fabric of our history, culture, and society. This year marks the 44th annual celebration of the achievements and contributions made by Jewish Americans, starting with the establishment of Jewish American Heritage week in 1980 and expanded in 2006 to encompass the month of May.

Jewish American Heritage Month acknowledges achievements of American Jews in the fields of literature, arts, entertainment, medicine, business, science, government, military service, music and more. Jewish Americans have played indispensable roles in our civic and community life, making invaluable contributions through their leadership and achievements.

Unfortunately, Jewish communities in this nation continue to be challenged by bigotry, hostility, discrimination, and violence. As we remember the lessons of the Holocaust, our commitment to religious freedom in America obligates us to root out prejudice and combat anti-Semitism. The Jewish American story is an essential chapter of the American narrative, and we recognize, honor, and celebrate Jewish Americans who strengthen our community every day.

We, the City Council of the City of Boulder, Colorado, declare May 2024 as

Jewish American Heritage Month

Aaron Brockett, Mayor

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Older Americans Month Declaration presented by Councilmember Schuchard

PRIMARY STAFF CONTACT
Megan Valliere, (720) 665-4594

ATTACHMENTS:

Description

- **Older Americans Month Declaration presented by Councilmember Schuchard**

Older Americans Month

May 2024

Each May, the Administration for Community Living sets the theme for Older Americans Month, and this year's theme is Powered by Connection which focuses on the importance of meaningful social connections for the health and well-being of older adults.

The Surgeon General's Framework for a National Strategy to Advance Social Connection points out the severe consequences of social isolation and recognizes the importance of creating and sustaining social and community connections. Evidence shows that social connections are healing. They increase lifespan and improve a variety of health risks including heart disease and stroke.

The city's endorsement of the Lifelong Boulder Initiative plays a pivotal role in promoting connections for older adults through supporting Boulder as an age-inclusive community. The changing demographics for this decade demonstrate a clear need to create and sustain individual and community connections for older adults. The demographics through 2030 show a dramatic increase in the older adult population in Colorado with an increase of 67% for adults ages 75-84 and an increase of 48% for adults 85 years and older.

Older Americans Month is a wonderful opportunity to acknowledge the power of connection and to support creating new social relationships with each other and our community. Personal and community connections also support intergenerational relationships where older adults can share their wealth of life experience and wisdom, guide our younger generations, and carry forward abundant cultural and historical knowledge.

Older Americans Month is a time to honor, acknowledge, and value older adults as they contribute their time, wisdom, and experience to our community. It is a time to emphasize the many positive aspects of aging, to push past traditional boundaries of aging stereotypes, and to embrace our community's diversity.

We, the City Council of Boulder, Colorado declare May 2024 as

Older Americans Month

And urge the community to take time this month to recognize the strengths of older adults in our community as essential and valuable members as well as acknowledging the individuals who support them.

Aaron Brockett, Mayor

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Remembering Los Seis Declaration presented by Mayor Pro Tem Speer

PRIMARY STAFF CONTACT
Megan Valliere, Assistant to City Council

ATTACHMENTS:

Description

- **Remembering Los Seis Declaration**

Remembering Los Seis De Boulder

May 27-29, 2024

In the span of less than 48 hours in May 1974, two car bombings killed six Chicano activists in Boulder. On May 27 at Chautauqua Park, an explosion took the lives of University of Colorado Boulder law school graduate Reyes Martinez; CU junior Neva Romero; and CU alumna Una Jaakola; and two days later, a bomb tore apart a car at a parking lot on 28th Street, killing former CU student Florencio Granado, students Heriberto Teran and Francisco Dougherty, and seriously injuring Antonio Alcantar.

Their deaths shocked the state and the news reverberated throughout the southwest, and they became known as “Los Seis de Boulder”.

Students, including Los Seis, protested the University's administrative actions that denied students their financial aid that resulted in the decrease of parity. Los Seis struggled to increase CU's enrollment to percentage-levels that reflected Colorado's Latino population, (parity).

For almost a half-century, the case has remained unsolved and shrouded in mystery, and for most of that time, “Los Seis de Boulder” and their deaths have gone unrecognized by city of Boulder residents, businesses, and institutions.

Los Seis de Boulder were loved by their families and communities, and May 2024 marks 50 years since these tragic bombings. Colorado Chautauqua has placed a memorial stone near the site of the first explosion, and the University of Colorado has recognized the students through a permanent sculpture on campus. The City of Boulder plans to erect a second sculpture at 17th Street and Pearl in May. Additionally, in December 2023, the Los Seis Memorial Endowed Scholarship fund was established with monetary contributions from community members and CU gifts.

The City Council of Boulder, Colorado declares in 2024 the

50th Anniversary of Remembering Los Seis De Boulder

And proclaims the importance of recognizing and remembering Los Seis and their struggles and the significance of their contributions to the overall fight for justice and equity; the need to educate the broad Boulder community about the history and implications of these tragedies; and invites the community to recognize Los Seis de Boulder through the upcoming 50th Anniversary Commemorative Events.

Aaron Brockett, Mayor

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Consideration of a motion to accept the April 11, 2024 Special City Council Meeting Minutes

PRIMARY STAFF CONTACT
Elesha Johnson, City Clerk

REQUESTED ACTION OR MOTION LANGUAGE
Motion to accept the April 11, 2024 Special City Council Meeting Minutes

ATTACHMENTS:

Description

- **Item 3A - DRAFT April 11, 2024 Special Meeting Minutes**

CITY COUNCIL SPECIAL MEETING

Via Zoom

Thursday, April 11, 2024

MINUTES

1. Call to Order and Roll Call:

Mayor Brockett called the meeting to order at 6:02 p.m.

Council Members present: Adams, Benjamin, Brockett, Folkerts, Marquis, Schuchard, Speer, Winer

Absent: Wallach

Motion	Made By/Seconded	Vote
Motion to **AMEND** the agenda To ADD: • Item 1B – **Debrief on City Power Outage** on April 6th and 7th	Speer / Benjamin	Carried 8:0

A. **Space Science Month Declaration** presented by Councilmember Benjamin

B. **Debrief on City Power Outage on April 6th & 7th**

Nuria Rivera-Vandermyde, City Manager provided Council with a debrief of actions taken and support provided to the community. She also noted that an invitation has been extended to Xcel to attend the April 18th meeting to answer questions from Council.

2. Consent Agenda

A. Consideration of a motion to **accept the February 22, 2024 Special Council Meeting Minutes**

B. Consideration of a motion to **accept the March 7, 2024 Regular Council Meeting Minutes**

C. Consideration of a motion to **accept the Recommendation of the Council Employee Evaluation Committee (Council Recruitment Committee),** to identify Jeffrey Cahn as the finalist for the position of Boulder Presiding Municipal Court Judge, **to appoint Jeffrey Cahn as Boulder Presiding Municipal Court Judge** and to **authorize Mayor Brockett and the City Manager to Execute an Employee Contract with Mr. Cahn**

Judge Cahn addressed the Council to extend his gratitude and continued dedicated service to the Boulder community.

D. **Introduction,** first reading and consideration of a motion to publish by title only **Ordinance 8631, updating the streetlighting standards by amending the City of Boulder Design and Construction Standards (DCS),** originally adopted pursuant to Ordinance 5985, and **adding a new Section 4-20-77, "Streetlighting Fees,"** B.R.C. 1981, and setting forth related details

Motion	Made By/Seconded	Vote
Motion to **APPROVE consent agenda items A-D**	Speer / Schuchard	Carried 8:0

3. Public Hearings

A. **Second reading** and consideration of a motion **to adopt Ordinance 8627 designating the area as shown in Exhibit A, to be known as the Civic Area Historic District, as a historic district** under Chapter 9-11, "Historic Preservation," B.R.C. 1981; and setting forth related details

Brad Mueller, Planning and Development Director provided Council with a historic background on this item.

Marcy Gerwing, Principal Planner, provided a presentation and answered questions from Council.

Leonard Segal, applicant with Historic Boulder, Inc., provided a presentation and answered questions from Council.

The public hearing **opened** at 7:53 p.m. and the following spoke:

DRAFT

- **Virtual**:

1. Patrick ORourke
2. Payson Seetsh
3. Joesph Stepanek
4. Kathryn Barth
5. Fran Sheets
6. Kristen Lewis
7. Scott Holwick
8. Stuart Lord
9. Bob Muckle
10. Lynn Segal
11. Dan Corson
12. Andrew Brandt
13. Daniel Howard
14. Aiden Fletcher
15. Tim Plass
16. Nick Forster

The public hearing **closed** at 8:31 p.m.

Motion	Made By/Seconded	Vote
Motion to ADOPT Ordinance 8627 **designating the area as shown in Exhibit A, to be known as the Civic Area Historic District, as a historic district** under Chapter 9-11, "Historic Preservation," B.R.C. 1981; and setting forth related details	Brockett / **NONE**	**Item did not move forward due to a lack of a "second".**
Motion to **DENY Ordinance 8627 designating the area as shown in Exhibit A, to be known as the Civic Area Historic District, as a historic district** under Chapter 9-11, "Historic Preservation," B.R.C. 1981; and setting forth related details	Folkerts / Benjamin	Approved 7:1 **NAY:** Brockett

4. Matters from the City Manager

A. Vision Zero Action Plan Update

DRAFT

Devin Joslin, Principal Traffic Engineer, provided a presentation and answered questions from Council.

Natalie Stiffler, Transportation and Mobility Director and Valerie Watson, Transportation and Mobility Deputy Director also answered questions from Council.

5. Discussion Items

6. Debrief

7. Adjournment

There being no further business to come before Council at this time, by motion regularly adopted, the meeting was **adjourned by Mayor Brockett at 9:55 p.m.**

Approved this 16th day of May 2024.

APPROVED BY:

_____
Aaron Brockett, Mayor

ATTEST:

_____
Elesha Johnson, City Clerk

DRAFT

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Consideration of a motion to accept the April 18, 2024 Regular City Council Meeting Minutes

PRIMARY STAFF CONTACT
Elesha Johnson, City Clerk

REQUESTED ACTION OR MOTION LANGUAGE
Motion to accept the April 18, 2024 Regular City Council Meeting Minutes

ATTACHMENTS:

Description

- **Item 3B - DRAFT April 18, 2024 Regular Meeting Minutes**

CITY COUNCIL MEETING

Council Chambers

Thursday, April 18, 2024

MINUTES

DRAFT

1. Call to Order and Roll Call:

Mayor Brockett called the meeting to order at 6:01 p.m.

Council Members present:	Adams, Benjamin, Brockett, Folkerts, Schuchard, Speer, Wallach, Winer
Virtual:	Marquis
Absent:	Wallach

Motion	Made By/Seconded	Vote
Motion to **AMEND** the agenda **To ADD:** **Item 1C** – Public Safety Power Shut Off Discussion with Xcel Energy	Winer / Speer	Carried 8:0

A. **Earth Day Declaration** presented by Councilmember Adams

B. **National Volunteer Appreciation Week Declaration** to be presented by Mayor Brockett

C. **Public Safety Power Shut Off Discussion** with Xcel Energy

Iffie Jennings, Community and Local Government Affairs Manager for Boulder County and Andrew Holder, Director of Community Relations from Xcel, provided

remarks and answered questions from Council. Robert Kenny, PSO President attended but did not speak.

2. Open Comment:

(Public comments are a summary of actual testimony. Full testimony is available on the council web page at: https://bouldercolorado.gov/city-council > Watch Live or Archived Meetings.)

Open Comment **opened** at 7:04 p.m.

- **In-Person (Council Chambers):**

1. Emily Zinn
2. Evan Buchman
3. ~~Eva Wheelock~~ ***moved to virtual***
4. Aram Bingham
5. Lindsey Loberg
6. Lis Collins
7. Paula Johansen
8. Bettina Swigger
9. Jonathan Singer
10. Patrick ORourke
11. Evan Ravitz
12. Joseph Stein
13. Khaled Alali
14. David Cooper
15. Laura Gonzalez

- **Virtual**

16. Bharath Tata
17. David Gustafson
18. ~~Sven Steinmo~~ ***did not show***
19. Flanders Lorton
20. Miriam De Santiago
21. Eva Wheelock

Open Comment **closed** at 7:51 p.m.

Due to disruptions in Chambers, Council recessed at 7:58 p.m. and reconvened at 8:06 p.m.

3. Consent Agenda

DRAFT

A. Consideration of a motion to **accept the March 14, 2024 Special City Council Meeting Minutes**

B. Consideration of a motion to **accept the March 21, 2024 Regular City Council Meeting Minutes**

C. Consideration of a motion **authorizing the City Manager to convey the permanently affordable housing unit at 500 Manhattan Dr #B2,** Boulder, CO to eligible buyers and sign all associated agreements

D. Consideration of a motion **authorizing the City Manager to convey the 925-933 Marine Street,** Boulder, CO to Emergency Family Assistance Association, Inc. (EFAA) and sign all associated agreements

E. Consideration of a motion **authorizing the City Manager to convey twelve permanently affordable homes at 4475 North Broadway**. The homes will be produced through a Flatirons Habitat for Humanity partnership in support of the Ponderosa Community Stabilization Project

F. Consideration of a motion to **authorize the city manager to enter into a settlement agreement to resolve a lawsuit filed by Joslynn Montoya and the Colorado Cross-Disability Coalition** for payment in the amount of $75,000

G. Consideration of a motion to **ratify the Library District Board of Trustees Selection Committee's appointment of two trustees** to the Boulder Public Library District Board of Trustees

H. **Introduction**, first reading and consideration of a motion to order published by title only **Ordinance 8625 designating the property at 2120 Bluebell Ave.**, City of Boulder, Colorado, to be known as the Fankboner-Hartman-Ely House, **as an individual landmark** under Chapter 9-11, "Historic Preservation," B.R.C. 1981; and setting forth related details

Motion	Made By/Seconded	Vote
Motion to **APPROVE consent agenda items A-H**	Benjamin /Adams	Carried 8:0

4. Call-Up Check-In

A. **Site Review to redevelop 1501 and 1509 Arapahoe Ave.** with eight attached residential dwelling units with underground parking and two at-grade parking spaces behind the building. The development is proposed to be three stories in height that will not exceed the by-right height limit of 38 feet. **Reviewed under case no. LUR2023-00002**

NO ACTION

DRAFT

5. Public Hearings

6. Matters from the City Manager

A. **Boulder Social Streets** - Update and Next Steps Recommendations

Mark Woulf, Assistant City Manager provided an introduction and background on this item.

Brett Merriam and Helena Wolf with Gehl Consultants provided a presentation and answered questions from Council.

Natalie Stiffler, Transportation and Mobility Director, Chris Jones, Community Vitality Director, and Matthew Chasansky, Arts and Culture Manager, answered questions from Council.

7. Matters from the City Attorney

8. Matters from the Mayor and Members of Council

9. Discussion Items

10. Debrief

11. Adjournment

There being no further business to come before Council at this time, by motion regularly adopted, the meeting was **adjourned by Mayor Brockett at 9:38 p.m.**

Approved this 16th day of May 2024.

APPROVED BY:

_____
Aaron Brockett, Mayor

ATTEST:

_____
Elesha Johnson, City Clerk

DRAFT

DRAFT

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM

Consideration of a motion to approve and authorize the city manager to enter into and execute four separate Intergovernmental Agreements, in substantially the same form as in **Attachments A-D**, between the City of Boulder and jurisdictions within the Boulder County region establishing a regional homeownership and rental compliance program administered by City of Boulder staff

PRIMARY STAFF CONTACT

Hollie Hendrikson/Housing Policy Senior Project Manager

REQUESTED ACTION OR MOTION LANGUAGE

Motion to approve and authorize the city manager to enter into and execute four separate Intergovernmental Agreements, in substantially the same form as in **Attachments A-D**, between the City of Boulder and jurisdictions within the Boulder County region establishing a regional homeownership and rental compliance program administered by City of Boulder staff.

ATTACHMENTS:

Description

- **Item 3C - Consideration of a motion to approve and authorize the city manager to establish a regional homeownership and rental compliance program administered by City of Boulder staff.**
- **Item 3C - Addendum Memo**

CITY OF BOULDER
CITY COUNCIL AGENDA ITEM

MEETING DATE: May 16, 2024

AGENDA TITLE
Consideration of a motion to approve and authorize the city manager to enter into and execute four separate Intergovernmental Agreements, in substantially the same form as in **Attachments A-D**, between the City of Boulder and jurisdictions within the Boulder County region establishing a regional homeownership and rental compliance program administered by City of Boulder staff.

PRESENTERS
Nuria Rivera-Vandermyde, City Manager
Kurt Firnhaber, Director of Housing and Human Services
Erin Poe, Deputy City Attorney
Jay Sugnet, Housing Senior Manager
Hollie Hendrikson, Senior Project Manager

EXECUTIVE SUMMARY
The City of Boulder and several of the region's jurisdictions are entering into an Intergovernmental Agreement (IGA) that establishes a regional homeownership and rental compliance program administered by City of Boulder staff in the Department of Housing and Human Services. The purpose of the initiative is to centralize compliance and homeownership program services through the Boulder County Regional Housing Partnership (BCRHP). Currently, the following local jurisdictions will pay for receiving these services through this IGA: Louisville, Lafayette, Erie, the Boulder County Housing Authority, and Nederland.

Currently, there are several municipalities within the Boulder County Regional Housing Partnership (BCRCH) that do not have dedicated resources or program infrastructure for homeownership programs and/or rental compliance programs to manage and oversee future affordable housing. Boulder County Housing Authority (BCHA), City of

Longmont, and the City of Boulder manage the majority of compliance for homes in which they have developed or funded. However, as other municipalities continue to grow their affordable housing programs and implement affordable housing programs, there will be a need to maintain high-quality, specialized expertise in compliance. The Regional Compliance Program initiative proposes a regionalized approach, administered by City of Boulder staff in the Department of Housing and Human Services, as Boulder's program and practices are well-established and can represent best practices for the regional partnership.

STAFF RECOMMENDATION

Suggested Motion Language:

Staff requests council consideration of this matter and action in the form of the following motion:

Motion to approve and authorize the city manager to enter into and execute four separate Intergovernmental Agreements, in substantially the same form as in **Attachments A-D**, between the City of Boulder and jurisdictions within the Boulder County region establishing a regional homeownership and rental compliance program administered by City of Boulder staff.

COMMUNITY SUSTAINABILITY ASSESSMENTS AND IMPACTS

- Economic – In 2017, the Boulder County Regional Housing Partnership (BCRHP) established a goal that 12 percent of rental and ownership housing across the region be permanently affordable for low-, moderate-, and middle-income households by 2035. To achieve this goal, jurisdictions in the region will need to collectively produce 8,000 new units to achieve this goal. This Regional Compliance Program will aid in the creation of these new units by extending City of Boulder expertise and resource to other jurisdictions in the region.
- Environmental – None at this time.
- Social – The affordable housing challenge is regional and is shared by each jurisdiction in Boulder County. Regional cooperation and action are needed to produce equitable solutions, and to produce an adequate amount of affordable housing. This Regional Compliance Program supports the implementation of a regional approach to finding solutions to our region's shared affordable housing challenge.

OTHER IMPACTS

- Fiscal – The Boulder County Board of Commissioners allocated Boulder County ARPA funds for startup resources to create a regional approach to affordable housing compliance countywide. With these funds, the City of Boulder has hired a new Housing Project Planner to help coordinate homeownership compliance activities for this partnership. County funding also supports the development of a

regional affordable housing database and a revolving foreclosure prevention fund. Once these County funds expire at the end of 2026, the individual jurisdictions will pay the City of Boulder directly for services.

- Staff time – Additional staff resources will be supported by the Boulder County ARPA funding agreement. City resources to support additional staff time are not anticipated.

BACKGROUND

This Regional Compliance Program is a longstanding goal of the BCRHP to create regional services in alignment with the 2017 Regional Housing Strategy. These types of services support the program infrastructure needed for more municipalities within the BCRHP to implement affordable housing programs. The principles of regionalized services have been awaiting the right opportunity for implementation; with Boulder County ARPA funds supporting the initial startup costs, and approval from Louisville, Lafayette, Erie, the Boulder County Housing Authority, and Nederland, this regional compliance idea is ready to move toward implementation.

Program Goals & Objectives

The purpose of the Intergovernmental Agreement is to centralize compliance and homeownership program services through the Boulder County Regional Housing Partnership (BCRHP). This plan will achieve several goals and objectives:

- Create policy alignment
- Use efficient resources
- Encourage regional collaboration
- Apply consistent best practices and processes
- Support newly adopted Inclusionary Zoning

In the Regional Compliance Program, equity and accessibility will be addressed through the adopted policies and procedures that dictate the practices of the program. Current local affordable housing programs have shown to dramatically increase access to housing to households with racial diversity. In addition, the homeownership program incorporates accessibility preferences into the application and vetting process. For example, interpretation is available in all languages through an online service; there are disability preferences to suit an individual's disability needs (such as a home with no stairs); there are dependent preferences for homes with more bedrooms being better suited for applicants with dependents; and a preference for placing applicants closer to where they work.

The Need & Lead Roles

Currently, there are several municipalities within the BCRHP that do not have dedicated resources or program infrastructure for homeownership programs and/or compliance programs. Boulder County Housing Authority (BCHA), City of Longmont, and the City of Boulder manage the majority of compliance for homes in which they have developed or funded. However, as other municipalities continue to grow their affordable housing programs, there will be a growing need to maintain high-quality, specialized expertise in

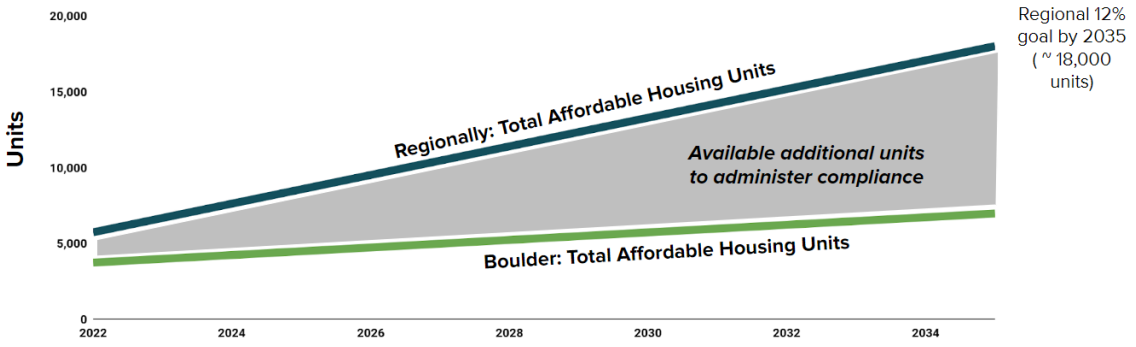
compliance. The BCRHP believes that is possible with a regionalized approach, administered by City of Boulder staff.

Similarly for homeownership programs, some municipalities in the BCRHP manage for-sale units on a case-by-case basis without a formalized team, which has been appropriate in the past given the small number of affordable for-sale units in the region. As the BCRHP continues to grow for-sale housing stock, there will be a similar need to administer a homeownership program at the regional level to create efficiencies in marketing units, qualifying buyers, facilitating sales/re-sales, and preventing foreclosures. The cities of Longmont and Boulder manage their own homeownership programs, and Boulder County does not have an ownership program. The BCRHP believes administration through the City of Boulder is appropriate as it has the most developed infrastructure to support such a program.

With the passage of Proposition 123, several regional partners made Local Government Affordable Housing Commitment which includes a requirement to increase existing affordable housing units by 3% a year and an expedited review process for affordable housing developments. Therefore, regional partners are in need of affordable homeownership and rental compliance program support now more than ever. Under the BCRHP, the City of Boulder will take responsibility for program administration with an established governance structure.

Serving the Regional Community
For the BCRHP to meet its goal of 12% affordable housing in the region by 2035, a significant increase in units over the next 13-years (and beyond) will be required. Now is the right time to establish a Regional Program Compliance infrastructure to support the compliance requirements associated with the units, as well as administration of any for-sale units.

The graph below demonstrates the increase in units over time. Not all units may be administered through this program, because some larger programs (such as with BCHA and City of Longmont) may choose to continue their programs in lieu of regionalizing. However, the goal of the Regional Compliance Program is to centralize services to the extent possible and feasible to cities and towns that do not have dedicated housing staff within their city structure. The Regional Compliance Program will support affordable housing programs and their communities across the region.



NEXT STEPS

The Regional Compliance Program proposes a governance structure to provide regional oversight to the programs:

	Policy Committee	Policy Exceptions Committee (homeownership)
Committee Participation (5-year term)	› One member from each participating jurisdiction › Regional Homeownership Program Manager › Regional Compliance Program Manager	› External volunteer participation › Regional Homeownership Program Manager
Committee Structure	› Purpose is to provide jurisdiction's with an oversight role of program activity in their community. › Twice annual meeting to review data; recommend adjustments to program as needed	› Considers unique and individual (case-by-case) circumstances that don't meet current procedures › Makes a recommendation to the jurisdiction's liaison, who makes final decision
	Example: The program mortgage policy needs to be updated to reflect the changing lending environment.	**Example:** A new home-buyer would like to make an investment 1-year ahead of the policy allowance, due to their personal and unique circumstance of moving into their new home.

The Policy Committee will be responsible for overseeing the success of the program alongside the BCRHP and the City of Boulder as the administrative jurisdiction. City staff are currently working closely with future members of this Policy Committee on preparing regional processes, establishing regional procedures, and training staff.

The goal city staff and this Policy Committee is to launch the Regional Compliance Program by summer 2024.

ATTACHMENTS

Attachment A –Intergovernmental Agreement Establishing Regional Affordable Homeownership and Rental Compliance Program Services: **Town of Erie**
Attachment B –Intergovernmental Agreement Establishing Regional Affordable Homeownership and Rental Compliance Program Services: **City of Lafayette**
Attachment C –Intergovernmental Agreement Establishing Regional Affordable Homeownership and Rental Compliance Program Services: **City of Louisville**
Attachment D –Intergovernmental Agreement Establishing Regional Affordable Homeownership and Rental Compliance Program Services: **Boulder County Housing Authority**

Town of Erie
Resolution No. 24-026

A Resolution of the Town Council of the Town of Erie Approving an Intergovernmental Agreement with the City of Boulder for Regional Affordable Homeownership and Rental Compliance Program Services

Whereas, the Town Council finds that it is in the best interest of the Town and the public health, safety and welfare to approve an Intergovernmental Agreement with the City of Boulder for regional affordable homeownership and rental compliance program services.

Now Therefore be it Resolved by the Town Council of the Town of Erie, Colorado, that:

Section 1. The Intergovernmental Agreement between the Town and the City of Boulder is hereby approved in substantially the form attached hereto, subject to final approval by the Town Attorney. Upon such approval, the Mayor is authorized to execute the Intergovernmental Agreement on behalf of the Town.

Adopted this 13th day of February, 2024.

Justin Brooks, Mayor

Attest:

Debbie Stamp, Town Clerk

TOWN OF ERIE CORPORATE SEAL COLORADO

Intergovernmental Agreement Establishing Regional Affordable Homeownership and Rental Compliance Program Services

This Intergovernmental Agreement ("IGA") establishing a regional affordable homeownership and rental compliance program is entered into by and between the Town of Erie ("Town of Erie"), a Colorado home rule municipality, and the City of Boulder, a Colorado home rule city, ("City of Boulder"), (each a "Party" and together the "Parties"), effective this 13th day of February 2024 (the "Effective Date").

Recitals

A. The Parties are authorized to enter into this IGA pursuant to C.R.S. § 29-1-203; and

B. Boulder County and areas of Weld County are in a housing crisis resulting in home prices and rents that are unaffordable; and

C. The housing crisis is, in part, a manifestation of racial inequity, following similar national trends on racial disparities for homeownership, rental opportunities, affordability, and adequate housing; and

D. The affordable housing challenge is regional and is shared by each jurisdiction in Boulder County, and a few in Weld County; and

E. Regional cooperation and action are needed to produce equitable solutions to the challenge to produce an adequate amount of affordable housing and distribute it across the area; and

F. Boulder County communities and residents are committed to and have made strong investments in affordable housing; and

G. In 2017, Boulder County communities agreed to a goal of ensuring a minimum of 12% of the housing inventory will be permanently affordable to low, moderate, and middle-income households by 2035; and

H. Boulder County communities created the Boulder County Regional Housing Partnership ("BCRHP") to address regional housing challenges and through the BCRHP agreed to establish a centralized compliance program for rental and homeownership services and dedicate the resources needed to address the housing needs of the community; and

I. For over two decades, the City of Boulder has operated a Rental and Homeownership Program ("Rental Compliance Program") that includes administrative and compliance processes. The Rental Compliance Program includes resources to market affordable homes and process applications, verify eligibility of applicants, and provide monitoring and

record-keeping. The Rental Compliance Program focuses on training, technical assistance, monitoring, record keeping, and does not act as a property manager; and

J. Through this IGA, the Parties are making a clear commitment to racial equity as a central tenet in this collaborative regional work. Shared regional housing challenges are rooted in historical practices, processes, and policies that have systematically racialized space by limiting access for Black, Indigenous, and People of Color (collectively "BIPOC") to safe, stable, and affordable housing in the communities in which they choose to live. Interrupting the history of racial segregation is an intended consequence of this collaborative regional work; and

K. While the Participating Jurisdiction is individually responsible for centering racial equity in its local affordable housing rental and homeownership programs, the Parties will strive to collectively achieve housing access for BIPOC communities, and foster support and accountability in this process. Collaborative activities may include collecting racialized housing data, leading community engagement activities, including those targeted and co-created with BIPOC communities, and ensuring elected officials, when making policy decisions, are aware of and considering racial equity impacts; and

The interests of the public are best served by the Parties entering into this IGA.

Now Therefore, in consideration of the Recitals, terms, conditions, and covenants included in this IGA, the Parties agree as follows:

Covenants

1. **Purpose**. The purpose of this IGA is to create the Regional Affordable Homeownership and Rental Compliance Program (the "Program") and define the structure of the Program and govern the financial contributions from the Parties in support of this provision of services.

2. **Term**. The term of this IGA shall commence as of the Effective Date. The IGA shall continue for a term of seven years unless a Party elects to terminate this IGA at the end of any calendar year, after giving 180 days' written notice.

3. **Services Provided by the City of Boulder**.

The City of Boulder will provide the following administrative services ("Services") while supporting Participating Jurisdiction independence and autonomy:

a. Homeownership Services. The City of Boulder will provide administrative services to market homes and process applications, verify eligibility of applicants, prepare legal documents to add affordable restrictions to homes, and provide record-keeping;

b. Rental Services. The City of Boulder will provide administrative services to the Participating Jurisdiction and property management companies within the

jurisdiction which include providing training, technical assistance, monitoring, and direction of rental properties to ensure owners/managers are adequately marketing their properties, processing applications, properly determining eligibility, and provide record-keeping to satisfy HUD requirements;

c. The City of Boulder will provide a main point of contact for each Service: a Regional Compliance Program Manager and a Regional Homeownership Program Manager; and

d. Additional details of the Services provided are described in **Exhibit A**.

4. **Expectations to Receive Services Provided**.

a. The Participating Jurisdiction will abide by the current policies and procedures of the Program as established and amended by the City of Boulder, in cooperation with the Participating Jurisdiction, as described in **Exhibit A**.

b. The Participating Jurisdiction will use the current City of Boulder restricted covenants as template language to ensure consistency of Program administration. The current covenant templates are summarized in **Exhibit B** (Homeownership) and **Exhibit C** (Rental). Using a different covenant may be grounds to terminate the agreement by the City of Boulder. If amendment of the covenant template(s) is required to comply with the Participating Jurisdiction's local law, the Participating Jurisdiction and the City of Boulder agree to work in good faith to amend the template(s) for that Participating Jurisdiction. A Jurisdiction-specific template(s) shall be reviewed and approved by both the City of Boulder and that Participating Jurisdiction prior to implementation.

c. The Participating Jurisdiction agrees to abide by all applicable existing policies and procedures (as described in **Exhibit A**) related to Program compliance. Advising on future changes to policies and procedures will be the responsibility of the Policy Advisory Committee, as described in Section 4.d. below.

d. The Participating Jurisdiction will identify a point of contact to coordinate all activities related to the administration of the Program. In addition, the Participating Jurisdiction will appoint one member to provide an advisory role of Program activity in their community and along with members from other jurisdictions accepting similar services from the City of Boulder will be known as the Policy Advisory Committee. This Policy Advisory Committee will meet, at a minimum, twice annually to review data and recommend adjustments to the Program as needed.

5. **Funding**.

a. Boulder County American Rescue Plan Act (ARPA) funds of approximately $1,259,549 will be utilized by the City of Boulder for years one and two

of the Program to pay for staff, database modifications and licenses, and to create a revolving loan fund to be used for foreclosure prevention.

b. Starting in year three, or later if the ARPA funds are not fully expended, the City of Boulder will provide administrative services with financial support from the Participating Jurisdiction, expressly subject to Subsection 5.c., below. The Parties will agree to a funding mechanism through an amendment to this IGA (e.g., flat yearly fee, fee based on percentage of homes in the Program, or some combination of the two) to continue Program services. Failure to make the contribution will be grounds to terminate this IGA by the City of Boulder. Contributions will be due annually on December 31.

c. The Parties understand and acknowledge that this IGA is subject to Article X, § 20 of the Colorado Constitution ("TABOR"). The Parties do not intend to violate the terms and requirements of TABOR by the execution of this IGA. It is understood and agreed that this IGA does not create a multiple fiscal year direct or indirect debt or obligation within the meaning of TABOR and not withstanding anything in this IGA to the contrary, all payment obligations of the Parties are expressly dependent and conditioned upon the continuing availability of funds beyond the term of the Parties' current fiscal period ending upon the next succeeding December 31. Financial obligations of the Parties payable after the current fiscal year are contingent upon funds for that purpose being appropriated, budgeted, and otherwise made available in accordance with the rules, regulations, ordinances and resolutions of the Parties and applicable law. Any failure of a Party to annually to appropriate adequate monies to finance the obligations under this IGA will terminate this IGA at such time as such then-existing appropriations are to be depleted. Notice will be given promptly to the other Party of any failure to appropriate such adequate monies.

6. **Liability**. Each Party agrees to be responsible for its own actions and omissions, and those of its officers, agents and employees in the performance or failure to perform work under this IGA. By agreeing to this provision, the Parties do not waive or intend to waive the limitations on liability which are provided to the Parties under the Colorado Governmental Immunity Act, C.R.S. § 24-10-101, *et seq.*, as amended.

7. **Dispute Resolution**. Prior to terminating this IGA, the Parties will attempt in good faith to resolve any dispute or claim arising out of or in relation to this IGA through negotiations.

8. **No Third-Party Beneficiaries**. The enforcement of the terms and conditions of this IGA and all rights of action relating to such enforcement will be strictly reserved to the Parties, and nothing contained in this IGA will give or allow any claim or right of action whatsoever by any other or third person. It is the express intent of the Parties to this IGA that any person receiving services or benefits under this IGA will be deemed an incidental beneficiary only.

9. **Notices**. All notice provided under this IGA must be in writing and sent by First Class U.S. Mail, electronic mail, or hand-delivery to the addresses set forth below. For mailing,

notice periods will begin to run on the day after the postmarked date of mailing. For electronic mail or hand delivery, notice periods will begin to run on the date of delivery.

If to the City of Boulder:
Kurt Firnhaber
Director of Housing & Human Services
City of Boulder
P.O. Box 791
Boulder, CO 80302

If to the Town of Erie
Sarah Nurmela
Director of Planning and Development
Town of Erie
645 Holbrook St
PO Box 750
Erie, CO 80516

10. **Entire Agreement**. This IGA contains the entire agreement between the Parties. This IGA may be modified or extended only by written agreement signed by the Parties. If any provision of this IGA is deemed to be illegal, invalid, or otherwise unenforceable, such provision will be severed, and the balance of the IGA will continue in full force and effect.

11. **Governmental Immunity**. The Parties do not waive or intend to waive, the limitations on liability which are provided to the Parties under the Colorado Governmental Immunity Act, C.R.S. §§ 24-10-101, *et seq*. ("CGIA"). The provisions of C.R.S. § 29-5-108 will not apply to activities conducted pursuant to this IGA.

12. **Independent Contractor**. The relationship between the Parties is one of an independent contractor and not an employment relationship. Neither the City of Boulder nor any agent or employee of the City of Boulder shall be deemed to be an agent or employee of a Participating Jurisdiction. The City and its employees and agents are not entitled to unemployment insurance or workers compensation benefits through the Participating Jurisdiction and the Participating Jurisdiction shall not pay for or otherwise provide such coverage for the City of Boulder or any of its agents or employees.

13. **Choice of Law; Venue**. Colorado law, and rules and regulations issued pursuant thereto, shall be applied in the interpretation, execution, and enforcement of this IGA. Any provision included or incorporated herein by reference which conflicts with said laws, rules, and regulations shall be null and void. Any provision incorporated herein by reference which purports to negate this in whole or in part shall not be valid or enforceable or available in any action at law, whether by way of complaint, defense, or otherwise. Any provision rendered null and void by the operation of this provision shall not invalidate the remainder of this IGA, to the extent capable of execution. Venue for any legal action arising out of this IGA shall be in Boulder County, Colorado.

14. **Authority**. Each of the individuals whose signature appears below represents and warrants that he or she has full authority to execute this IGA on behalf of the Party on whose behalf he or she has affixed his or her signature to this IGA.

Wherefore, the Parties have entered to this IGA as of the Effective Date.

City of Boulder,
a Colorado home rule city

_____
Nuria Rivera-Vandermyde,
City Manager

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney's Office

Town of Erie
A Colorado home rule municipality

~~Malcolm Fleming,~~ Justin Brooks
~~Town Manager~~ Mayor

Attest:

Debbie Stamp, Town Clerk

Exhibit A – Scope of Services

Purpose

The purpose of the Program is to centralize homeownership and rental compliance program services through the Boulder County Regional Housing Partnership (BCRHP). The Program will achieve several goals:

- Create policy alignment
- Use resources efficiently
- Encourage regional collaboration
- Apply consistent best practices and processes
- Support newly adopted affordable housing programs
- Provide streamlined access to multiple programs for residents
- Ensure racial equity is centered as a primary objective of the collaborative work through encouraging prioritization of first meeting the affordable housing needs of the most underserved in our community.

The Program is a transformational idea in that it has been a longstanding goal of the BCRHP to create regional services in alignment with the 2017 Regional Housing Strategy and can support the program infrastructure needed for more municipalities within the BCRHP to implement affordable housing programs.

Throughout the Program, equity and accessibility will be addressed through the adopted policies and procedures that dictate the practices. Current local affordable housing programs have shown to dramatically increase access to housing to households with racial diversity.

The Need & Lead Roles

Currently, there are several municipalities within the BCRHP that do not have dedicated resources or program infrastructure for homeownership and/or rental compliance programs. Boulder County Housing Authority (BCHA), the City of Longmont, and the City of Boulder manage most of the compliance for homes which they have developed or funded. However, as other municipalities continue to grow their affordable housing programs, there will be a growing need to maintain high-quality, specialized expertise in compliance. The BCRHP believes that is possible with a regionalized approach, administered by City of Boulder staff.

Similarly for homeownership programs, some municipalities in the BCRHP manage for-sale units on a case-by-case basis without a formalized team, which has been appropriate in the past given the small number of affordable for-sale units in the region. As the BCRHP continues to grow for-sale housing stock, there will be a similar need to administer a homeownership program at the regional level to create efficiencies in marketing units, qualifying buyers, facilitating sales / re-sales, preventing foreclosure, and implement industry best practices. The City of Longmont and City of Boulder manage their own homeownership programs.

Under the BCRHP, the City of Boulder Department of Housing and Human Services will take responsibility for Program administration. For the homeownership and rental program this responsibility will commence when an affordable home is brought into the program or when the program designated covenant is attached to an existing home. Specifically, the regional homeownership program will not participate in the management or sale of homes with covenants different from the regional homeownership covenant (i.e., existing affordable homeownership units).

Resources & Funding

The Program presents a two-year funding proposal to startup the program and establish a one-time revolving fund for region-wide foreclosure prevention:

	Budget
Rental & ownership compliance, implementation, administration and strategic leadership staff	$584,243
Database licenses & support	$13,098
Foreclosure prevention (revolving fund)	$662,000
Total 2-Year Budget	**$1,259,341**

This funding will address all resources needed to implement the Program for two years. Thereafter, a permanent funding source from each of the municipalities or County will create a sustainable approach for the Services. Similar programs today work regionally and are paid for between jurisdictions. These programs include: the County's Housing Help Line, Longmont's housing rehab program, and Boulder's Mediation and Resolution Program. Participating jurisdictions contribute a share of the costs to the administering jurisdiction.

Program Policy Setting

The Program will incorporate a committee structure to advise on policy setting for the Program:

	Policy Setting Committee	**Policy Exceptions Committee** (homeownership)
Committee Participation (5-year term)	› One member from each participating jurisdiction › Regional Homeownership Program Manager › Regional Compliance Program Manager	› External volunteer participation › Regional Homeownership Program Manager
Committee Structure	› Purpose is to provide jurisdiction's with an advisory role of program activity in their community. › Twice annual meeting to review data; recommend adjustments to program as needed	› Considers unique and individual (case-by-case) circumstances that don't meet current procedures › Makes a recommendation to the jurisdiction's liaison, who makes final decision
	Example: The program mortgage policy needs to be updated to reflect the changing lending environment.	**Example:** A new home-buyer would like to make an investment 1-year ahead of the policy allowance, due to their personal and unique circumstance of moving into their new home.

The Policy Setting Committee will be responsible for guiding the program alongside the BCRHP and the City of Boulder as the administrative jurisdiction. Success will be measured by how closely the established goals are met.

The Homeownership Policy Exceptions Committee will be administered by the Program and each participating jurisdiction will be collectively responsible for recruiting members to ensure broad representation.

Policies and Procedures (Homeownership Program)
Affordable homes in the programs will be marketed and sold to qualified buyers according to the existing policies and procedures developed by the City of Boulder and the Participating Jurisdiction. These policies and procedures are living documents that will evolve to meet the needs of the Homeownership Program and will continue to evolve with the involvement of the participating jurisdictions through the Policy Committee.

One of the first tasks to launch the Program will be to modify current written materials (e.g., policies, procedures, marketing, website, etc.) from a City of Boulder focus to a regional approach to administration. Homes entering the Program from other jurisdictions will be administered to the benefit of that jurisdiction's work force per the current Program policies and procedures.

Policies
The following list of existing **policies** will be used as a basis to administer the Program specific to homeownership:

1. Eligibility Requirements
    a. Eligibility Requirements for Program Certification
    b. Applications Missing Documents – Applies to New Applications and Recertifications
    c. Income Limit Interpretation
    d. Income Change Policy
    e. Commission Based Income Policy
    f. Asset Limits
    g. Asset Decrease Policy
    h. Trusts
    i. Third Party Employment Verification
    j. Multiple Benefit
    k. Minimum and Maximum Number of Bedrooms
    l. Waiving Household Number + 1 Bedroom
    m. Homebuyer Education Class
    n. Gift Limitations
    o. Buyer's $2,000 Minimum Cash Contribution
    p. Ineligibility Policy
2. Selection Process Policies
    a. Work and One-Year Certification Preferences
    b. Preferences for 3 or More Bedroom Units
    c. Occupancy Preferences

   d. Accessible Unit/Special Feature Unit Housing Policy
   e. Displaced Renters and Homebuyer Preferences
   f. Selection Entry Requirements
   g. Applicant under contract may not enter fair selection process
   h. 24 Hours to Make an Offer After the Fair Selection
3. Homeowner Policies
   a. Capital Improvement/Capital Update Credit and Maintenance Policy
   b. Pre-purchase Upgrades
   c. Insurance Requirements for Town homes
   d. Homeownership Rental Policy
   e. Homeownership Rental Policy Regarding Resales
   f. Homeownership Rental Exception Policy
4. Resale & Developers
   a. AMI % Change for Resale Formula
   b. Home Income Limit Change
   c. Homeowner Resale Calculation Policy
   d. Resale Options Policy
   e. Sales Commissions
   f. Excessive Damage Assessment/Inspection Standard
   g. Subsidizing Resale Units
   h. Seller Concessions
   i. Developer Contracts
5. Mortgage Policy
6. Miscellaneous Policies
   a. Exception Requests
   b. Not Allowing Permanently Affordable Homes to go to Foreclosure
   c. Working with Developmentally-Challenged Applicants

Procedures
The following is a list of existing **procedures** that will form the basis to administer the Program specific to homeownership:

1. Applications
   a. Application Processing
   b. Application Check Processing/Deposits
   c. Application Waitlist Management
   d. Applicant Personally Identifiable Information
2. Sales
   a. Marketing A Home
   b. Holding a Fair Selection Process
   c. Sales - Post Selection Process to Closing
   d. Pre-Purchase Upgrades – New Construction
3. Post Purchase
   a. Capital Improvements
   b. Refinance
4. Other

a. Exception Request
b. Annual Income Number Update
c. Loan Repayment
d. Foreclosure and Purchase
e. Personally Identifiable Information (PII)

Foreclosure Prevention
A foreclosure prevention fund for the Program is an important tool to ensure homes remain affordable in perpetuity. The Program records a $10 Deed of Trust on all affordable homes. This ensures that the Homeownership Program Manager is notified in the event of foreclosure proceedings or an attempted sale outside of the Program. The Homeownership Program Manager will contact the owner to facilitate the sale of the home to an eligible buyer or in rare circumstances the Program will purchase the home prior to or after foreclosure. If the Program purchases a home, it will make all the necessary repairs and sell the home to an eligible buyer and the proceeds are returned to the fund. The $1.2M revolving fund ensures that sufficient resources are available in the event that 3-4 homes are required to be purchased at the same time to ensure the integrity of the Program. This is a revolving fund, so funds used to purchase an affordable home are returned at the time of sale. This revolving loan fund will also be used to cover any costs associated with the purchase (holding, repair, fees, etc.) in lieu of raising the price of the home to ensure deeper and longer affordability. However, in the majority of cases the Program will be able to work with the troubled homeowner to facilitate a sale to another eligible buyer and avoid the expense of foreclosure and the subsequent impact on the homeowner's credit score. The foreclosure prevention fund is only available for homes in Boulder County due restrictions in funding (i.e., ARPA).

Covenant Enforcement
Post-purchase, the Program continues to monitor to confirm owners comply with the agreements contained in the covenant. Renting an ownership unit outside of the parameters in the covenant is the primary violation. As a result, occupancy compliance work involves investigating potential rental violations, working with owners to get them back into compliance and, in some cases, commencing legal action. Program staff will work to regularly educate owners about occupancy requirements to prevent violations. Unfortunately, there are still issues and the Program is diligent about investigating issues. There will be instances where Program staff will need to partner with the local jurisdictions' staff and their legal counsel in the pursuit of resolution (e.g., confirm violation of owner occupancy through a home visit, preparing an existing document related to a purchase or foreclosure redemption, levy fines, etc.).

Policies and Procedures (Rental Program)
Affordable rentals in the Program will be marketed and available to eligible renters according to policies and procedures developed by the City of Boulder. The City of Boulder's Rental Compliance Program has been developed to not only ensure long-term compliance and preserve permanent affordability, but to also ensure that all publicly supported rental housing properties serve the most vulnerable residents. These policies and procedures are living documents that evolve to meet the needs of the Program and will continue to evolve with the involvement of the participating jurisdictions through the Policy Committee.

Like the Homeownership Policies and Procedures (described above), one of the first tasks to launch the rental Program will be to modify current written materials (e.g., policies, procedures, marketing, website, etc.) from a City of Boulder focus to a regional approach. Rental units entering the Program from other jurisdictions will be administered to the benefit of that jurisdiction's work force and residents per the modified Program policies and procedures.

The following list of **policies and procedures** will be used as a basis to administer the Program specific to rentals:

1. Roles and Responsibilities
    a. Rental Compliance Program
    b. Housing Sr Compliance Manager
    c. Housing Sr Program Manager
    d. Housing Project Manager
    e. Compliance and Monitoring Administrator
    f. Owner
    g. Property Manager/Property Management Company
    h. Changes in Ownership or Management of Property
2. Regulatory Requirements
    a. Rental Housing Licensing *(City of Boulder specific program)*
    b. Period of Affordability
    c. Unit Mix
    d. Fair Housing and Equal Opportunity
    e. Nondiscrimination in Housing *(City of Boulder specific program)*
    f. City of Boulder Human Rights Ordinance *(City of Boulder specific program)*
    g. ADA, Section 504 & Fair Housing Accessibility
    h. Section 504 & Disabilities Act (ADA)
    i. Section 405 & Disability Rights in Housing
    j. Housing for Older Persons
    k. Affirmative Marketing
    l. Limited English Proficiency
    m. Language Access Plan
    n. Marketing Requirements
    o. Screening & Selection Applicants
    p. Tenant Selection Plan
    q. Preferences for Tenants with Special Needs
    r. Notice to Applicants
    s. Waiting Lists Requirements
    t. Interest List
    u. Declaration of Citizenship
    v. Race & Ethnicity
3. Eligibility Requirements
    a. Occupancy Limits
    b. Authorized Guests & Visitors
    c. Restriction on Short-Term Rental & Subletting
    d. Electronic Signatures & Document Transmission

   e. Student Policy
   f. Definition of Income
   g. Determining Income Eligibility
   h. Income Calculation
   i. Method of Income & Asset Verification
   j. Acceptable Forms of Income Verification
   k. Annual Recertification
   l. Excluded Sources of Income
   m. Effective Terms of Certification
   n. Assets Limits
   o. Increase in Housing Income
   p. Changes in Household Composition
   q. Unit Transfer
   r. Unit Transfer with Change in Household Composition
   s. Determining Rents
   t. City Approval of Rent Adjustments
   u. Utility Allowance
4. Tenant Rights & Protections
   a. No Eviction without Representation
   b. Minimum Lease Requirements
   c. Prohibited Lease Terms
   d. Required Lease Addendums
   e. Violence Against Women Act
   f. Termination of Tenancy
   g. Non-Renewal of Lease
   h. Charges & Fees
   i. Option Fees
   j. Non-Optional/Mandatory Fees
   k. Guidelines for Allowable Charges & Fees
   l. Prohibited Fees
   m. Conflict of Interest
   n. Dispute Resolution
   o. Mediation Services
5. Property Standards
   a. Minimum Property Standards
   b. Lead Based Paint Requirements
   c. Annual Inspections
6. Records and Reporting Requirements
   a. Maintaining Tenant Records
   b. Sample Tenant File Forms
   c. Record Retention
   d. Access to Records
   e. Reporting Requirements
7. Compliance Monitoring
   a. Monitoring Overview
   b. Monitoring Plan

c. Types of Monitoring
d. Site Review & Remote Monitoring Process
e. Technical Assistance
f. Monitoring Long-Term Viability
g. Non-Compliance
h. Term of Enforcement

Covenant Enforcement
Within 12 months of lease-up, the Program will monitor affordable rental properties to confirm owners/managers comply with the agreements contained in the covenant and Rental Compliance Manual. After initial lease-up, each property will be monitored every three years. Program staff will work to regularly educate owners/managers about rental compliance requirements to prevent issues of non-compliance. When issues of non-compliance arise, Program staff will need to partner with the local jurisdictions' staff and their legal counsel in the pursuit of resolution.

Data Requirements
A regional approach to affordable housing requires a regional database to facilitate application processing, facilitate transactions, track the inventory, monitor programs, and evaluate progress over time. The database is also integral to providing good client services to program participants and ensure ongoing compliance with local and federal rules associated with affordable housing funds. The City of Boulder recently converted an old Access database (HAL) to Salesforce (Housing Dataverse) with greater capabilities. The budget of $13,098 estimates the time required to hire a consultant to modify Salesforce to include the capabilities of keeping track of affordable housing units outside of the City of Boulder. It also includes the cost of licenses for the staff required to administer the Program for participating jurisdictions.

The City of Boulder's Affordable Housing Program has a history of better serving Black, Indigenous, and People of Color (BIPOC) than the broader housing market. Where possible, the work performed under this IGA should be informed through the use of racialized data and metrics in order to help ensure the outcomes of the programs and supports provided across the region are centered in racial equity.

Exhibit B – Homeownership Affordable Covenant Summary

All Permanently Affordable ownership homes are sold subject to a covenant that ensure the home remains perpetually affordable into the future. The buyer must accept all terms of the covenant to be eligible to purchase the home.

Covenant Key Points

- The maximum income and assets of a new buyer will be established in advance of sale or re-sale, and the home may not be sold to a buyer that exceeds the maximum income and asset limit.
- The home has a Maximum Resale Price Limit that includes limited appreciation and allows for specific capital improvements.
- Buyers are required to maintain their affordable home in a manner that protects the health, safety, and livability for future homeowners.
- Eligible capital improvements for which a homeowner can receive credit are limited in amount and type and must be pre-approved by the program to receive credit.
- The ability to refinance is limited to 90-93% of the Maximum Resale Price Limit. The program must be contacted prior to arranging refinancing with a lender to ensure this limit is not exceeded.
- The home must be occupied by the owner as the owner's principal place of residence unless the program has approved a rental arrangement.
- The home cannot be rented in its entirety during the first five years of ownership.
- After five years of ownership, the home may be rented for one year out of every seven. The program needs to be contacted prior to renting for approval.
- A long-term rental of only one room in the home may be permitted after the first year of ownership. Licensing regulations for each jurisdiction must be followed.

There are instances where the Program will require an Interim Covenant in exchange for funding or to meet a regulatory requirement. Interim covenants ensure affordability through a project design and development phase when the exact details of the project are unknown. Once a certificate of occupancy is issued for a home by a local jurisdiction, the interim covenant is replaced with a permanent covenant specific to that home.

Exhibit C– Rental Affordable Covenant Summary

All Permanently Affordable rental units are subject to a covenant that ensures the rental property/units remain perpetually affordable into the future. The Owner must accept all terms of the covenant and Rental Compliance Manual.

Rental Covenant Key Points

- Maximum Income: The maximum income limits at initial occupancy determine household income eligibility. Household income after initial occupancy may increase up to 84% AMI.
- Over-Income: Households that have an income at or above 84% are considered over income and therefore no longer eligible to occupy the affordable unit.
- Maximum Assets: The Asset Policy imposes a 55,000 liquid asset limit. Seniors and persons with disabilities are exempt from the liquid asset limit. The policy also imposes a restriction on ownership interest in residential property in which an applicant can legally reside.
- Maximum Rent & Rent Increases: Maximum rent is based on the Area Median Income outlined in the Covenant and the number of bedrooms. Rents can only be increased once per year up to the maximum rent published.
- Capital Reserves: The Owner must contribute a minimum amount of funds annually towards capital replacement reserve.
- Property Standards: Buyers are required to maintain their affordable home in a manner that protects the health, safety, and livability for future homeowners.
- Reporting Requirements: The Owner/Manager must submit Quarterly and Annual Reports to the City as outlined in the Rental Compliance Manual
- Record & Retention Requirements: The Owner/Manager must have complete records and meet the retention requirements as outlined in the Rental Compliance Manual.
- Tenant Selection Plan: The Owner/Manager must develop a Tenant Selection Plan which outlines the selection criteria. The Plan must be in compliance with the City's Tenant Selection Policies.
- Waiting List Requirements: The Owner/Manager must create and maintain a wait list.
- Lease Requirements & Prohibited Lease Terms: Leases between the Owner and residents of the specified permanently affordable units must be for not less than one year unless mutually agreed upon by the Owner and residents. The lease must not contain any of the prohibited lease terms as outlined in the Rental Compliance Manual.
- Termination of Tenancy: The Owner may not terminate the tenancy or refuse to renew the lease of a tenant of the Property except for serious or repeated violation of the terms and conditions of the lease; for violation of applicable federal, state or local law; or for other good cause as determined by the Owner and City of Boulder policies. Any termination of tenancy or refusal to renew must be preceded by not less than 30 days by service upon the tenant of a written notice from the Owner specifying the grounds for the action.

There are also instances where the Program will require an Interim Covenant in exchange for funding or to meet a regulatory requirement. Interim covenants ensure affordability through a project design and development phase when the exact details of the project are unknown. Once a certificate of occupancy is issued for an affordable rental property by a local jurisdiction, the interim covenant is replaced with a permanent covenant specific to that affordable property.

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CITY OF LAFAYETTE
RESOLUTION NO. 2024-13

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LAFAYETTE, COLORADO, APPROVING AN INTERGOVERNMENTAL AGREEMENT WITH THE CITY OF BOULDER ESTABLISHING REGIONAL AFFORDABLE HOMEOWNERSHIP AND RENTAL COMPLIANCE PROGRAM SERVICES

WHEREAS, Section 18(2)(a) of Article XIV of the Colorado Constitution, and Part 2, Article 1, Title 29, C.R.S., encourage and authorize the use of intergovernmental agreements for the efficient and economical provision of governmental services; and

WHEREAS, Boulder County and areas of Weld County are in a housing crisis resulting in home prices and rents that are unaffordable and the affordable housing challenge is regional and is shared by each jurisdiction in Boulder County, and a few in Weld County; and

WHEREAS, regional cooperation and action are needed to produce equitable solutions to the challenge to produce an adequate amount of affordable housing and distribute it across the area; and

WHEREAS, in 2017, Boulder County communities, including the City of Lafayette, agreed to a goal of ensuring a minimum of 12% of the housing inventory will be permanently affordable to low, moderate, and middle-income households by 2035; and

WHEREAS, Boulder County communities created the Boulder County Regional Housing Partnership ("BCRHP") to address regional housing challenges and through the BCRHP agreed to establish a centralized compliance program for rental and homeownership services and dedicate the resources needed to address the housing needs of the community; and

WHEREAS, for over two decades, the City of Boulder has operated a Rental and Homeownership Program ("Rental Compliance Program") that includes administrative and compliance processes, including resources to market affordable homes and process applications, verify eligibility of applicants, and provide monitoring and record-keeping; and

WHEREAS, the City of Boulder's Rental Compliance Program also focuses on training, technical assistance, monitoring, and record keeping, and does not act as a property manager; and

WHEREAS, the City of Lafayette desires to collaborate with the City of Boulder and other communities in the region to collectively achieve housing access for systematically marginalized groups and individuals, including Black, Indigenous, and People of Color (collectively "BIPOC") through activities that may include collecting racialized housing data, leading community engagement activities, including those targeted and co-created with BIPOC communities, and ensuring elected officials, when making policy decisions, are aware of and considering racial equity impacts; and

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WHEREAS, the City Council finds that it is in the best interest of the City and the public health, safety, and welfare of the community to approve the attached Intergovernmental Agreement with the City of Boulder to establish regional affordable homeownership and rental compliance program services.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Lafayette, Colorado, as follows:

1. The Intergovernmental Agreement Establishing Regional Affordable Homeownership and Rental Compliance Program Services between the City of Boulder and the City of Lafayette is hereby approved in substantially the form attached hereto. The Mayor is authorized to execute the Intergovernmental Agreement on behalf of the City.

RESOLVED AND PASSED THIS 19th DAY OF MARCH, 2024.

CITY OF LAFAYETTE, COLORADO

DocuSigned by:
JD Mangat
297EC1E1527C47B...
Jaideep Mangat, Mayor

ATTEST:

DocuSigned by:
Lynnette Beck
17A863D74AAC8417...
Lynnette Beck, City Clerk

APPROVED AS TO FORM:

DocuSigned by:
Mary Lynn Macsalka
4B0660C1EFDD4D2...
Mary Lynn Macsalka, City Attorney

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Intergovernmental Agreement Establishing Regional Affordable Homeownership and Rental Compliance Program Services

This Intergovernmental Agreement ("IGA") establishing a regional affordable homeownership and rental compliance program is entered into by and among the City of Lafayette, a Colorado home rule municipality, ("Participating Jurisdiction") the City of Boulder, a Colorado home rule city, ("City of Boulder"), (each a "Party" and together the "Parties"), effective this _____ day of _____, 2024 (the "Effective Date").

RECITALS

A. The Parties are authorized to enter into this IGA pursuant to C.R.S. § 29-1-203; and

B. Boulder County and areas of Weld County are in a housing crisis resulting in home prices and rents that are unaffordable; and

C. The housing crisis is, in part, a manifestation of racial inequity, following similar national trends on racial disparities for homeownership, rental opportunities, affordability, and adequate housing; and

D. The affordable housing challenge is regional and is shared by each jurisdiction in Boulder County, and a few in Weld County; and

E. Regional cooperation and action are needed to produce equitable solutions to the challenge to produce an adequate amount of affordable housing and distribute it across the area; and

F. Boulder County communities and residents are committed to and have made strong investments in affordable housing; and

G. In 2017, Boulder County communities agreed to a goal of ensuring a minimum of 12% of the housing inventory will be permanently affordable to low, moderate, and middle-income households by 2035; and

H. Boulder County communities created the Boulder County Regional Housing Partnership ("BCRHP") to address regional housing challenges and through the BCRHP agreed to establish a centralized compliance program for rental and homeownership services and dedicate the resources needed to address the housing needs of the community; and

I. For over two decades, the City of Boulder has operated a Rental and Homeownership Program ("Rental Compliance Program") that includes administrative and compliance processes. The Rental Compliance Program includes resources to market affordable homes and process applications, verify eligibility of applicants, and provide monitoring and

record-keeping. The Rental Compliance Program focuses on training, technical assistance, monitoring, record keeping, and does not act as a property manager; and

J. Through this IGA, the Parties are making a clear commitment to racial equity as a central tenet in this collaborative regional work. Shared regional housing challenges are rooted in historical practices, processes, and policies that have systematically racialized space by limiting access for Black, Indigenous, and People of Color (collectively "BIPOC") to safe, stable, and affordable housing in the communities in which they choose to live. Interrupting the history of racial segregation is an intended consequence of this collaborative regional work; and

K. While the Participating Jurisdiction is individually responsible for centering racial equity in its local affordable housing rental and homeownership programs, the Parties will strive to collectively achieve housing access for BIPOC communities, and foster support and accountability in this process. Collaborative activities may include collecting racialized housing data, leading community engagement activities, including those targeted and co-created with BIPOC communities, and ensuring elected officials, when making policy decisions, are aware of and considering racial equity impacts; and

L. The interests of the public are best served by the Parties entering into this IGA.

NOW THEREFORE, in consideration of the Recitals, terms, conditions, and covenants included in this IGA, the Parties agree as follows:

COVENANTS

1. **Purpose**. The purpose of this IGA is to create the Regional Affordable Homeownership and Rental Compliance Program (the "Program") and define the structure of the Program and govern the financial contributions from the Parties in support of this provision of services.

2. **Term**. The term of this IGA shall commence as of the Effective Date. The IGA shall continue for a term of seven years unless a Party elects to terminate this IGA at the end of any calendar year, after giving 180 days' written notice.

3. **Services Provided by the City of Boulder**.

   The City of Boulder will provide the following administrative services ("Services") while supporting Participating Jurisdiction independence and autonomy:

   a. Homeownership Services. The City of Boulder will provide administrative services to market homes and process applications, verify eligibility of applicants, prepare legal documents to add affordable restrictions to homes, and provide record-keeping;

   b. Rental Services. The City of Boulder will provide administrative services to the Participating Jurisdiction and property management companies within the

jurisdiction which include providing training, technical assistance, monitoring, and direction of rental properties to ensure owners/managers are adequately marketing their properties, processing applications, properly determining eligibility, and provide record-keeping to satisfy HUD requirements;

c. The City of Boulder will provide a main point of contact for each Service: a Regional Compliance Program Manager and a Regional Homeownership Program Manager; and

d. Additional details of the Services provided are described in **Exhibit A**.

4. **Expectations to Receive Services Provided**.

a. The Participating Jurisdiction will abide by the current policies and procedures of the Program as established and amended by the City of Boulder, in cooperation with the Participating Jurisdiction, as described in **Exhibit A**.

b. The Participating Jurisdiction will use the current City of Boulder restricted covenants as template language to ensure consistency of Program administration. The current covenant templates are summarized in **Exhibit B** (Homeownership) and **Exhibit C** (Rental). Using a different covenant may be grounds to terminate the agreement by the City of Boulder. If amendment of the covenant template(s) is required to comply with the Participating Jurisdiction's local law, the Participating Jurisdiction and the City of Boulder agree to work in good faith to amend the template(s) for that Participating Jurisdiction. A Jurisdiction-specific template(s) shall be reviewed and approved by both the City of Boulder and that Participating Jurisdiction prior to implementation.

c. The Participating Jurisdiction agrees to abide by all applicable existing policies and procedures (as described in **Exhibit A**) related to Program compliance. Advising on future changes to policies and procedures will be the responsibility of the Policy Advisory Committee, as described in Section 4.d. below.

d. The Participating Jurisdiction will identify a point of contact to coordinate all activities related to the administration of the Program. In addition, the Participating Jurisdiction will appoint one member to provide an advisory role of Program activity in their community and along with members from other jurisdictions accepting similar services from the City of Boulder will be known as the Policy Advisory Committee. This Policy Advisory Committee will meet, at a minimum, twice annually to review data and recommend adjustments to the Program as needed.

5. **Funding**.

a. Boulder County American Rescue Plan Act (ARPA) funds of approximately $1,259,549 will be utilized by the City of Boulder for years one and two

of the Program to pay for staff, database modifications and licenses, and to create a revolving loan fund to be used for foreclosure prevention.

b. Starting in year three, or later if the ARPA funds are not fully expended, the City of Boulder will provide administrative services with financial support from the Participating Jurisdiction, expressly subject to Subsection 5.c., below. The Parties will agree to a funding mechanism through an amendment to this IGA (e.g., flat yearly fee, fee based on percentage of homes in the Program, or some combination of the two) to continue Program services. Failure to make the contribution will be grounds to terminate this IGA by the City of Boulder. Contributions will be due annually on December 31.

c. The Parties understand and acknowledge that this IGA is subject to Article X, § 20 of the Colorado Constitution ("TABOR"). The Parties do not intend to violate the terms and requirements of TABOR by the execution of this IGA. It is understood and agreed that this IGA does not create a multiple fiscal year direct or indirect debt or obligation within the meaning of TABOR and not withstanding anything in this IGA to the contrary, all payment obligations of the Parties are expressly dependent and conditioned upon the continuing availability of funds beyond the term of the Parties' current fiscal period ending upon the next succeeding December 31. Financial obligations of the Parties payable after the current fiscal year are contingent upon funds for that purpose being appropriated, budgeted, and otherwise made available in accordance with the rules, regulations, ordinances and resolutions of the Parties and applicable law. Any failure of a Party to annually to appropriate adequate monies to finance the obligations under this IGA will terminate this IGA at such time as such then-existing appropriations are to be depleted. Notice will be given promptly to the other Party of any failure to appropriate such adequate monies.

6. **Liability**. Each Party agrees to be responsible for its own actions and omissions, and those of its officers, agents and employees in the performance or failure to perform work under this IGA. By agreeing to this provision, the Parties do not waive or intend to waive the limitations on liability which are provided to the Parties under the Colorado Governmental Immunity Act, C.R.S. § 24-10-101, *et seq*., as amended.

7. **Dispute Resolution**. Prior to terminating this IGA, the Parties will attempt in good faith to resolve any dispute or claim arising out of or in relation to this IGA through negotiations.

8. **No Third-Party Beneficiaries**. The enforcement of the terms and conditions of this IGA and all rights of action relating to such enforcement will be strictly reserved to the Parties, and nothing contained in this IGA will give or allow any claim or right of action whatsoever by any other or third person. It is the express intent of the Parties to this IGA that any person receiving services or benefits under this IGA will be deemed an incidental beneficiary only.

9. **Notices**. All notice provided under this IGA must be in writing and sent by First Class U.S. Mail, electronic mail, or hand-delivery to the addresses set forth below. For mailing,

notice periods will begin to run on the day after the postmarked date of mailing. For electronic mail or hand delivery, notice periods will begin to run on the date of delivery.

If to the City of Boulder:

Kurt Firnhaber
Director of Housing & Human Services
City of Boulder
P.O. Box 791
Boulder, CO 80302

If to the Participating Jurisdiction:

Jeff Brasel
Director of Planning & Building
City of Lafayette
1290 S. Public Road
Lafayette, CO 80026

10. **Entire Agreement**. This IGA contains the entire agreement between the Parties. This IGA may be modified or extended only by written agreement signed by the Parties. If any provision of this IGA is deemed to be illegal, invalid, or otherwise unenforceable, such provision will be severed, and the balance of the IGA will continue in full force and effect.

11. **Governmental Immunity**. The Parties do not waive or intend to waive, the limitations on liability which are provided to the Parties under the Colorado Governmental Immunity Act, C.R.S. §§ 24-10-101, *et seq*. ("CGIA"). The provisions of C.R.S. § 29-5-108 will not apply to activities conducted pursuant to this IGA.

12. **Independent Contractor**. The relationship between the Parties is one of an independent contractor and not an employment relationship. Neither the City of Boulder nor any agent or employee of the City of Boulder shall be deemed to be an agent or employee of a Participating Jurisdiction. The City and its employees and agents are not entitled to unemployment insurance or workers compensation benefits through the Participating Jurisdiction and the Participating Jurisdiction shall not pay for or otherwise provide such coverage for the City of Boulder or any of its agents or employees.

13. **Choice of Law; Venue**. Colorado law, and rules and regulations issued pursuant thereto, shall be applied in the interpretation, execution, and enforcement of this IGA. Any provision included or incorporated herein by reference which conflicts with said laws, rules, and regulations shall be null and void. Any provision incorporated herein by reference which purports to negate this in whole or in part shall not be valid or enforceable or available in any action at law, whether by way of complaint, defense, or otherwise. Any provision rendered null and void by the operation of this provision shall not invalidate the

remainder of this IGA, to the extent capable of execution. Venue for any legal action arising out of this IGA shall be in Boulder County, Colorado.

14. **Authority**. Each of the individuals whose signature appears below represents and warrants that he or she has full authority to execute this IGA on behalf of the Party on whose behalf he or she has affixed his or her signature to this IGA.

WHEREFORE, the Parties have entered to this IGA as of the Effective Date.

City of Boulder,
a Colorado home rule city

_____
Nuria Rivera-Vandermyde, City Manager

ATTEST:

_____
Elesha Johnson, City Clerk

APPROVED AS TO FORM:

_____
City Attorney's Office

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City of Lafayette,
a Colorado home rule municipality

DocuSigned by:
Kady Doelling
45F306E672C5432...
Kady Doelling, City Administrator

ATTEST:

DocuSigned by:
Lynnette Beck
7A853D74AAC8447...
Lynnette Beck, City Clerk

APPROVED AS TO FORM:

DocuSigned by:
Mary Lynn Macsalka
B0660CCFEDD54DA...
City Attorney's Office

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Exhibit A – Scope of Services

Purpose

The purpose of the Program is to centralize homeownership and rental compliance program services through the Boulder County Regional Housing Partnership (BCRHP). The Program will achieve several goals:

- Create policy alignment
- Use resources efficiently
- Encourage regional collaboration
- Apply consistent best practices and processes
- Support newly adopted affordable housing programs
- Provide streamlined access to multiple programs for residents
- Ensure racial equity is centered as a primary objective of the collaborative work through encouraging prioritization of first meeting the affordable housing needs of the most underserved in our community.

The Program is a transformational idea in that it has been a longstanding goal of the BCRHP to create regional services in alignment with the 2017 Regional Housing Strategy and can support the program infrastructure needed for more municipalities within the BCRHP to implement affordable housing programs.

Throughout the Program, equity and accessibility will be addressed through the adopted policies and procedures that dictate the practices. Current local affordable housing programs have shown to dramatically increase access to housing to households with racial diversity.

The Need & Lead Roles

Currently, there are several municipalities within the BCRHP that do not have dedicated resources or program infrastructure for homeownership and/or rental compliance programs. Boulder County Housing Authority (BCHA), the City of Longmont, and the City of Boulder manage most of the compliance for homes which they have developed or funded. However, as other municipalities continue to grow their affordable housing programs, there will be a growing need to maintain high-quality, specialized expertise in compliance. The BCRHP believes that is possible with a regionalized approach, administered by City of Boulder staff.

Similarly for homeownership programs, some municipalities in the BCRHP manage for-sale units on a case-by-case basis without a formalized team, which has been appropriate in the past given the small number of affordable for-sale units in the region. As the BCRHP continues to grow for-sale housing stock, there will be a similar need to administer a homeownership program at the regional level to create efficiencies in marketing units, qualifying buyers, facilitating sales / re-sales, preventing foreclosure, and implement industry best practices. The City of Longmont and City of Boulder manage their own homeownership programs.

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Under the BCRHP, the City of Boulder Department of Housing and Human Services will take responsibility for Program administration. For the homeownership and rental program this responsibility will commence when an affordable home is brought into the program or when the program designated covenant is attached to an existing home. Specifically, the regional homeownership program will not participate in the management or sale of homes with covenants different from the regional homeownership covenant (i.e., existing affordable homeownership units).

Resources & Funding

The Program presents a two-year funding proposal to startup the program and establish a one-time revolving fund for region-wide foreclosure prevention:

	Budget
Rental & ownership compliance, implementation, administration and strategic leadership staff	$584,243
Database licenses & support	$13,098
Foreclosure prevention (revolving fund)	$662,000
Total 2-Year Budget	**$1,259,341**

This funding will address all resources needed to implement the Program for two years. Thereafter, a permanent funding source from each of the municipalities or County will create a sustainable approach for the Services. Similar programs today work regionally and are paid for between jurisdictions. These programs include: the County's Housing Help Line, Longmont's housing rehab program, and Boulder's Mediation and Resolution Program. Participating jurisdictions contribute a share of the costs to the administering jurisdiction.

Program Policy Setting

The Program will incorporate a committee structure to advise on policy setting for the Program:

	Policy Setting Committee	**Policy <u>Exceptions</u> Committee** (homeownership)
Committee Participation (5-year term)	› One member from each participating jurisdiction › Regional Homeownership Program Manager › Regional Compliance Program Manager	› External volunteer participation › Regional Homeownership Program Manager
Committee Structure	› Purpose is to provide jurisdiction's with an advisory role of program activity in their community. › Twice annual meeting to review data; recommend adjustments to program as needed	› Considers unique and individual (case-by-case) circumstances that don't meet current procedures › Makes a recommendation to the jurisdiction's liaison, who makes final decision
	Example: The program mortgage policy needs to be updated to reflect the changing lending environment.	**Example:** A new home-buyer would like to make an investment 1-year ahead of the policy allowance, due to their personal and unique circumstance of moving into their new home.

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The Policy Setting Committee will be responsible for guiding the program alongside the BCRHP and the City of Boulder as the administrative jurisdiction. Success will be measured by how closely the established goals are met.

The Homeownership Policy Exceptions Committee will be administered by the Program and each participating jurisdiction will be collectively responsible for recruiting members to ensure broad representation.

Policies and Procedures (Homeownership Program)
Affordable homes in the programs will be marketed and sold to qualified buyers according to the existing policies and procedures developed by the City of Boulder and the Participating Jurisdiction. These policies and procedures are living documents that will evolve to meet the needs of the Homeownership Program and will continue to evolve with the involvement of the participating jurisdictions through the Policy Committee.

One of the first tasks to launch the Program will be to modify current written materials (e.g., policies, procedures, marketing, website, etc.) from a City of Boulder focus to a regional approach to administration. Homes entering the Program from other jurisdictions will be administered to the benefit of that jurisdiction's work force per the current Program policies and procedures.

Policies
The following list of existing **policies** will be used as a basis to administer the Program specific to homeownership:

1. Eligibility Requirements
    a. Eligibility Requirements for Program Certification
    b. Applications Missing Documents – Applies to New Applications and Recertifications
    c. Income Limit Interpretation
    d. Income Change Policy
    e. Commission Based Income Policy
    f. Asset Limits
    g. Asset Decrease Policy
    h. Trusts
    i. Third Party Employment Verification
    j. Multiple Benefit
    k. Minimum and Maximum Number of Bedrooms
    l. Waiving Household Number + 1 Bedroom
    m. Homebuyer Education Class
    n. Gift Limitations
    o. Buyer's $2,000 Minimum Cash Contribution
    p. Ineligibility Policy
2. Selection Process Policies
    a. Work and One-Year Certification Preferences
    b. Preferences for 3 or More Bedroom Units
    c. Occupancy Preferences

   d. Accessible Unit/Special Feature Unit Housing Policy
   e. Displaced Renters and Homebuyer Preferences
   f. Selection Entry Requirements
   g. Applicant under contract may not enter fair selection process
   h. 24 Hours to Make an Offer After the Fair Selection
3. Homeowner Policies
   a. Capital Improvement/Capital Update Credit and Maintenance Policy
   b. Pre-purchase Upgrades
   c. Insurance Requirements for Town homes
   d. Homeownership Rental Policy
   e. Homeownership Rental Policy Regarding Resales
   f. Homeownership Rental Exception Policy
4. Resale & Developers
   a. AMI % Change for Resale Formula
   b. Home Income Limit Change
   c. Homeowner Resale Calculation Policy
   d. Resale Options Policy
   e. Sales Commissions
   f. Excessive Damage Assessment/Inspection Standard
   g. Subsidizing Resale Units
   h. Seller Concessions
   i. Developer Contracts
5. Mortgage Policy
6. Miscellaneous Policies
   a. Exception Requests
   b. Not Allowing Permanently Affordable Homes to go to Foreclosure
   c. Working with Developmentally-Challenged Applicants

Procedures
The following is a list of existing **procedures** that will form the basis to administer the Program specific to homeownership:

1. Applications
   a. Application Processing
   b. Application Check Processing/Deposits
   c. Application Waitlist Management
   d. Applicant Personally Identifiable Information
2. Sales
   a. Marketing A Home
   b. Holding a Fair Selection Process
   c. Sales - Post Selection Process to Closing
   d. Pre-Purchase Upgrades – New Construction
3. Post Purchase
   a. Capital Improvements
   b. Refinance
4. Other

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a. Exception Request
b. Annual Income Number Update
c. Loan Repayment
d. Foreclosure and Purchase
e. Personally Identifiable Information (PII)

Foreclosure Prevention
A foreclosure prevention fund for the Program is an important tool to ensure homes remain affordable in perpetuity. The Program records a $10 Deed of Trust on all affordable homes. This ensures that the Homeownership Program Manager is notified in the event of foreclosure proceedings or an attempted sale outside of the Program. The Homeownership Program Manager will contact the owner to facilitate the sale of the home to an eligible buyer or in rare circumstances the Program will purchase the home prior to or after foreclosure. If the Program purchases a home, it will make all the necessary repairs and sell the home to an eligible buyer and the proceeds are returned to the fund. The $1.2M revolving fund ensures that sufficient resources are available in the event that 3-4 homes are required to be purchased at the same time to ensure the integrity of the Program. This is a revolving fund, so funds used to purchase an affordable home are returned at the time of sale. This revolving loan fund will also be used to cover any costs associated with the purchase (holding, repair, fees, etc.) in lieu of raising the price of the home to ensure deeper and longer affordability. However, in the majority of cases the Program will be able to work with the troubled homeowner to facilitate a sale to another eligible buyer and avoid the expense of foreclosure and the subsequent impact on the homeowner's credit score. The foreclosure prevention fund is only available for homes in Boulder County due restrictions in funding (i.e., ARPA).

Covenant Enforcement
Post-purchase, the Program continues to monitor to confirm owners comply with the agreements contained in the covenant. Renting an ownership unit outside of the parameters in the covenant is the primary violation. As a result, occupancy compliance work involves investigating potential rental violations, working with owners to get them back into compliance and, in some cases, commencing legal action. Program staff will work to regularly educate owners about occupancy requirements to prevent violations. Unfortunately, there are still issues and the Program is diligent about investigating issues. There will be instances where Program staff will need to partner with the local jurisdictions' staff and their legal counsel in the pursuit of resolution (e.g., confirm violation of owner occupancy through a home visit, preparing an existing document related to a purchase or foreclosure redemption, levy fines, etc.).

Policies and Procedures (Rental Program)
Affordable rentals in the Program will be marketed and available to eligible renters according to policies and procedures developed by the City of Boulder. The City of Boulder's Rental Compliance Program has been developed to not only ensure long-term compliance and preserve permanent affordability, but to also ensure that all publicly supported rental housing properties serve the most vulnerable residents. These policies and procedures are living documents that evolve to meet the needs of the Program and will continue to evolve with the involvement of the participating jurisdictions through the Policy Committee.

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Like the Homeownership Policies and Procedures (described above), one of the first tasks to launch the rental Program will be to modify current written materials (e.g., policies, procedures, marketing, website, etc.) from a City of Boulder focus to a regional approach. Rental units entering the Program from other jurisdictions will be administered to the benefit of that jurisdiction's work force and residents per the modified Program policies and procedures.

The following list of **policies and procedures** will be used as a basis to administer the Program specific to rentals:

1. Roles and Responsibilities
    a. Rental Compliance Program
    b. Housing Sr Compliance Manager
    c. Housing Sr Program Manager
    d. Housing Project Manager
    e. Compliance and Monitoring Administrator
    f. Owner
    g. Property Manager/Property Management Company
    h. Changes in Ownership or Management of Property
2. Regulatory Requirements
    a. Rental Housing Licensing *(City of Boulder specific program)*
    b. Period of Affordability
    c. Unit Mix
    d. Fair Housing and Equal Opportunity
    e. Nondiscrimination in Housing *(City of Boulder specific program)*
    f. City of Boulder Human Rights Ordinance *(City of Boulder specific program)*
    g. ADA, Section 504 & Fair Housing Accessibility
    h. Section 504 & Disabilities Act (ADA)
    i. Section 405 & Disability Rights in Housing
    j. Housing for Older Persons
    k. Affirmative Marketing
    l. Limited English Proficiency
    m. Language Access Plan
    n. Marketing Requirements
    o. Screening & Selection Applicants
    p. Tenant Selection Plan
    q. Preferences for Tenants with Special Needs
    r. Notice to Applicants
    s. Waiting Lists Requirements
    t. Interest List
    u. Declaration of Citizenship
    v. Race & Ethnicity
3. Eligibility Requirements
    a. Occupancy Limits
    b. Authorized Guests & Visitors
    c. Restriction on Short-Term Rental & Subletting
    d. Electronic Signatures & Document Transmission

   e. Student Policy
   f. Definition of Income
   g. Determining Income Eligibility
   h. Income Calculation
   i. Method of Income & Asset Verification
   j. Acceptable Forms of Income Verification
   k. Annual Recertification
   l. Excluded Sources of Income
   m. Effective Terms of Certification
   n. Assets Limits
   o. Increase in Housing Income
   p. Changes in Household Composition
   q. Unit Transfer
   r. Unit Transfer with Change in Household Composition
   s. Determining Rents
   t. City Approval of Rent Adjustments
   u. Utility Allowance
4. Tenant Rights & Protections
   a. No Eviction without Representation
   b. Minimum Lease Requirements
   c. Prohibited Lease Terms
   d. Required Lease Addendums
   e. Violence Against Women Act
   f. Termination of Tenancy
   g. Non-Renewal of Lease
   h. Charges & Fees
   i. Option Fees
   j. Non-Optional/Mandatory Fees
   k. Guidelines for Allowable Charges & Fees
   l. Prohibited Fees
   m. Conflict of Interest
   n. Dispute Resolution
   o. Mediation Services
5. Property Standards
   a. Minimum Property Standards
   b. Lead Based Paint Requirements
   c. Annual Inspections
6. Records and Reporting Requirements
   a. Maintaining Tenant Records
   b. Sample Tenant File Forms
   c. Record Retention
   d. Access to Records
   e. Reporting Requirements
7. Compliance Monitoring
   a. Monitoring Overview
   b. Monitoring Plan

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c. Types of Monitoring
d. Site Review & Remote Monitoring Process
e. Technical Assistance
f. Monitoring Long-Term Viability
g. Non-Compliance
h. Term of Enforcement

Covenant Enforcement
Within 12 months of lease-up, the Program will monitor affordable rental properties to confirm owners/managers comply with the agreements contained in the covenant and Rental Compliance Manual. After initial lease-up, each property will be monitored every three years. Program staff will work to regularly educate owners/managers about rental compliance requirements to prevent issues of non-compliance. When issues of non-compliance arise, Program staff will need to partner with the local jurisdictions' staff and their legal counsel in the pursuit of resolution.

Data Requirements
A regional approach to affordable housing requires a regional database to facilitate application processing, facilitate transactions, track the inventory, monitor programs, and evaluate progress over time. The database is also integral to providing good client services to program participants and ensure ongoing compliance with local and federal rules associated with affordable housing funds. The City of Boulder recently converted an old Access database (HAL) to Salesforce (Housing Dataverse) with greater capabilities. The budget of $13,098 estimates the time required to hire a consultant to modify Salesforce to include the capabilities of keeping track of affordable housing units outside of the City of Boulder. It also includes the cost of licenses for the staff required to administer the Program for participating jurisdictions.

The City of Boulder's Affordable Housing Program has a history of better serving Black, Indigenous, and People of Color (BIPOC) than the broader housing market. Where possible, the work performed under this IGA should be informed through the use of racialized data and metrics in order to help ensure the outcomes of the programs and supports provided across the region are centered in racial equity.

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Exhibit B – Homeownership Affordable Covenant Summary

All Permanently Affordable ownership homes are sold subject to a covenant that ensure the home remains perpetually affordable into the future. The buyer must accept all terms of the covenant to be eligible to purchase the home.

Covenant Key Points

- The maximum income and assets of a new buyer will be established in advance of sale or re-sale, and the home may not be sold to a buyer that exceeds the maximum income and asset limit.
- The home has a Maximum Resale Price Limit that includes limited appreciation and allows for specific capital improvements.
- Buyers are required to maintain their affordable home in a manner that protects the health, safety, and livability for future homeowners.
- Eligible capital improvements for which a homeowner can receive credit are limited in amount and type and must be pre-approved by the program to receive credit.
- The ability to refinance is limited to 90-93% of the Maximum Resale Price Limit. The program must be contacted prior to arranging refinancing with a lender to ensure this limit is not exceeded.
- The home must be occupied by the owner as the owner's principal place of residence unless the program has approved a rental arrangement.
- The home cannot be rented in its entirety during the first five years of ownership.
- After five years of ownership, the home may be rented for one year out of every seven. The program needs to be contacted prior to renting for approval.
- A long-term rental of only one room in the home may be permitted after the first year of ownership. Licensing regulations for each jurisdiction must be followed.

There are instances where the Program will require an Interim Covenant in exchange for funding or to meet a regulatory requirement. Interim covenants ensure affordability through a project design and development phase when the exact details of the project are unknown. Once a certificate of occupancy is issued for a home by a local jurisdiction, the interim covenant is replaced with a permanent covenant specific to that home.

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Exhibit C– Rental Affordable Covenant Summary

All Permanently Affordable rental units are subject to a covenant that ensures the rental property/units remain perpetually affordable into the future. The Owner must accept all terms of the covenant and Rental Compliance Manual.

Rental Covenant Key Points

- Maximum Income: The maximum income limits at initial occupancy determine household income eligibility. Household income after initial occupancy may increase up to 84% AMI.
- Over-Income: Households that have an income at or above 84% are considered over income and therefore no longer eligible to occupy the affordable unit.
- Maximum Assets: The Asset Policy imposes a 55,000 liquid asset limit. Seniors and persons with disabilities are exempt from the liquid asset limit. The policy also imposes a restriction on ownership interest in residential property in which an applicant can legally reside.
- Maximum Rent & Rent Increases: Maximum rent is based on the Area Median Income outlined in the Covenant and the number of bedrooms. Rents can only be increased once per year up to the maximum rent published.
- Capital Reserves: The Owner must contribute a minimum amount of funds annually towards capital replacement reserve.
- Property Standards: Buyers are required to maintain their affordable home in a manner that protects the health, safety, and livability for future homeowners.
- Reporting Requirements: The Owner/Manager must submit Quarterly and Annual Reports to the City as outlined in the Rental Compliance Manual
- Record & Retention Requirements: The Owner/Manager must have complete records and meet the retention requirements as outlined in the Rental Compliance Manual.
- Tenant Selection Plan: The Owner/Manager must develop a Tenant Selection Plan which outlines the selection criteria. The Plan must be in compliance with the City's Tenant Selection Policies.
- Waiting List Requirements: The Owner/Manager must create and maintain a wait list.
- Lease Requirements & Prohibited Lease Terms: Leases between the Owner and residents of the specified permanently affordable units must be for not less than one year unless mutually agreed upon by the Owner and residents. The lease must not contain any of the prohibited lease terms as outlined in the Rental Compliance Manual.
- Termination of Tenancy: The Owner may not terminate the tenancy or refuse to renew the lease of a tenant of the Property except for serious or repeated violation of the terms and conditions of the lease; for violation of applicable federal, state or local law; or for other good cause as determined by the Owner and City of Boulder policies. Any termination of tenancy or refusal to renew must be preceded by not less than 30 days by service upon the tenant of a written notice from the Owner specifying the grounds for the action.

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There are also instances where the Program will require an Interim Covenant in exchange for funding or to meet a regulatory requirement. Interim covenants ensure affordability through a project design and development phase when the exact details of the project are unknown. Once a certificate of occupancy is issued for an affordable rental property by a local jurisdiction, the interim covenant is replaced with a permanent covenant specific to that affordable property.

RESOLUTION NO. 13
SERIES 2024

A RESOLUTION APPROVING AN INTERGOVERNMENTAL AGREEMENT WITH THE CITY OF BOULDER FOR SUPPORT TO ESTABLISH A REGIONAL AFFORDABLE HOMEOWNERSHIP AND RENTAL COMPLIANCE PROGRAM

WHEREAS, the City of Louisville (the "City"), is part of the Boulder County Regional Housing Partnership (BCRHP) that was established to address regional housing affordability challenges; and

WHEREAS, the BCRHP agreed to establish a centralized program for the administration of rental and homeownership services; and

WHEREAS, the City currently does not have any resources dedicated to administering any affordable housing programs; and

WHEREAS, the City of Boulder has agreed to provide support for administering any affordable housing programs for least two years in the City; and

WHEREAS, there has been prepared an intergovernmental agreement (the " IGA") to set forth the City and City of Boulder's respective rights and obligations; and

WHEREAS, by this resolution the City Council desires to approve and authorize the Mayor to execute the IGA.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LOUISVILLE, COLORADO:

Section 1. The Intergovernmental Agreement, by and between the City of Louisville and the City of Boulder for support to establish a regional affordable homeownership and rental compliance program, is hereby approved in essentially the same form as the copy of such IGA that accompanies this resolution.

Section 2. The Mayor is hereby authorized to execute the IGA on behalf of the City, and the Mayor is hereby further authorized to negotiate and approve such revisions to the IGA as the Mayor determines are necessary or desirable for the protection of the City, so long as the essential terms and conditions of the IGA are not altered.

PASSED AND ADOPTED this 19th day of March, 2024.

Christopher M. Leh, Mayor

ATTEST:

Meredyth Muth, City Clerk

CITY OF LOUISVILLE SEAL COLORADO

Intergovernmental Agreement Establishing Regional Affordable Homeownership and Rental Compliance Program Services

This Intergovernmental Agreement ("IGA") establishing a regional affordable homeownership and rental compliance program is entered into by and among the City of Louisville, a Colorado home rule city, ("City of Louisville") and the City of Boulder, a Colorado home rule city, ("City of Boulder"), effective this ____ day of ____ 2024 (the "Effective Date").

RECITALS

A. The Parties are authorized to enter into this IGA pursuant to C.R.S. § 29-1-203; and

B. Boulder County and areas of Weld County are in a housing crisis resulting in home prices and rents that are unaffordable; and

C. The housing crisis is, in part, a manifestation of racial inequity, following similar national trends on racial disparities for homeownership, rental opportunities, affordability, and adequate housing; and

D. The affordable housing challenge is regional and is shared by each jurisdiction in Boulder County, and a few in Weld County; and

E. Regional cooperation and action are needed to produce equitable solutions to the challenge to produce an adequate amount of affordable housing and distribute it across the area; and

F. Boulder County communities and residents are committed to and have made strong investments in affordable housing; and

G. In 2017, Boulder County communities agreed to a goal of ensuring a minimum of 12% of the housing inventory will be permanently affordable to low, moderate, and middle-income households by 2035; and

H. Boulder County communities created the Boulder County Regional Housing Partnership ("BCRHP") to address regional housing challenges and through the BCRHP agreed to establish a centralized compliance program for rental and homeownership services and dedicate the resources needed to address the housing needs of the community; and

I. For over two decades, the City of Boulder has operated a Rental and Homeownership Program ("Rental Compliance Program") that includes administrative and compliance processes. The Rental Compliance Program includes resources to market affordable homes and process applications, verify eligibility of applicants, and provide monitoring and record-keeping. The Rental Compliance Program focuses on training, technical assistance, monitoring, record keeping, and does not act as a property manager; and

J. Through this IGA, the Parties are making a clear commitment to racial equity as a central tenet in this collaborative regional work. Shared regional housing challenges are rooted in historical practices, processes, and policies that have systematically racialized space by limiting access for Black, Indigenous, and People of Color (collectively "BIPOC") to safe, stable, and affordable housing in the communities in which they choose to live. Interrupting the history of racial segregation is an intended consequence of this collaborative regional work; and

K. While the City of Louisville is individually responsible for centering racial equity in its local affordable housing rental and homeownership programs, the Parties will strive to collectively achieve housing access for BIPOC communities, and foster support and accountability in this process. Collaborative activities may include collecting racialized housing data, leading community engagement activities, including those targeted and co-created with BIPOC communities, and ensuring elected officials, when making policy decisions, are aware of and considering racial equity impacts; and

The interests of the public are best served by the Parties entering into this IGA.

NOW THEREFORE, in consideration of the Recitals, terms, conditions, and covenants included in this IGA, the Parties agree as follows:

COVENANTS

1. **Purpose**. The purpose of this IGA is to create the Regional Affordable Homeownership and Rental Compliance Program (the "Program") and define the structure of the Program and govern the financial contributions from the Parties in support of this provision of services.

2. **Term**. The term of this IGA shall commence as of the Effective Date. The IGA shall continue for a term of seven years unless a Party elects to terminate this IGA at the end of any calendar year, after giving 180 days' written notice.

3. **Services Provided by the City of Boulder**.

   The City of Boulder will provide the following administrative services ("Services") while supporting City of Louisville independence and autonomy:

   a. Homeownership Services. The City of Boulder will provide administrative services to market homes and process applications, verify eligibility of applicants, prepare legal documents to add affordable restrictions to homes, and provide record-keeping;

   b. Rental Services. The City of Boulder will provide administrative services to the City of Louisville and property management companies within the jurisdiction which include providing training, technical assistance, monitoring, and direction of rental properties to ensure owners/managers are adequately marketing their properties,

processing applications, properly determining eligibility, and provide record-keeping to satisfy HUD requirements;

c. The City of Boulder will provide a main point of contact for each Service: a Regional Compliance Program Manager and a Regional Homeownership Program Manager; and

d. Additional details of the Services provided are described in **Exhibit A**.

4. **Expectations to Receive Services Provided**.

a. The City of Louisville will abide by the current policies and procedures of the Program as established and amended by the City of Boulder, in cooperation with the City of Louisville, as described in **Exhibit A**.

b. The City of Louisville will use the current City of Boulder restricted covenants as template language to ensure consistency of Program administration. The current covenant templates are summarized in **Exhibit B** (Homeownership) and **Exhibit C** (Rental). Using a different covenant may be grounds to terminate the agreement by the City of Boulder. If amendment of the covenant template(s) is required to comply with the City of Louisville's local law, the City of Louisville and the City of Boulder agree to work in good faith to amend the template(s) for that City of Louisville. A Jurisdiction-specific template(s) shall be reviewed and approved by both the City of Boulder and that City of Louisville prior to implementation.

c. The City of Louisville agrees to abide by all applicable existing policies and procedures (as described in **Exhibit A**) related to Program compliance. Advising on future changes to policies and procedures will be the responsibility of the Policy Advisory Committee, as described in Section 4.d. below.

d. The City of Louisville will identify a point of contact to coordinate all activities related to the administration of the Program. In addition, the City of Louisville will appoint one member to provide an advisory role of Program activity in their community and along with members from other jurisdictions accepting similar services from the City of Boulder will be known as the Policy Advisory Committee. This Policy Advisory Committee will meet, at a minimum, twice annually to review data and recommend adjustments to the Program as needed.

5. **Funding**.

a. Boulder County American Rescue Plan Act (ARPA) funds of approximately $1,259,549 will be utilized by the City of Boulder for years one and two of the Program to pay for staff, database modifications and licenses, and to create a revolving loan fund to be used for foreclosure prevention.

b. Starting in year three, or later if the ARPA funds are not fully expended, the City of Boulder will provide administrative services with financial support from the City of Louisville, expressly subject to Subsection 5.c., below. The Parties will agree to a funding mechanism through an amendment to this IGA (e.g., flat yearly fee, fee based on percentage of homes in the Program, or some combination of the two) to continue Program services. Failure to make the contribution will be grounds to terminate this IGA by the City of Boulder. Contributions will be due annually on December 31.

c. The Parties understand and acknowledge that this IGA is subject to Article X, § 20 of the Colorado Constitution ("TABOR"). The Parties do not intend to violate the terms and requirements of TABOR by the execution of this IGA. It is understood and agreed that this IGA does not create a multiple fiscal year direct or indirect debt or obligation within the meaning of TABOR and not withstanding anything in this IGA to the contrary, all payment obligations of the Parties are expressly dependent and conditioned upon the continuing availability of funds beyond the term of the Parties' current fiscal period ending upon the next succeeding December 31. Financial obligations of the Parties payable after the current fiscal year are contingent upon funds for that purpose being appropriated, budgeted, and otherwise made available in accordance with the rules, regulations, ordinances and resolutions of the Parties and applicable law. Any failure of a Party to annually to appropriate adequate monies to finance the obligations under this IGA will terminate this IGA at such time as such then-existing appropriations are to be depleted. Notice will be given promptly to the other Party of any failure to appropriate such adequate monies.

6. **Liability**. Each Party agrees to be responsible for its own actions and omissions, and those of its officers, agents and employees in the performance or failure to perform work under this IGA. By agreeing to this provision, the Parties do not waive or intend to waive the limitations on liability which are provided to the Parties under the Colorado Governmental Immunity Act, C.R.S. § 24-10-101, *et seq*., as amended.

7. **Dispute Resolution**. Prior to terminating this IGA, the Parties will attempt in good faith to resolve any dispute or claim arising out of or in relation to this IGA through negotiations.

8. **No Third-Party Beneficiaries**. The enforcement of the terms and conditions of this IGA and all rights of action relating to such enforcement will be strictly reserved to the Parties, and nothing contained in this IGA will give or allow any claim or right of action whatsoever by any other or third person. It is the express intent of the Parties to this IGA that any person receiving services or benefits under this IGA will be deemed an incidental beneficiary only.

9. **Notices**. All notice provided under this IGA must be in writing and sent by First Class U.S. Mail, electronic mail, or hand-delivery to the addresses set forth below. For mailing, notice periods will begin to run on the day after the postmarked date of mailing. For electronic mail or hand delivery, notice periods will begin to run on the date of delivery.

If to the City of Boulder:
Kurt Firnhaber
Director of Housing & Human Services
City of Boulder
P.O. Box 791
Boulder, CO 80302

If to the City of Louisville:
Rob Zuccaro
Community Development Director
City of Louisville
749 Main Street
Louisville, CO 80027

10. **Entire Agreement**. This IGA contains the entire agreement between the Parties. This IGA may be modified or extended only by written agreement signed by the Parties. If any provision of this IGA is deemed to be illegal, invalid, or otherwise unenforceable, such provision will be severed, and the balance of the IGA will continue in full force and effect.

11. **Governmental Immunity**. The Parties do not waive or intend to waive, the limitations on liability which are provided to the Parties under the Colorado Governmental Immunity Act, C.R.S. §§ 24-10-101, *et seq*. ("CGIA"). The provisions of C.R.S. § 29-5-108 will not apply to activities conducted pursuant to this IGA.

12. **Independent Contractor**. The relationship between the Parties is one of an independent contractor and not an employment relationship. Neither the City of Boulder nor any agent or employee of the City of Boulder shall be deemed to be an agent or employee of the City of Louisville. The City and its employees and agents are not entitled to unemployment insurance or workers compensation benefits through the City of Louisville and the City of Louisville shall not pay for or otherwise provide such coverage for the City of Boulder or any of its agents or employees.

13. **Choice of Law; Venue**. Colorado law, and rules and regulations issued pursuant thereto, shall be applied in the interpretation, execution, and enforcement of this IGA. Any provision included or incorporated herein by reference which conflicts with said laws, rules, and regulations shall be null and void. Any provision incorporated herein by reference which purports to negate this in whole or in part shall not be valid or enforceable or available in any action at law, whether by way of complaint, defense, or otherwise. Any provision rendered null and void by the operation of this provision shall not invalidate the remainder of this IGA, to the extent capable of execution. Venue for any legal action arising out of this IGA shall be in Boulder County, Colorado.

14. **Authority**. Each of the individuals whose signature appears below represents and warrants that he or she has full authority to execute this IGA on behalf of the Party on whose behalf he or she has affixed his or her signature to this IGA.

WHEREFORE, the Parties have entered to this IGA as of the Effective Date.

City of Boulder,
a Colorado home rule city

By: _____

Nuria Rivera-Vandermyde,
City Manager

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney's Office

City of Louisville,
a Colorado home rule city

By: _____

Christopher M. Leh, Mayor

ATTEST:

_____

Meredyth Muth, City Clerk

Exhibit A – Scope of Services

Purpose

The purpose of the Program is to centralize homeownership and rental compliance program services through the Boulder County Regional Housing Partnership (BCRHP). The Program will achieve several goals:

- Create policy alignment
- Use resources efficiently
- Encourage regional collaboration
- Apply consistent best practices and processes
- Support newly adopted affordable housing programs
- Provide streamlined access to multiple programs for residents
- Ensure racial equity is centered as a primary objective of the collaborative work through encouraging prioritization of first meeting the affordable housing needs of the most underserved in our community.

The Program is a transformational idea in that it has been a longstanding goal of the BCRHP to create regional services in alignment with the 2017 Regional Housing Strategy and can support the program infrastructure needed for more municipalities within the BCRHP to implement affordable housing programs.

Throughout the Program, equity and accessibility will be addressed through the adopted policies and procedures that dictate the practices. Current local affordable housing programs have shown to dramatically increase access to housing to households with racial diversity.

The Need & Lead Roles

Currently, there are several municipalities within the BCRHP that do not have dedicated resources or program infrastructure for homeownership and/or rental compliance programs. Boulder County Housing Authority (BCHA), the City of Longmont, and the City of Boulder manage most of the compliance for homes which they have developed or funded. However, as other municipalities continue to grow their affordable housing programs, there will be a growing need to maintain high-quality, specialized expertise in compliance. The BCRHP believes that is possible with a regionalized approach, administered by City of Boulder staff.

Similarly for homeownership programs, some municipalities in the BCRHP manage for-sale units on a case-by-case basis without a formalized team, which has been appropriate in the past given the small number of affordable for-sale units in the region. As the BCRHP continues to grow for-sale housing stock, there will be a similar need to administer a homeownership program at the regional level to create efficiencies in marketing units, qualifying buyers, facilitating sales / re-sales, preventing foreclosure, and implement industry best practices. The City of Longmont and City of Boulder manage their own homeownership programs.

Under the BCRHP, the City of Boulder Department of Housing and Human Services will take responsibility for Program administration. For the homeownership and rental program this responsibility will commence when an affordable home is brought into the program or when the program designated covenant is attached to an existing home. Specifically, the regional homeownership program will not participate in the management or sale of homes with covenants different from the regional homeownership covenant (i.e., existing affordable homeownership units).

Resources & Funding

The Program presents a two-year funding proposal to startup the program and establish a one-time revolving fund for region-wide foreclosure prevention:

	Budget
Rental & ownership compliance, implementation, administration and strategic leadership staff	$584,243
Database licenses & support	$13,098
Foreclosure prevention (revolving fund)	$662,000
Total 2-Year Budget	**$1,259,341**

This funding will address all resources needed to implement the Program for two years. Thereafter, a permanent funding source from each of the municipalities or County will create a sustainable approach for the Services. Similar programs today work regionally and are paid for between jurisdictions. These programs include: the County's Housing Help Line, Longmont's housing rehab program, and Boulder's Mediation and Resolution Program. Participating jurisdictions contribute a share of the costs to the administering jurisdiction.

Program Policy Setting

The Program will incorporate a committee structure to advise on policy setting for the Program:

	Policy Setting Committee	**Policy Exceptions Committee** (homeownership)
Committee Participation (5-year term)	› One member from each participating jurisdiction › Regional Homeownership Program Manager › Regional Compliance Program Manager	› External volunteer participation › Regional Homeownership Program Manager
Committee Structure	› Purpose is to provide jurisdiction's with an advisory role of program activity in their community. › Twice annual meeting to review data; recommend adjustments to program as needed	› Considers unique and individual (case-by-case) circumstances that don't meet current procedures › Makes a recommendation to the jurisdiction's liaison, who makes final decision
	Example: The program mortgage policy needs to be updated to reflect the changing lending environment.	**Example:** A new home-buyer would like to make an investment 1-year ahead of the policy allowance, due to their personal and unique circumstance of moving into their new home.

The Policy Setting Committee will be responsible for guiding the program alongside the BCRHP and the City of Boulder as the administrative jurisdiction. Success will be measured by how closely the established goals are met.

The Homeownership Policy Exceptions Committee will be administered by the Program and each participating jurisdiction will be collectively responsible for recruiting members to ensure broad representation.

Policies and Procedures (Homeownership Program)
Affordable homes in the programs will be marketed and sold to qualified buyers according to the existing policies and procedures developed by the City of Boulder and the Participating Jurisdiction. These policies and procedures are living documents that will evolve to meet the needs of the Homeownership Program and will continue to evolve with the involvement of the participating jurisdictions through the Policy Committee.

One of the first tasks to launch the Program will be to modify current written materials (e.g., policies, procedures, marketing, website, etc.) from a City of Boulder focus to a regional approach to administration. Homes entering the Program from other jurisdictions will be administered to the benefit of that jurisdiction's work force per the current Program policies and procedures.

Policies
The following list of existing **policies** will be used as a basis to administer the Program specific to homeownership:

1. Eligibility Requirements
    a. Eligibility Requirements for Program Certification
    b. Applications Missing Documents – Applies to New Applications and Recertifications
    c. Income Limit Interpretation
    d. Income Change Policy
    e. Commission Based Income Policy
    f. Asset Limits
    g. Asset Decrease Policy
    h. Trusts
    i. Third Party Employment Verification
    j. Multiple Benefit
    k. Minimum and Maximum Number of Bedrooms
    l. Waiving Household Number + 1 Bedroom
    m. Homebuyer Education Class
    n. Gift Limitations
    o. Buyer's $2,000 Minimum Cash Contribution
    p. Ineligibility Policy
2. Selection Process Policies
    a. Work and One-Year Certification Preferences
    b. Preferences for 3 or More Bedroom Units
    c. Occupancy Preferences

   d. Accessible Unit/Special Feature Unit Housing Policy
   e. Displaced Renters and Homebuyer Preferences
   f. Selection Entry Requirements
   g. Applicant under contract may not enter fair selection process
   h. 24 Hours to Make an Offer After the Fair Selection
3. Homeowner Policies
   a. Capital Improvement/Capital Update Credit and Maintenance Policy
   b. Pre-purchase Upgrades
   c. Insurance Requirements for Town homes
   d. Homeownership Rental Policy
   e. Homeownership Rental Policy Regarding Resales
   f. Homeownership Rental Exception Policy
4. Resale & Developers
   a. AMI % Change for Resale Formula
   b. Home Income Limit Change
   c. Homeowner Resale Calculation Policy
   d. Resale Options Policy
   e. Sales Commissions
   f. Excessive Damage Assessment/Inspection Standard
   g. Subsidizing Resale Units
   h. Seller Concessions
   i. Developer Contracts
5. Mortgage Policy
6. Miscellaneous Policies
   a. Exception Requests
   b. Not Allowing Permanently Affordable Homes to go to Foreclosure
   c. Working with Developmentally-Challenged Applicants

Procedures

The following is a list of existing **procedures** that will form the basis to administer the Program specific to homeownership:

1. Applications
   a. Application Processing
   b. Application Check Processing/Deposits
   c. Application Waitlist Management
   d. Applicant Personally Identifiable Information
2. Sales
   a. Marketing A Home
   b. Holding a Fair Selection Process
   c. Sales - Post Selection Process to Closing
   d. Pre-Purchase Upgrades – New Construction
3. Post Purchase
   a. Capital Improvements
   b. Refinance
4. Other

a. Exception Request
b. Annual Income Number Update
c. Loan Repayment
d. Foreclosure and Purchase
e. Personally Identifiable Information (PII)

Foreclosure Prevention
A foreclosure prevention fund for the Program is an important tool to ensure homes remain affordable in perpetuity. The Program records a $10 Deed of Trust on all affordable homes. This ensures that the Homeownership Program Manager is notified in the event of foreclosure proceedings or an attempted sale outside of the Program. The Homeownership Program Manager will contact the owner to facilitate the sale of the home to an eligible buyer or in rare circumstances the Program will purchase the home prior to or after foreclosure. If the Program purchases a home, it will make all the necessary repairs and sell the home to an eligible buyer and the proceeds are returned to the fund. The $1.2M revolving fund ensures that sufficient resources are available in the event that 3-4 homes are required to be purchased at the same time to ensure the integrity of the Program. This is a revolving fund, so funds used to purchase an affordable home are returned at the time of sale. This revolving loan fund will also be used to cover any costs associated with the purchase (holding, repair, fees, etc.) in lieu of raising the price of the home to ensure deeper and longer affordability. However, in the majority of cases the Program will be able to work with the troubled homeowner to facilitate a sale to another eligible buyer and avoid the expense of foreclosure and the subsequent impact on the homeowner's credit score. The foreclosure prevention fund is only available for homes in Boulder County due restrictions in funding (i.e., ARPA).

Covenant Enforcement
Post-purchase, the Program continues to monitor to confirm owners comply with the agreements contained in the covenant. Renting an ownership unit outside of the parameters in the covenant is the primary violation. As a result, occupancy compliance work involves investigating potential rental violations, working with owners to get them back into compliance and, in some cases, commencing legal action. Program staff will work to regularly educate owners about occupancy requirements to prevent violations. Unfortunately, there are still issues and the Program is diligent about investigating issues. There will be instances where Program staff will need to partner with the local jurisdictions' staff and their legal counsel in the pursuit of resolution (e.g., confirm violation of owner occupancy through a home visit, preparing an existing document related to a purchase or foreclosure redemption, levy fines, etc.).

Policies and Procedures (Rental Program)
Affordable rentals in the Program will be marketed and available to eligible renters according to policies and procedures developed by the City of Boulder. The City of Boulder's Rental Compliance Program has been developed to not only ensure long-term compliance and preserve permanent affordability, but to also ensure that all publicly supported rental housing properties serve the most vulnerable residents. These policies and procedures are living documents that evolve to meet the needs of the Program and will continue to evolve with the involvement of the participating jurisdictions through the Policy Committee.

Like the Homeownership Policies and Procedures (described above), one of the first tasks to launch the rental Program will be to modify current written materials (e.g., policies, procedures, marketing, website, etc.) from a City of Boulder focus to a regional approach. Rental units entering the Program from other jurisdictions will be administered to the benefit of that jurisdiction's work force and residents per the modified Program policies and procedures.

The following list of **policies and procedures** will be used as a basis to administer the Program specific to rentals:

1. Roles and Responsibilities
    a. Rental Compliance Program
    b. Housing Sr Compliance Manager
    c. Housing Sr Program Manager
    d. Housing Project Manager
    e. Compliance and Monitoring Administrator
    f. Owner
    g. Property Manager/Property Management Company
    h. Changes in Ownership or Management of Property
2. Regulatory Requirements
    a. Rental Housing Licensing *(City of Boulder specific program)*
    b. Period of Affordability
    c. Unit Mix
    d. Fair Housing and Equal Opportunity
    e. Nondiscrimination in Housing *(City of Boulder specific program)*
    f. City of Boulder Human Rights Ordinance *(City of Boulder specific program)*
    g. ADA, Section 504 & Fair Housing Accessibility
    h. Section 504 & Disabilities Act (ADA)
    i. Section 405 & Disability Rights in Housing
    j. Housing for Older Persons
    k. Affirmative Marketing
    l. Limited English Proficiency
    m. Language Access Plan
    n. Marketing Requirements
    o. Screening & Selection Applicants
    p. Tenant Selection Plan
    q. Preferences for Tenants with Special Needs
    r. Notice to Applicants
    s. Waiting Lists Requirements
    t. Interest List
    u. Declaration of Citizenship
    v. Race & Ethnicity
3. Eligibility Requirements
    a. Occupancy Limits
    b. Authorized Guests & Visitors
    c. Restriction on Short-Term Rental & Subletting
    d. Electronic Signatures & Document Transmission

   e. Student Policy
   f. Definition of Income
   g. Determining Income Eligibility
   h. Income Calculation
   i. Method of Income & Asset Verification
   j. Acceptable Forms of Income Verification
   k. Annual Recertification
   l. Excluded Sources of Income
   m. Effective Terms of Certification
   n. Assets Limits
   o. Increase in Housing Income
   p. Changes in Household Composition
   q. Unit Transfer
   r. Unit Transfer with Change in Household Composition
   s. Determining Rents
   t. City Approval of Rent Adjustments
   u. Utility Allowance
4. Tenant Rights & Protections
   a. No Eviction without Representation
   b. Minimum Lease Requirements
   c. Prohibited Lease Terms
   d. Required Lease Addendums
   e. Violence Against Women Act
   f. Termination of Tenancy
   g. Non-Renewal of Lease
   h. Charges & Fees
   i. Option Fees
   j. Non-Optional/Mandatory Fees
   k. Guidelines for Allowable Charges & Fees
   l. Prohibited Fees
   m. Conflict of Interest
   n. Dispute Resolution
   o. Mediation Services
5. Property Standards
   a. Minimum Property Standards
   b. Lead Based Paint Requirements
   c. Annual Inspections
6. Records and Reporting Requirements
   a. Maintaining Tenant Records
   b. Sample Tenant File Forms
   c. Record Retention
   d. Access to Records
   e. Reporting Requirements
7. Compliance Monitoring
   a. Monitoring Overview
   b. Monitoring Plan

c. Types of Monitoring
d. Site Review & Remote Monitoring Process
e. Technical Assistance
f. Monitoring Long-Term Viability
g. Non-Compliance
h. Term of Enforcement

Covenant Enforcement
Within 12 months of lease-up, the Program will monitor affordable rental properties to confirm owners/managers comply with the agreements contained in the covenant and Rental Compliance Manual. After initial lease-up, each property will be monitored every three years. Program staff will work to regularly educate owners/managers about rental compliance requirements to prevent issues of non-compliance. When issues of non-compliance arise, Program staff will need to partner with the local jurisdictions' staff and their legal counsel in the pursuit of resolution.

Data Requirements
A regional approach to affordable housing requires a regional database to facilitate application processing, facilitate transactions, track the inventory, monitor programs, and evaluate progress over time. The database is also integral to providing good client services to program participants and ensure ongoing compliance with local and federal rules associated with affordable housing funds. The City of Boulder recently converted an old Access database (HAL) to Salesforce (Housing Dataverse) with greater capabilities. The budget of $13,098 estimates the time required to hire a consultant to modify Salesforce to include the capabilities of keeping track of affordable housing units outside of the City of Boulder. It also includes the cost of licenses for the staff required to administer the Program for participating jurisdictions.

The City of Boulder's Affordable Housing Program has a history of better serving Black, Indigenous, and People of Color (BIPOC) than the broader housing market. Where possible, the work performed under this IGA should be informed through the use of racialized data and metrics in order to help ensure the outcomes of the programs and supports provided across the region are centered in racial equity.

Exhibit B – Homeownership Affordable Covenant Summary

All Permanently Affordable ownership homes are sold subject to a covenant that ensure the home remains perpetually affordable into the future. The buyer must accept all terms of the covenant to be eligible to purchase the home.

Covenant Key Points

- The maximum income and assets of a new buyer will be established in advance of sale or re-sale, and the home may not be sold to a buyer that exceeds the maximum income and asset limit.
- The home has a Maximum Resale Price Limit that includes limited appreciation and allows for specific capital improvements.
- Buyers are required to maintain their affordable home in a manner that protects the health, safety, and livability for future homeowners.
- Eligible capital improvements for which a homeowner can receive credit are limited in amount and type and must be pre-approved by the program to receive credit.
- The ability to refinance is limited to 90-93% of the Maximum Resale Price Limit. The program must be contacted prior to arranging refinancing with a lender to ensure this limit is not exceeded.
- The home must be occupied by the owner as the owner's principal place of residence unless the program has approved a rental arrangement.
- The home cannot be rented in its entirety during the first five years of ownership.
- After five years of ownership, the home may be rented for one year out of every seven. The program needs to be contacted prior to renting for approval.
- A long-term rental of only one room in the home may be permitted after the first year of ownership. Licensing regulations for each jurisdiction must be followed.

There are instances where the Program will require an Interim Covenant in exchange for funding or to meet a regulatory requirement. Interim covenants ensure affordability through a project design and development phase when the exact details of the project are unknown. Once a certificate of occupancy is issued for a home by a local jurisdiction, the interim covenant is replaced with a permanent covenant specific to that home.

Exhibit C– Rental Affordable Covenant Summary

All Permanently Affordable rental units are subject to a covenant that ensures the rental property/units remain perpetually affordable into the future. The Owner must accept all terms of the covenant and Rental Compliance Manual.

Rental Covenant Key Points

- Maximum Income: The maximum income limits at initial occupancy determine household income eligibility. Household income after initial occupancy may increase up to 84% AMI.
- Over-Income: Households that have an income at or above 84% are considered over income and therefore no longer eligible to occupy the affordable unit.
- Maximum Assets: The Asset Policy imposes a 55,000 liquid asset limit. Seniors and persons with disabilities are exempt from the liquid asset limit. The policy also imposes a restriction on ownership interest in residential property in which an applicant can legally reside.
- Maximum Rent & Rent Increases: Maximum rent is based on the Area Median Income outlined in the Covenant and the number of bedrooms. Rents can only be increased once per year up to the maximum rent published.
- Capital Reserves: The Owner must contribute a minimum amount of funds annually towards capital replacement reserve.
- Property Standards: Buyers are required to maintain their affordable home in a manner that protects the health, safety, and livability for future homeowners.
- Reporting Requirements: The Owner/Manager must submit Quarterly and Annual Reports to the City as outlined in the Rental Compliance Manual
- Record & Retention Requirements: The Owner/Manager must have complete records and meet the retention requirements as outlined in the Rental Compliance Manual.
- Tenant Selection Plan: The Owner/Manager must develop a Tenant Selection Plan which outlines the selection criteria. The Plan must be in compliance with the City's Tenant Selection Policies.
- Waiting List Requirements: The Owner/Manager must create and maintain a wait list.
- Lease Requirements & Prohibited Lease Terms: Leases between the Owner and residents of the specified permanently affordable units must be for not less than one year unless mutually agreed upon by the Owner and residents. The lease must not contain any of the prohibited lease terms as outlined in the Rental Compliance Manual.
- Termination of Tenancy: The Owner may not terminate the tenancy or refuse to renew the lease of a tenant of the Property except for serious or repeated violation of the terms and conditions of the lease; for violation of applicable federal, state or local law; or for other good cause as determined by the Owner and City of Boulder policies. Any termination of tenancy or refusal to renew must be preceded by not less than 30 days by service upon the tenant of a written notice from the Owner specifying the grounds for the action.

There are also instances where the Program will require an Interim Covenant in exchange for funding or to meet a regulatory requirement. Interim covenants ensure affordability through a project design and development phase when the exact details of the project are unknown. Once a certificate of occupancy is issued for an affordable rental property by a local jurisdiction, the interim covenant is replaced with a permanent covenant specific to that affordable property.

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Intergovernmental Agreement Establishing Regional Affordable Homeownership and Rental Compliance Program Services

This Intergovernmental Agreement ("IGA") establishing a regional affordable homeownership and rental compliance program is entered into by and among the Housing Authority of the County of Boulder, State of Colorado, a public body, corporate and politic ("Participating Jurisdiction") the City of Boulder, a Colorado home rule city, ("City of Boulder"), (each a "Party" and together the "Parties"), effective as of April 23, 2024 (the "Effective Date").

RECITALS

A. The Parties are authorized to enter into this IGA pursuant to C.R.S. § 29-1-203; and

B. Boulder County and areas of Weld County are in a housing crisis resulting in home prices and rents that are unaffordable; and

C. The housing crisis is, in part, a manifestation of racial inequity, following similar national trends on racial disparities for homeownership, rental opportunities, affordability, and adequate housing; and

D. The affordable housing challenge is regional and is shared by each jurisdiction in Boulder County, and a few in Weld County; and

E. Regional cooperation and action are needed to produce equitable solutions to the challenge to produce an adequate amount of affordable housing and distribute it across the area; and

F. Boulder County communities and residents are committed to and have made strong investments in affordable housing; and

G. In 2017, Boulder County communities agreed to a goal of ensuring a minimum of 12% of the housing inventory will be permanently affordable to low, moderate, and middle-income households by 2035; and

H. Boulder County communities created the Boulder County Regional Housing Partnership ("BCRHP") to address regional housing challenges and through the BCRHP agreed to establish a centralized compliance program for rental and homeownership services and dedicate the resources needed to address the housing needs of the community; and

I. For over two decades, the City of Boulder has operated a Rental and Homeownership Program ("Rental Compliance Program") that includes administrative and compliance processes. The Rental Compliance Program includes resources to market affordable homes and process applications, verify eligibility of applicants, and provide monitoring and record-keeping. The Rental Compliance Program focuses on training, technical assistance, monitoring, record keeping, and does not act as a property manager; and

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J. Through this IGA, the Parties are making a clear commitment to racial equity as a central tenet in this collaborative regional work. Shared regional housing challenges are rooted in historical practices, processes, and policies that have systematically racialized space by limiting access for Black, Indigenous, and People of Color (collectively "BIPOC") to safe, stable, and affordable housing in the communities in which they choose to live. Interrupting the history of racial segregation is an intended consequence of this collaborative regional work; and

K. While the Participating Jurisdiction is individually responsible for centering racial equity in its local affordable housing rental and homeownership programs, the Parties will strive to collectively achieve housing access for BIPOC communities, and foster support and accountability in this process. Collaborative activities may include collecting racialized housing data, leading community engagement activities, including those targeted and co-created with BIPOC communities, and ensuring elected officials, when making policy decisions, are aware of and considering racial equity impacts; and

The interests of the public are best served by the Parties entering into this IGA.

NOW THEREFORE, in consideration of the Recitals, terms, conditions, and covenants included in this IGA, the Parties agree as follows:

COVENANTS

1. **Purpose**. The purpose of this IGA is to create the Regional Affordable Homeownership and Rental Compliance Program (the "Program") and define the structure of the Program and govern the obligations of the Parties in connection with the Program.

2. **Term**. The term of this IGA shall commence as of the Effective Date. The IGA shall continue for a term of seven years unless a Party elects to terminate this IGA at the end of any calendar year, after giving 180 days' written notice.

3. **Services Provided by the City of Boulder**.

   The City of Boulder will provide the following administrative services ("Services") while supporting Participating Jurisdiction independence and autonomy:

   a. Homeownership Services. The City of Boulder will provide administrative services to market homes and process applications, verify eligibility of applicants, prepare legal documents to add affordable restrictions to homes, and provide record-keeping;

   b. The City of Boulder will provide a main point of contact for the Services: a Regional Compliance Program Manager and a Regional Homeownership Program Manager; and

   c. Additional details of the Services provided are described in **Exhibit A**.

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4. **Expectations to Receive Services Provided**.

a. The Participating Jurisdiction will abide by the current policies and procedures of the Program as established and amended by the City of Boulder, in cooperation with the Participating Jurisdiction, as described in **Exhibit A**.

b. The Participating Jurisdiction will use the current City of Boulder restricted covenant for homeownership as template language to ensure consistency of Program administration. The current covenant template is summarized in **Exhibit B** (Homeownership). Using a different covenant may be grounds to terminate the agreement by the City of Boulder. If amendment of the covenant template(s) is required to comply with the Participating Jurisdiction's local law, the Participating Jurisdiction and the City of Boulder agree to work in good faith to amend the template(s) for that Participating Jurisdiction. A Jurisdiction-specific template(s) shall be reviewed and approved by both the City of Boulder and that Participating Jurisdiction prior to implementation.

c. The Participating Jurisdiction agrees to abide by all applicable existing policies and procedures (as described in **Exhibit A**) related to Program compliance. Advising on future changes to policies and procedures will be the responsibility of the Policy Advisory Committee, as described in Section 4.d. below.

d. The Participating Jurisdiction will identify a point of contact to coordinate all activities related to the administration of the Program. In addition, the Participating Jurisdiction will appoint one member to provide an advisory role of Program activity in their community and along with members from other jurisdictions accepting similar services from the City of Boulder will be known as the Policy Advisory Committee. This Policy Advisory Committee will meet, at a minimum, twice annually to review data and recommend adjustments to the Program as needed.

5. **Funding**.

a. The Services are currently available at no charge to the Participating Jurisdiction. Boulder County American Rescue Plan Act (ARPA) funds of approximately $1,259,549 will be utilized by the City of Boulder for years one and two of the Program to pay for staff, database modifications and licenses, and to create a revolving loan fund to be used for foreclosure prevention.

b**.** Starting in year three, or later if the ARPA funds are not fully expended, the City of Boulder expects it may require payment from the Participating Jurisdiction in order to continue providing the Services. At such time, the Parties will work in good faith to negotiate an Amendment to this IGA to incorporate an appropriate pricing mechanism (e.g., flat yearly fee, fee based on percentage of homes in the Program, or some combination of the two) to continue Program services. If the Parties cannot agree to a mutually-acceptable funding amount and mechanism, the City of Boulder may terminate this IGA without penalty.

c. The Parties understand and acknowledge that this IGA is subject to Article X, § 20 of the Colorado Constitution ("TABOR"). The Parties do not intend to violate the terms and requirements of TABOR by the execution of this IGA. It is understood and agreed that this IGA does not and will not create a multiple fiscal year direct or indirect debt or obligation within the meaning of TABOR and not withstanding anything in this IGA to the contrary, all payment obligations of the Parties are expressly dependent and conditioned upon the continuing availability of funds beyond the term of the Parties' current fiscal period ending upon the next succeeding December 31. Financial obligations of the Parties payable after the current fiscal year are contingent upon funds for that purpose being appropriated, budgeted, and otherwise made available in accordance with the rules, regulations, ordinances and resolutions of the Parties and applicable law. Any failure of a Party to annually to appropriate adequate monies to finance the obligations under this IGA will terminate this IGA at such time as such then-existing appropriations are to be depleted. Notice will be given promptly to the other Party of any failure to appropriate such adequate monies.

6. **Liability**. Each Party agrees to be responsible for its own actions and omissions, and those of its officers, agents and employees in the performance or failure to perform work under this IGA. By agreeing to this provision, the Parties do not waive or intend to waive the limitations on liability which are provided to the Parties under the Colorado Governmental Immunity Act, C.R.S. § 24-10-101, *et seq*., as amended.

7. **Dispute Resolution**. In the event of any dispute or claim arising out of this IGA, the Parties will first attempt to resolve the matter informally through good faith negotiations.

8. **No Third-Party Beneficiaries**. The enforcement of the terms and conditions of this IGA and all rights of action relating to such enforcement will be strictly reserved to the Parties, and nothing contained in this IGA will give or allow any claim or right of action whatsoever by any other or third person. It is the express intent of the Parties to this IGA that any person receiving services or benefits under this IGA will be deemed an incidental beneficiary only.

9. **Notices**. All notice provided under this IGA must be in writing and sent by First Class U.S. Mail, electronic mail, or hand-delivery to the addresses set forth below. For mailing, notice periods will begin to run on the day after the postmarked date of mailing. For electronic mail or hand delivery, notice periods will begin to run on the date of delivery.

If to the City of Boulder:
Kurt Firnhaber
Director of Housing & Human Services
City of Boulder
P.O. Box 791
Boulder, CO 80302
firnhaberk@bouldercolorado.gov

If to the Participating Jurisdiction:
Boulder County Housing Authority
Executive Director
P.O. Box 471
Boulder CO 80306
slopez-baker@bouldercounty.gov

10. **Entire Agreement**. This IGA contains the entire agreement between the Parties regarding the creation and operation of a centralized homeownership and rental compliance program through the BCRHP. This IGA may be modified or extended only by written agreement signed by the Parties. If any provision of this IGA is deemed to be illegal, invalid, or otherwise unenforceable, such provision will be severed, and the balance of the IGA will continue in full force and effect.

11. **Governmental Immunity**. The Parties do not waive or intend to waive, the limitations on liability which are provided to the Parties under the Colorado Governmental Immunity Act, C.R.S. §§ 24-10-101, *et seq*. ("CGIA"). The provisions of C.R.S. § 29-5-108 will not apply to activities conducted pursuant to this IGA.

12. **Independent Contractors**. The relationship between the Parties is one of independent contractors. Neither Party nor any agent or employee of such Party shall be deemed to be an agent or employee of the other Party. Neither Party or its employees and agents are entitled to unemployment insurance or workers compensation benefits through the other Party.

13. **Choice of Law; Venue**. Colorado law, and rules and regulations issued pursuant thereto, shall be applied in the interpretation, execution, and enforcement of this IGA. Any provision included or incorporated herein by reference which conflicts with said laws, rules, and regulations shall be null and void. Any provision incorporated herein by reference which purports to negate this in whole or in part shall not be valid or enforceable or available in any action at law, whether by way of complaint, defense, or otherwise. Any provision rendered null and void by the operation of this provision shall not invalidate the remainder of this IGA, to the extent capable of execution. Venue for any legal action arising out of this IGA shall be in Boulder County, Colorado.

14. **Authority**. Each of the individuals whose signature appears below represents and warrants that he or she has full authority to execute this IGA on behalf of the Party on whose behalf he or she has affixed his or her signature to this IGA.

[SIGNATURES TO FOLLOW]

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WHEREFORE, the Parties have entered to this IGA as of the Effective Date.

City of Boulder,
a Colorado home rule city

_____
Nuria Rivera-Vandermyde,
City Manager

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney's Office

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Participating Jurisdiction,

MR

BOULDER COUNTY HOUSING AUTHORITY

Ashley Stolzmann April 23, 2024

Chair

APPROVED

By Boulder County Attorney (apg) AS TO FORM at 2:16 pm, Apr 05, 2024

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Exhibit A – Scope of Services

Purpose

The purpose of the Program is to centralize homeownership and rental compliance program services through the Boulder County Regional Housing Partnership (BCRHP). The Program will achieve several goals:

- Create policy alignment
- Use resources efficiently
- Encourage regional collaboration
- Apply consistent best practices and processes
- Support newly adopted affordable housing programs
- Provide streamlined access to multiple programs for residents
- Ensure racial equity is centered as a primary objective of the collaborative work through encouraging prioritization of first meeting the affordable housing needs of the most underserved in our community.

The Program is a transformational idea in that it has been a longstanding goal of the BCRHP to create regional services in alignment with the 2017 Regional Housing Strategy and can support the program infrastructure needed for more municipalities within the BCRHP to implement affordable housing programs.

Throughout the Program, equity and accessibility will be addressed through the adopted policies and procedures that dictate the practices. Current local affordable housing programs have shown to dramatically increase access to housing to households with racial diversity.

Regardless of any terms to the contrary elsewhere in the IGA, this Scope of Services applies to the Participating Jurisdiction only with respect to the homeownership compliance portion of the Program. The Participating Jurisdiction will receive no services for, or have any obligations in connection with, the rental compliance portion of the Program.

The Need & Lead Roles

Currently, there are several municipalities within the BCRHP that do not have dedicated resources or program infrastructure for homeownership and/or rental compliance programs. Boulder County Housing Authority (BCHA), the City of Longmont, and the City of Boulder manage most of the compliance for homes which they have developed or funded. However, as other municipalities continue to grow their affordable housing programs, there will be a growing need to maintain high-quality, specialized expertise in compliance. The BCRHP believes that is possible with a regionalized approach, administered by City of Boulder staff.

Similarly for homeownership programs, some municipalities in the BCRHP manage for-sale units on a case-by-case basis without a formalized team, which has been appropriate in the past given the small number of affordable for-sale units in the region. As the BCRHP continues to grow for-sale housing stock, there will be a similar need to administer a homeownership program at the regional level to create efficiencies in marketing units, qualifying buyers, facilitating sales / re-sales, preventing foreclosure, and implement industry best practices. The City of Longmont and City of Boulder manage their own homeownership programs.

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Under the BCRHP, the City of Boulder Department of Housing and Human Services will take responsibility for Program administration. For the homeownership and rental program this responsibility will commence when an affordable home is brought into the program or when the program designated covenant is attached to an existing home. Specifically, the regional homeownership program will not participate in the management or sale of homes with covenants different from the regional homeownership covenant (i.e., existing affordable homeownership units).

Resources & Funding

The Program presents a two-year funding proposal to startup the program and establish a one-time revolving fund for region-wide foreclosure prevention:

	Budget
Rental & ownership compliance, implementation, administration and strategic leadership staff	$584,243
Database licenses & support	$13,098
Foreclosure prevention (revolving fund)	$662,000
Total 2-Year Budget	**$1,259,341**

This funding will address all resources needed to implement the Program for two years. Thereafter, a permanent funding source from each of the municipalities or County will create a sustainable approach for the Services. Similar programs today work regionally and are paid for between jurisdictions. These programs include: the County's Housing Help Line, Longmont's housing rehab program, and Boulder's Mediation and Resolution Program. Participating jurisdictions contribute a share of the costs to the administering jurisdiction.

Program Policy Setting

The Program will incorporate a committee structure to advise on policy setting for the Program:

	Policy Setting Committee	**Policy Exceptions Committee** (homeownership)
Committee Participation (5-year term)	› One member from each participating jurisdiction › Regional Homeownership Program Manager › Regional Compliance Program Manager	› External volunteer participation › Regional Homeownership Program Manager
Committee Structure	› Purpose is to provide jurisdiction's with an advisory role of program activity in their community. › Twice annual meeting to review data; recommend adjustments to program as needed	› Considers unique and individual (case-by-case) circumstances that don't meet current procedures › Makes a recommendation to the jurisdiction's liaison, who makes final decision
	Example: The program mortgage policy needs to be updated to reflect the changing lending environment.	**Example:** A new home-buyer would like to make an investment 1-year ahead of the policy allowance, due to their personal and unique circumstance of moving into their new home.

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The Policy Setting Committee will be responsible for guiding the program alongside the BCRHP and the City of Boulder as the administrative jurisdiction. Success will be measured by how closely the established goals are met.

The Homeownership Policy Exceptions Committee will be administered by the Program and each participating jurisdiction will be collectively responsible for recruiting members to ensure broad representation.

Policies and Procedures (Homeownership Program)
Affordable homes in the programs will be marketed and sold to qualified buyers according to the existing policies and procedures developed by the City of Boulder and the Participating Jurisdiction. These policies and procedures are living documents that will evolve to meet the needs of the Homeownership Program and will continue to evolve with the involvement of the participating jurisdictions through the Policy Committee.

One of the first tasks to launch the Program will be to modify current written materials (e.g., policies, procedures, marketing, website, etc.) from a City of Boulder focus to a regional approach to administration. Homes entering the Program from other jurisdictions will be administered to the benefit of that jurisdiction's work force per the current Program policies and procedures.

Policies
The following list of existing **policies** will be used as a basis to administer the Program specific to homeownership:

1. Eligibility Requirements
    a. Eligibility Requirements for Program Certification
    b. Applications Missing Documents – Applies to New Applications and Recertifications
    c. Income Limit Interpretation
    d. Income Change Policy
    e. Commission Based Income Policy
    f. Asset Limits
    g. Asset Decrease Policy
    h. Trusts
    i. Third Party Employment Verification
    j. Multiple Benefit
    k. Minimum and Maximum Number of Bedrooms
    l. Waiving Household Number + 1 Bedroom
    m. Homebuyer Education Class
    n. Gift Limitations
    o. Buyer's $2,000 Minimum Cash Contribution
    p. Ineligibility Policy
2. Selection Process Policies
    a. Work and One-Year Certification Preferences
    b. Preferences for 3 or More Bedroom Units
    c. Occupancy Preferences
    d. Accessible Unit/Special Feature Unit Housing Policy

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   e. Displaced Renters and Homebuyer Preferences
   f. Selection Entry Requirements
   g. Applicant under contract may not enter fair selection process
   h. 24 Hours to Make an Offer After the Fair Selection
3. Homeowner Policies
   a. Capital Improvement/Capital Update Credit and Maintenance Policy
   b. Pre-purchase Upgrades
   c. Insurance Requirements for Town homes
   d. Homeownership Rental Policy
   e. Homeownership Rental Policy Regarding Resales
   f. Homeownership Rental Exception Policy
4. Resale & Developers
   a. AMI % Change for Resale Formula
   b. Home Income Limit Change
   c. Homeowner Resale Calculation Policy
   d. Resale Options Policy
   e. Sales Commissions
   f. Excessive Damage Assessment/Inspection Standard
   g. Subsidizing Resale Units
   h. Seller Concessions
   i. Developer Contracts
5. Mortgage Policy
6. Miscellaneous Policies
   a. Exception Requests
   b. Not Allowing Permanently Affordable Homes to go to Foreclosure
   c. Working with Developmentally-Challenged Applicants

Procedures
The following is a list of existing **procedures** that will form the basis to administer the Program specific to homeownership:

1. Applications
   a. Application Processing
   b. Application Check Processing/Deposits
   c. Application Waitlist Management
   d. Applicant Personally Identifiable Information
2. Sales
   a. Marketing A Home
   b. Holding a Fair Selection Process
   c. Sales - Post Selection Process to Closing
   d. Pre-Purchase Upgrades – New Construction
3. Post Purchase
   a. Capital Improvements
   b. Refinance
4. Other
   a. Exception Request

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b. Annual Income Number Update
c. Loan Repayment
d. Foreclosure and Purchase
e. Personally Identifiable Information (PII)

Foreclosure Prevention

A foreclosure prevention fund for the Program is an important tool to ensure homes remain affordable in perpetuity. The Program records a $10 Deed of Trust on all affordable homes. This ensures that the Homeownership Program Manager is notified in the event of foreclosure proceedings or an attempted sale outside of the Program. The Homeownership Program Manager will contact the owner to facilitate the sale of the home to an eligible buyer or in rare circumstances the Program will purchase the home prior to or after foreclosure. If the Program purchases a home, it will make all the necessary repairs and sell the home to an eligible buyer and the proceeds are returned to the fund. The $1.2M revolving fund ensures that sufficient resources are available in the event that 3-4 homes are required to be purchased at the same time to ensure the integrity of the Program. This is a revolving fund, so funds used to purchase an affordable home are returned at the time of sale. This revolving loan fund will also be used to cover any costs associated with the purchase (holding, repair, fees, etc.) in lieu of raising the price of the home to ensure deeper and longer affordability. However, in the majority of cases the Program will be able to work with the troubled homeowner to facilitate a sale to another eligible buyer and avoid the expense of foreclosure and the subsequent impact on the homeowner's credit score. The foreclosure prevention fund is only available for homes in Boulder County due restrictions in funding (i.e., ARPA).

Covenant Enforcement

Post-purchase, the Program continues to monitor to confirm owners comply with the agreements contained in the covenant. Renting an ownership unit outside of the parameters in the covenant is the primary violation. As a result, occupancy compliance work involves investigating potential rental violations, working with owners to get them back into compliance and, in some cases, commencing legal action. Program staff will work to regularly educate owners about occupancy requirements to prevent violations. Unfortunately, there are still issues and the Program is diligent about investigating issues. There will be instances where Program staff will need to partner with the local jurisdictions' staff and their legal counsel in the pursuit of resolution (e.g., confirm violation of owner occupancy through a home visit, preparing an existing document related to a purchase or foreclosure redemption, levy fines, etc.).

Policies and Procedures (Rental Program)

Affordable rentals in the Program will be marketed and available to eligible renters according to policies and procedures developed by the City of Boulder. The City of Boulder's Rental Compliance Program has been developed to not only ensure long-term compliance and preserve permanent affordability, but to also ensure that all publicly supported rental housing properties serve the most vulnerable residents. These policies and procedures are living documents that evolve to meet the needs of the Program and will continue to evolve with the involvement of the participating jurisdictions through the Policy Committee.

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Like the Homeownership Policies and Procedures (described above), one of the first tasks to launch the rental Program will be to modify current written materials (e.g., policies, procedures, marketing, website, etc.) from a City of Boulder focus to a regional approach. Rental units entering the Program from other jurisdictions will be administered to the benefit of that jurisdiction's work force and residents per the modified Program policies and procedures.

The following list of **policies and procedures** will be used as a basis to administer the Program specific to rentals:

1. Roles and Responsibilities
    a. Rental Compliance Program
    b. Housing Sr Compliance Manager
    c. Housing Sr Program Manager
    d. Housing Project Manager
    e. Compliance and Monitoring Administrator
    f. Owner
    g. Property Manager/Property Management Company
    h. Changes in Ownership or Management of Property
2. Regulatory Requirements
    a. Rental Housing Licensing *(City of Boulder specific program)*
    b. Period of Affordability
    c. Unit Mix
    d. Fair Housing and Equal Opportunity
    e. Nondiscrimination in Housing *(City of Boulder specific program)*
    f. City of Boulder Human Rights Ordinance *(City of Boulder specific program)*
    g. ADA, Section 504 & Fair Housing Accessibility
    h. Section 504 & Disabilities Act (ADA)
    i. Section 405 & Disability Rights in Housing
    j. Housing for Older Persons
    k. Affirmative Marketing
    l. Limited English Proficiency
    m. Language Access Plan
    n. Marketing Requirements
    o. Screening & Selection Applicants
    p. Tenant Selection Plan
    q. Preferences for Tenants with Special Needs
    r. Notice to Applicants
    s. Waiting Lists Requirements
    t. Interest List
    u. Declaration of Citizenship
    v. Race & Ethnicity
3. Eligibility Requirements
    a. Occupancy Limits
    b. Authorized Guests & Visitors
    c. Restriction on Short-Term Rental & Subletting
    d. Electronic Signatures & Document Transmission
    e. Student Policy

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   f. Definition of Income
   g. Determining Income Eligibility
   h. Income Calculation
   i. Method of Income & Asset Verification
   j. Acceptable Forms of Income Verification
   k. Annual Recertification
   l. Excluded Sources of Income
   m. Effective Terms of Certification
   n. Assets Limits
   o. Increase in Housing Income
   p. Changes in Household Composition
   q. Unit Transfer
   r. Unit Transfer with Change in Household Composition
   s. Determining Rents
   t. City Approval of Rent Adjustments
   u. Utility Allowance
4. Tenant Rights & Protections
   a. No Eviction without Representation
   b. Minimum Lease Requirements
   c. Prohibited Lease Terms
   d. Required Lease Addendums
   e. Violence Against Women Act
   f. Termination of Tenancy
   g. Non-Renewal of Lease
   h. Charges & Fees
   i. Option Fees
   j. Non-Optional/Mandatory Fees
   k. Guidelines for Allowable Charges & Fees
   l. Prohibited Fees
   m. Conflict of Interest
   n. Dispute Resolution
   o. Mediation Services
5. Property Standards
   a. Minimum Property Standards
   b. Lead Based Paint Requirements
   c. Annual Inspections
6. Records and Reporting Requirements
   a. Maintaining Tenant Records
   b. Sample Tenant File Forms
   c. Record Retention
   d. Access to Records
   e. Reporting Requirements
7. Compliance Monitoring
   a. Monitoring Overview
   b. Monitoring Plan
   c. Types of Monitoring

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d. Site Review & Remote Monitoring Process
e. Technical Assistance
f. Monitoring Long-Term Viability
g. Non-Compliance
h. Term of Enforcement

Covenant Enforcement
Within 12 months of lease-up, the Program will monitor affordable rental properties to confirm owners/managers comply with the agreements contained in the covenant and Rental Compliance Manual. After initial lease-up, each property will be monitored every three years. Program staff will work to regularly educate owners/managers about rental compliance requirements to prevent issues of non-compliance. When issues of non-compliance arise, Program staff will need to partner with the local jurisdictions' staff and their legal counsel in the pursuit of resolution.

Data Requirements
A regional approach to affordable housing requires a regional database to facilitate application processing, facilitate transactions, track the inventory, monitor programs, and evaluate progress over time. The database is also integral to providing good client services to program participants and ensure ongoing compliance with local and federal rules associated with affordable housing funds. The City of Boulder recently converted an old Access database (HAL) to Salesforce (Housing Dataverse) with greater capabilities. The budget of $13,098 estimates the time required to hire a consultant to modify Salesforce to include the capabilities of keeping track of affordable housing units outside of the City of Boulder. It also includes the cost of licenses for the staff required to administer the Program for participating jurisdictions.

The City of Boulder's Affordable Housing Program has a history of better serving Black, Indigenous, and People of Color (BIPOC) than the broader housing market. Where possible, the work performed under this IGA should be informed through the use of racialized data and metrics in order to help ensure the outcomes of the programs and supports provided across the region are centered in racial equity.

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Exhibit B – Homeownership Affordable Covenant Summary

All Permanently Affordable ownership homes are sold subject to a covenant that ensure the home remains perpetually affordable into the future. The buyer must accept all terms of the covenant to be eligible to purchase the home.

Covenant Key Points

- The maximum income and assets of a new buyer will be established in advance of sale or re-sale, and the home may not be sold to a buyer that exceeds the maximum income and asset limit.
- The home has a Maximum Resale Price Limit that includes limited appreciation and allows for specific capital improvements.
- Buyers are required to maintain their affordable home in a manner that protects the health, safety, and livability for future homeowners.
- Eligible capital improvements for which a homeowner can receive credit are limited in amount and type and must be pre-approved by the program to receive credit.
- The ability to refinance is limited to 90-93% of the Maximum Resale Price Limit. The program must be contacted prior to arranging refinancing with a lender to ensure this limit is not exceeded.
- The home must be occupied by the owner as the owner's principal place of residence unless the program has approved a rental arrangement.
- The home cannot be rented in its entirety during the first five years of ownership.
- After five years of ownership, the home may be rented for one year out of every seven. The program needs to be contacted prior to renting for approval.
- A long-term rental of only one room in the home may be permitted after the first year of ownership. Licensing regulations for each jurisdiction must be followed.

There are instances where the Program will require an Interim Covenant in exchange for funding or to meet a regulatory requirement. Interim covenants ensure affordability through a project design and development phase when the exact details of the project are unknown. Once a certificate of occupancy is issued for a home by a local jurisdiction, the interim covenant is replaced with a permanent covenant specific to that home.

CITY OF BOULDER
CITY COUNCIL ITEM ADDENDUM

MEETING DATE: May 16, 2024

AGENDA TITLE
Consideration of a motion to approve and authorize the city manager to enter into and execute four separate Intergovernmental Agreements, in substantially the same form as in **Attachments A-D**, between the City of Boulder and jurisdictions within the Boulder County region establishing a regional homeownership and rental compliance program administered by City of Boulder staff.

PAGE NUMBERS: 2

DESCRIPTION:
Change the suggested motion language on page 2 to reflect the highlighted section below:

Motion to approve and authorize the city manager to enter into and execute the Intergovernmental Agreements, in substantially the same form as in Attachments **A-D**, and future Intergovernmental Agreements in substantially the same form as shown in Attachments A-D, between the City of Boulder and jurisdictions within the Boulder County region establishing a regional homeownership and rental compliance program administered by City of Boulder staff.

ATTACHMENTS:
No additional attachments.

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Consideration of a motion to adopt the findings and conclusions of the Boulder City Council, as specified in this Agenda Memorandum dated May 16, 2024, for the disapproval of the designation of the Civic Area Historic District

PRIMARY STAFF CONTACT
Marcy Gerwing, City Planner Principal

REQUESTED ACTION OR MOTION LANGUAGE
Motion to adopt the findings and conclusions of the Boulder City Council, as specified in this Agenda Memorandum dated May 16, 2024, for the disapproval of the designation of the Civic Area Historic District

ATTACHMENTS:
Description

- **Item 3D - Disapproval of the Designation of the Civic Area Historic District**

CITY OF BOULDER
CITY COUNCIL AGENDA ITEM

MEETING DATE: May 16, 2024

AGENDA TITLE

Consideration of a motion to adopt the findings and conclusions of the Boulder City Council, as specified in this Agenda Memorandum dated May 16, 2024, for the disapproval of the designation of the Civic Area Historic District

PRESENTERS

Nuria Rivera-Vandermyde, City Manager
Teresa Taylor Tate, City Attorney
Chris Reynolds, Deputy City Attorney
Brad Mueller, Director of Planning and Development Services
Kristofer Johnson, Comprehensive Planning Senior Manager
Marcy Gerwing, Principal Historic Preservation Planner

EXECUTIVE SUMMARY

On April 11, 2024, City Council held a public hearing to consider adopting Proposed Ordinance 8627 designating the area as shown in **Attachment A**, to be known as the Civic Area Historic District, as a historic district under Chapter 9-11, "Historic Preservation," B.R.C. 1981. A record of the hearing is available online: links to Memorandum dated April 11, 2024 and video recording of April 11, 2024 City Council Meeting. The council's discussion begins at 2:39:28.

On a motion by L. Folkerts, seconded by M. Benjamin, the City Council voted (7-1, A. Brockett opposed; council member M. Wallach absent) to disapprove the historic district designation. This Memorandum provides the findings and conclusions of the council's decision.

STAFF RECOMMENDATION

Suggested Motion Language:

Staff requests council consideration of this matter and action in the form of the following motion:

Motion to adopt the findings and conclusions of the Boulder City Council, as specified in this Agenda Memorandum dated May 16, 2024, for the disapproval of the designation of the Civic Area Historic District

CRITERIA FOR REVIEW

Section 9-11-6 Council Ordinance Designating Landmark or Historic District provides that council will adopt written findings and conclusions within 45 days after the quasi-judicial hearing. The findings and conclusions will address whether the designation meets the purposes and standards in subsection 9-11-1(a) and section 9-11-2, "City Council May Designate or Amend Landmarks and Historic Districts," B.R.C. 1981, in balance with the goals and policies of the Boulder Valley Comprehensive Plan.

FINDINGS AND CONCLUSIONS

The City Council held a public hearing on the proposal of the designation of the Civic Area Historic District under the procedures prescribed by Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981, on April 11, 2024, pursuant to public notice. In accordance with its authority under Section 9-11-6, "Council Ordinance Designating Landmark or Historic District," B.R.C. 1981, the City Council disapproved the designation of the Civic Area Historic District, the area more particularly described in **Attachment A**.

Based upon the evidence presented at the hearing held on April 11, 2024, the City Council found the designation of the Civic Area Historic District was inconsistent with the purposes and standards of Historic Preservation pursuant to Sections 9-11-1(a) and 9-11-2, B.R.C. 1981, and it is not in balance with the goals and policies of the Boulder Valley Comprehensive Plan.

Specifically, City Council found:

A. The designation of the Civic Area Historic District will not protect, enhance, and perpetuate an area reminiscent of a past era of history nor preserve important examples of Boulder's historic architecture and site of historical interest.
   i. The structures within the proposed district are already protected through individual landmark designation; and
   ii. The city and community can elevate the stories of historically marginalized populations regardless of designation.

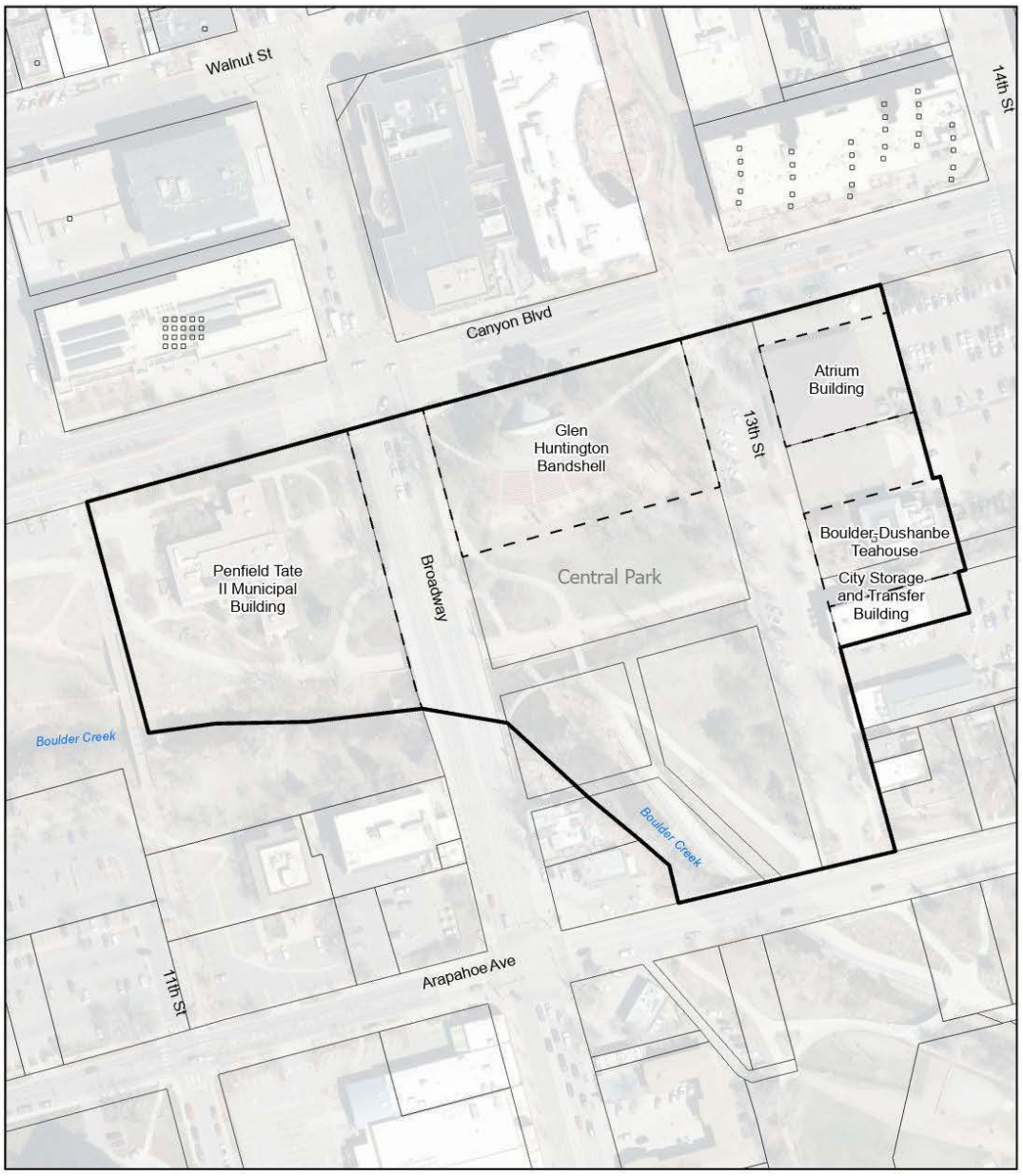
B. The proposed designation will not maintain an appropriate setting and environment for the site, nor enhance property values, stabilize the neighborhood, promote tourist trade and interest, or foster knowledge of the city's living heritage.
   i. Due to the extent of changes to the park and the amount of traffic around and through the area, it does not retain its historic integrity; and
   ii. Historic district designation would not enhance the area, given needed improvements.

C. The proposal will not designate an area having a special character and historical, architectural or aesthetic interest or value and constituting a distinct section of the city.
   i. The area is not a distinct section of the city, as demonstrated by the changes to the proposed boundary through the process and the lack of a unifying character of the area.

D. The proposal is not in balance with the goals and policies of the Boulder Valley Comprehensive Plan (BVCP).
   i. Historic district designation is not the proper tool given the lack of unifying character of the area (Policy 2.31 Historic Preservation/Conservation Tools); and
   ii. The Central Area is important and historic designation will reduce options in the reimagining of the area in the Civic Area Phase 2 project. (Policy 2.20 Role of the Central Area).

ATTACHMENT

A – Proposed Civic Area Historic District Map


Walnut St
14th St
Canyon Blvd
Atrium Building
Glen Huntington Bandshell
13th St
Boulder-Dushanbe Teahouse
City Storage and Transfer Building
Penfield Tate II Municipal Building
Broadway
Central Park
Boulder Creek
Boulder Creek
11th St
Arapahoe Ave
Proposed Civic Center Historic District
Proposed Civic Center Historic District
Historic Landmarks
Ownership Parcels
N
0 50 100 200 Feet

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Consideration of a motion to amend the Council Rules of Procedure Sec. II. Communication with Council, Sec. IV. Council Meeting Agenda and Sec. XVI. Rules of Decorum

PRIMARY STAFF CONTACT
Teresa Taylor Tate, City Attorney, 303.441.3020

REQUESTED ACTION OR MOTION LANGUAGE
Motion to amend the Council Rules of Procedure Sec. II. Communication with Council, Sec. IV. Council Meeting Agenda and, Sec. XVI. Rules of Decorum

ATTACHMENTS:

Description

- **Item 3E - Amendments to Council Rules of Procedure**

CITY OF BOULDER
CITY COUNCIL AGENDA ITEM

MEETING DATE: May 16, 2024

AGENDA TITLE

Consideration of a motion to amend Council Rules of Procedure Sec. II. Communications with Council, Sec. IV. Council Meeting Agenda and Sec. XVI. Rules of Decorum.

PRESENTERS

Nuria Rivera-Vandermyde, City Manager
Teresa Taylor Tate, City Attorney
Erin Poe, Deputy City Attorney

EXECUTIVE SUMMARY

At its retreat in April 2024, council requested a number of changes to the Council Procedure to facilitate orderly meetings and efficient operations of government, and limit disruptions. Those changes along with clean up changes are contained in **Attachment A**.

STAFF RECOMMENDATION

Suggested Motion Language

Staff requests council consideration of this matter and action in the form of the following motion:

Motion to amend Council Rules of Procedure Sec. II. Communications with Council, Sec. IV. Council Meeting Agenda and Sec. XVI. Rules of Decorum

COMMUNITY SUSTAINABILITY ASSESSMENTS AND IMPACTS

- **Economic** -None
- **Environmental** -None
- **Social** -None

OTHER IMPACTS

- **Fiscal** -None
- **Staff time** -None

RESPONSES TO QUESTIONS FROM COUNCIL AGENDA COMMITTEE

None.

BOARD AND COMMISSION FEEDBACK

None.

PUBLIC FEEDBACK

None.

BACKGROUND

At its retreat in April 2024, the Council requested a number of changes to the Council Rules of Procedure to facilitate orderly meetings and efficient operations of government, and limit disruptions. Those changes along with clean up from the separation of the library are contained in **Attachment A.**

ANALYSIS

The amendments to the Council Rules of Procedure Sec. IV. Council Meeting Agenda and Sec. XVI. Rules of Decorum are intended to facilitate orderly meetings and efficient operations of government, and limit disruptions. Changes include, but are not limited to, limiting the podium to one person; providing for a rule that limits speakers from speaking at successive meetings if more than 20 people are signed up for open comment; prohibiting affixing items to city property; prohibition on standing in the aisles; limiting sign size; and limiting noise. The amendments also codify the ability to remove all persons from council chambers and to move to a virtual meeting in the event of disruption that interrupts the council meeting. Finally, clean up changes contained in Sec. II. Communications with Council include correcting typos and grammar, and removing a reference to a city library.

NEXT STEPS

Council may adopt the proposed changes to the Council Rules of Procedure or not.

ATTACHMENT

Attachment A – Proposed Amendments to Council Rules of Procedure

COUNCIL PROCEDURE

This procedure is intended to govern the actions of the city council in the general conduct of its business and to serve as a reference in settling parliamentary disputes. In handling routine business, the council may by general consent use a more informal procedure than that set forth in this procedure.

This procedure may be suspended at any time by vote of five council members or of two-thirds of the council members present, whichever is the greater.

I. Presiding Officers: Mayor and Mayor Pro Tem.

Council members shall be selected to serve as mayor and mayor pro tem. The mayor pro tem shall fulfill the position identified as "acting mayor" in Charter Section 15. All council members are equal; the mayor and mayor pro tem have no additional authority except as set forth in the City Charter, the City Code, or in these procedures. The mayor, or the mayor pro tem in the mayor's absence, shall serve as the chair of the council at all regular council meetings. The mayor or the mayor pro tem are responsible for conducting meetings in an orderly and democratic manner and assuring that minority opinion may be expressed and that the majority is allowed to rule. At the same time, the mayor and mayor pro tem retain all of the prerogatives of a duly elected council member: The mayor or mayor pro tem may make and second motions and take part in discussions and may vote on all matters not an interest prohibited pursuant to Section 2-7-2, B.R.C. 1981. In addition to chairing council meetings, the mayor is frequently called upon to perform certain ceremonial duties or to serve on intergovernmental committees. Whenever possible, the mayor shall attempt to share these responsibilities equitably among the other council members, including the mayor pro tem.

II. Communication with Council.

It is very important for the council to hear the views of members of the public. There are several ways in which a person can participate.

(a) City phone numbers and email addresses are provided to reach all council members.

(b) Electronic means of communication with and from council members as a group is provided through Hotline and Council Correspondence on the city's website. The Hotline is an electronic means for council members to ask questions of staff and convey information to the public that is posted in a manner that is available to the public on the city's website. Staff responses to Hotline questions of council members are posted on Hotline in order to be available to the public. The city's website contains a Council Correspondence email which directs the comment of the person to each council member and many staff members. The city manager's office directs questions from Council Correspondence to the appropriate staff member for response. ~~Computers are available at city libraries for those who may not be able to view the City's website from other locations~~. All correspondence to Council is published online.

(c) Open Comment. At the beginning of every regular council meeting, up to forty-five minutes are set aside for open comment. During that time, twenty randomly selected members of the public are invited to express their views on any issue, except those set for public hearing later in the meeting.

(d) Public Hearings. Public hearings are held to seek input on a particular ordinance or policy decision. These hearings provide an organized forum to address a particular subject. Statements made during a public hearing become part of the record for council's decision on the issue. Quasi-judicial hearings

shall be conducted pursuant to Chapter 1-3, "Quasi-Judicial Hearings, B.R.C. 1981. Provided, however, witnesses shall not be required to testify under oath.

(e) Comment on Motions Made Under Matters. The council will consider motions arising from matters raised by the mayor, members of council, the city manager, or the city attorney. No vote will be taken on these motions until the public has been given an opportunity to comment.

III. Agenda.

a. Notice. The agenda is generally distributed to council members no later than the Thursday preceding the council meetings, whether regular, special, or continued meetings. Items will generally not be ~~added, but~~added but may be added or deleted by the agenda committee or by a majority of council. Whenever practicable, notice shall be given of all agenda items by publication of the title or a general description thereof in the Boulder Daily Camera on the weekend preceding the council meeting. However, failure to give such notice shall not invalidate any action taken by the council, and such provision shall not apply at all to items adopted by emergency.

b. Council Agenda Committee (CAC). Items are placed on the agenda by the staff, with the approval of the members of an agenda committee in attendance at a meeting called by the mayor to review the agenda. In addition to the mayor and the mayor pro tem, the council designates a third council member for six to seven weeks at a time (depending on the council meeting cycle) to serve on the agenda committee. A sign-up list is circulated to council members. Replacements are solicited from all remaining council members whenever an agenda committee member cannot attend a meeting. If more council members wish to attend ~~than~~then there are vacancies, the mayor makes the appointment. Meetings of the agenda committee are open to the public and the press/~~media, but~~media but are not advertised. No more than four council members may attend an agenda committee meeting at any time. "Drop-ins" should notify the mayor in advance whenever possible. Presence of staff members at agenda committee meetings is subject to the discretion of the city manager.

c. Agenda Review. The agenda committee holds an agenda review to review the successes and the difficulties of the council in dealing with agenda items during the preceding calendar quarter and to schedule agenda items for the next calendar quarter, when such items are known in advance. Council members who wish to have the entire council address an agenda issue should identify the issue and ask the agenda committee to schedule a discussion under Matters.

d. CAC Mission. Representing the views of the entire city council, the agenda committee: 1) sets the agenda for council meetings and study sessions; 2) comments on written agenda materials to assure that all reasonable questions anticipated from the public and any member of the council are answered; 3) acts as a sounding board for staff; 4) informs the city council and staff of emerging issues; 5) requests that staff supply information to the council concerning emerging issues; and 6) discusses correspondence and email to the mayor and the city council and responses to open comment. The agenda committee assigns the responsibility for drafting and signing such responses. But individual council members may respond as well, at their discretion. The agenda committee determines when boards and commissions should be requested to address the council concerning their deliberations, and when matters should be referred back to a board or commission before council action is scheduled. Generally, it is expected that boards and commissions with an adopted mission statement that includes a certain area of concern will be asked to advise council about any agenda item dealing with that area of concern. The agenda committee also establishes check points for council input on important staff projects. Agenda committee minutes are made available to the council by email. Approved draft agendas and the council calendar for the upcoming meeting agendas are attached to the minutes.

e. CAC Ground Rules.

1. No Decisions. The agenda committee should not make a "decision" on anything except for specific decisions relating to the council agenda and assignment of correspondence for a response. If a scheduling item is controversial, the CAC shall bring the matter to the entire council.

2. No References. Agenda committee members should avoid reference to the meeting in debate, as by statements such as: "This was discussed in the agenda committee meeting," or "We dealt with that question in the agenda committee meeting." Above all, there should be no reference to any "decision" having been made by the agenda committee.

3. CAC Communications with Council. If, as a result of an agenda committee meeting, the committee determines that it is necessary to contact the remaining council members to convey information or to obtain advice about proposed staff action, staff should contact each available council member. Council members, including agenda committee members, generally should not be involved in such communications. But this does not restrict any council member from contacting other council members and conveying any information or requesting any advice or action. Agenda committee members and other council members may communicate with other council members about any matter, but such process should not substitute for staff action as set forth ~~above, and~~above and is subject to the "open meeting" requirements of state law (§ 24-6-402(2)(d)(III), C.R.S.).

4. CAC to Focus on Council Concerns Rather Than Personal Point of View. It is not appropriate for agenda committee members to use the agenda committee meeting to advance their own political agendas or points of view. This is conceded to be difficult to avoid, especially when three council members are discussing an upcoming decision, but it is essential.

5. CAC Not to Indicate Council Support. Prior to approval by the council, the agenda committee and staff are prohibited from indicating any city commitment to city sponsorship or support of an event or to city support for a development proposal.

6. Questions to CAC. Council members are urged to send questions, comments, and suggestions to the staff or to members of the agenda committee prior to its meeting. The agenda committee will endeavor to discuss all such questions, comments, and suggestions at its meeting.

7. Postponement of Issues. It is acceptable for members of the city council to ask for postponement of issues to accommodate a brief absence, when the rescheduling will not inconvenience other council members and the individual council member has a significant interest in the particular issue being decided. However, no council member has a right to require such a change, and the decision of the CAC is generally treated as final, although the council is, as always, the final decision maker.

8. No Rule of Three. Meetings of the CAC shall not be used to indicate a "rule of three" for information/research requests. See Section X, Research and Study Sessions, Subsection A, Information/Research Requests/Rule of Three.

9. Thursday Meetings. CAC shall not schedule council meetings on dates other than Thursdays without polling all council members for their availability. CAC shall not schedule meetings on the fifth Thursday of any month without the prior consent of council.

10. Consent Items, Urgent Items, Time Budget, and Order of Agenda. The CAC designates potential consent items, so that they can be dealt with in a summary fashion. The CAC also designates urgent items, for which delay is not possible or inadvisable, so that the council can deal with such items prior to adjournment. The CAC sets the order of the agenda and sets a time budget for each item. Based on the estimated time budget, CAC shall make every effort not to schedule any meeting with an expected adjournment time after 10:30 p.m.

IV. Council Meeting Agenda.

a. Council meetings shall be conducted as follows:

1. Call to Order and Roll Call. Meetings are generally called to order at 6 p.m. sharp.

2. Open Comment.

A. Time for open comment on any subject not scheduled for public hearing is provided for at each regular business meeting of the council. Up to forty-five minutes is provided at the beginning of the meeting at the conclusion of the COVID-19 briefing and response. Speaking shall be limited as set forth in subsection (C) below. During open comment, an individual speaker can speak for up to two minutes.

B. Only one person~~speaker~~ is permitted at the podium at a time, unless a speaker requests a companion due to ~~n accommodation~~ a disability or~~such as~~ or required for interpretation assistance ~~is requested~~.

C. A speaker shall begin by stating his or her name and address. If a speaker believes that providing such information would put the speaker at risk, the speaker need not disclose his or her name or ~~address, but~~address but should say whether or not he or she resides in the City of Boulder.

~~C~~D. The ~~sign up~~sign-up form for speakers will be available via the internet, beginning at 8:00 a.m. on the Friday after the day that the agenda for the meeting is made available (Thursday). Speakers will designate in the form if they wish to speak "in-person" or "virtually.". ~~:~~ Online sign up shall end at 2:00 p.m. on the Wednesday preceding a meeting, even if the day is a holiday. No later than 5:00 p.m. on the day prior to the meeting (Wednesday) or noon on the day of the meeting, if the day prior to the meeting is a city holiday, the city clerk shall post on the internet a list of no more than twenty individuals who will be invited to speak at the meeting. If more than twenty people register to speak, the city clerk shall select twenty names at random from among those who have registered. The clerk~~and~~ shall exclude speakers who spoke during open comment at the ~~regular or special~~ meeting immediately preceding the current meeting unless less than twenty people have registered to speak. In that situation, the clerk will randomly select from the group of speakers who spoke at the prior meeting during open comment to fill the remaining slots . ~~A person is prohibited from speaking during open comment two meetings in a row.~~

E~~D~~. Any person selected to speak who requires a city-provided ~~an~~ interpreter shall be invited to speak first. Any person wishing to use an electronic presentation as part of his or her comments shall provide the presentation to the city clerk no later than 2:00 p.m. on the day of the meeting. The presentation will be provided to members of council to review. No presentation will be shown during a council meeting.

F~~E~~. At the conclusion of Open Comment, the presiding officer may ask city staff for any response to matters raised during Open Comment. At the conclusion of the staff response, any council member may ask that the original speaker be recalled to reply to the staff response. Such comment shall be limited to one minute.

3. Consent Agenda. Including generally, but not strictly limited to:

A. Minutes. Minutes of previous meetings are approved as made available beforehand, and as corrected by the city clerk, in response to council suggestions, in the discretion of the clerk. This procedure should not be used to alter remarks to express a more considered point of view. Such remarks should be made under item 8, Matters from the Mayor and Members of Council. A motion to approve the minutes is deemed to include such corrections, as well as any corrections made at the meeting.

B. First Readings. Although generally calendared as part of the consent agenda, the city manager may request that a particular first reading be scheduled early on the agenda when staff/council interaction on the item is important on first reading. See Section V, Procedure in Handling Ordinances, Resolutions and Important Motions, Subsection C, First Reading.

C. Second Readings. Second Readings shall generally be scheduled for a public hearing. The Council Agenda Committee may schedule second reading of ordinance on consent only for the following:

1. The Quarterly Supplement codifying previously adopted ordinances.

2. Ordinances for which the council has previously held a public hearing.

3. Other ordinances that are routine in nature, which do not elicit public interest and to which no council member objects.

4. Call-Up Check-In. Call-ups (typically appeals to council) are considered during item 4. If the decision about whether to exercise the council's call-up authority is a matter of substantial public interest, the agenda committee shall schedule a public hearing for consideration of the potential call-up. Call-ups scheduled for public hearing shall not be considered as part of a call-up check-in.

5. Public Hearings. Expected substantial public comment items are generally placed first on the agenda, in the order of public interest in the item, as anticipated by the council agenda committee, but critical short items may be placed first when deemed appropriate by the agenda committee. Items from the city manager, city attorney, or mayor and members of council which are of substantial public interest are placed in this section of the agenda, in the order of public interest. Provided however, that CAC may place matters of significant public interest at the beginning of the meeting before open comment. CAC shall not schedule more than two substantive public hearings at any council meeting. The ~~sign up~~sign-up form for speakers will be available via the internet, beginning at 8:00 a.m. on the Friday after the day that the agenda for the meeting is made available (Thursday). Speakers will designate in the form if they wish to speak "in-person" or "virtually". Online sign-up shall end at 2:00 p.m. on the Wednesday preceding a meeting, even if the day is a holiday. A speaker shall begin by stating his or her name and address. If a speaker believes that providing such information would put the speaker at risk, the speaker need not disclose his or her name or address but should say whether or not he or she resides in the City of Boulder. During a public hearing an individual speaker can speak for up to three minutes. However, a speaker's time may be limited to two minutes if more than fifteen people have signed up to speak. Three or more people can pool their time so one speaker can speak for five minutes, if all of the people pooling time have signed up to speak when the spokesperson is called to speak and are in the council chambers or present virtually when the speaker is called. The five minutes of pooled time can be reduced to four minutes by the presiding officer if the time for individuals has been reduced to two minutes. Speakers will need to designate on the form if they are pooling with 2 other speakers and indicate who the primary speaker will be and provide the names of the individuals they are pooling with. An applicant may request additional time as reasonably required to present his or her case. In response, the mayor may designate a longer time period for applicants, generally not to exceed fifteen minutes and to occur immediately upon the opening of the public hearing, in order to give the public an opportunity to respond. Additional support for applicant's positions should come from individual witnesses. Board or commission members, whose board or commission acted on a matter and who have been designated to speak by the board or commission, will be allowed to speak during staff presentation or at the beginning of the public hearing. A board or commission may designate a person who voted with the majority or a person who voted with the minority or one speaker from each side.

6. Matters from the City Manager. No final decision may be made under this item, or item 7, Matters from the City Attorney, or 8, Matters from the Mayor and Members of Council. All decisions shall be

made either after a public hearing or on the consent agenda. Matters items are for informational purposes only. No actionable items shall be raised under Matters.

7. Matters from the City Attorney.

8. Matters from the Mayor and Members of Council. At this point, any council member may place before the council matters which are not included in the formal agenda. This item is generally limited to responses to open comment, appointments to boards and commissions, sharing of information, and requests for advice concerning matters pending before other bodies, requests for staff work, and requests for scheduling future agenda items. Matters requiring a formal council vote, such as motions to sponsor an event or to allocate funds, are normally placed on the agenda through the regular agenda review process, rather than dealt with under this item. If a council member wishes to reconsider a prior council decision, the council member shall request that the Council Agenda Committee schedule a discussion under item 8. Prior council decisions shall be reconsidered only after a material change in law or fact. A material change in law or fact means a change that if having occurred before the prior council decision would have made it unlikely that a majority of council would have supported the prior decision. If five or more council members support reconsidering a prior decision, the Council Agenda Committee shall be directed to schedule substantive consideration at a later meeting. No discussion of revisiting a prior decision shall exceed fifteen minutes.

9. Debrief. Council will have a brief discussion of no more than five minutes for council members to discuss issues regarding that evening's meeting. The discussion is intended to identify issues to be addressed by the Council Agenda Committee or by the council at a future meeting. This time should not be used to revisit arguments raised earlier in the meeting. The intent is to improve council's process by identifying issues concerning process, scheduling, and meeting implementation while fresh in council members' minds to allow for later discussion and resolution.

10. Adjournment. The council's goal is that all meetings be adjourned by 10:30 p.m. An agenda check will be conducted at or about 9:00 p.m., and no later than at the end of the first item finished after 9:00 p.m. Generally, absent a deadline which the council cannot affect, no new substantial item will be addressed after 10:30 p.m. At the 9:00 p.m. agenda check council will make a realistic assessment of the items remaining on the agenda. Council will table and ask the Council Agenda Committee to reschedule any item that council members reasonably believe will prevent adjournment by 10:30 p.m. The Debrief is not a substantial item. No new item shall be introduced after 10:30 p.m. unless a majority of the council members in attendance at that time agree. All council meetings shall be adjourned at or before 11:00 p.m., unless the meeting is extended by a vote of two-thirds of the council members present. Council shall attempt to schedule any matter not heard before adjournment as the first item at the next study session. If necessary, the council shall schedule a special meeting to coincide with the scheduled study session. It is assumed that council will reschedule items previously scheduled for the study session to accommodate any newly added items.

V. Rules of Speaking.

a. Mayor Directs Meeting. To obtain the floor, a council member or staff member addresses the mayor.

b. Assignment of Floor. To assign the floor, the mayor recognizes by calling out the council member's name. Only one council member may have the floor at a time. A council member shall not speak while another has the floor, except to make a point of order. The mayor generally next recognizes the council member who first asks for the floor after it has been relinquished. The mayor may, in his or her sole discretion, temporarily suspend the rules of speaking in order to permit a direct colloquy between council members with respect to an issue or motion properly before the council. All council members and staff members are requested to direct their remarks to the council action under consideration.

c. Outline of Decisions. The staff and the mayor should attempt to focus discussion of agenda items in accordance with the materials, which should contain a proposed outline of decisions.

d. Minimize Debates Prior to Public Hearings. Council members should minimize debate prior to public hearings and use the period prior to public hearings to ask questions for clarification rather than to lecture, give speeches, score debating points, or ask rhetorical questions. The mayor may intervene to avoid extended debate prior to public hearings.

e. Minimize Debates After Decisions. Council members should minimize debate after decisions and move on to the next item.

f. Motions to Table. Tabling motions are generally discussed before they are made, in order to allow for a reasonable amount of council discussion prior to making a non-debatable motion.

g. Early Warning Process. Council members should give early warning to the mayor and the city manager whenever substantial opposition is anticipated to an agenda item, so that an appropriate staff and council response can be prepared.

h. Rotation of Questions. Questions are rotated so that, to the extent practicable, different council members are given the lead on each agenda item and questions are grouped by subject matter whenever it is practicable to do so.

i. Mayor May Intervene. The mayor may intervene in council debate in order to solicit a motion after five to ten minutes of debate, seek to wrap-up discussion when debate seems to be proceeding longer than warranted, determine whether council wishes to postpone council action when more information or staff work appears warranted to facilitate a council decision, and ask council to group follow-up questions by topic.

j. No Surprises. Council members will make every effort not to surprise each other by bringing up something new at a meeting, and rather will give notice of their intention to do so as soon as practical before the meeting.

VI. Procedure in Handling Motions.

a. Making a Motion. A council member, after obtaining the floor, makes a motion. (If long or involved, it should be in writing.) The council member may state reasons briefly before making the motion; but may argue the motion only after it has been seconded; and having spoken once may not speak again until everyone who wishes to be heard has had the opportunity to speak, except to answer questions asked by other council members. Having made a motion, a council member may neither speak against it nor vote against it.

b. Seconding a Motion. Another council member seconds the motion. All motions require a second, to indicate that more than one member is interested in discussing the question. The seconder does not, however, have to favor the motion in order to second it, and may both speak and vote against it. If there is no second, the mayor shall not recognize the motion.

c. Stating the Motion. The mayor states the motion and asks for discussion.

d. Debate. General debate and discussion follow, if desired. Council members, the city manager, the city attorney or the city clerk, when wishing to speak, follow the rules of speaking outlined above. The speaker's position on the motion should be stated directly: "I favor this motion because...," "I am opposed to this because...," etc. Remarks should be addressed to the mayor.

e. Question. The mayor restates the motion and puts the question. Negative as well as affirmative votes are taken.

1. If the mayor is in doubt of the result of a voice vote, the mayor may call for raising of hands or a roll call vote.
2. If any council member is in doubt of the result of a voice vote, the council member may obtain a vote by raising of hands or by roll call by calling for it (without need to be recognized by the mayor).
3. In case of a tie vote, the motion is lost.

f. Result. The mayor announces the result. The motion is not completed until the result is announced.

VII. Procedure in Handling Ordinances, Resolutions and Important Motions.

a. Two Readings. All ordinances require at least two readings, because the city charter requires ten days' advance publication in final form. The agenda committee may require similar publication of complex or important motions and resolutions, in order to assure informed public participation.

b. Notice. All documents delivered to council members' residences or electronically prior to any meeting shall be deemed to have been received and read, unless a council member indicates to the contrary during consideration of the matter. In the event that a council member has not received and read the document in question, the mayor shall determine an appropriate course of action, which may consist of an explanation of the substance of the document by a person familiar with its contents, or a recess. Abstentions are not permitted by the city charter under these circumstances.

c. First Reading. On first reading, the clerk reads the title or the general description of the item set forth on the agenda, and the council has an opportunity to ask questions of the staff. Whenever practicable, council members ask first reading questions in writing or by email to "Hotline" in advance of the meeting no later than 5:00 p.m. on the Sunday preceding the meeting. Any remaining questions are asked at the meeting. The deadline for first reading questions is noon on the day following the meeting. Complex questions are subject to the "rule of five" for information and research requests set forth in Section X, Research and Study Sessions, Subsection A, Information/Research Requests/Rule of Three. The mayor then requests an appropriate motion. However phrased, an affirmative motion is construed as one to order the item published. Unless otherwise stated in the motion, all publication shall be by title only. The mayor then states the question, followed by proposal of amendments, if any, restates the question if necessary, and puts the question to a vote. After the conclusion of the vote, the mayor declares the item to have been ordered published or to have been rejected for publication. Publication does not constitute substantive approval of an item.

d. Second Reading. On second reading, the clerk reads the title, or the general description of the item set forth on the agenda, followed by the staff presentation, and then the council has an opportunity to ask questions of the staff. Thereafter, the mayor opens a public hearing and supervises the public hearing. If any council member wishes, questions may be asked of persons testifying. Council may consider a response to public testimony at the meeting, and the agenda committee may consider a response the following week, but the normal response is in the council members' actions on the agenda. The mayor then requests an appropriate motion. The motion should be one to adopt the ordinance, and, however phrased, an affirmative motion shall be so construed. Unless otherwise stated in the motion, all publication shall be by title only. The mayor then states the question, followed by discussion by the council, the city manager and the city attorney and dialogue with staff in response to questions raised by the council, followed by debate, proposal of amendments, if any, and consideration thereof in the form of motions. After debate, the mayor restates the question and requests that the clerk conduct a roll call vote. After the conclusion of the roll call vote, the mayor declares the ordinance adopted or defeated.

e. Resolutions. Resolutions are handled in the same manner as the second reading of an ordinance, except that the vote need not be by roll call.

f. Emergencies. Ordinances may be passed by emergency on first or second reading, upon appropriate findings of urgency and need. In the event of passage by emergency on first reading, the first reading is handled in the same manner as the second reading of an ordinance, and the second reading is omitted. Council should endeavor to limit emergency ordinances to the quarterly supplement, matters in which there is a deadline, and matters affecting life, health or safety.

g. Amendments. Non-emergency ordinances which are amended in substance rather than in form on second reading are republished in the same form originally published (either in full or by title only), as amended, and voted on again at a third reading, without further staff presentation or public hearing. The council retains the discretion to set a public hearing on third reading by majority vote. The same procedure applies to later substantive amendments as well.

VIII. Voting.

Voting ultimately decides all questions. The council may use any one of the following ways of voting:

a. Voice Vote. All in favor say "aye," and all opposed say "no." The mayor rules on whether the "ayes" or the "nos" predominate, and the question is so decided.

b. Raising of Hands. All in favor raise their hands, and then all opposed raise their hands. The mayor decides which side predominates and notes dissents for the record.

c. Roll Call. The clerk calls the roll of the council members, and each member present votes "aye" or "no" as each name is called. The roll is called in alphabetical order, with the following special provision: On the first roll call vote the clerk shall begin with the first name on the list; on the second vote, the clerk shall begin with the second and end with the first; and so on, continuing thus to rotate the order. This rotation shall continue from meeting to meeting.

IX. Nominations and Elections.

The mayor and mayor pro tem shall be selected in the following manner:

a. In odd-number years, after the first Tuesday in November, but no later than the second Tuesday in November, any council member with an unexpired term or council member elect may express his or her interest in serving as mayor or mayor pro tem. Any person expressing an interest shall post a Hotline message regarding his or her interest in and qualifications for either or both positions.

b. The council meeting convened pursuant to Charter Section 9, on the third Tuesday in November of odd-numbered years, shall be chaired by the council member with the most consecutive years of service on the council who did not express an interest in serving as mayor or mayor pro tem. If there is more than one council member with the most consecutive years of service on council not seeking to be elected mayor or mayor pro tem, the city clerk shall place the names of each such council member in a container and select one who shall preside at the convening meeting.

c. In the interest of transparency and public participation, after the new council members are sworn in pursuant to Section 9 of the Charter, the meeting convened at 10:00 a.m. on the third Tuesday in November shall be continued until 6:00 p.m. At that time, the council shall hold a public hearing on the selection of the mayor and mayor pro tem.

d. The mayor pro tem shall serve for a period of one year. In even numbered years, council members interested in serving as mayor pro tem shall express interest and speak to their qualifications at the first meeting in November. In even numbered years, nominations and elections for the mayor pro tem shall be held at the second meeting in November.

e. Nominations. At the conclusion of public testimony, council will consider nominations for mayor and mayor pro tem. Any council member may nominate anyone that expressed an interest on Hotline in odd numbered years or made a speech at the first meeting in November of even numbered years, including himself or herself, for either position. Provided, however, that the requirement of prior expression of interest shall be waived for any council member whose election was not decided before the second meeting in November. Nominations for mayor and acting mayor (generally referred to as mayor pro tem) are made orally. No second is required, but the consent of the nominee should have been obtained in advance. Any person so nominated may at this time withdraw his or her name from nomination. Silence by the nominee shall be interpreted as acceptance of candidacy.

f. Order of Vote. A motion then is made and seconded to close the nominations and acted on as any motion. The voting is accomplished by raising of hands unless there is only one nomination and a unanimous vote for the candidate. The names shall be called in alphabetical order or reverse alphabetical order depending upon a flip of a coin by the clerk, who shall thereafter alternate the order for all further election ballots during the same meeting.

g. Ballots. If it is the desire of the council to use paper ballots rather than a voice vote, such a procedure is proper. However, since there is no provision for a secret vote, each ballot must be signed by the council member casting the vote.

h. Elimination Process. If any of the candidates nominated receives five votes on the first ballot, such person is declared elected. If none of the candidates receives five votes on the first ballot, the candidate (plus ties) receiving the lowest number of votes is dropped as a candidate unless this elimination would leave one candidate or less for the office. If this elimination would leave one candidate or less for the office, another vote is taken, and once again the candidate (plus ties) receiving the lowest number of votes is dropped as a candidate unless this elimination would leave one candidate or less for the office. In the event that one candidate or less is left for the office after the second vote, a flip of a coin shall be used in order to eliminate all but two candidates for the office.

i. Impasse Process. In the event that neither of the two final candidates receives five votes on the first ballot on which there are only two candidates, another vote shall be taken. If no candidate receives five votes on the second such ballot, the candidate who receives the votes of a majority of the council members present shall be declared elected. If no candidate receives such a majority vote, the meeting shall be adjourned for a period not to exceed twenty-four hours, and new nominations and new ballots shall be taken. If no candidate receives five votes on the first ballot at the adjourned meeting on which there are only two candidates, another vote shall be taken. If no candidate receives five votes on the second such ballot, the candidate who receives the votes of a majority of the council members present shall be declared elected. If no candidate receives a majority vote on the second such ballot at the adjourned meeting, a flip of a coin shall be used to determine which of the two final candidates shall be declared elected as mayor or mayor pro tem.

j. Appointment of Board Alternates. In the event that the Boulder Revised Code provides for the appointment of temporary alternate board members, such members shall be appointed as follows: The most recently departed member of the board needing a temporary alternate, who is eligible and able to serve, shall be appointed. In the event that more than one member departed at the same time, alternates shall be chosen in reverse alphabetical order, with appointments alternating between the eligible and able former members who departed at the same time. In the event that the most recently departed member is not eligible or able to serve, the next previously departed member shall be chosen, applying the procedure above if there is more than one potential appointee. No person shall be eligible for a temporary alternate appointment if he or she was removed from the board by the council. A temporary alternate shall be appointed only when a member's absence either results in the lack of a quorum or may prevent the board from taking action. No person appointed as a temporary

alternate shall serve at two consecutive meetings of the board to which he or she is appointed unless it is necessary to complete an agenda item that has been continued to another meeting.

k. Boards and Commissions. Elections to fill positions on boards or commissions shall be conducted in the same manner. However, a majority of the council members present rather than a majority of the full council is sufficient to decide an election of this nature. Each board or commission vacancy shall be voted on separately.

l. Advertising of Vacancies After Partial Terms. Prior to advertising board and commission vacancies, when a person has already served on the board or commission and is seeking reappointment, council should make the decision of whether or not to advertise that particular vacancy.

X. Research and Study Sessions.

a. Information/Research Requests/Rule of Three. Requests for information should be directed to "Hotline," or, if a public request is not appropriate, directly to the city manager or the city attorney. Requests for a briefing should be directed to the city manager or the city attorney. A single council member may require the city manager or the city attorney to provide available information at any time or to answer any question concerning an agenda item. The concurrence of three council members is required to assign a matter for research by staff. For staff to spend more time than the city manager or the city attorney considers reasonable in light of other staff time commitments, the concurrence of five council members is required. In such case, the manager or attorney shall report the results of the preliminary research and an estimate of the time required to complete the task as the manager or attorney proposes. In any case, a vote shall be taken at a council meeting, but work may proceed in an emergency pending such vote. The council shall be informed of any such emergency work. Requests for information relating to an agenda item should be made sufficiently in advance to allow staff time to assemble the requested information. Requests for information relating to a quasi-judicial matter before the council are permitted provided that staff shall inform the applicant of the request and shall provide the applicant with a copy of any response.

b. Budget Rule. A matter shall be placed before the council for decision during the deliberation of the budget by a vote equal to or greater than the number of council members remaining at the meeting after deduction of the majority thereof.

c. Study Sessions. The chair of each study session shall be selected through rotation of council members who have expressed an interest in chairing study sessions. The Mayor and Mayor Pro Tem may be included in the rotation. The order of the rotation shall follow generally the rotation of members at the Council Agenda Committee, with the Mayor or Mayor Pro Tem presiding when a member is not available, has not expressed an intent to chair a study session or the member agrees to defer to the Mayor or Mayor Pro Tem. Materials for study sessions generally will be made available to the council and the public at least ten days before the date of the study session. Notice will be given as for other council meetings. Written comments received by staff prior to noon on the Thursday preceding study sessions will be forwarded to all council members that evening. Testimony of persons other than staff or consultants or subject-matter experts designated by the city manager is not permitted at study sessions unless a majority of the council members present votes to suspend this rule. The council will give direction to staff at study sessions for the presentation of action items at future regular council meetings. Full summaries of study sessions shall be placed on a later council agenda for approval, including the direction given, any remaining issues and any staff reaction or proposed work plan in response to the study session.

XI. Procedure in Handling Major Capital Improvement Projects.

Major capital improvement projects shall be handled, to the extent practicable, in accordance with the City Plans and Projects Handbook, dated November 2007. Failure to follow any aspect of such processes shall not be grounds for any challenge to any city project. Prior to a development review decision by the planning board or approval of the community and environmental assessment process by an advisory board, the council may determine by motion to review the project prior to the decision on the concept review or community and environmental assessment process. If so, the manager will schedule a public hearing and consideration of a motion directing staff concerning: 1) the goals and objectives of the program which will be served by the project, and 2) the conceptual design of the project. For those projects requiring development review, the council will deal only indirectly with the factors which may ultimately be entailed in a development review application under Chapter 9-4, "Land Development Review," B.R.C. 1981, in recognition that it may later be called upon to adjudicate such questions on a call-up of a planning board decision.

XII. Council Calendar.

The city publishes a calendar of hearings set by city staff and boards and commissions. Any council member may attend such hearings and events, but council members may not testify at a board or commission hearing and may be disinvited from ceremonial events by the host. Council members are responsible for notifying the council office of hearings and events for which they are the liaison to the council.

XIII. Council Member Appointments.

The council may appoint council members to serve on ad hoc and ongoing intergovernmental committees, such as the Colorado Municipal League Policy Committee, the Denver Regional Council of Governments, the National League of Cities, or the Boulder County Consortium of Cities. Council members may be appointed for staff activities on an ad hoc basis. Appointments shall be made at council meetings, after notice to the council that the appointment will be considered as part of the agenda of the meeting. The mayor appoints one of the members to the Housing Authority and one to the Urban Renewal Authority, in conformity with state law, but council is notified at a council meeting of each such appointment, and the Urban Renewal Authority appointment is subject to council ratification. The council appoints one of its members to the board of directors of the Boulder Museum of Contemporary Art, the Boulder Convention and Visitors Bureau, the Colorado Chautauqua Association, the Downtown Business Improvement District Board, the Rocky Flats Stewardship Council, the Commuting Solutions Committee, the Mile High Flood District, the Boulder County Resource Conservation Advisory Board, and the board of directors of the Dairy Arts Center. The mayor will serve on the Metro Mayor's Caucus and the US 36 Mayors and Commissioners Coalition. Council members are expected to inform the council of their committee activities and to request advice on important policy issues.

XIV. Parliamentary Procedure.

Except as otherwise provided herein or as advised by the city attorney, all matters of procedure are governed by the then current Robert's Rules of Order Newly Revised.

XV. Declarations and Resolutions.

a. Mayor to Screen. All matters proposed for council or mayoral action which commemorate a period of time or commend the actions of a person or a group or endorse a position or an idea not directly related to the affairs of the city shall be screened by the mayor.

b. Mayoral Declarations. If a group with substantial local support requests such action, and the mayor determines that there is no substantial political issue concerning such action, the proposed declaration shall be included in the agenda for the Council Agenda Committee. Any council member who would prefer that the declaration be issued by the entire council, read out loud at a council meeting or discussed by the entire council shall inform the Council Agenda Committee. Depending on the specific request the Committee can decide to issue the declaration from the entire council (not just the Mayor), schedule a time for reading at a future council meeting or schedule consideration of whether to issue, amend, or deny the declaration at a future council meeting. If no council member seeks full council consideration, the Mayor may sign the declaration. All signed declarations shall be posted on the city's website.

c. Council Resolutions. In extraordinary circumstances, if the group supporting the action determines that it wishes council action rather than a mayoral declaration, and the action otherwise meets the criteria set forth above, the mayor may, if the mayor considers such action appropriate in light of the importance of the action and the additional business on the council agenda, place a resolution on the agenda for council action.

d. Resolutions. Resolutions are appropriate for legislative concerns, including, without limitation, conveyances of positions or ideas to other legislative and administrative bodies. But all legislative actions must be by ordinance.

e. Political Questions. In the event that a substantial political issue is determined to be presented by a proposed declaration, the mayor shall not act or place the matter on the agenda, but instead will inform the group supporting the action that the matter will be placed on the agenda only if a majority of the council members present at a meeting of the council so directs. The burden shall be on such group to present the issue to the council. The mayor may request council advice at any time concerning proposed mayoral or council action.

f. Foreign Policy and National Policy Questions. Council shall not act on a foreign policy or national policy issue on which no prior official city policy has been established by the council or the people, unless sufficient time and resources can be allocated to assure a full presentation of the issue.

g. Fund-Raising. Publicity for fund-raising efforts and community events will be deemed inappropriate for council action, although major efforts and events may be commemorated if the majority of the council members present at a meeting of the council so directs.

XVI. Rules of Decorum.

a. Council Intent for Rules of Decorum. The city's business is conducted at city council meetings by the elected officials of the city. All council meetings are open to the public, but the public's participation is permitted only at formal council business meetings during the time and in the manner set forth in these rules. Public participation is generally not permitted during study sessions and other informal council meetings, although the council may permit public participation and provide reasonable time and manner restrictions. T~~t~~he public is encouraged to express comments in writing or other communication prior to those meetings. In order for the council to conduct its business in a manner completely open to the public by video, rules of decorum are necessary. Historically, council meetings have lasted numerous hours which may limit the practical ability for the public to participate and the effectiveness of staff to make presentations and elected officials to discuss issues and make decisions. The intent of these rules is to:

   1. Provide a safe and secure setting for council and the public to attend to the city's business.

   2. Enable council to conduct its deliberative process without disruptions ~~interruption~~ in a manner that can be heard and viewed by all viewing and recorded for the simultaneous or later viewing by the public.

3. Ensure that the public has a full opportunity to be heard during public hearings and open comment periods of council meetings.
4. Facilitate transparency in the conduct of council meetings so that all persons have the opportunity to observe and hear all of the council discussion and votes.
5. State specific rules so that all may know the rules in advance and be subject to the same rules.
6. Limit interruptions, unreasonable delay, or duplication of comments, presentations, or discussion.
7. Develop an atmosphere of productive civic discourse that is respectful of diverse opinions and allows presentation of positions that vary from the position of others at the meeting without insults or intimidation.
8. Balance the need for the council to conduct effective meetings without the meetings extending late into the night or early morning with the need to give a full opportunity for the public to be heard.
9. Facilitate council meetings as business meetings, therefore public comments should relate to the business of the city and, as such, be addressed to the council as a whole, which conducts the business of the city.
10. Adopt these rules of decorum as the standard for conduct of meetings of the city council and staff of the city.
11. Protect city property from damage.

b. Rules of Decorum for the Public. During all times a meeting of the city council is being conducted, the following rules shall apply:

1. Prior to addressing council, a person shall sign-up providing information for the council record.
2. All remarks to the council shall be only after the speaker is acknowledged by the presiding officer.
3. While in attendance at a council meeting, no attendee shall disrupt, disturb, or otherwise impede the orderly conduct of any council meeting in a manner that obstructs the business of the meeting. This includes any means, including but not limited to, ~~by any means including~~ speech that creates an actual disruption, ~~including~~ or conversation with other audience members that interferes with the council members ability to hear and focus on the business or other audience members ability to hear the proceedings, ~~and in a manner that obstructs the business of the meeting.~~ Disorderly conduct also includes failing to obey any lawful order of the presiding officer to leave the meeting room or refrain from addressing the council.
4. No attendee shall make threats or other forms of intimidation against any person in the council chambers or meeting room.
5. All persons participating in a council meeting, including, without limitation, council members, staff, and attendees, shall silence all cell phones, pagers, and other electronic devices to prevent disruption at the meeting.
6. No person participating in any council meeting shall be in a state of intoxication caused by the person's use of alcohol or drugs.
7. All remarks shall be limited to matters related to the business of the city. Obscenity, racial, national origin, gender, or religious epithets, and other disruptive speech and behavior are prohibited.
8. Only one person shall be at the podium during public comment or public hearings unless a companion for a disability or for interpretation is needed.
9. No one shall stand in the aisles in violation of the fire code or in a way that obstructs the vision or audio of other audience members.

10. No signs shall be permitted in council chambers except for one sign held by a ~~human~~ person ~~and~~ measuring no more than ~~**x**~~12x12 inches which is held no higher than the person's forehead.

11. No items shall be affixed to or propped against any surface in the council chambers ~~building~~ without the permission of the city manager.

12. Clapping, snapping, shouts, lights, lasers, noisemaking devices and the like shall be considered disruptive and are prohibited except for following a ~~decorations~~ declaration or as invited by the mayor or chairperson to celebrate special events such a declarations.

c. Enforcement of Decorum. The mayor or other presiding officer of the council, with the assistance of city staff shall be responsible for maintaining the order and decorum of meetings. The mayor or presiding officer may order that any person who fails to observe these rules of decorum be muted and/or removed from the meeting, may call a recess, and may order all persons to leave ~~clear~~ council chambers:

1. The mayor or presiding officer may interrupt any speaker who is violating these rules of decorum if they are causing an actual disruption.

2. The mayor or presiding officer shall attempt to provide a verbal warning to any attendee or particular speaker that may be violating these rules of decorum, but such verbal warning shall not be required as a condition of removing an offender from the council chambers or meeting room, or taking a recess, ordering attendees to vacate the chambers, or moving to a virtual meeting.

3. These enforcement provisions are in addition to the authority held by the sergeant-at-arms or any other peace officer in attendance, to maintain order pursuant to the officer's lawful authority.

4. Any person removed from the council chambers or meeting room shall be excluded from further attendance at the meeting from which the person has been removed, unless permission to attend is granted upon the motion adopted by a majority vote of the council.

5. Any person who has been removed from a meeting may be charged with violation of the applicable provision of the Boulder Revised Code.

6. A person removed from a council meeting may request a hearing to dispute prohibition under the provisions of Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981, if the appeal is filed with the manager within ten days of the date of prohibition. The hearing will be before a hearing officer that is appointed by the city manager. The scope of the hearing will be limited to the following: (1) whether there was a prior removal in the past twenty-four months, and (2) the nature and extent of the behavior resulting in the suspension. The hearing officer will forward a recommendation to the council to affirm the sanction, modify the sanction, or to remove the sanction to the city council for its consideration at a subsequent meeting of the council.

7. In addition to any other authority of the mayor or presiding officer, the presiding officer may call a recess during which time the members of the council shall leave the meeting room.

8. In addition to any other authority of the mayor or presiding officer, the presiding officer may make or entertain a motion to move the meeting to a virtual forum.

d. Rules of Decorum for Council. Members of the council shall attempt to balance the right of the public to know positions of the elected and appointed officials and rationale for decisions with the need for balanced discussion and timely adjournment of the meeting. In order to realize this balance, members shall endeavor to:

1. Articulate questions, opinions, comments and reasons for votes succinctly;

2. Exercise self-discipline by avoiding repeating statements of others, being verbose in expressing opinions or straying off the topic;
3. Allow the presiding officer to manage the meeting and call on members before speaking;
4. Support the presiding officer in enforcement of these rules;
5. Permit other members an opportunity to speak once on an issue before speaking a second time on the same issue;
6. Focus on the issue being discussed rather than disagreement of ideas by using "I" statements and avoiding personal attacks or assuming motives of another;
7. Consider the adopted council goals, staff work plans and limited resources when making requests for delay or additional information;
8. Acknowledge that new topics raised during a meeting by a member of the public or of the council may not have the benefit of all of the necessary background information, may not be presented from a balanced perspective, and decisions in such situations are more often emotionally driven. New topics raised during a meeting are most often best resolved by deferring the decision to the city manager or to a future agenda with direction to staff to provide background materials before the matter is considered at a future meeting. If council desires to take up a matter raised during a meeting, the request should be made and additional information requested under "Matters from the Mayor and Members of Council" portion of the agenda.

e. Interpretation of Rules. These rules are intended to support the intent of the council set forth above. These rules are not to be used to limit public participation or council debate, but to enable the effective functioning of the council. These rules are not intended to restrict an individual's right to constitutionally protected speech. Either the council or the presiding officer may temporarily suspend these rules or grant exceptions in order to effectuate their intent.

XVII. Record Retention for Executive Sessions.

Between November 5, 2014 and December 31, 2017, the city council was authorized to conduct executive sessions for the purpose of obtaining and receiving legal advice, including negotiation strategy regarding the creation of a municipal electric utility. The following rules shall remain in effect to govern retention and disclosure.

a. Any recording of an executive session shall be maintained in a secure place within the city and may not be accessed by anyone, other than the City Manager or City Attorney, their authorized delegate or a Member of the City Council, except upon order of a court of competent jurisdiction.
b. Any recording of an executive session shall be maintained until December 31, 2022, unless litigation relating to matters discussed is initiated or pending during that time in which case the recording shall be maintained until the conclusion of the litigation. The council shall be required to approve the destruction of any such recording of an executive session.
c. Council may, by unanimous vote, release all or part of a recording of an executive session.

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Consideration of a motion to authorize the city manager to enter into a settlement agreement to resolve a lawsuit filed by Sina Goharjou in the amount of $125,000

PRIMARY STAFF CONTACT
Teresa Taylor Tate, City Attorney, 303.441.3020

REQUESTED ACTION OR MOTION LANGUAGE
Motion to authorize the city manager to enter into a settlement agreement to resolve a lawsuit filed by Sina Goharjou in the amount of $125,000

ATTACHMENTS:

Description

- **Item 3F - Motion to authorize Goharjou settlement in the amount of $125,000**

CITY OF BOULDER
CITY COUNCIL AGENDA ITEM

MEETING DATE: May 16, 2024

AGENDA TITLE

Consideration of a motion to authorize the city manager to enter into a settlement agreement to resolve a lawsuit filed by Sina Goharjou for payment in the amount of $125,000.

PRESENTERS

Nuria Rivera-Vandermyde, City Manager
Teresa Taylor Tate, City Attorney
Luis Toro, Senior Counsel

EXECUTIVE SUMMARY

This matter arises out of an incident on the Pearl Street Mall. Mr. Goharjou was walking on the mall when he allegedly stepped on a corroded water meter cover, partially fell into the water meter pit, and suffered personal injuries.

Because the amount of the settlement exceeds $50,000, City Council approval of the proposed settlement is necessary pursuant to Section 2-2-14(c) B.R.C., 1981, to make the settlement legally binding.

The city manager and city attorney recommend approval of the settlement.

STAFF RECOMMENDATION

Suggested Motion Language:
Staff requests council consideration of this matter and action in the form of the following motion:

Motion to authorize the city manager to enter into a settlement to resolve a lawsuit filed by Sina Goharjou for payment in the amount of $125,000.

COMMUNITY SUSTAINABILITY ASSESSMENTS AND IMPACTS

- **Economic** - The settlement will save the city expert witness fees and staff time and eliminate the possibility of a judgment in excess of the settlement amount.
- **Environmental** – None.
- **Social** - The resolution of disputes is generally of social benefit and the resolution of this dispute will free up staff time to work on other projects.

OTHER IMPACTS

- **Fiscal** - Payment for the proposed settlement will be made from the city's Property and Casualty Fund which was established and funded for the purpose of paying claims and settling cases. This settlement is within the city's anticipated loss planning parameters.
- **Staff time** – The settlement is expected to save some city attorney staff time.

RESPONSES TO QUESTIONS FROM COUNCIL AGENDA COMMITTEE

None.

BOARD AND COMMISSION FEEDBACK

None.

PUBLIC FEEDBACK

None.

BACKGROUND

In his amended complaint, Sina Goharjou alleged that he suffered serious injuries after stepping on a corroded water meter cover on the Pearl Street Mall, and that his injuries were caused by the City's allegedly negligent inspection and maintenance of water meter covers on the Mall. He claimed that the dollar value of his injuries exceeded $700,000. The proposed settlement is in the amount of $125,000.

ANALYSIS

It is not possible to predict the outcome of a trial. Given the projected costs of litigation, the city attorney believes that it is unlikely that the city will be in a significantly better economic position by litigating the case as compared to approving the proposed settlement agreement.

The city manager also supports the proposed settlement.

Council has the option of approving or rejecting the proposed settlement. If council rejects the settlement, litigation will continue.

ATTACHMENT

Attachment A – Proposed Goharjou Settlement Agreement

SETTLEMENT AGREEMENT AND MUTUAL RELEASE

This Settlement Agreement and Mutual Release ("Agreement") is made and entered into between the City of Boulder ("City") and Sina Goharjou ("Mr. Goharjou"). The City and Mr. Goharjou are referred to collectively herein as the "Parties."

This Agreement is made in consideration of the following:

RECITALS

1. On August 30, 2023, Mr. Goharjou filed his complaint in *Goharjou v. City of Boulder*, Boulder County District Court Case No. 2023CV30615, hereinafter referred to as the "Action."

2. The complaint alleged that Mr. Goharjou suffered injuries as the result of an incident occurring on or about February 7, 2023 on the 1200 block of the Pearl Street Mall in Boulder (the "Incident").

3. The Parties now wish to resolve all claims, disputes, and differences between them in connection with the Incident and the Action.

4. The Parties understand, acknowledge, and agree that this Agreement constitutes the compromise of all disputed claims and that it is the desire and intention of the Parties to reach a final and complete resolution of all claims and causes of action between them relating to the Incident and the Action.

AGREEMENT

1. Payment. Within thirty days of approval of this Agreement by Boulder City Council, the City agrees to deliver to Mr. Goharjou's counsel the sum of $125,000 (the "Settlement Sum"), by a check made payable to Strickler, Brennan, Catlin, LLC, Client Trust Account. The City makes no representation or warranty with respect to the taxation of the Settlement Sum. Mr. Goharjou shall indemnify the City from any claims asserted by any governmental entity for taxes, penalties and interest resulting from payment of the Settlement Sum.

2. Release of Claims by Mr. Goharjou. Mr. Goharjou, for himself and his agents, attorneys, affiliates, corporations, entities, successors, administrators, employees, servants, and insurers hereby knowingly and voluntarily releases and discharges the City from any and all actions or causes of action, suits, debts, claims, demands for damages, costs, expenses, attorney's fees, or any other damages or relief whatsoever at law or in equity, whether known or unknown, held by Mr. Goharjou and arising out of or related to the Incident or the Action.

3. Release of Claims by the City. The City, for itself and its agents, attorneys, affiliates, corporations, entities, successors, administrators, employees, servants, and insurers hereby knowingly and voluntarily releases and discharges Mr. Goharjou from any and all actions or causes of action, suits, debts, claims, demands for damages, costs, expenses, attorney's fees, or

any other damages or relief whatsoever at law or in equity, whether known or unknown, held by the City and arising out of or related to the Incident or the Action.

4. Dismissal of Action. As soon as practicable after receipt of the Settlement Sum, Mr. Goharjou shall cause his counsel to file a stipulated motion to dismiss the Action with prejudice.

5. Attorney's Fees and Costs. Each Party shall bear their own costs, attorney's fees, and other expenses incurred in connection with this matter. The Parties expressly release and disclaim any entitlement they may have to the payment of costs, attorney's fees, or other expenses by the other Party related to the Incident or the Action.

6. Indemnification. Each Party agrees to indemnify the other against claims by any person, firm, or corporation made pursuant to a theory of assignment, lien interest, co-ownership, subrogation right, or other right of substitution to claims related to the Incident or the Action. This provision shall apply to, among other things, claims by governmental entities or agencies or claims by other persons or third-party insurance carriers claiming a subrogation or other interest in the Settlement Sum.

7. Representations and Warranties. The Parties make the following representations and warranties:

a. None of Mr. Goharjou's claims or the City's claims released in the Agreement has been assigned or transferred to another person or entity, and each Party has authority to execute this Agreement.

b. Each Party has carefully read, knows, and understands the full contents of this Agreement and is voluntarily entering into this Agreement after having had the opportunity to receive independent legal advice from an attorney of their choice.

c. Each Party has not relied, and does not rely, on any statement, representation, omission, inducement, or promise of any other Party (or any officer, agent, employee, representative, or attorney for any other Party) in executing this Agreement, or in making the settlement provided for herein, except as expressly stated in this Agreement.

d. Each Party has investigated the facts pertaining to this settlement and this Agreement, and all matters pertaining thereto, to the full extent necessary; and each assumes the risk that there may exist facts that each does not know exist and that, if known, would materially affect the decision to execute this Agreement.

e. Each Party is competent to enter this Agreement.

8. Cooperation and Further Acts. The Parties agree, for themselves, their heirs, executors, attorneys, agents, and assigns, that they will abide by this Agreement and that they will do all such acts, and prepare, execute, and deliver all such documents, as may reasonably be required to implement and effectuate this Agreement.

9. Interpretation and Construction. Each of the Parties has had an adequate opportunity to read and review, and to consider with her or its own attorney(s), the effect of the language of this Agreement; has agreed to its terms; and has participated in the drafting of all provisions of this Agreement. Further, the language of this Agreement shall be construed as a whole, according to its intent, and not strictly for or against any party hereto, regardless of who drafted or was primarily responsible for drafting any of the language in this Agreement.

10. Binding on Successors and Assigns. This Agreement is binding upon, and shall inure to the benefit of, the Parties and their respective agents, employees, representatives, officers, directors, subsidiaries, assigns, administrators, insurers, and successors-in-interest.

11. Jurisdiction, Governing Law, and Forum. This Agreement shall be construed in accordance with and governed by the laws of the State of Colorado, without regard to any laws relating to choice of laws or conflict of laws between or among jurisdictions. Exclusive venue for any dispute arising out of or related to this Agreement shall lie in the District Court for Boulder County, Colorado.

12. Entire Agreement. The Agreement contains the entire understanding of the Parties relating to the subject matter of the Agreement. No promise, inducement, or agreement which is not specifically provided in this Agreement has been made by any Party to this Agreement, and no warranties, representations, or undertakings are made by the Parties except as are expressly provided herein.

13. Complete Compromise. The Parties execute and agree to this Agreement, acknowledging the receipt and sufficiency of consideration for this Agreement; agreeing that this Agreement is a complete compromise of matters involving disputed issues of fact and law; and fully assuming the risk of any mistake of fact or law.

14. Assumption of Risk of Error. The Parties expressly waive and assume the risk of any and all claims, obligations, demands, rights, costs, expenses, compensation, or causes of action for damages or other relief arising out of any matter described in this Agreement or in the claims, and which exist as of this date but which they do not know or suspect to exist in their favor, whether through ignorance, oversight, error, negligence, or otherwise, and which, if known, would materially affect their decision to enter into this Agreement.

15. Counterparts. This Agreement may be executed contemporaneously in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Facsimile or email copies of signatures shall be deemed original signatures.

16. Savings Clause. If any part of this Agreement is found or determined by a court of law to be unenforceable or void, the rest of the Agreement shall survive, and be given full force and effect.

17. Modification. This Agreement may not be altered, amended, modified, or otherwise changed in any respect whatsoever except by a writing duly executed by the Parties or by authorized representatives of the Parties. The Parties agree that they will make no claim at any time or place that this Agreement has been orally altered or modified or otherwise changed by oral communication of any character.

IN WITNESS WHEREOF, the Parties have executed the Agreement as of the latest date indicated below.

Date	SINA GOHARJOU
Date	NURIA RIVERA-VANDERMYDE City Manager, City of Boulder

ATTEST:

Date	ELESHA M. JOHNSON City Clerk, City of Boulder

APPROVED AS TO FORM:

Date	LUIS A. TORO Counsel for the City
Date	MARK E. BIDDISON Counsel for Mr. Goharjou

DRAFT

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM

Introduction, first reading and consideration of a motion to order published by title only Ordinance 8622, amending Title 9, "Land Use Code," B.R.C. 1981, to simplify certain development review processes, and setting forth related details

PRIMARY STAFF CONTACT

Lisa Houde, Senior Planner

REQUESTED ACTION OR MOTION LANGUAGE

Motion to introduce and order published by title only Ordinance 8622, amending Title 9, "Land Use Code," B.R.C. 1981, to simplify certain development review processes, and setting forth related details.

ATTACHMENTS:

Description

- **Item 3G - 1st Rdg Ord 8622 to Simplify Development Review Processes**

CITY OF BOULDER
CITY COUNCIL AGENDA ITEM

MEETING DATE: May 16, 2024

AGENDA TITLE

Introduction, first reading and consideration of a motion to order published by title only Ordinance 8622, amending Title 9, "Land Use Code," B.R.C. 1981, to simplify certain development review processes, and setting forth related details.

REQUESTING DEPARTMENT / PRESENTERS

Nuria Rivera-Vandermyde, City Manager
Brad Mueller, Director of Planning & Development Services
Charles Ferro, Senior Planning Manager
Karl Guiler, Senior Policy Advisor
Lisa Houde, Senior City Planner

EXECUTIVE SUMMARY

The purpose of this item is for City Council to consider an ordinance that would amend the Land Use Code to streamline several development review processes to increase efficiency and timeliness of applications.

At the 2023 City Council retreat, council members asked Planning and Development Services (P&DS) to investigate potential policy or code changes that could make development review processes simpler and more predictable for applicants. While this item is in response to the 2023 retreat discussion, this topic was recently reinforced at the 2024 Council retreat, where the priority of "Economic Development Plan & Program Enhancements" was adopted. The changes proposed in Ordinance 8622 impact several different application types and focus on key issues identified by internal and external stakeholders.

A summary of the proposed changes can be found in **Attachment A**, and an attached annotated ordinance in **Attachment B** includes detailed footnotes describing each proposed change. A version of the draft without footnotes is provided in **Attachment C**.

STAFF RECOMMENDATION

Suggested Motion Language:

Staff requests council consideration of this matter and action in the form of the following motion:

Motion to introduce and order published by title only Ordinance 8622, amending Title 9, "Land Use Code," B.R.C. 1981, to simplify certain development review processes, and setting forth related details.

BOARD AND COMMISSION FEEDBACK

Planning Board – Ordinances changing the Land Use Code require Planning Board recommendation to City Council. Planning Board reviewed the ordinance at their meeting on May 7 and unanimously recommended approval, with one change:

Main Motion: Motion by M. Robles, seconded by K. Nordback, that Planning Board recommends that City Council adopt Ordinance 8622, amending Title 9, "Land Use Code," B.R.C. 1981, to simplify certain development review processes, and setting forth related details.

> *Motion to amend the main motion by J. Boone, seconded by M. McIntyre, to strike from the ordinance the requirement to require 2 Planning Board members to call up an item and continue to allow for call-up by one Planning Board member. Motion to amend passes 5-1 (M. Roberts opposed, L. Kaplan absent).*

Main motion, as amended by J. Boone's motion to amend, passes 6-0. (L. Kaplan absent).

Staff has incorporated the Planning Board's recommended change in Ordinance 8622, which no longer modifies the current number of Planning Board members required to call up an item.

COMMUNITY FEEDBACK

Staff has focused on a "consult" level of engagement for this project, which includes targeted engagement using the existing Planning Board and City Council public hearing process and direct engagement of development review applicants. Staff held two stakeholder discussions in late January to meet with applicants about the potential changes and solicit their input and suggestions for other process improvements. A summary of stakeholder feedback can be found in **Attachment D** and specific feedback is briefly summarized within each main topic in the *Analysis* section of this memo.

BACKGROUND

Over the last few years, P&DS staff have been working on a reimagination of the department's business practices and business model. This has included transitioning all development review services online, while also integrating in-person and telephone assistance as the public health concerns of the pandemic have improved. The department has already undertaken many steps to implement the goal of operational excellence in areas of administrative control. Though separate and distinct from the topic of this memo and initiative, these administrative and operational efforts to meet established performance standards remain ongoing, and initial trends in improving customer satisfaction and more consistently achieving performance goals are positive.

At the 2023 City Council retreat, council members asked P&DS to now also investigate potential policy or code changes that could make development review processes simpler and more predictable for applicants. Specifically, council members asked that staff identify any code-related processes that are preventing work from being done efficiently. Council members regularly hear about challenges from community members regarding the duration of land use approvals and permit approvals in the city. Staff hears similar concerns regarding application timing as well. In addition, recent analysis of the city's appointed boards and commissions highlighted increased workload issues for the appointed groups that could be reduced by making more decisions administrative.

These goals towards simplification and predictability have been reinforced more recently as well. At its recent 2024 retreat, council adopted eleven priorities, including one titled "Economic Development Plan & Program Enhancements." This council priority challenges the city organization to both move quickly to address needs within the local business community, leverage opportunities, and to envision and plan for a greater role in supporting a strong and resilient local economy.

Secondly, the city as an organization adopted a functional Citywide Strategic Plan early this year. Intended primarily as an internal organizing structure for the city's numerous workplans and initiatives, the Strategic Plan is organized around the city's Sustainability, Equity and Resilience Framework, the "Economically Vital" Goal area of the Strategic Plan includes Strategy #15: "Streamline processes for housing, parking, infrastructure, land use, and events that tie directly to priority community outcomes." This agenda item, then, advances the related supporting Priority Action Item to "Identify and implement ways to reduce bureaucracy, improve efficiency, and facilitate quicker approvals for initiatives that align with and enhance the City's priorities related to sustainability, safety, economic vitality, and community well-being," by streamlining processes, improving efficiency, and facilitating quicker reviews.

Of note, several development review procedural improvements that are consequences of code-related requirements were already initiated throughout 2023, including:

- Improvements to the accessory dwelling unit approval process
- Changes to the use table and standards that streamlined review processes for common uses like restaurants (see more detail on page 8)
- Amendments that provided flexibility on when approvals expire

As detailed below, there are several other opportunities for administrative improvements that could be made to further streamline city processes, relative to code requirements and their associated procedures.

ANALYSIS

The following sections provide background and summarize major topics related to the draft ordinance.

Planning Board Call-Ups

- Remove call-up requirement for all floodplain and wetland applications. The opportunity for these applications to be appealed by the applicant or a member of the public (and thus brought to Planning Board for decision) would remain, or for staff to refer a project to Planning Board for decision.
- Remove call-up requirement for nonresidential Use Reviews without site changes through new Minor Use Review process (see more detailed Use Reviews section below).
- Apart from code changes, staff plans to implement additional process improvements that could streamline the amount of time it takes for staff to produce the call-up memos by standardizing mapping processes and memo templates.

> **Anticipated Result:** Based on the previous five years of application data, a reduction of approximately 40% of call-up memos developed by staff and reviewed by the Planning Board, which add several weeks to each development review process for an average of 14 floodplain and wetland projects per year. This would allow staff to reallocate time to other applications and improve overall efficiency.

Use Reviews

- Develop a new "Minor Use Review" process that exempts straightforward Use Reviews for nonresidential uses in nonresidential districts that do not involve site changes from Planning Board call-up. Fees would be lower than a typical Use Review process. Notice of the application would still be provided to property owners within 600 feet of the subject property. Staff decisions could still be appealed within 14 days of the decision and then brought to Planning Board for a hearing. Staff could also refer applications to the board. Limiting this to nonresidential uses in nonresidential districts ensures that existing standards requiring ground floor nonresidential would not be circumvented and ensures that new nonresidential space in residential districts would require the full Use Review process, while uses simply replacing existing nonresidential space are eligible for the simpler process.
- Exempt Minor Use Reviews from the requirement for a Development Agreement to streamline the approval process and timeline for more straightforward proposals.
- Explore process improvements to expedite the final Development Agreement step of the approval for other Use Reviews, such as standardizing templates during the application process or reallocating workloads to expedite the signing steps.

> **Anticipated Result:** Based on 2018-2023 data, about 40% of previous Use Reviews likely would have been eligible to be processed as a Minor Use Review. Absent other recent code changes that impact Use Review requirements for some uses, removing the call-up requirement would reduce the approval process by several weeks, and the Development Agreement exemption can further reduce the process by up to 90 days. This will also reduce time and costs for applicants, support new businesses by reducing barriers, and potentially enable a richer mix of uses in the city.

Nonresidential Uses in Residential Zoning Districts

- Remove the requirement that nonresidential uses in a residential zoning district automatically require a Planning Board public hearing. Opportunity for appeal would remain in place, as well as call-up if site changes are proposed.
- Using the same logic, the requirement for automatic public hearing of dwelling units in the Public zoning district has been removed as well.

> **Anticipated Result:** Based on recent years, these changes would eliminate a few public hearings at Planning Board per year and would reduce overall approval time by at least 60 days for each of these applications.

Development Review Extensions

- Remove requirement for Planning Board approval of extensions.
- Increase staff-level extensions to two one-year extensions rather than two six-month extensions, with a requirement to demonstrate diligence and good cause.
- Replace difficult to apply "substantially complete" language, and instead require building permit and start of construction or use establishment within the three-year period.
- If no permits are obtained and construction has not begun after the three-year period, or five years with the two staff-level extensions, the approval would expire.

> **Anticipated Result:** Public hearings at Planning Board would no longer be necessary, which would reduce required staff and board time, staff would not need to process administrative extensions as frequently, and more approvals would likely be able to meet the three-year time frame, further eliminating need for extensions.

Minor Amendments

- Update both the minor modification and minor amendment criteria, using a more parallel structure of qualitative and quantitative standards.
- The changes to minor modifications are intended to improve the clarity of the language and to better summarize numerical adjustments (related to standards like floor area, open space, and others) in a table, with some flexibility added to language regarding floor area.
- For minor amendments, more substantive changes have been made to the criteria, such as allowing up to 20 percent amendments in setbacks and building location, and requiring basic intent (rather than "substantial") consistency with the intent of the approval to give more flexibility to smaller projects. Minor amendments remain subject to Planning Board call-up.

> **Anticipated Result:** More applications would be able to be processed as Minor Amendments. This would increase the number of Minor Amendments and reduce the number of Site Review Amendments, reducing cost for applicant and staff time needed on review. Greater clarity on Minor Modification standards is expected to reduce time spent by staff and applicants on interpretation.

Subdivisions

- Update lot line adjustment language to reflect current practice.
- Remove Planning Board notification of lot line elimination application decisions, which are already administrative decisions that Planning Board cannot modify.

> **Anticipated Result:** Several hours of staff time and Planning Board packet review time would be reduced.

Substitution of Use, Transitional Regulations, and Use Review Modifications

- Clarity has been added to the interrelated sections regarding transitional regulations in Section 9-1-4, the use review amendment and minor modification process in Section 9-2-15, and the definition of nonconforming use in Chapter 9-16.

> **Anticipated Result:** A reduction in staff time currently spent interpreting and providing clarity to applicants.

Vacations of Utility and Drainage Easements

- Eliminate the requirement for City Council call-up of utility and drainage easements, which are rarely, if ever, called up. Other easement vacations, like public rights-of-way or access easements would still require council review.

> **Anticipated Result:** Removal of about seven City Council call-ups per year based on recent numbers, reducing several weeks in overall approval time and several hours of staff and council review and processing time.

Other Changes: Parking for Unlisted Uses, Solar Exceptions, Multiple Buildings on RL-2 Lots

- Incorporate new options for staff determination of parking requirement for uses not listed in the Use Table.
- Modify public notice for solar exception to align with other administrative variances.
- Provide greater flexibility for RL-2 zoned properties to incorporate more than one building on a lot.

> **Anticipated Result:** Greater flexibility for some uses with unique circumstances. Several hours of staff time spent on solar exception notices that could be reallocated to other tasks.

Planning Board Call-Ups

Background

Boulder's land use code allows many application types to be decided administratively by the City Manager (delegated to staff), but then the Planning Board has the opportunity to call up the City Manager's decision. The applications that may be called up are summarized in Table 4-1. Only one Planning Board member needs to call up an item. Once called up, the Planning Board holds a public hearing at a future meeting and makes a decision on the application. Similarly, the City Council has the authority to call up any Planning Board decision but may only call up an application on a majority vote. In addition, an applicant or any interested person can appeal any staff decision.

Call-up memos describe the application request and staff provides a full analysis of the request and ultimate staff decision. Call-up memos typically take staff at least two hours to draft, plus additional time for leadership review of each item. Most of the applications brought to the Planning Board are not ultimately called up. However, the call-up procedure provides an opportunity for the Planning Board to discuss and decide on an application directly.

The application types that are currently subject to call-up by the Planning Board are:

- Expansion of Nonconforming Use
- Final Plat
- Floodplain Development Permit
- Form-Based Code Review
- Geophysical Exploration Permit
- Minor Amendment
- Minor Subdivision
- Parking reduction >25% but ≤50%
- Site Review
- Site Review Amendment
- Wetland Permit

Comparable Cities

Call-ups by a Planning Board or similar appointed group are relatively uncommon in other similarly sized Colorado communities. If present, call-up procedures in other communities are usually only established for City Council members to call up a decision. The call-up process does allow Boulder to delegate some decision-making authority to staff that other cities may not provide, with the potential for call-up of those decisions.

Appeal processes are more typically utilized in other cities which allow applicants, or in some cases residents, to appeal a staff or board-level decision. Many cities specifically identify who has standing or eligibility to appeal a decision.

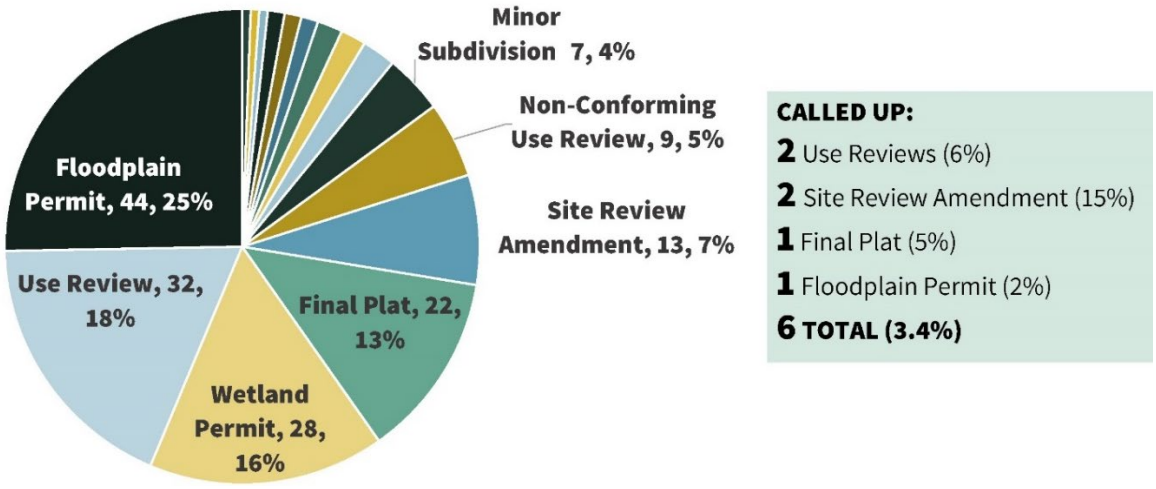
Recent Applications

Staff analyzed the call-ups from recent years. Out of 174 applications brought to the Planning Board, six (3.4%) were called up. Nearly half of the applications brought to the board for potential call-up relate to floodplain or wetland development and are very rarely called up. In the last five years (2018-2023), only one floodplain or wetland permit

was called up by the board, of 72 that could be called up. That application was ultimately approved. The required call-up step adds at least two to four weeks to the overall approval process.

Only one of the six applications had any significant deviation from the original staff approval after going through the call-up process. In that single case, Planning Board denied a Use Review application for the new construction of a drive-thru restaurant where staff had recommended approval with conditions.

Call-Ups (2018-2023)



Analysis

Staff reviewed all application types that are currently subject to call-up and considered the benefits and drawbacks of the call-up procedure noted above, particularly the most common applications such as floodplain and wetland permits, use reviews, final plats, site review amendments, minor subdivisions, minor amendments, or others. Some applications, like final plats (Sec. 81), are required by city charter to be reviewed by the Planning Board.

Planning Board Input

This topic was discussed as a matters item at the January 23 Planning Board meeting. Board members were supportive of eliminating call-up requirements for floodplain and wetland applications and staff review of other application that may not have much benefit from call-up. Members expressed interest in maintaining call-up for Site Review and some Use Reviews. Board members had differing opinions about the number of Planning Board members that should be required to call an application up – some wanted to maintain the current allowance of only one member and others were comfortable increasing it to three members.

Stakeholder Input

The stakeholders staff met with in January were supportive of changing call-up procedures and shared that the call-up process adds significant ambiguity and length to the process. The stakeholders expressed concern about the requirement that only one

member of Planning Board is required to call an application up. They noted that call-ups rarely, if ever, change the outcome of the project. Some noted that if something is to be called up, the Planning Board member should be required to provide a reason why, so that the applicant can better prepare for the public hearing.

> *Proposed Code Changes:*
>
> - Remove call-up requirement for all floodplain and wetland applications. The opportunity for these applications to be appealed by the applicant or a member of the public (and thus brought to Planning Board for decision) would remain, or for staff to refer a project to Planning Board for decision.
> - Remove call-up requirement for nonresidential Use Reviews without site changes through new Minor Use Review process (see more detailed Use Reviews section below).
> - Apart from code changes, staff plans to implement additional process improvements that could streamline the amount of time it takes for staff to produce the call-up memos by standardizing mapping processes and memo templates.
> - **Anticipated Result:** Based on the previous five years of application data, a reduction of approximately 40% of call-up memos developed by staff and reviewed by the Planning Board, which add several weeks to each development review process for an average of 14 floodplain and wetland projects per year. This would allow staff to reallocate time to other applications and improve overall efficiency.

Use Reviews

Background

In Boulder, many types of businesses and housing require approval through the Use Review process. Use Review is a discretionary review that ensures that a particular use is appropriate in a proposed location. The use must meet certain compatibility criteria identified in Section 9-2-15(e) and the process allows for conditions or standards to be applied to the use to ensure compatibility. Most Use Reviews are decided by staff but are subject to call-up by Planning Board.

Boulder also has a Conditional Use review process, which is an administrative review that is not subject to Planning Board call-up. The use standards in Chapter 6 of the land use code outline the specific use standards that are the objective conditions that the application must meet for approval. Aside from Use Review and Conditional Uses, uses are either allowed by right or prohibited.

Comparable Cities

This type of process is common in almost every community across the country, but the procedure is called by many different names, like conditional use permits, special permits, special exceptions, use by special review, or others. Most communities require a public hearing for these types of applications.

One less typical requirement of Boulder's Use Review compared to other cities is the requirement to record a Development Agreement after approval. Most other cities in Colorado require a much simpler notification document to be recorded with the county, if recording of a decision is required at all:

- In Longmont, applicants record a general Notice of Site Plan Approval with the county clerk and the city maintains a copy of the resolution that contains the conditions of approval, approved site plan, and recorded notice of approval.
- Broomfield does not require Development Agreements for standalone Uses by Special Review; Development Agreements are used only for larger development projects, particularly when there are public improvements involved.
- Louisville has applicants record a site plan set with all conditions of approval, but not a Development Agreement. If there is not site planning involved, Louisville records only the resolution of approval with any conditions listed.
- Golden does not record anything with the county for Special Use Permits. They maintain a record in their internal address files and permitting system.
- Colorado Springs does not require Conditional Use approval documentation to be recorded. They provide the applicant with stamped plans and an approval letter and maintain copies in their permitting system.
- Fort Collins does record Development Agreements associated with Final Development Plan approvals. Their staff noted that they also experience delays with recording because of the degree of coordination that Development Agreements usually require for projects.

Analysis

Use Reviews are a common development review application in Boulder, with an average of 19 applications reviewed per year. The most frequent applications in the last few years have been for the following use types:

- Restaurants, brewpubs, or taverns
- Non-conforming use expansion (no more than 10%)
- Indoor athletic facilities
- Efficiency living units
- Hotels

Use Reviews account for approximately one-quarter of all applications that Planning Board has the opportunity to call up. Only two Use Reviews have been called up in the last five years out of 32 that were brought to the Planning Board.

In the last few years, Use Reviews have been taking about 200 days for approval, or nearly seven months. Often, about 20 percent of this time involves the city waiting for the applicant to resubmit application materials with needed details. When analyzing the efficiency of development review applications, the timeliness of approvals for Use Reviews appears to be a significant potential opportunity to address.

Since Use Reviews are considered through the city's discretionary land use review process, upon application they are also routed to various other city departments for comments, including transportation, engineering, building code, fire, the City Attorney's Office, parks, housing, and landscaping reviewers. These initial reviews are valuable in

that they may identify potential issues that would come up at the time of building permit, but can sometimes contribute to the length of the Use Review process.

Development Agreements also add time to the process. Per Section 9-2-9, after final approval Use Reviews also require the execution of a Development Agreement. This can add up to 90 days to the overall approval process, depending on how expediently this final requirement is met.

Several code amendments in the last few years have addressed requirements for Use Reviews. In the Use Table and Standards project, standards for restaurants, brewpubs, and taverns were modified to increase the size allowance by right and generalize patio standards; this went into effect in December and is expected to significantly reduce the number of Use Review requests for this use type. Only about 15 percent of the restaurants that received Use Review approval in the last few years would still require that approval.

Similarly, the use type of Indoor Athletic Facilities was defined separately and a 5,000 square foot limit was established in the industrial zoning districts to allow these uses by right; this is also expected to reduce Use Review applications and already has allowed several small facilities by right in the last year that would have otherwise needed Use Review approval.

In the Zoning for Affordable Housing code changes, the requirement for properties with a certain percentage of Efficiency Living Units to obtain Use Review approval was eliminated and thus will reduce those applications.

Planning Board Input

In their previous discussion, Planning Board asked staff to look into the impact of the recent Use Table changes on the number of Use Reviews that would be required. As noted above, staff determined that the changes adopted in the Use Table and Standards project, only about 15 percent of the restaurants and 40 percent of indoor athletic facilities that recently went through the Use Review process would still require that approval.

Several members expressed an interest in maintaining Use Reviews as call-ups, while some supported the concept of exempting Use Reviews without site changes from some steps of the process. A concern was raised about allowing residential uses on the ground floor of buildings without a call-up potential, if there were no site changes. Planning Board members also asked about the need for Development Agreements for Use Reviews and one member suggested using that tool for some applications but not for all.

Stakeholder Input

Stakeholders indicated that Use Reviews rarely have unique conditions added and are seldom called up by the Planning Board. They suggested that projects without new construction involved should not have as many application requirements or as high of fee as both pose barriers to new businesses. Many businesses are paying double rent while waiting for approval to move to new locations.

Some said that some landlords encourage tenants not to even seek city approval due to the length of the approval process, and some design firms will tell clients that their tenant finish project is infeasible if a Use Review is required.

Stakeholders mentioned that the scrutiny needed for these applications are often out of sync with the potential issues. The applicant perspective is that Use Reviews tend to get stuck in infinite review cycles.

Stakeholders also noted issues with the Development Agreement process, particularly when a Use Review is required for a simple tenant change. Property owners are hesitant to sign Development Agreements because the language in the agreement is often not applicable to the work proposed – for example, references to financial guarantees and improvements that are not part of the request.

> *Proposed Code Change:*
>
> - Develop a new "Minor Use Review" process that exempts straightforward Use Reviews for nonresidential uses in nonresidential districts that do not involve site changes from Planning Board call-up. Fees would be lower than a typical Use Review process. Notice of the application would still be provided to property owners within 600 feet of the subject property. Staff decisions could still be appealed within 14 days of the decision and then brought to Planning Board for a hearing. Staff could also refer applications to the board. Limiting this to nonresidential uses in nonresidential districts ensures that existing standards requiring ground floor nonresidential would not be circumvented and ensures that new nonresidential space in residential districts would require the full Use Review process, while uses simply replacing existing nonresidential space are eligible for the simpler process.
> - Exempt Minor Use Reviews from the requirement for a Development Agreement to streamline the approval process and timeline for more straightforward proposals.
> - Explore process improvements to expedite the final Development Agreement step of the approval for other Use Reviews, such as standardizing templates during the application process or reallocating workloads to expedite the signing steps.
> - **Anticipated Result:** Based on 2018-2023 data, about 40% of previous Use Reviews likely would have been eligible to be processed as a Minor Use Review. Absent other recent code changes that impact Use Review requirements for some uses, removing the call-up requirement would reduce the approval process by several weeks, and the Development Agreement exemption can further reduce the process by up to 90 days. This will also reduce time and costs for applicants, support new businesses by reducing barriers, and potentially enable a richer mix of uses in the city.

Nonresidential Uses in Residential Zoning Districts

Background

Section 9-2-15(d)(1) identifies a few use types for which Planning Board must automatically review and decide on Use Review applications after a public hearing:

- Nonresidential uses in residential zoning districts
- Attached and detached dwelling units or a residential use in a Public (P) district
- Oil and gas operations

The requirement for Planning Board decision of nonresidential uses in residential zoning districts has been in the code since at least the early 1980s, when mixing uses was much less common and planning guidance often strictly separated uses.

Most nonresidential uses are prohibited in residential districts. Only a few even have the option to seek Use Review approval in residential districts: some public and institutional uses like government facilities or specialized instruction facilities, and some commercial uses like art studios, offices, or personal services.

In the last year, Planning Board has reviewed a few Use Review applications for nonresidential uses in a residential zoning district and has questioned the necessity of their review of these types of applications.

Comparable Cities

It is rare for other cities to differentiate a process for nonresidential uses in residential zoning districts; often it is either prohibited or requires the same type of review that any Use Review or similar application would need.

Recent Applications

All recent applications for nonresidential uses in residential zoning districts have been approved by Planning Board. The requirement to attend Planning Board typically adds at least 60 days to the approval process of an application due in part to full board schedules.

Analysis

The automatic requirement for a Planning Board public hearing reflects a dated approach to mixing of uses. In the early 1980s, when Boulder's initial mixed use regulations were put into place, mixing of uses was a new planning and zoning concept and understandably, the potential impacts were relatively unknown and a Planning Board public hearing might have seemed necessary to evaluate impacts. Forty years later, planners have significant experience dealing with mixed uses and the community is much more accustomed to and supportive of mixed uses, so this automatic requirement of a public hearing is no longer necessary.

Planning Board Input

At the January 23 meeting, board members had some clarifying questions but in general several members expressed support for removing this requirement for automatic Planning Board public hearing for nonresidential uses in residential zoning districts.

Stakeholder Input

Applicants often note the added expense and unpredictability of this requirement and were supportive of this potential change.

> *Proposed Code Change:*
>
> - Remove the requirement that nonresidential uses in a residential zoning district automatically require a Planning Board public hearing. Opportunity for appeal would remain in place, as well as call-up if site changes are proposed.
> - Using the same logic, the requirement for automatic public hearing of dwelling units in the Public zoning district has been removed as well.

- **Anticipated Result:** Based on recent years, these changes would eliminate a few public hearings at Planning Board per year and would reduce overall approval time by at least 60 days for each of these applications.

Development Review Extensions

Background

Applications for site review, use review, or form-based code review must begin and "substantially complete" the approved work within three years of final approval (Section 9-2-12). Applicants can request an extension for completion if the project is not substantially complete by that time. City staff can grant up to two six-month extensions, after which an applicant can request further extension for the Planning Board, even if the project did not require board review for initial approval. Applicants must prove that there has been reasonable diligence towards completing the project and that there is good cause for the extension. The Planning Board may impose additional conditions as needed as part of a public hearing to consider the extension.

The code is unclear about when the Planning Board approved extension begins and whether there are any limits on the lengths of extension the board may approved or rounds of extensions. This has caused confusion on some recent extensions and clarity would help streamline the process and make it more predictable for staff, applicants, and the Planning Board. The discussion about what potential new regulations should be imposed on the project that were not required initially also adds significant uncertainty.

In addition, the definition of "substantially complete" is currently detailed as "the time when the construction is sufficiently complete so the owner can occupy the work or portion thereof for the use for which it is intended." This has been viewed as inflexible, and difficult to interpret on many projects.

Comparable Cities

Most cities do specify a time limit for the validity of approvals. However, it appears to be uncommon to base the validity on the concept of substantial completion, as Boulder does. Most cities simply require that the project obtain necessary building permits or start construction before the expiration of the land use approval.

Analysis

In the last five years, applicants for 14 different projects have requested 20 extensions of a development review approval. Two of these projects requested Planning Board level extensions, which were each approved for three additional years.

The definition of "substantially complete" has been difficult to implement and may be helpful to further clarify. Because of rising development costs and the impacts of the pandemic, this section of the code could benefit from added clarity and flexibility to allow approved projects to move forward.

Planning Board Input

Planning Board expressed support for potential changes to the development review extensions and inquired about whether there has been an increase in requests due to the

COVID-19 pandemic, which appears to have had an impact on construction timing. Extension requests did increase in 2023, three years after the start of the pandemic.

Stakeholder Input

Stakeholders encouraged staff to investigate the flexibility of phasing plan requirements. They noted that changes to the "substantially complete" language would be very helpful as it causes significant stress for applicants. Other communities use the start of construction, which is more straightforward. They noted that when extensions go to the Planning Board, they always seem to be approved, so these should just be staff level reviews.

Proposed Change:

- Remove requirement for Planning Board approval of extensions.
- Increase staff-level extensions to two one-year extensions rather than two six-month extensions, with a requirement to demonstrate diligence and good cause.
- Replace difficult to apply "substantially complete" language, and instead require building permit and start of construction or use establishment within the three-year period.
- If no permits are obtained and construction has not begun after the three-year period, or five years with the two staff-level extensions, the approval would expire.
- **Anticipated Result:** Public hearings at Planning Board would no longer be necessary, which would reduce required staff and board time, staff would not need to process administrative extensions as frequently, and more approvals would likely be able to meet the three-year time frame, further eliminating need for extensions.

Minor Amendments

Background

After a Site Review application is approved, there are three options to request approval for any changes: minor modification, minor amendment, or site review amendment. These changes could be to a recent approval or could be to an approval from the 1970s. Boulder replaced the Planned Unit Development (PUD) process with Site Review in the 1990s, but still administers changes to decades of previously approved PUDs through the three amendment types.

Minor modifications are the simplest process and are reviewed administratively, but must meet specific limitations. Changes to approved Site Review applications that exceed the limits of an administrative minor modification are processed as a minor amendment. Minor amendments are also reviewed by staff but as a formal Site Review type application, they are only subject to a limited set of the Site Review criteria and are subject to call-up by the Planning Board. Full Site Review amendments are the most significant changes and require a standard Site Review application subject to all the Site Review criteria.

Minor amendments must meet several standards related to dwelling unit type, open space, building coverage, height, and infrastructure improvements. See Section 9-2-14(l).

Comparable Cities

Processes like minor amendments are common in cities with PUDs. Most cities have only two tiers of applications for changes to these applications – typically a "minor" or a "major" change. Cities that have recently updated their code often integrate tables to clearly indicate the minor numeric adjustments to approved plans that can be approved through a simple administrative process. For example, Denver has an extensive table of administrative adjustments that can be allowed and uses a template to document all minor modifications in a standardized way.

Analysis

In the last five years, 11 minor amendments have been processed and each typically takes about four months for approval. They are relatively infrequent applications, likely because the criteria do not apply to many situations. Several small-scale changes have been pushed into a full Site Review amendment process because the proposal did not meet the specific standards for minor amendment. In many cases, it is either because the criteria language is strict about meeting the original intent of the Site Review ("substantial consistency") or because it is limited to changes to "approved building location or additions to existing buildings." This language in particular often keeps many relatively straightforward proposals with minimal impact on neighboring properties from qualifying for the minor amendment process.

Planning Board Input

The board gave limited input on this issue at the January 23 meeting but did note the need to call up site review amendments.

Stakeholder Input

Stakeholders said that any changes to approved site reviews are difficult. Several felt that some changes, like moving windows or doors by a few feet, should not require even a minor modification process. Stakeholders noted a need to redefine the minor amendment process, and focus on potential for off-site impacts. Some examples were shared that involved full site review amendments for seemingly minor changes, which could be addressed by modifying the minor amendment criteria to ensure more changes can fall under that process.

> *Proposed Change:*
>
> - Update both the minor modification and minor amendment criteria, using a more parallel structure of qualitative and quantitative standards.
> - The changes to minor modifications are intended to improve the clarity of the language and to better summarize numerical adjustments (related to standards like floor area, open space, and others) in a table, with some flexibility added to language regarding floor area.
> - For minor amendments, more substantive changes have been made to the criteria, such as allowing up to 20 percent amendments in setbacks and building location,

and requiring basic intent (rather than "substantial") consistency with the intent of the approval to give more flexibility to smaller projects. Minor amendments remain subject to Planning Board call-up.

- **Anticipated Result:** More applications would be able to be processed as Minor Amendments. This could increase the number of Minor Amendments and reduce the number of Site Review Amendments, reducing cost for applicant and staff time needed on review. Greater clarity on Minor Modification standards is expected to reduce time spent by staff and applicants on interpretation.

Subdivisions

Background

Boulder has several applications that allow land to be subdivided, with all requirements detailed in Chapter 12 of the land use code. A typical subdivision requires approval of both a preliminary plat and final plat. Alternatively, some in residential districts can be processed as a minor subdivision if there are no standard modifications, no new public improvements, no steep slopes, or no existing buildings that would require removal. Some other application types are exempt from the typical subdivision process like lot line adjustments and eliminations. The City Charter (Sec. 81) addresses Planning Board review of subdivisions, as approved by voters in 1951.

Comparable Cities

Boulder's subdivision process is generally similar to other Colorado communities. The state has certain subdivision requirements as well, so there is not significant variability among cities in Colorado. For example, Longmont has a preliminary subdivision plat and final subdivision plat process, a minor subdivision plat process which includes a boundary/lot line adjustment process, and a conveyance plat process.

Analysis

There are some limitations on changes to the subdivision process due to state and City Charter limitations. However, some minor changes could improve the timeliness of process and reduce staff time. Currently, notices of decision on lot line eliminations are sent to the board as an informational item, but the board does not have an ability to affect or change the administrative decision. This board notification process could be eliminated to save staff and board review time. Additionally, there is some language in the lot line adjustment section that does not align with current practice and could be updated.

Planning Board and Stakeholder Input

Changes to the subdivision process were not discussed by the Planning Board on January 23. Some stakeholders noted that the final plat can hold up a project and requested that the Subdivision Agreement could be started earlier on in the process. Others asked that preliminary and final plat applications could be run concurrently.

Proposed Change

- Update lot line adjustment language to reflect current practice.

- Remove Planning Board notification of lot line elimination application decisions, which are already administrative decisions that Planning Board cannot modify.
- **Anticipated Result:** Several hours of staff time and Planning Board packet review time would be reduced.

Substitutions of Use, Transitional Regulations, and Use Review Modifications

Background

For the past decade or so, city staff have been processing administrative "substitution of use" applications to review and approve primarily new owners or tenants of restaurant spaces where restaurants had previously been located and where the use had become subject to conditional or use review standards since those restaurants were originally established. This review confirms that operating characteristics were not expanded beyond those previously approved for the restaurant. The process generally works well and has provided a quick approval process for restaurants, a use type that changes over frequently. A substitution of use process allows these businesses to avoid seeking a separate conditional or use review approval. It is based on the transitional regulations in Section 9-1-4(e).

The city also reviews "substitution of nonconforming use" or "change of nonconforming use" applications similarly, to swap one nonconforming use for another if it is determined not to be an expansion. This similarity in process and naming convention has caused confusion and conflation of the two separate processes.

Comparable Cities

Many other cities would require new users to obtain a conditional use approval or Use Review approval; Boulder's process appears to be more flexible than other cities in that respect. However, as noted in the memo for Ordinance 8590, Boulder has historically had fairly restrictive requirements on restaurants over time, so other cities would be unlikely to require Use Reviews for restaurants.

Analysis

In the last five years, 44 substitutions of use have been approved; 43 of these were for restaurant uses. The majority were for restaurants taking over space previously approved through Use Review that are maintaining the same operating characteristics. These reviews are sometimes required by a Use Review condition of approval or typically staff indicates the requirement when a restaurant comes in for various licensing requirements. 12 substitutions of *nonconforming* use have been approved during the same time.

Planning Board and Stakeholder Input

This topic was identified after the January 23 meeting with Planning Board and the stakeholder meetings, so specific feedback has not yet been received. However, this would not be a significant change to existing practices but would clarify existing confusing language in the code.

Proposed Change:

- Clarity has been added to the interrelated sections regarding transitional regulations in Section 9-1-4, the use review amendment and minor modification process in Section 9-2-15, and the definition of nonconforming use in Chapter 9-16.
- **Anticipated Result:** A reduction in staff time currently spent interpreting and providing clarity to applicants.

Vacations of Utility and Drainage Easements

Background

Per Section 8-6-10, public easements can be vacated through an administrative review if they are not for access or right-of-way, but the vacation is subject to a 30-day City Council call-up period. A total of 31 vacations of utilities have been processed in the last 5 years for various utility or drainage easements that were no longer needed. Vacations often involve removal of an obsolete drainage or utility easement that has been replaced with new easements as part of a development project or may involve something as simple as shaving off a portion of an easement to allow for the placement of a shed or eave.

Comparable Cities

This type of process is not always called a vacation in other cities – some other communities call this "relinquishment" or "release" of easements. Denver and Longmont require all easement vacations to be approved by their City Councils, while Broomfield allows for an administrative release of easements.

Analysis

Staff is not aware of any of the utility vacations in at least the last five years, and maybe in the last few decades, being called up by City Council. The administrative time for the many staff members involved to provide notice, prepare and review a City Council call-up memo, include the memo and materials in council agendas, and then attend City Council meetings, does not likely align with the potential benefit of these call-ups.

Stakeholder Input

This topic was identified after the January 23 meeting with Planning Board and the stakeholder meetings, so specific feedback has not yet been received. However, vacation of utility easements can frequently add time to an overall development review project, so it is expected that stakeholders would be supportive of this change.

Proposed Change:

- Eliminate the requirement for City Council call-up of utility and drainage easements, which are rarely, if ever, called up. Other easement vacations, like public rights-of-way or access easements would still require council review.
- **Anticipated Result:** Removal of about seven City Council call-ups per year based on recent numbers, reducing several weeks in overall approval time and several hours of staff and council review and processing time.

Other Changes: Parking for Unlisted Uses, Solar Exceptions, Multiple Buildings on a RL-2 Lot

Background

Parking for Unlisted Uses: Occasionally, applicants submit permits to the city with uses not listed in or contemplated by the land use code. Currently, parking for uses that are not listed in the Use Table are limited in procedural options for flexibility. For a nonresidential use, several zoning districts require one space per 300 or 400 square feet. However, some uses have unique operating characteristics that do not generate that much parking need. If the property is not large enough to be eligible for site review, there is no application process available to reduce the parking requirement for these unlisted uses beyond 25 percent.

Solar Exceptions: Section 9-9-17(f) describes the current solar exception process, an administrative procedure to vary solar access requirements. For staff to grant a solar exception, the applicant must provide affidavits from each affected property indicating there is no objection to the exception. Currently, applications without these affidavits are referred to the Board of Zoning Adjustment for decision. In addition to this, Table 4-2 requires mailed and posted notice for solar exceptions.

Multiple Buildings on a RL-2 Lot: Subsection 9-9-2(b) prohibits more than one building on a lot in the RL zoning districts, unless approved through Site Review. However, RL-2 zoning districts were largely developed under Planned Unit Development or Site Review approvals that incorporate more than one principal building per lot.

Comparable Cities

Many similar communities include alternative parking standard options for unlisted uses. Other cities around the country have solar access regulations as well, and cities have varying approaches to allowing multiple buildings on a lot.

Analysis

Parking for Unlisted Uses: While relatively uncommon, providing options for alternative ways to determine parking requirements for unlisted uses would provide a procedural option that does not currently exist, while not impacting the significantly more common listed uses.

Solar Exceptions: There have been about 20 solar exception applications in Boulder in the last five years. The solar exception notice could be better aligned with the process for other administrative variances and reduce some administrative steps in the review process.

Multiple Buildings on a RL-2 Lot: About seven percent of the land area in the city is zoned RL-2. This minor change to the code would provide greater flexibility for those lots to make changes that are aligned with the intent of their original approval without requiring a full site review amendment.

Stakeholder Input

These topics were identified after the January 23 meeting with Planning Board and the stakeholder meetings, so specific feedback has not yet been received. However, it is

expected that stakeholders would be supportive of these changes as they provide flexibility and would likely improve timeliness of solar exception applications.

> *Proposed Change:*
>
> - Incorporate new options for staff determination of parking requirement for uses not listed in the Use Table.
> - Modify public notice for solar exception to align with other administrative variances.
> - Provide greater flexibility for RL-2 zoned properties to incorporate more than one building on a lot.
> - **Anticipated Result:** Greater flexibility for some uses with unique circumstances. Several hours of staff time spent on solar exception notices that could be reallocated to other tasks.

Other Procedural Improvements Planned

Process improvements also go beyond ordinance changes. Staff is committed to continually assessing the efficiency of internal administrative practices. Based on internal and external stakeholder engagement as part of this project, some additional topics have risen as focus areas for further improvement, in addition to those noted in previous sections:

TEC Docs

Stakeholders shared many helpful comments about ways to improve the Technical Documents or "TEC Doc" process. However, the TEC Doc process is not part of the land use code. TEC Docs are the engineering plan sets and site construction drawings submitted after discretionary land use cases and before building permits. P&DS staff is already scheduled to embark on a separate update to the TEC Doc process in mid-2024.

Pre-Application Meetings

Stakeholders expressed interest in modifying the pre-application meeting process, by allowing more pre-application meetings to take place, where primary staff reviewers are present and can provide conceptual feedback on a proposal before an application is filed. Currently, staff holds about 35 pre-application meetings per year with applicants. Staff will explore whether potential changes to the pre-application meetings may improve the expediency of approvals.

Analysis of Project Objectives

Staff has identified the following key issues for the City Council's consideration:

1. Does the City Council find that the proposed ordinance implements the adopted policies of the Boulder Valley Comprehensive Plan?
2. Does the City Council suggest any modifications to the proposed ordinance?

Staff finds that the proposed ordinance implements the adopted policies of the comprehensive plan. The following analysis is provided to demonstrate how the project objective is met through the proposed ordinance.

What is the reason for the ordinance and what public purpose will be served?

City Council directed P&DS staff to investigate potential policy or code changes that could make development review processes simpler and more predictable for applicants. Specifically, council members asked that staff identify any processes that are preventing work from being done efficiently and removing tasks that add time but not value to projects. Council members regularly hear about challenges from community members regarding the duration of land use approvals and permit approvals in the city. Staff hears similar concerns regarding application timing as well. In addition, recent analysis of the city's boards and commissions highlighted increased workload issues for the appointed groups that could be reduced by making more decisions administrative.

How is the ordinance consistent with the purpose of the zoning districts or code chapters being amended?

This ordinance is focused on improvements to the development review process which provides uniform and consistent methods for evaluating and reviewing all proposals for and ensuring compliance with the development standards. In many cases as noted above, there are opportunities to make processes clearer and more efficient while still meeting this purpose.

Are there consequences in denying this ordinance?

The consequence of denying this ordinance is that some less efficient processes for development review approvals would be maintained. Frequent issues of interpretation and needed clarification would not be improved in the code.

What adverse effects may result with the adoption of this ordinance?

Staff does not anticipate that adverse effects may result with the adoption of this ordinance. While the changes focus on expediting the timeliness of some approval processes, particularly the use review process, several assurances remain in the code to avoid negative impacts.

For example, the elimination of the call-up requirement for the new Minor Use Review process is limited to only nonresidential uses in nonresidential zoning districts without site changes and retains both public notice and the opportunity for appeal. Changes to the minor amendment criteria will provide some needed flexibility while also keeping the applications subject to call-up.

Changes to the development review extension process and determination of "substantially complete" projects should clear up a frequent area of concern, while still ensuring that any development that has not obtained a building permit or started construction within three years would expire or require staff approval of an extension, who can analyze whether the applicant has proven reasonable diligence and good cause for extension.

What factors are influencing the timing of the proposed ordinance? Why?

City Council directed P&DS staff to complete process improvement work in 2023, in addition to completing a number of other ordinances that, as noted in the background section of this memorandum, also improved processes. This focused ordinance is intended to be complete in quarter two of 2024 to allow staff time to focus on the 2024-2025 work program priorities that were set by City Council at their April retreat.

How does the ordinance compare to practices in other cities?

Analysis of each focus area of change and practices in comparable cities has been provided in the above summary of changes section of this memorandum.

How will this ordinance implement the comprehensive plan?

This project implements several relevant policies noted below. The process improvements will support the efficiency of city decision making, while still ensuring potential impacts of development proposals are adequately mitigated.

Built Environment Policy 2.13: Protection of Residential Neighborhoods Adjacent to Non-Residential Zones
The city and county will take appropriate actions to ensure that the character and livability of established residential neighborhoods will not be undermined by spill-over impacts from adjacent regional or community business zones or by incremental expansion of business activities into residential areas. The city and county will protect residential neighborhoods from intrusion of non-residential uses by protecting edges and regulating the impacts of these uses on neighborhoods.

Built Environment Policy 2.14: Mix of Complementary Land Uses
The city and county will strongly encourage, consistent with other land use policies, a variety of land uses in new developments. In existing neighborhoods, a mix of land use types, housing sizes and lot sizes may be possible if properly mitigated and respectful of neighborhood character. Wherever land uses are mixed, careful design will be required to ensure compatibility, accessibility and appropriate transitions between land uses that vary in intensity and scale.

Economy Policy 5.01: Revitalizing Commercial & Industrial Areas
The city supports strategies unique to specific places for the redevelopment of commercial and industrial areas. Revitalization should support and enhance these areas, conserve their strengths, minimize displacement of users and reflect their unique characteristics and amenities and those of nearby neighborhoods. Examples of commercial and industrial areas for revitalization identified in previous planning efforts are Diagonal Plaza, University Hill commercial district, Gunbarrel and the East Boulder industrial area.

The city will use a variety of tools and strategies in area planning and in the creation of public/ private partnerships that lead to successful redevelopment and minimize displacement and loss of service and retail uses. These tools may include, but are not limited to, area planning with community input, infrastructure improvements, shared parking strategies, transit options and hubs and changes to zoning or development standards and incentives (e.g., financial incentives, development.

Economy Policy 5.03: Diverse Mix of Uses & Business Types
The city and county will support a diversified employment base within the Boulder Valley, reflecting labor force capabilities and recognizing the community's quality of life and strengths in a number of industries. The city values its industrial, service and office uses and will

continue to identify and protect them. The city will evaluate areas with non-residential zoning to ensure the existing and future economic vitality of Boulder while responding to the needs of regional trends and a changing global economy.

Economy Policy 5.05: Support for Local Business & Business Retention
The city and county value the diverse mix of existing businesses, including primary and secondary employers of different sizes, in the local economy. Nurturing, supporting and maintaining a positive climate for the retention of existing businesses and jobs is a priority. The city recognizes the vital role of small, local and independent businesses and non-profits that serve the community and will balance needs of redevelopment in certain areas with strategies that minimize displacement of existing businesses and create opportunities for startups and growing businesses. The city will continue to proactively analyze trends in market forces to shape its activities, plans and policies regarding local business and business retention. The city and county will consider the projected needs of businesses and their respective employees, such as commercial and office space, when planning for transportation infrastructure, programs and housing.

Economy Policy 5.06: Affordable Business Space & Diverse Employment Base
The city and county will further explore and identify methods to better support businesses and non-profits that provide direct services to residents and local businesses by addressing rising costs of doing business in the city, including the cost of commercial space. The city will consider strategies, regulations, policies or new programs to maintain a range of options to support a diverse workforce and employment base and take into account innovations and the changing nature of the workplace.

Economy Policy 5.14: Responsive to Changes in the Marketplace
The city recognizes that development regulations and processes have an impact on the ability of businesses to respond to changes in the marketplace. The city will work with the local business community and residents to make sure the city's regulations and development review processes provide a level of flexibility to allow for creative solutions while meeting broader community goals. This could involve modifying regulations to address specific issues and make them more responsive to emerging technologies and evolving industry sectors.

Local Governance & Community Engagement Policy 10.01: High-Performing Government
The city and county strive for continuous improvement in stewardship and sustainability of financial, human, information and physical assets. In all business, the city and county seek to enhance and facilitate transparency, accuracy, efficiency, effectiveness and quality customer service. The city and county support strategic decision-making with timely, reliable and accurate data and analysis.

ATTACHMENTS

Attachment A: Summary of Changes

Attachment B: Annotated Ordinance 8622

Attachment C: Ordinance 8622 Without Footnotes

Attachment D: Summary of Stakeholder Feedback

Attachment E: Project Charter

Summary of Changes

DEVELOPMENT REVIEW PROCESS SIMPLIFICATION

Background

Based on direction from City Council at their 2023 retreat, Planning and Development Services staff investigated potential policy or code changes that could make code-related development review processes simpler and more predictable for applicants. **Ordinance 8622** incorporates several changes to the city's Land Use Code that are intended to streamline development review processes and address common issues.

Planning Board Call-Ups

- **Remove call-up requirement** for floodplain and wetland applications and Use Review applications for nonresidential uses in nonresidential districts without proposed site changes.

Use Reviews

- **Develop new Minor Use Review process** that exempts Use Reviews for nonresidential uses in nonresidential districts without site changes from call-ups and Development Agreements.
- **Remove automatic Planning Board hearing requirement** for nonresidential uses in residential zoning districts and residential uses in public zoning district.

Development Review Extensions

- **Remove requirement for Planning Board approval** of longer extensions.
- **Increase length of staff-level extensions** to two one-year extensions.
- **Replace requirement to substantially complete a project within three years** prior to expiration with a requirement to obtain permits and start construction.

Minor Amendments

- **Update minor modification and minor amendment criteria** to provide simpler processes for changes with minimal impact.

Subdivisions

- **Remove Planning Board notification** of lot line elimination applications.

Transitional Regulations

- **Clarify interrelated language** for nonconforming uses, transitional regulations, and use review minor amendments.

Vacation of Utility and Drainage Easements

- **Eliminate City Council call-up requirement for** vacation of utility and drainage easement applications.

Other Changes

- **Provide alternatives** for parking requirements for unlisted uses.
- **Modify public notice** of solar exceptions to align with other administrative variances.
- **Provide flexibility in RL-2** district for more than two buildings on a lot.

5/16 DRAFT

Annotated Ordinance: City Council Review Draft

NOTE: This version of the ordinance includes footnotes that help to describe all of the proposed changes as well as the redlined tracked changes to existing code language.

Section 1. Section 4-20-43, "Development Application Fees," B.R.C. 1981, is amended to read as follows:

4-20-43. Development Application Fees.

(a) Subdivision fees:

...

(b) Land use regulation fees:

...

(3) An applicant for approval of a use review shall pay the following fees:

Standard

Initial application $3,420

Reapplication for same type of revision on same property within six months (if initial application is withdrawn or denied) .....$1,710.

Fee includes an initial and two subsequent staff reviews of the application. Each additional staff review of an application is .....$1,130.

Nonconforming uses and nonstandard lots and buildings

Initial application $2,870

Reapplication for same type of revision on same property within six months (if initial application is withdrawn or denied) $1,435

Fee includes an initial and two subsequent staff reviews of the application. Each additional staff review of an application is .....$950.

Minor use review

Initial application $1,710

Reapplication for same type of revision on same property within six months (if initial application is withdrawn or denied) $855

Fee includes an initial and two subsequent staff reviews of the application. Each additional staff review of an application is .....$560.[1]

...

Section 2. Section 8-6-10, "Vacation of Public Easements," B.R.C. 1981, is amended to read as follows:

8-6-10. - Vacation of Public Easements

Vacation of city easements dedicated for any purpose, except public rights of way and access easements, may occur:

(a) Through the subdivision process; or

(b) By approval of the city manager upon a determination that no public need exists for such easement. The city manager will review the requested vacation pursuant to Section 9-2-2, "Administrative Review Procedures," B.R.C. 1981. ~~If the city manager approves an easement vacation, it is not effective until thirty days after the date of its approval. Promptly after approving the vacation, the manager will forward to the city council a written report, including a legal description of vacated portion of the easement and the reasons for approval. The manager will publish notice of the proposed vacation once in a newspaper of general circulation in the city within thirty days after the vacation is approved. Upon receiving such report and at any time before the effective date of the vacation, the council may rescind the manager's approval and call up the vacation request for its consideration at a public hearing, which constitutes a revocation of the vacation.~~[2]

Section 3. Section 9-1-4, "Transitional Regulations," B.R.C. 1981, is amended to read as follows:

9-1-4. Transitional Regulations

This section addresses the applicability of new substantive standards enacted by amendments to this title to activities, actions and other matters that are pending or occurring as of the effective date ~~of this title~~thereof.

...

[1] Adds lower fee for new "minor use review" process, described in 9-2-15.

[2] This change removes the requirement for City Council call-up of utility or drainage easement vacations. These applications are very infrequently, if ever, called up by council. Many of these easement vacations coincide with major development projects and can hold up building permit issuance for an otherwise entirely approved project.

(e) Existing Uses Subject to Specific Use Standards or That Require a Use Review or Conditional Use Approval:[3]

(1) Use Review or Conditional Use Approvals: Any previously approved use that was established prior to the adoption of new regulations that make ~~such~~ the use permitted only pursuant to a conditional use or a use review shall be allowed to continue in operation. Any ~~change or~~ expansion of ~~a~~ the use ~~that was established prior to the adoption of new regulations that make such use permitted pursuant to a conditional use or a use review~~ shall be made in conformance with the applicable ~~standards~~ procedure for use review or~~,~~ conditional uses~~, or for changes or expansions to nonconforming uses~~.[4]

(2) Specific Use Standards: Any previously allowed use that was established prior to the adoption of new regulations that make such use allowed subject to specific use standards shall be allowed to continue in operation. Changes to ~~a~~ the use ~~that was established prior to adoption of the new regulations that imposed specific use standards~~ shall be made in conformance with the applicable specific use standards~~or in conformance with the applicable standards for changes or expansions to nonconforming uses~~.[5]

(3) Discontinued Use: If active and continuous operations of a use subject to the standards of paragraphs (e)(1) or (e)(2) of this section are not carried on for a period of three years, it shall thereafter be occupied and used by a use meeting the requirements of this title~~, as required by Subsection 9-10-2(a), B.R.C. 1981~~.[6]

(f) Nonconforming Uses: Nonconforming uses are subject to the standards in Chapter 9-10, "Nonconforming Standards," B.R.C. 1981.[7]

(~~f~~g) Violations Continue: Any violation of the previous land development regulations of the city shall continue to be a violation under this title and shall be subject to the penalties and enforcement set forth in Chapter 9-15, "Enforcement," B.R.C. 1981, unless the use, development, construction or other activity is clearly consistent with the express terms of this title.

[3] These changes clarify existing processes for uses subject to new review process or use standard requirements.
[4] This simplifies existing complex language.
[5] This subsection was originally added in 2019 when limited uses were added to the land use code. In 2022, this was adjusted to reflect the specific use standards that apply to some allowed uses. If an existing conforming use is not able to meet new specific use standards, any changes must be made in conformance with the specific use standards.
[6] This reference to nonconforming uses has been moved to (f) below.
[7] Separated nonconforming using into different subsection.

Section 4. Section 9-2-1, "Types of Reviews," B.R.C. 1981, is amended to read as follows:

9-2-1. Types of Reviews

...

(b) Summary Chart:

TABLE 2-1: REVIEW PROCESSES SUMMARY CHART

I. ADMINISTRATIVE REVIEWS	*II. DEVELOPMENT REVIEW AND BOARD ACTION*
Affordable housing design review pursuant to Section 9-13-4, B.R.C. 1981	Annexation/initial zoning
Building permits	BOZA variances
Change of address	Concept plans
Change of street name	Demolition, moving, and removal of buildings with potential historic or architectural significance, per Section 9-11-23, "Review of Permits for Demolition, On-Site Relocation, and Off-Site Relocation of Buildings Not Designated," B.R.C. 1981
Conditional uses, as noted in Table 6-1: Use Table	Form-based code review
Demolition, moving, and removal of buildings with no historic or architectural significance, per Section 9-11-23, "Review of Permits for Demolition, On-Site Relocation, and Off-Site Relocation of Buildings Not Designated," B.R.C. 1981	Geophysical exploration permit
Easement vacation	Landmark alteration certificates other than those that may be approved by staff per Section 9-11-14, "Staff Review of Application for Landmark Alteration Certificate," B.R.C. 1981
Extension of development approval/staff level	Lot line adjustments
Landmark alteration certificates (staff review per Section 9-11-14, "Staff Review of Application for Landmark Alteration Certificate," B.R.C. 1981)	Lot line elimination
Landscape standards variance	Minor Subdivisions
Minor modification to approved site plan	Out of city utility permit
Minor modification to approved form-based code review	Rezoning
Noise barriers along major streets per Paragraph 9-9-15(c)(7), B.R.C. 1981	Site review
Nonconforming use ~~(~~extension~~, change of use (incl. parking))~~[8]	Subdivisions
Parking deferral per Subsection 9-9-6(e), B.R.C. 1981	Use review
	Vacations of street, alley, or access easement

[8] Language throughout the ordinance referencing "change of use" has been replaced with "expansion of nonconforming use".

Parking reduction of up to 25 percent per Subsection 9-9-6(f), B.R.C. 1981 Parking reductions and modifications for bicycle parking per Paragraph 9-9-6(g)(6), B.R.C. 1981 Parking stall variances Public utility Rescission of development approval Revocable permit Right-of-way lease Setback variance Site access variance Substitution of nonconforming use[9] Solar exception Zoning verification	

Section 5. Section 9-2-2, "Administrative Review Procedures," B.R.C. 1981, is amended to read as follows:

9-2-2. Administrative Review Procedures

(a) Purpose: Administrative review of projects will occur at various times in project development to ensure compliance with the development standards of the city.

...

(d) Conditional Uses:

...

(5) Expiration: Any conditional use approval that is not established within one year of its approval, is discontinued for at least three years, or is replaced by another use of land shall expire.[10]

...

Section 6. Section 9-2-7, "Development Review Action," B.R.C. 1981, is amended to read as follows:

[9] Nonconforming uses can be substituted as described in 9-10, but that has not explicitly included in the table.
[10] Clearer language.

9-2-7. Development Review Action

No development review application will be accepted unless and until it is determined to be complete. Such determination will be made within five days after the submission of the application. The city manager will review the application and provide the applicant with a list of any deficiencies.

...

(b) Planning Board Review and Recommendation: Development review applications requiring a decision by the planning board shall be reviewed as follows:

...

(3) Appeal and Call-Ups:

(A) The applicant or any interested person may appeal the city manager's decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.

(B) A member of the planning board may call-up an application for review pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981, except that minor use review processes are not subject to call-up by planning board.[11]

...

Section 7. Section 9-2-8, “Public Hearing Requirements,” B.R.C. 1981, is amended to read as follows:

9-2-8. Public Hearing Requirements

Within sixty days after a referral, or an appeal or call-up pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981, the approving agency, after publishing notice pursuant to Section 9-4-3, "Public Notice Requirements," B.R.C. 1981, will hold a public hearing on the application.[12]

...

Section 8. Section 9-2-9, “Final Approval Requirements,” B.R.C. 1981, is amended to read as follows:

9-2-9. Final Approval Requirements

[11] Clarifies new minor use review exception.
[12] Clearer language.

(a) Development Agreement: After the approving agency has finally approved an application for use review, site review, or form-based code review, the owner and the city manager will execute a development agreement that incorporates all conditions of the approval, including, without limitation, time limits for completion of the development, and, if applicable, requirements for appropriate easements or deed restrictions if unique conditions of approval apply. The development agreement shall be binding on all parties thereto, shall run with the land and will be recorded upon execution by the city clerk in the office of the County Clerk and Recorder of Boulder County. Any violation of a development agreement is a violation of this title.

(1) Exceptions: The city manager may waive the requirement for a development agreement for:

(A) A minor amendment to a site review;

(B) A minor use review process; and

(C) If there are no public improvements associated with a form-based code review application, a form-based code review~~the city manager can waive the requirements for a development agreement~~.[13]

(b) Final Approved Plans: The applicant shall file a paper or electronic copy containing the approved site plan, any applicable restrictions or modifications to the underlying zoning district, and any conditions approved by the approving agency. The paper or electronic copy shall be filed with the city manager, who will endorse and date the approved site plan. The location of the approved development will be included on an official map showing development in the City. The paper or electronic copy will remain on file in the planning department.

(c) Expiration: Unless expressly waived by the city manager for good cause, pursuant to a written request made prior to expiration of the approval, if the applicant fails to file the final approved plans according to the specifications in Subsection (b) above or sign the development agreement within ninety days of final approval, the approval expires.[14]

Section 9. Section 9-2-10, "Amendment Procedures," B.R.C. 1981, is amended to read as follows:

9-2-10. Amendment Procedures

[13] This change provides flexibility regarding the Development Agreement for Use Review applications without site changes (a new process deemed "minor use review"). This will help to expedite the process for those applications. Minor amendments, per 9-2-14(l)(2)(e), are already allowed to have development agreements waived, so this has been incorporated here as well.
[14] "Written" has been added to clarify this requirement.

An approved use review may be amended pursuant to Subsection 9-2-15(~~h~~j),[15] B.R.C. 1981. An approved site review may be amended pursuant to Subsection 9-2-14(l) or (m), B.R.C. 1981. The city manager may approve, without notice, minor modifications to a ~~use review or a~~ site review under the procedures prescribed by Subsection 9-2-14(k), B.R.C. 1981.[16]

Section 10. Section 9-2-12, "Development Progress Required," B.R.C. 1981, is amended to read as follows:

9-2-12. Development Progress Required.[17]

(a) Three-Year Rule: The applicant must obtain applicable building permit approvals and start construction within three years of the date of the final approval of the site review, use review, or form-based code review. For a use review without construction requiring a building permit, the use must be established within three years of the date of final approval. ~~begin and substantially complete the approved site review, use review, or form-based code review as specified in the development agreement within three years from the time of the final approval of the site, use, or form-based code review or as modified by a development schedule incorporated in the development agreement. For the purposes of this section, substantially complete means the time when the construction is sufficiently complete so the owner can occupy the work or portion thereof for the use for which it is intended. If the project is to be developed in stages, the applicant must begin and substantially complete the development of each stage within three years of the time provided for the start of construction of each stage in the development agreement. Failure to substantially complete the development or any development stage within three years of the approved development schedule shall cause the unbuilt portion of the development approval to expire.~~

(1) Phasing: For reviews with phased development established in the development agreement, for each development phase, the applicable building permits must be obtained and construction must be started within three years of the start of the phase, or as modified by the development agreement.

(2) Expiration: Failure to comply with the three-year rule shall cause the development approval to expire. For phased development, if an approval for one phase expires, then all successive phases not completed or under

[15] This fixes an error from a previous ordinance and updates according to other numbering changes later in this ordinance.
[16] The reference above to 9-2-15(j) is sufficient.
[17] Modifies requirement from "substantially complete" to obtaining a building permit and starting construction, clarifies phasing, removes Planning Board extension approval requirement, and increases time that staff may grant extension of an approval.

construction shall expire. After an approval has expired, any new application for development is subject to all the procedures and standards of this title in effect at the time of such application.

(3) Vested Rights: Nothing in this section is deemed to create a vested property right in any applicant; such vested property right may only be created pursuant to the provisions of Section 9-2-20, "Creation of Vested Rights," B.R.C. 1981.

(b) Extension: If the applicant requests an extension prior to the expiration of a site review, use review, or form-based code review approval, the city manager may grant an extension of the approval pursuant to the following: ~~Prior to the expiration of a form-based code review, use review, or site review approval, the applicant may request an extension of the time allowed for the completion of the development.~~

(1) The city manager will grant up to two one-year extensions to obtain applicable building permit approvals and start construction or establish the use if the applicant demonstrates that it exercised reasonable diligence and has good cause as to why the extension should be granted. The extension must be requested in writing prior to the expiration of the approval. The first extension extends the approval by one year from the date of final approval. The second extension extends the approval by an additional year and can be requested only after the first extension has been granted and additional progress has been made. ~~City Manager Level Extension: The city manager may grant up to two six-month extensions for each phase of the development if such extension will enable the applicant to substantially complete the phase of development or is necessary to allow the applicant to request an extension from the planning board.~~

~~(2) Planning Board Level Extension: The planning board may grant an extension of a development approval, pursuant to a hearing conducted under the provisions of Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981, after the applicant has exhausted any extension granted pursuant to Paragraph (b)(1) of this section. The applicant shall be required to demonstrate that it exercised reasonable diligence in completing the project according to the approved development schedule and good cause as to why the extension should be granted.~~

(A) Criteria for Demonstrating Reasonable Diligence: An applicant may show that it has exercised reasonable diligence by providing evidence that it has done substantial work towards obtaining building permit approval or starting construction~~completing the project~~. Such evidence may include, without limitation, drafting plans for building permit or technical document review, applications for building permits or other permits that are required prior to the issuance of

building permits~~,~~ or site preparation and grading~~, or commencement of the construction of a portion of the project~~.

(B) Criteria for Demonstrating Good Cause: An applicant may show good cause as to why an extension should be granted by providing evidence that includes, without limitation, the following: a demonstration of the applicant's ability to ~~complete the project~~obtain building permit approval and start construction within the extension; the extension is needed because of the size of the project or phasing of the development; or that economic cycles and market conditions ~~prevented~~ delayed the building permit approval process and start of construction ~~the construction of the project~~ during the original approval period.

~~(C) Additional Conditions: As part of a hearing to consider an extension, the planning board may impose additional conditions on the applicant in order to ensure compliance with any amendments to this title enacted after the date of the original approval.~~

(c) Building Permits: Upon issuance of a building permit pursuant to a development review approval, the applicant must adhere to the schedule for construction and inspection as defined in the city building code, Chapter 10-5, "Building Code," B.R.C. 1981. In addition to the provisions of this title, all provisions of the building code regarding expiration and termination of building permits shall apply.

(d) Annexations/Six-Month Rule: If an owner of property not located within the city, for which a development review application is approved, fails to annex the property to the city within six months of the date of approval, the approval shall expire unless the approving agency extends the time period, upon a finding of good cause predicated upon a written request of the applicant delivered to the city manager before the expiration of the six-month period.

(e) Rescission of Development Approval: If, after use review, special review, site review, Planned Development (PD), Planned Residential Development (PRD), or Planned Unit Development (PUD) approval is granted pursuant to this chapter, the owner of property desires to develop, instead, under the provisions of Chapters 9-6, "Use Standards," 9-7, "Form and Bulk Standards," and 9-8, "Intensity Standards," B.R.C. 1981, the owner may request rescission of such use review, site review, PD, PRD or PUD approval by filing a written request for rescission with the city manager. The manager will grant a rescission if: [18]

(1) ~~The manager will grant a rescission of such use review, site review, PD, PRD, or PUD approval if no~~No building permit has been issued for the development and neither the city nor the developer has taken any actions in

[18] Numbering added to clarify the circumstances in which rescission may be requested; removes some repetitive language.

detrimental reliance on the terms of the development agreement~~.~~; ~~The manager may also rescind a site review, PD, PRD, or PUD approval if~~

(2) For a site review, PD, PRD, or PUD approval, the existing or proposed development complies with all the use, form, and intensity requirements of Chapters 9-6, "Use Standards," 9-7, "Form and Bulk Standards," and 9-8, "Intensity Standards," B.R.C. 1981, and there is no substantial public benefit in maintaining the original approval~~.~~; or ~~An owner may also request a rescission of a use review or special review approval in order to~~

(3) For a use review or special review approval, the rescission will return the property to a use that is allowed by right or as a conditional use ~~if it~~and the owner is able to meet all applicable standards for such use under this title.

Section 11. Section 9-2-14, “Site Review,” B.R.C. 1981, is amended to read as follows:

9-2-14. Site Review

...

(h) Criteria: No site review application shall be approved unless the approving agency finds that the project is consistent with the following criteria:

...

(6) Land Use Intensity and Height Modifications: Modifications to minimum open space on lots, floor area ratio (FAR), maximum height, and number of dwelling units per acre requirements will be approved pursuant to the standards of this subparagraph:

...

(C) Additional Criteria for a Height Bonus and Land Use Intensity Modifications: A building proposed with a fourth or fifth story or addition thereto that exceeds the permitted height requirements of Section 9-7-5, "Building Height," or 9-7-6, "Building Height, Conditional," B.R.C. 1981, together with any additional floor area or residential density approved under Subparagraph (h)(6)(B), may be approved if it meets the requirements of this Subparagraph (h)(6)(C). For purposes of this Subparagraph(h)(6)(C), bonus floor area shall mean floor area that is on a fourth or fifth story and is partially or fully above the permitted height and any floor area that is the result of an increase in density or floor area described in Subparagraph (h)(6)(B). The approving authority may approve a height up to fifty-five feet if one of the following criteria is met:

...

(iv) Alternative Community Benefit: Pursuant to the standard in this Subparagraph (iv), the approving authority may approve an alternative method of compliance to provide additional benefits to the community and qualify for a height bonus together with any additional floor area or density that may be approved under Subparagraph (h)(6)(B). The approving authority will approve the alternative method of compliance if the applicant proposes the alternative method of compliance and demonstrates that the proposed method:

a. Will improve the facilities or services delivered by the city, including without limitation any police, fire, ~~library,~~[19] human services, parks and recreation, or other municipal facility, land or service, or will provide an arts, cultural, human services, housing, environmental or other benefit that is a community benefit objective in the BVCP, and

b. Is of a value that is equivalent to or greater than the benefits required by this Subparagraph (h)(6)(C).

...

(k) Minor Modifications to Approved Site Plans: The city manager reviews applications for minor modifications pursuant to the procedures in Section 9-2-2, "Administrative Review Procedures," B.R.C. 1981.

(1) Standards: Minor modifications may be approved if the proposed modification complies with the following standards:

(A) Scope: The proposed modification is to the approved plans.[20]

(B) Intent: The modification does not alter the basic intent of the site plan approval;[21]

(C) Residential Uses: The housing type is not changed;[22]

(D) Height: No portion of any building is expanded above the height permitted under Sections 9-7-1, "Schedule or Form and Bulk Standards," or 9-7-6, "Building Height, Conditional," B.R.C. 1981;[23]

---

[19] This is a cleanup change – it was part of Ordinance 8617 adopted by City Council in January 2024 related to the library district.
[20] This new language is intended to better clarify the difference between minor modifications and minor amendments – with a minor amendment, the written statement and conditions of approval may be changed. Modifications are intended to be more for physical changes.
[21] Current wording of (9), moved towards beginning of list.
[22] From current standard (5), with "dwelling unit type" changed to "housing type," as that is now a defined term in the land use code.
[23] From current standard (6), simplified.

(E) Parking: Any parking reduction is reviewed and approved through the process and criteria in Subsection 9-9-6(f), B.R.C. 1981;[24]

(F) Solar Panels: Any solar panels do not substantially add to the mass or perceived height of the building and comply with all applicable building height, solar access, building coverage, and open space requirements;[25]

(G) Other Requirements: The modification complies with all other applicable requirements of this title; and

(H) Modified Standards: The numeric standards in the site plan are not modified by more than allowed through Table 2-3.

Table 2-3: Minor Modification Standards

Standard modified	Maximum allowed as a minor modification
Setbacks: interior to the site plan area	No limit to setback modifications
Setbacks: along boundary of site plan area	Minimum zoning district requirement
Floor area (cumulative in minor modification processes)	Increase of up to 10 percent of the floor area granted in the site review approval, not to exceed the maximum floor area ratio listed in Chapter 9-8, "Intensity Standards," B.R.C. 1981. These limitations on floor area do not apply to detached dwelling units on individual lots in zoning districts without a maximum floor area ratio.[26]
Open space	Minimum zoning district requirement[27]
Building location	Up to 10 percent of the length or width of the building[28]
Building envelope	Increase of up to 10 percent in area

(2) Notification: If an applicant requests approval of a minor modification to an approved site review, the city manager will determine which properties within the development would be affected by the proposed change. The city

[24] From current standard (7), simplified language and separated from open space.
[25] From current standard (8), simplified language.
[26] Simplified version of current standard (2), with 10% or 200 sf changed to a simpler 10% requirement. Limit of 5% for buildings over the permitted height removed (additional height already not permitted by proposed standard (1)(D), previous standard (6)).
[27] Past practice has allowed minor reductions in open space for projects that provided open space in excess of their requirement, as long as it did not reduce further than the zoning district minimum requirement, as stated here. Minor amendments may modify by 20%.
[28] Consolidated version of current standard (3) and (4), simplified to a 10% allowance.

manager will provide notice pursuant to Subsection 9-4-3(b), B.R.C. 1981, of the proposed change to all property owners so determined to be affected.[29]

~~Changes to the site plan, building plans, and landscaping plans may be approved by the city manager without an amendment to the site plan if such changes are minor. All minor modifications shall be noted, signed, and dated on the approved site plan. For proposed minor modifications of site review projects that are partially or totally developed, the applicant shall provide notice to any owners of property within the development that might be affected, as determined by the manager. In determining whether a proposed change is a minor modification, the following standards shall apply:~~

~~(1) Setbacks along the boundary of the site plan area cannot be reduced by a minor modification to be less than the minimum setbacks permitted by the underlying zoning district;~~

~~(2) Excepting any site plan approval consisting of detached dwelling units on individual lots where no maximum floor area ratio applies, the floor area of the development, including principal and accessory buildings, may be expanded by the cumulative total of no more than the greater of ten percent or two hundred square feet or, in the case of a building that exceeds the permitted height, no more than five percent, except that the portion of any building over thirty-five feet in height may not be expanded under the provisions of this paragraph. However, the floor area or FAR shall not exceed the maximum floor area or FAR of a zoning district or granted in the site review approval, if such amount requires special approval through the site review process;~~

~~(3) Approved commercial and industrial building locations may be moved or expanded by no more than the greater of ten feet, or ten percent of the length of the building, measured along the building's axis in the direction that the building is being moved or expanded;~~

~~(4) Approved principal and accessory building locations may be moved or expanded by no more than ten feet in any direction within the development in residential districts and lots abutting residential districts. The resulting setbacks shall not be less than the minimum allowed setback of the underlying zone;~~

~~(5) Dwelling unit type may not be changed;~~

~~(6) The portion of any building over the permitted height under Section 9-7-1, "Schedule of Form and Bulk Standards," B.R.C. 1981, may not be expanded under the provisions of this subsection;~~

[29] Current language from the beginning of (k), relocated since it is not an approval standard. Makes staff responsible for providing notification, rather than requiring applicant to provide proof of notification.

~~(7) No increase may be granted to an open space reduction or to a parking reduction in excess of that allowed in Subsection 9-9-6(f), B.R.C. 1981;~~

~~(8) Solar panels that are proposed to be mounted on a building's roof may not substantially add to the mass or perceived height of the building and shall be consistent with Sections 9-7-7, "Building Height, Conditional," and 9-9-7, "Solar Access," B.R.C. 1981. Solar panels proposed to be ground mounted may not result in a building coverage greater than permitted by the zone and shall not result in open space less than required by Chapter 9-8, "Intensity Standards, " B.R.C. 1981; and~~

~~(9) No change may alter the basic intent of the site plan approval.~~

(l) Minor Amendments to Approved Site Plans: The city manager reviews applications for minor amendments for changes that exceed the limits of a minor modification in Subsection (k) pursuant to the procedures in Section 9-2-7, "Development Review Action," B.R.C. 1981.[30]

(1) Standards: Minor amendments may be approved if the proposed amendment complies with the following standards:

(A) Scope: The proposed amendment is to the approved plans, conditions of approval, or written statement.[31]

(B) Intent: The minor amendment does not alter the basic intent of the site plan approval.[32]

(C) Site Review Criteria: The minor amendment complies with the site review criteria of Subparagraphs (h)(2) and (h)(3) of this section;[33]

(D) Residential Uses: The housing type is not changed;[34]

(E) Height: No portion of any building is expanded above the height permitted under Sections 9-7-1, "Schedule or Form and Bulk Standards," or 9-7-6, "Building Height, Conditional," B.R.C. 1981;

(F) Parking: Any additional parking that is provided is accommodated in the previously approved on-site parking design;[35]

(G) Other Requirements: The minor amendment complies with all other applicable requirements of this title; and

[30] Language from current (l)(1) updated for parallel drafting with minor modification language. Removed reference to "approved building location or additions to existing buildings" to expand applicability of minor amendment process.
[31] Differentiated from minor modifications, which are changes only to approved plans.
[32] The intent statement matches that of the minor modification, rather than the more complex "substantially consistent" language in current (2)(D).
[33] From current (2)(C).
[34] From current standard (B).
[35] Adapted from current standard (F).

(H) Modified Standards: The numeric standards in the site plan are not amended by more than allowed through Table 2-4.

Table 2-4: Minor Amendment Standards

Standard amended	Maximum allowed as a minor amendment, but not to exceed maximum or minimum zoning district requirements.
Floor area (cumulative in minor amendment processes)	20 percent
Open space (cumulative in minor amendment processes)	Decrease of up to 20 percent[36]
Building location	Up to 20 percent of the length or width of the building

~~(1) Standards: Changes to approved building location or additions to existing buildings, which exceed the limits of a minor modification, may be considered through the minor amendment process if the following standards are met:~~

~~(A) In a residential zone as set forth in Section 9-5-2, "Zoning Districts," B.R.C. 1981, all approved dwelling units within the development phase have been completed;~~[37]

~~(B) In residential zones, dwelling unit type is not changed;~~

~~(C) The required open space per dwelling unit requirement of the zone is met on the lot of the detached dwelling unit to be expanded;~~[38]

~~(D) The total open space per dwelling unit in the development is not reduced by more than ten percent of the amount specified on the approved site plan and is not reduced to less than the minimum required for the zone;~~

~~(E) If the residential open space provided within the development or an approved phase of a development cannot be determined, the detached dwelling unit is not expanded by more than ten percent and there is no variation to the required setbacks for that lot;~~

[36] From current standard (D).
[37] This standard was not carried forward so that minor amendments can have wider applicability.
[38] This overly prescriptive standard has been removed.

~~(F) For a building in a nonresidential use module, the building coverage is not increased by more than twenty percent, the addition does not cause a reduction in required open space, and any additional required parking that is provided is substantially accommodated within the existing parking arrangement;~~[39]

~~(G) The portion of any building over the permitted height under Section 9-7-1, "Schedule of Form and Bulk Standards," B.R.C. 1981, is not increased; and~~

~~(H) The proposed minor amendment does not require public infrastructure improvements or other off-site improvements.~~[40]

(2) ~~Amendments to the Site Review Approval~~ Process: Applications for minor amendment shall be ~~approved~~ reviewed and approved according to the procedures prescribed by this section for site review approval, except:

(A) If an applicant requests approval of a minor amendment to an approved site review, the city manager will determine which properties within the development would be affected by the proposed change. The city manager will provide notice pursuant to Subsection 9-4-3(b), B.R.C. 1981, of the proposed change to all property owners so determined to be affected, and to all property owners within a radius of 600 feet of the subject property.

(B) Only the owners of the subject property shall be required to sign the application.

~~(C) The minor amendment shall be found to comply with the review criteria of Subparagraphs (h)(2)and (h)(3)of this section.~~ [41]

~~(D) The minor amendment shall be substantially consistent with the intent of the original approval, including conditions of approval, the intended design character, and site arrangement of the development, and specific limitations on additions or total size of the building which were required to keep the building in general proportion to others in the surrounding area or minimize visual impacts.~~ [42]

(~~E~~C) The city manager may amend, waive, or create a development agreement.

[39] This standard has not been carried forward as it does not apply in most circumstances.
[40] This standard was not carried forward as it is unlikely to apply often to situations that meet the other standards of a minor amendment.
[41] Moved up into minor amendment standards.
[42] Moved up into minor amendment standards, modified language.

Section 12. Section 9-2-15, “Use Review,” B.R.C. 1981, is amended to read as follows:

9-2-15. Use Review

(a) Purpose: Each zoning district established in Section 9-5-2, "Zoning Districts," B.R.C. 1981, is intended for a predominant use, but other uses designated in Section 9-6-1, "Schedule of Permitted Land Uses," B.R.C. 1981, may be allowed by use review if a particular use is demonstrated to be appropriate in the proposed location. Nonconforming uses may be upgraded or expanded under this section if the change would not adversely affect the traffic and the environment of the surrounding area or if the change would reduce the degree of the nonconformity or improve the appearance of the structure or site without increasing the degree of nonconformity. Nonstandard buildings may be changed, expanded or modified consistent with the criteria and standards set forth in this section and Subsection 9-10-3(a), B.R.C. 1981.

...

(d) Review and Recommendation:

(1) The city manager will review applications for use review of ~~a nonresidential use in residential zoning districts, attached and detached dwelling units or a residential use in a P district, and~~ oil and gas operations and will submit a recommendation to the planning board for its final action pursuant to Subsection 9-2-7(b), B.R.C. 1981.[43]

(2) The city manager shall review and make decisions on all other use review applications pursuant to Subsection 9-2-7(a), B.R.C. 1981.

(3) Reviews by either the city manager or planning board shall be pursuant to Section 9-2-7, "Development Review Action," B.R.C. 1981, except that minor use review processes are not subject to call-up by planning board.[44]

(e) Criteria for Review: No use review application will be approved unless the approving agency finds all of the following:

~~(1) Consistency With Zoning and Nonconformity: The use is consistent with the purpose of the zoning district as set forth in Section 9-5-2, "Zoning Districts," B.R.C. 1981, except in the case of a nonconforming use;~~[45]

(~~2~~1) Rationale: The use either:

---

[43] Removes automatic Planning Board review requirement for these uses. Applications would still be subject to call-up unless they qualify as minor use review.
[44] Exception added for new “minor use review” applications without site changes.
[45] This criterion is unnecessary and has been removed; the Use Table determines what uses are allowed by Use Review in each district.

(A) Provides direct service or convenience to or reduces adverse impacts to the surrounding uses or neighborhood;

(B) Provides a compatible transition between higher intensity and lower intensity uses;

(C) Is necessary to foster a specific city policy, as expressed in the Boulder Valley Comprehensive Plan, including, without limitation, historic preservation, moderate income housing, residential and nonresidential mixed uses in appropriate locations, and group living arrangements for special populations; or

(D) Is an existing legal nonconforming use or ~~a change thereto~~an expansion that is permitted under Subsection (f) of this section;

(~~3~~2) Compatibility: The location, size, design, and operating characteristics of the ~~proposed development or change to an existing development are such that the~~ use will be reasonably compatible with and have minimal negative impact on the use of nearby properties, or, for residential uses or community, cultural, and educational uses in industrial zoning districts, the proposed development reasonably mitigates the potential negative impacts from nearby properties;[46]

(~~4~~3) Infrastructure: ~~As compared to development permitted under Section 9-6-1, "Schedule of Permitted Land Uses," B.R.C. 1981, in the zone, or as compared to the existing level of impact of a nonconforming use, the~~ The ~~proposed development~~use will not significantly adversely affect the infrastructure of the surrounding area, including, without limitation, water, wastewater and storm drainage utilities and streets, compared to an allowed use in the zoning district, or compared to the existing level of impact of a nonconforming use;[47]

(~~5~~4) Character of Area: The use will not change the predominant character of the surrounding area or the character established by adopted design guidelines or plans for the area; and

(~~6~~5) Conversion of Dwelling Units to Nonresidential Uses: There shall be a presumption against approving the conversion of dwelling units in the residential zoning districts to nonresidential uses that are allowed pursuant to a use review, or through the ~~change~~ substitution of one nonconforming use with~~to~~ another nonconforming use. The presumption against such a conversion may be overcome by a finding that the use to be approved serves another compelling social, human services, governmental or recreational need in the community, including, without limitation, a use for a daycare

[46] Rewording for clarity and parallel drafting.
[47] Rewording for clarity.

center, park, religious assembly, social service use, benevolent organization use, art studio or workshop, museum, or an educational use.

(f) Additional Criteria for ~~Modifications~~ Expansion ~~to~~ of a Nonconforming Use~~s~~:[48] No application for ~~a change to~~an expansion of a nonconforming use shall be granted unless all of the following criteria are met in addition to the criteria set forth above:

(1) Reasonable Measures Required: The applicant has undertaken all reasonable measures to reduce or alleviate the effects of the nonconformity upon the surrounding area, including, without limitation, objectionable conditions, glare, adverse visual impacts, noise pollution, air emissions, vehicular traffic, storage of equipment, materials and refuse, and on-street parking, so that the ~~change~~ expansion will not adversely affect the surrounding area.

(2) Reduction in Nonconformity/Improvement of Appearance: The proposed ~~change or~~ expansion will either reduce the degree of nonconformity of the use or improve the physical appearance of the structure or the site without increasing the degree of nonconformity.

(3) Compliance With This Title~~/Exceptions~~: The ~~proposed change in use~~expansion complies with all ~~of the~~other applicable requirements of this title.~~:~~[49]

~~(A) Except for a change of a nonconforming use to another nonconforming use; and~~

~~(B) Unless a variance to the setback requirements has been granted pursuant to Section 9-2-3, "Variances and Interpretations," B.R.C. 1981, or the setback has been varied through the application of the requirements of Section 9-2-14, "Site Review," B.R.C. 1981.~~

(4) Cannot Reasonably Be Made Conforming: The existing building or lot cannot reasonably be utilized or made to conform to the requirements of Chapter 9-6, "Use Standards," 9-7, "Form and Bulk Standards," 9-8, "Intensity Standards," or 9-9, "Development Standards," B.R.C. 1981. This paragraph (4) shall not apply to reconstruction or restoration permitted pursuant to Paragraph 9-10-3(c)(4), B.R.C. 1981, with respect to density and other pre-existing nonconformities of the use or nonstandard features of the building.

(5) No Increase in Floor Area Over Ten Percent: The ~~change or~~ expansion will not result in a cumulative increase in floor area of more than ten percent of the existing floor area.

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[48] Clarifications. Only expansions of nonconforming use are subject to this review process, so that has been clarified. Substitutions of nonconforming use is the application term used more commonly so that has been updated as well throughout the criteria.
[49] This language has been in the code since at least the early 1980s. A more general review of compliance with all other standards is sufficient, rather than calling out these two particular items.

(6) Approving Authority May Grant Zoning Variances: The approving authority may grant the variances permitted by Subsection 9-2-3(d), B.R.C. 1981, upon finding that the criteria set forth in Subsection 9-2-3(h), B.R.C. 1981, have been met.

(g) Conditions of Approval: The approving agency may impose modifications or conditions on the use review approval ~~in order~~ to ~~assure~~ ensure compliance with the criteria set forth in Subsections (e) and (f) of this section. In the case of a nonconforming use, conditions may also be imposed to reduce nonconformity and to improve site design.

(h) Oil and Gas Operations: The criteria for review in Subsection (e) shall not apply to an application for oil and gas operations. An oil and gas operations use shall meet the criteria set forth in Section 9-6-7(b), "Oil and Gas Operations," B.R.C. 1981. Any use review approval for an oil and gas operations use shall expire, whether operational or not, in ten years from the date of final approval. Prior to such expiration for an oil and gas operations use, applicants will be responsible for submitting a new use review application for an oil and gas operations use proposed for operation beyond ten years. Following approval of any oil and gas operations use, the applicant shall have two years to obtain the necessary permits to establish the use.

(i) Minor Use Review Process:[50] A use review for a nonresidential use that is proposed in a zoning district other than a residential district and proposed to occupy an existing nonresidential space without any site changes may be reviewed pursuant to a minor use review process. For the purposes of this subsection, site changes do not include changes to landscape plantings, pedestrian pathways, installation of bicycle parking, ordinary site maintenance or repair, signs, or site lighting.

(1) Process: The city manager shall review and make decisions on all minor use review process applications pursuant to Subsection 9-2-7(a), "City Manager Review and Recommendation," B.R.C. 1981. The applicant or any interested person may appeal the city manager's decision pursuant to Paragraph 9-2-15(l)(1), but the city manager's decision is not subject to call-up by the planning board pursuant to Paragraph 9-2-15(l)(2). The city manager may refer the application to the planning board for review or decision.

(2) Development Agreement: The city manager may waive the requirements for a development agreement for a minor use review.

(~~i~~j) Amendments and Minor Modifications:[51] ~~No person shall expand or modify any approved use review use. However, the approved site plan may be modified as provided in Subsection 9-2-14(k), B.R.C. 1981, if it does not expand the use, any changes conform to Section 9-7-1, "Schedule of Form and Bulk Standards," B.R.C. 1981; the impact on other uses of the approved use review is not changed; and the~~

[50] New "minor use review" process has been added to allow for expedited processing of use review applications without site changes.
[51] Clarifies the process to modify approved use reviews and more clearly outlines the existing criteria for a minor change.

~~change complies with all other provisions of this title and any other ordinance of the city.~~ No person shall modify an approved use review without a new use review approval, except that minor modifications to the approved site plan may be approved pursuant to Section 9-2-2, "Administrative Review Procedures," B.R.C, 1981, provided that the minor modification meets the following standards:

(1) The use is not expanded and the modification is otherwise substantially consistent with the conditions of the original approval;

(2) The modification does not adversely increase impacts to other surrounding properties or adjacent uses; and

(3) The site plan complies with all other provisions of this title and any other ordinance of the city.

(~~j~~k) Expiration: Any use review approval or previously approved special review ~~which~~ that is discontinued for at least three years shall expire. The city manager, upon a finding of good cause, may grant an extension not to exceed six months from the original date of expiration. In addition, use review approvals for oil and gas operations are subject to expiration pursuant to the standards in Subsection (h) of this section.

(~~k~~l) Appeals and Call-Ups:

(1) The applicant or any interested person may appeal the city manager's decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.

(2) A member of the planning board may call-up the manager's decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981, except that decisions in minor use review processes are not subject to call-up by the planning board.[52]

(3) The city council may call-up any planning board decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.

Section 13. Section 9-3-6, "Floodplain Development Permits," B.R.C. 1981, is amended to read as follows:

9-3-6. Floodplain Development Permits.

...

(h) Floodplain development permits that allow for development in the conveyance zone or the high hazard zone, or which will involve a change of watercourse, shall be decided by the city manager. The decision of the city manager ~~shall be subject~~

[52] Exception added for minor use review.

~~to~~may be ~~call-up by the planning board, or~~ appeal~~ed~~ by any aggrieved party to the planning board, subject to the ~~call-up and~~ appeal procedure of Section 9-4-4, "Appeals, Call-Ups, and Public Hearings," B.R.C. 1981.[53]

...

Section 14. Section 9-3-7, "Variances," B.R.C. 1981, is amended to read as follows:

9-3-7. Variances

(a) The city manager may grant a variance from the requirements of Subsection 9-3-2(i) and Sections 9-3-3, 9-3-4, and 9-3-5, B.R.C. 1981, except that no variance shall be granted for expansion or enlargement of any structure constructed after July 12, 1978, unless such expansion or enlargement conforms to the flood protection elevation requirement in effect at the time of the original construction.

...

(f) Any decision by the city manager to approve a variance may be ~~is subject to call-up by the planning board or~~ appeal~~ed~~ by any aggrieved party to the planning board as described by Section 9-4-4, "Appeals, Call-Ups, and Public Hearings," B.R.C. 1981.[54]

...

Section 15. Section 9-3-9, "Stream, Wetlands, and Water Body Protection," B.R.C. 1981, is amended to read as follows:

9-3-9. Stream, Wetlands, and Water Body Protection

...

(c) Permitted, Allowed and Prohibited Uses within the Regulated Area: The purpose of this subsection is to describe activities that are exempted, conditionally permitted, requiring development review or prohibited:

(1) Explanation of Table Abbreviations: The abbreviations used in the cells in table 3-1 have the following meanings:

"E"(Exempted Activities): indicates that the use type is allowed as a matter of right and no stream, wetland or water body permit is required.

"C"(Conditional Use Review): indicates that the use type will be reviewed in accordance with the requirements in paragraph (e)(~~3~~2) of this section.[55]

---

[53] Removed Planning Board call-up requirement for floodplain development permits. Aggrieved parties may still appeal.
[54] Removed Planning Board call-up requirement for floodplain variances. Aggrieved parties may still appeal.
[55] Necessary renumbering.

"S"(Standard Permit Review): indicates that the use type will be reviewed in accordance with the requirements in paragraph (e)(~~4~~3) of this section.[56]

"P"(Prohibited Activities): indicates that the use type is prohibited in the zone.

"N"(Allowed with Notice): indicates that the use type is allowed as a matter of right subject to the application of best management practices as defined in chapter 9-16, "Definitions," B.R.C. 1981, and provision of notice in paragraph (5) of this subsection. Such activity shall not significantly alter the function of the stream, wetland or water body. No person shall conduct any activity that is allowed with notice in violation of the best management practices.

...

(e) Stream, Wetland and Water Body Permit Application Review:

(1) Acceptance of Application: Applicants for stream, wetland or water body permits shall submit an application as set forth in subsection (d) of this section. Upon receipt of an application, the city manager shall review the application for completeness. A permit application will be accepted when the city manager determines that it is complete.

~~(2) Public Notification of Application: Upon acceptance of a complete standard review application, public notice shall be provided according to the requirements shown in section 9-4-3, "Public Notice Requirements," B.R.C. 1981, using Public Notice Type 5 from table 4-2. Public notice of a conditional use review application is not required.~~[57]

(~~3~~2) Criteria for Review: For an activity requiring conditional use or standard review, the applicant shall demonstrate that the stream, wetland or water body permit application meets the following criteria:

...

(B) Criteria for the Outer Buffer Zone: In the outer buffer zone, the following criteria shall apply:

(i) The provisions of Subparagraph (e)(~~3~~2)(A) of this section.[58]

(ii) Impervious surface coverage: Any new building or attached structure, expansion of an existing building or attached structure, new surfacing or expansion of an existing surface that would result in a cumulative total of twenty percent or more impervious surface in the outer zone on the property

[56] Necessary renumbering.
[57] The requirement for call-up for floodplain and wetland applications has been removed, therefore the notice would not be applicable.
[58] Necessary renumbering.

shall provide mitigation according to the requirements in subsection (f) of this section for the loss of pervious surface.

(C) Criteria for the Inner Buffer Zone: In the inner buffer zone, the following criteria shall apply:

(i) The provisions of Subparagraph (e)(~~3~~2)(A) of this section.[59]

(ii) The provisions of Subparagraph (e)(~~3~~2)(B) of this section.[60]

(iii) Channel bank protection or stabilization shall utilize, to the extent feasible, techniques that involve landscaping with appropriate native plants rather than rock or artificially hardened structures.

(iv) All new plant material adjacent to wetlands or water bodies or along the banks of a stream shall be consistent with all applicable city rules concerning best management practices as described in chapter 9-16, "Definitions," B.R.C. 1981. Mitigation monitoring for restoration projects may be required by the city manager.

(v) "Vegetation removal - major" shall only be allowed to prevent noxious weed infestation, provide for native habitat restoration or for other permitted projects. Major removal of vegetation shall be mitigated within the inner buffer according to the requirements in subsection (f) of this section.

(vi) New steps, paths or other minor access to or over a stream on private property will be permitted if there is no more than one access on an individual property, the path or steps are designed to have minimal impact to the wetland, stream or water body, and the path and the area of impact does not exceed four feet in width.

(D) Criteria for the Wetland, Stream or Water Body: In the wetland, stream, or water body, the following criteria shall apply:

(i) The provisions of Subparagraph (e)(~~3~~2)(A) of this section.[61]

(ii) The provisions of Subparagraph (e)(~~3~~2)(B) of this section.[62]

(iii) The provisions of Subparagraph (e)(~~3~~2)(C) of this section.[63]

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[59] Necessary renumbering.
[60] Necessary renumbering.
[61] Necessary renumbering.
[62] Necessary renumbering.
[63] Necessary renumbering.

(iv) Replacement or repair of an existing fence shall be generally in the same location and not result in additional impacts to the wetland, stream, or water body.

(v) Utility line or drop structure maintenance or repair shall not impact the existing functions of the wetland, stream, or water body.

(vi) Activities conducted solely for the purpose of removing stream sediment shall not alter the flood capacity as shown on the adopted floodplain maps. Vegetated channel bottoms shall be restored and stabilized.

(4) Criteria for Standard Review: In addition to the standards in paragraph (e)(~~3~~2) of this section, the applicant shall demonstrate that the stream, wetland or water body permit application meets the following criteria:[64]

...

(g) Permit Issuance:

...

(5) Referrals, Call-up or Appeal:

(A) Conditional Use Permits: For conditional use permits, there shall be no referrals, call-ups or appeals. An applicant may resubmit a standard permit application for a denied conditional use application, pay the balance of the standard permit fee and proceed pursuant to the standard permit review process.

(B) Standard Review Permits: The decision of the city manager ~~shall be subject to call-up by the planning board~~may be~~, or~~ appealed by the applicant to the planning board, subject to the ~~call-up and~~ appeal procedure of ~~section~~Section~~,~~ 9-4-4 "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.[65]

...

(k) Stream, Wetland and Water Body Boundaries:

...

(3) Map Revisions: At the request of a property owner and after submittal of an application and payment of the fee prescribed in section 4-20-53, "Stream, Wetland and Water Body Permit and Map Revision Fees," B.R.C. 1981, or at the city manager's initiative, adopted stream, wetland and water body boundaries may be modified by the city manager by means of the

[64] Necessary renumbering.
[65] Removed Planning Board call-up requirement for standard wetland permits. Applicants may still appeal.

performance of a boundary determination in accordance with the requirements of this subsection:

...

(B) Review of Map Revision Applications:

(i) The city manager shall review the application in accordance with subsection (l) of this section, and may approve the proposed boundary change, approve the proposed boundary change with modifications or deny the proposed boundary change.

(ii) The decision of the city manager ~~shall be subject to call-up by the planning board or~~may be appealed by the applicant to the planning board, subject to the ~~call-up and~~ appeal procedure of Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.[66]

...

(m) Variances:

...

(7) The decision of the city manager ~~shall be subject to call-up by the planning board, or~~may be appealed by the applicant to the planning board, subject to the ~~call-up and~~ appeal procedure of Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.[67]

...

Section 16. Table 4-1: Summary of Decision Authority by Process Type in Section 9-4-2, "Development Review Procedures," B.R.C. 1981, is amended to read as follows:

9-4-2. Development Review Procedures

(a) Development Review Authority: Table 4-1 of this section summarizes the review and decision-making responsibilities for the administration of the administrative and development review procedures described in this chapter. The table is a summary tool and does not describe all types of decisions made under this code. Refer to sections referenced for specific requirements. ~~Form and bulk standards may also be modified by site review.~~ [68]Additional procedures that are required by this code but located in other chapters are:

---

[66] Removed Planning Board call-up requirement for wetland map revisions. Applicants may still appeal.
[67] Removed Planning Board call-up requirement for wetland variances. Applicants may still appeal.
[68] Removed irrelevant language.

(1) "Historic Preservation," chapter 9-11; and

(2) "Inclusionary Housing," chapter 9-13.

TABLE 4-1: SUMMARY OF DECISION AUTHORITY BY PROCESS TYPE[69]

Standard or Application Type	*Staff/City Manager*	*BOZA*	*Planning Board*	*City Council*
Code Interpretation SECTION 9-2-3	D	CA(14)	CA(30)	CA
Setback variance ≤20% SECTION 9-2-3	D	D	—	—
Setback variance >20% SECTION 9-2-3	—	D	—	—
Parking access dimensions SECTION ~~9-2-2~~9-9-5	D	—	—	—
Parking deferral SUBSECTION ~~9-2-2~~9-9-6(e)	D	—	—	—
Parking reduction ≤25% SUBSECTION ~~9-2-2~~9-9-6(f)	D	—	—	—
Parking reduction >25% but ≤50% SUBSECTION ~~9-2-2~~9-9-6(f)	D(14)	—	CA, D(30)	CA
Parking reduction >50% SUBSECTION 9-9-6(f)	—	—	D(30)	CA
Conditional Building height~~, conditional~~ SECTION 9-7-6	D	—	—	—
Building height, less than principal or nonstandard building height max SECTION 9-2-14	D(14)	—	CA, D(30)	CA
Building height, greater than principal building height max SECTION 9-2-14	—	—	D(30)	CA
Building height SECTION 9-7-5	—	—	D(30)	CA
Conditional Use SECTION 9-2-~~1~~2	D	—	—	—
Site Review SECTION 9-2-14	D(14)	—	CA, D(30)	CA
Use Review SECTION 9-2-15	D(14)	—	CA, D(30)	CA
Minor Use Review[70] SUBSECTION 9-2-15(i)	D(14)	—	A	CA
Use Review Minor Modification [71] SUBSECTION 9-2-15(j)	D	—	—	—
Form-Based Code Review SECTION 9-2-16	D(14)	—	CA, D(30)	CA
Administrative Form-Based Code Review~~, administrative~~ SECTION 9-2-16	D	—	—	—
Form-Based Code Review~~, minor~~ Minor ~~modification~~Modification SECTION 9-2-16	D	—	—	—
Annexation SECTION 9-2-17	—	—	R	D
Rezoning SECTION 9-2-19	—	—	R	D

[69] The final ordinance will reorganize this table by Section and improve formatting for ease of reference. The current organization is shown here to make it easier to review the text changes.
[70] Added minor use review, with only appeal authority rather than call-up.
[71] Added use review minor modification as described in 9-2-15.

Wetland Permit~~-Simple~~ Conditional[72] SECTION 9-3-9	D	—	—	—
Wetland Permit-Standard SECTION 9-3-9	D(14)	—	~~D(30)~~A	CA
Extension of Develop~~men~~t Approval ~~≤1 yr~~ PARAGRAPH 9-2-12(b)~~(1)~~	D	—	—	—
~~Extension of Dev't Approval >1 yr~~ ~~PARAGRAPH 9-2-12(b)(2)~~ [73]	~~—~~	~~—~~	~~D(30)~~	~~CA~~
Rescission of Develop~~men~~t Approval SUBSECTION 9-2-12(e)	D	—	—	—
Creation of Vested Rights >3 years SECTION 9-2-20	—	—	R	D
Floodplain Dev~~'~~elopment Permit SECTION 9-3-6	D(14)	—	~~C~~A~~(30)~~	CA
Wetland Boundary ~~change-~~ ~~Standard~~Revision SUBSECTION 9-3-9(~~e~~k) [74]	~~—~~ D(14)	—	~~R~~ A	~~D~~ CA
Geophysical Exploration Permit SECTION 9-6-7(b)	D(14)	—	CA(30)	CA
Substitution of Nonconforming Use SECTION 9-10-3	D	—	—	—
Expansion of a Nonconforming Use SECTION 9-10-3	D(14)	—	CA(30)	CA
~~Subdivision, prelim~~ Preliminary ~~plat~~ Plat SECTION 9-12-7	D	—	—	—
~~Subdivision, f~~Final ~~plat~~ Plat SECTION 9-12-8	D(14)	—	CA	—
Minor Subdivision~~, minor~~ SECTION 9-12-5	D(14)	—	CA(30)	~~CA~~[75]
~~Subdivision, LLA or LLE~~Lot Line Adjustment or Lot Line Elimination SECTIONS 9-12-3 and 9-12-4	D	—	—	—
Solar Exception SUBSECTION 9-9-17(f)	D	D	—	—
Solar Access Permit SUBSECTION 9-9-17(h)	D	D	—	—
~~Owner or Tenant~~Accessory Building Coverage SUBSECTION 9-7-8(a)	—	D	—	—
Minor Modification of Discretionary Approval SUBSECTION 9-2-14(k)	D	—	—	—
Minor Amendment of Discretionary Approval SUBSECTION 9-2-14(l)	D(14)	—	CA(30)	CA
Amendment of Discretionary Approval not involving height SUBSECTION 9-2-14(m)	D(14)	—	CA, D(30)	CA
Amendment of Discretionary Approval involving height SECTION 9-2-14	—	—	D(30)	CA
KEY: D = Decision Authority CA = Call-Up and Appeal Authority (for City Council, call-up only) R = Recommendation only (A) = Appeal Authority only[76] (n) = Maximum number of days for call-up or appeal				

[72] Inconsistent term fixed.
[73] Planning Board extensions have been removed.
[74] In 9-3-9(k), these are described as boundary revisions. Other columns updated to match text.
[75] Fixes error in the table. These are not subject to Council call-up.
[76] This has been added to clarify there are some circumstances that can be appealed, but not called up.

Section 17. Section 9-4-3, "Public Notice Requirements," B.R.C. 1981, is amended to read as follows:

9-4-3. Public Notice Requirements

(a) Process and Options: When a process or procedure identified in this title requires public notice, the city manager shall provide such notice according to Table 4-2 of this section. If a code section does not reference a specific method, the city manager shall determine the most appropriate notification method to be used.

TABLE 4-2: PUBLIC NOTICE OPTIONS

Public Notice Type	*Type of Application, Meeting or Hearing*	*Mailed Notice*	*Posted Notice*
1	Administrative Reviews (except those identified below)	none	none
2	Preliminary Plats and Minor Subdivisions	To adjacent property owners a minimum of 10 days before final action and mineral rights owners a minimum of 30 days before initial hearing or decision	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing
3	Good neighbor meetings	To property owners within 600 feet of subject property a minimum of 10 days before meeting	none
4	Solar ~~exceptions, solar~~ access permits[77]	To adjacent property owners a minimum of 10 days before final action	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing
5	Applications requiring BOZA action~~, wetland permit and boundary determination~~ [78]	To property owners within 300 feet of subject property a minimum of 10 days before final action	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing
6	Development Review Applications (site review, use review, annexation, rezoning, concept plans)	To property owners within 600 feet of subject property a minimum of 10 days before final action and mineral rights owners a minimum of 30 days before initial hearing or decision	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing

[77] Solar exceptions are processed similarly to other administrative variances, so would instead use public notice type 1 accordingly. Exception approvals already require an affidavit from all affected properties per 9-9-17(f)(4), so other properties affected would be aware and indicate no objection. Like other administrative variances, applications with neighbor objection are referred to BOZA by staff or decisions can be appealed by the applicant per 9-9-17(f)(5).

[78] Requirements for Planning Board call-ups have been removed, so notice has been removed accordingly to make these reviews administrative.

7	Form-based code review	To property owners and all addresses within 600 feet of the subject property a minimum of 10 days before final action and mineral rights owners a minimum of 30 days before initial hearing or decision	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing
8	Use review applications for oil and gas operations	To property owners, all addresses, and the local government designee of any local government within 5,280 feet (one mile) of the subject property upon finding an application complete and a minimum of 10 days before final action and any mineral rights owners at that time and a minimum of 30 days before initial hearing	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing

...

Section 18. Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981, is amended to read as follows:

9-4-4. Appeals, Call-Ups and Public Hearings

When a section of the land use ~~regulations~~ code indicates that a decision is subject to appeal or call-up, the following standards shall apply:

(a) Appeal: If a right to appeal is noted in this title, ~~If noted in Table 4-1, Section 9-4-2, "Development Review Procedures," B.R.C. 1981, in a specific section,~~ an applicant or, if applicable, any interested person may appeal the city manager's decision to grant or deny an application to the planning board by delivering a written notice of appeal to the city manager within fourteen days of the decision.

(b) Board Call-Up: If a planning board call-up of a city manager decision is noted in this title, ~~If noted in Table 4-1, Section 9-4-2, "Development Review Procedures," B.R.C. 1981~~, a member of the planning board may call up a city manager's decision upon written notification to staff or by making a verbal request, on the record, at a regularly scheduled board meeting within fourteen days of the manager's decision. A member of the BOZA may call up a city manager's decision regarding an interpretation upon written notification to staff or by making a verbal request, on the record, at a regularly scheduled board meeting within fourteen days of the manager's decision. ~~On any application that it calls up, the board will hold a public hearing under the procedures prescribed by Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981, after publishing notice as provided in Subsection 9-4-3(d), B.R.C. 1981. Within thirty days of the public hearing or within such other time as the board and the applicant mutually agree, the board will either grant the application in whole or in part, with or without modifications and conditions, or deny it. The decision will specifically set forth in what respects the development review application meets or fails to meet the standards and criteria required by Sections 9-~~

~~2-14, "Site Review," 9-2-15, "Use Review," and 9-2-16, "Form-Based Code Review," B.R.C. 1981, for the type of review requested.~~ [79]

(c) City Council Call-Up: With the exception of minor subdivisions and plats, t~~T~~he city council may call up any board decision within thirty days of the board's action. The city manager may extend the call-up period until the council's next regular meeting, if the manager finds in writing within the original call-up period that the council will not receive notice of a decision of the board in time to enable it to call up the decision for review. ~~On any application that it calls up, the council will hold a public hearing under the procedures prescribed by Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981, after publishing notice as specified by Subsection 9-4-3(d), B.R.C. 1981, summarized in Subsection (b) of this section.~~ Together with the evidence presented at such public hearing, the council may consider the record, or any portion thereof, of the hearing before the board. ~~Within thirty days of the public hearing or within such other time as the council and the applicant mutually agree, the council will either grant the application in whole or in part, with or without modifications and conditions, or deny it. The decision will specifically set forth in what respects the development review application meets or fails to meet the standards and criteria required by Sections 9-2-14, "Site Review," 9-2-15, "Use Review," and 9-2-16, "Form-Based Code Review," B.R.C. 1981, for the type of review requested.~~ [80]

(d) Public Hearing Requirements: Within sixty days after ~~a referral,~~ appeal or call-up under this section, the approving agency will hold a public hearing on the application. On any application that it calls up, the board or council will hold a public hearing under the procedures prescribed by Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981, after publishing notice as provided in Subsection 9-4-3(d), B.R.C. 1981. Within thirty days of the public hearing or within such other time as the board or council and the applicant mutually agree, the board or council will either grant the application in whole or in part, with or without modifications and conditions, or deny it. The decision will specifically set forth in what respects the development review application meets or fails to meet the standards and criteria required by Sections 9-2-14, "Site Review," 9-2-15, "Use Review," and 9-2-16, "Form-Based Code Review," B.R.C. 1981, for the type of review requested. [81]

...

Section 19. Section 9-6-3, “Specific Use Standards - Residential Uses,” B.R.C. 1981, is amended to read as follows:

[79] This text is repetitive in both (b) and (c); it has been consolidated together below in (d).
[80] This text is repetitive in both (b) and (c); it has been consolidated together below in (d), with the unique sentence about council evidence remaining in place. Also clarifies exception for minor subdivision and plats.
[81] This text is repetitive in both (b) and (c); it has been consolidated together here. Removed “referral” from first line as referral process is described in 9-2-8 and is not a call-up or appeal.

9-6-3. Specific Use Standards - Residential Uses

(a) Residential Uses:

(1) This Subsection (a) sets forth standards for uses in the residential use classification that are subject to specific use standards pursuant to Table 6-1, Use Table.

(2) Residential Uses in the IG and IM Zoning Districts: The following standards apply in the IG and IM zoning districts to residential uses that may be approved pursuant to a use review:

(A) Location: Dwelling units may be constructed only on a lot or parcel that meets one or more of the following requirements (i), (ii), or (iii). If a lot or parcel meets this location standard, the approving authority shall presume that the standard in Paragraph 9-2-15(e)(~~5~~4), B.R.C. 1981, has been met.[82]

...

(d) Dwelling Unit, Detached:

...

(2) In the RH-1, RH-2, RH-3, RH-4, RH-5, RH-7, MU-1, MU-2, and MU-4 Zoning Districts:

(A) Review Process: In the RH-1, RH-2, RH-3, RH-4, RH-5, RH-7, MU-1, MU-2, and MU-4 zoning districts, the following review process applies to detached dwelling units:

...

(ii) Use Review: A new detached dwelling unit that is not allowed by right may be approved pursuant to a use review if the approving authority finds that:

a. The use meets the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (~~4~~3), and (~~5~~4), "Use Review," B.R.C. 1981;[83]

...

Section 20. Section 9-6-5, “Specific Use Standards - Commercial Uses,” B.R.C. 1981, is amended to read as follows:

9-6-5. Specific Use Standards - Commercial Uses

[82] Necessary renumbering – criteria (1) was removed.
[83] Necessary renumbering – criteria (1) was removed.

...

(b) Brewery, Distillery, and Winery:

...

(2) In the IS-1, IS-2, and IMS Zoning Districts:

...

(A) In the IS-1, IS-2, and IMS zoning districts, breweries, distilleries, and wineries shall meet the following standards:

...

(i) Review Process: In the IS-1, IS-2, and IMS zoning districts, the following review process applies:

...

c. Use Review: If the use is not allowed by right or as a conditional use, the use may be approved only pursuant to a use review subject to the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (~~4~~3), and (~~5~~4) "Use Review," B.R.C. 1981.[84]

...

(3) In the IG and IM Zoning Districts:

(A) In the IG and IM zoning districts, breweries, distilleries, and wineries shall meet the following standards:

(i) Review Process: In the IG and IM zoning districts, the following review process applies:

...

c. Use Review: If the use is not allowed by right or as a conditional use, the use may be approved only pursuant to a use review subject to the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (~~4~~3), and (~~5~~4) "Use Review," B.R.C. 1981.[85]

...

(i) Office Uses:

...

(2) Office Uses in the MU-4 Zoning District:

---

[84] Necessary renumbering, criteria (1) was removed.
[85] Necessary renumbering, criteria (1) was removed.

(A) Review Process: In the MU-4 zoning district, the following review process applies to office uses:

...

(ii) Use Review: Office uses that may not be approved by right may be approved pursuant to a use review if the approving authority finds that the use:

a. Meets the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (~~4~~3), and (~~5~~4), "Use Review," B.R.C. 1981; and

...

(3) Office Uses in the BT-1, BT-2, BMS, BR-1, and BR-2 Zoning Districts:

(A) Review Process: In the BT-1, BT-2, BMS, BR-1, and BR-2 zoning districts, the following review process applies to office uses:

(i) Allowed Use: Office uses are allowed by right if they meet the following standards:

a. The use is located within the University Hill general improvement district;

b. The combined total amount of floor area of any office uses does not exceed 20,000 square feet on the lot or parcel; or

c. The use was legally established within the associated floor area prior to August 6, 2019. ~~Uses that exceed the 20,000 square feet limitation of Subparagraph (A)(i)b. shall be considered a nonconforming use.~~ Changes in operations, such as changes in ownership, tenancy, management, number of employees, hours of operation, or changes to other uses also within the office use category within the existing floor area referenced in this subsection, ~~shall~~ do not require city manager review.~~be considered an expansion of a nonconforming use. Such changes shall not require a request for a change of use pursuant to Section 9-10-3(c)(2), "Standards for Changes to Nonconforming Uses," B.R.C. 1981.~~ Additions or changes to floor plans that result in the combined floor area of these uses exceeding ~~the~~ 20,000 square ~~foot~~ feet ~~limitation of Subparagraph (A)(i)b. for the nonconforming floor area~~

~~may~~ are not ~~be~~ allowed by right and are subject to the standards of Subparagraphs (A)(ii) and (A)(iii).[86]

(ii) Conditional Use: The use may be approved as a conditional use if the following standards are met:

a. The total amount of floor area of any office uses does not exceed 40,000 square feet on the lot or parcel;

b. Dwelling units are constructed on the same lot or parcel or within the area of the same approved site review, planned unit development, or form-based code review and at least thirteen percent of those dwelling units meet the requirements for permanently affordable units set forth in Chapter 9-13, "Inclusionary Housing," B.R.C. 1981; and

c. No less than two permanently affordable units are constructed on said lot or parcel or within said area of an approved site review, planned unit development, or form-based code review.

(iii) Use Review: Any use that is not allowed by right and may not be approved as a conditional use may be approved pursuant to a use review if the approving authority finds that the use:

a. Meets the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (~~4~~3), and (~~5~~4), "Use Review," B.R.C. 1981; and[87]

b. The proposed use is part of a mixed-use development that includes residential or retail uses.

...

(k) Office:

...

(4) In the IG and IM Zoning Districts:

(A) Review Process: In the IG and IM zoning districts, the following review process applies to offices:

...

(ii) Use Review: If the office is not allowed by right, the use may be approved only pursuant to a use review. In addition to meeting the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (~~4~~3),

---

[86] Clarifications related to nonconforming use definition changes and new language for substitutions of owner and tenant processes.
[87] Necessary renumbering as (1) is removed.

and (~~5~~4) "Use Review," B.R.C. 1981, the applicant shall demonstrate that:[88]

...

(r) Financial Institution:

...

(2) In the MU-4 Zoning District:

(A) Review Process: In the MU-4 zoning district, the following review process applies to financial institutions:

...

(ii) Use Review: Financial institutions that may not be approved by right may be approved pursuant to a use review if the approving authority finds that the use:

a. Meets the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (~~4~~3), and (~~5~~4), "Use Review," B.R.C. 1981; and[89]

...

Section 21. Section 9-7-5, "Building Height," B.R.C. 1981, is amended to read as follows:

9-7-5. Building Height

...

(d) Nonconformity to Permitted Height: For existing buildings that exceed the height permitted in Section 9-7-1, "Schedule of Form and Bulk Standards," or Section 9-7-6, "Building Height, Conditional," B.R.C. 1981, the following changes require approval under Section 9-2-14, "Site Review," B.R.C. 1981:

(1) ~~There shall be no increase in~~ Increasing the building's highest point as established by Subsection 9-7-5(b), "Measurement of Height," B.R.C. 1981;

(2) Adding building elements or massing above the permitted or conditional height unless permitted by Section 9-7-7, "Building Height, Appurtenances," B.R.C. 1981; or

[88] Necessary renumbering as (1) is removed.
[89] Necessary renumbering as (1) is removed.

(3) ~~or~~ Adding ~~the~~ floor area of buildings ~~greater than the~~above the permitted or conditional height ~~but less than fifty-five feet in height, unless approved under Section 9-2-14, "Site Review," B.R.C. 1981~~.[90]

...

...

Section 22. Section 9-8-5, "Occupancy of Dwelling Units," B.R.C. 1981, is amended to read as follows:

9-8-5. Occupancy of Dwelling Units

...

(d) Nonconforming Uses: A nonconforming residential use that is ~~not permitted~~prohibited by Section 9-6-1, "Schedule of Permitted Land Uses," B.R.C. 1981, or is a lot or parcel that does not meet the density requirements of Chapter 9-8, "Intensity Standards," B.R.C. 1981, is subject to the following:[91]

...

Section 23. Section 9-9-6, "Parking Standards," B.R.C. 1981, is amended to read as follows:

9-9-6. Parking Standards

(a) Rationale: The intent of this section is to provide adequate off-street parking for all uses, to prevent undue congestion and interference with the traffic carrying capacity of city streets, and to minimize the visual and environmental impacts of excessive parking lot paving.

...

(c) General Parking Requirements:

(1) Rounding Rule: For all motor vehicle and bicycle parking space requirements resulting in a fraction, the fraction shall be:

(A) Rounded to the next higher whole number when the required number of spaces is five or less; or

(B) Rounded to the next lower whole number when the required number of spaces is more than five.

---

[90] Clarifies changes allowed to buildings that do not conform to height requirements and that additional floor area below the maximum height is permitted.

[91] Aligns language with changes proposed in definition of "nonconforming use."

(2) Parking Requirements for Lots in Two or More Zoning Districts: For lots that have more than one zoning designation, the required motor vehicle and bicycle parking for the use(s) on the lot may be provided on any portion of the lot, subject to the provisions of this title.

(3) Off-Street Parking Requirement for Unlisted Nonresidential Uses: If the city manager determines that the use type is not specifically listed in Table 6-1, Use Table, or Table 9-4, Use Specific Motor Vehicle Parking Requirements for Nonresidential Uses in All Zones, the city manager may apply one of the following standards that adequately meets the parking needs of the use:[92]

(A) The applicable off-street parking requirement under Table 9-3, Nonresidential Motor Vehicle Parking Requirements by Zoning District;

(B) The off-street parking requirement under Table 9-4 for the listed use type most similar to the proposed use type based on public parking demand, nature of the use, number of employees, or any other factors deemed appropriate by the city manager;

(C) An off-street parking requirement established based on local or national best practices or by reference to standards or resources such as the Institute of Traffic Engineers, Urban Land Institute, International Council of Shopping Centers, American Association of State Highway and Transportation Officials, or American Planning Association; or

(D) An off-street parking requirement demonstrated by a parking demand study prepared by the applicant according to Paragraph 9-9-6(d)(6).

...

Section 24. Section 9-9-17, "Solar Access," B.R.C. 1981, is amended to read as follows:

9-9-17. Solar Access

...

(d) Basic Solar Access Protection:

(1) Solar Fence: A solar fence is hereby hypothesized for each lot located in SA Area I and SA Area II. Each solar fence completely encloses the lot in

[92] This provides additional flexibility for unlisted uses to determine unique parking requirements and is common in other communities. Some properties are not eligible to apply for Site Review to further modify parking requirements, so this provides a path for determining appropriate standards.

question, and its foundation is contiguous with the lot lines. Such fence is vertical, is opaque and lacks any thickness.

(A) SA Area I: No person shall erect an object or structure on any other lot that would shade a protected lot in SA Area I to a greater degree than the lot would be shaded by a solar fence twelve feet in height, between two hours before and two hours after local solar noon on a clear winter solstice day.

(B) SA Area II: No person shall erect an object or structure on any other lot that would shade a protected lot in SA Area II to a greater degree than the lot would be shaded by a solar fence twenty-five feet in height, between two hours before and two hours after local solar noon on a clear winter solstice day.

(C) SA Area III: Solar fences are not hypothesized for lots located in SA Area III. Solar access protection in SA Area III is available under this section only through permits, as hereinafter provided.

(D) Adjoining Duplex or Townhouse Lots in All Solar Areas: On duplex or townhouse lots, solar fences are not hypothesized on interior lot lines between adjoining units of a duplex or adjoining townhouses. Other lot lines are subject to the solar fence restrictions of subsection (A), (B), or (C), as applicable.[93]

...

(f) Exceptions

(5) Referral or Appeal of City Manager's Decision: The city manager may refer the application or the city manager's decision may be appealed by the applicant to the BOZA pursuant to the procedures of Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981. If an affidavit from each owner of each affected lot per subparagraph (f)(4)(A) cannot be obtained, the applicant may apply for consideration of the exception before the BOZA. Public notification of the hearing shall be provided pursuant to Section 9-4-3, "Public Notice Requirements," B.R.C. 1981. The sign posted shall remain posted until the conclusion of the hearing.[94]

(g) Solar Siting:

...

(2) Waivers: Upon request of any applicant for a building permit or a subdivision or planned unit development approval, the approving authority may waive

[93] This clarifies that solar fences are not considered for adjoining duplex or townhouse lots, but still considered at the exterior of a development.
[94] Changes made to mirror changes in Table 4-4 to better align solar exceptions with other administrative variances.

such of the requirements of this paragraph as it deems appropriate if it finds that any of the following criteria are met:

...

~~(D) The applicant's proposal incorporates the following additional energy resource and conservation option points in excess of the requirements of Subsection 10-5.5-2(y), "Resource Conservation - Green Points," B.R.C. 1981:~~

~~(i) 2 points - to qualify for a waiver of the requirement of Subparagraph (g)(1)(A) of this section;~~

~~(ii) 3 points - to qualify for a waiver of the requirement of Subparagraph (g)(1)(B) of this section; and~~

~~(iii) The city manager finds that adequate protection for any solar energy systems to be installed is provided either under the provisions of this section, or through covenants, easements, or other agreements among affected landowners.~~[95]

...

Section 25. Section 9-10-2, "Continuation or Restoration of Nonconforming Uses and Nonstandard Buildings, Structures, and Lots," B.R.C. 1981, is amended to read as follows:

9-10-2. Continuation or Restoration of Nonconforming Uses and Nonstandard Buildings, Structures, and Lots

Nonconforming uses and nonstandard buildings and lots in existence on the effective date of the ordinance which first made them nonconforming may continue to exist subject to the following:

(a) One-Year Expiration for Nonconforming Uses: A nonconforming use, except for a use that is nonconforming only because it fails to meet the required off street parking standards ~~in~~ of Section~~s~~ 9-9-6, "Parking Standards," ~~and~~ or residential density requirements of Section 9-~~7~~8-1, " Schedule of Intensity Standards~~Schedule of Form and Bulk Standards~~," B.R.C. 1981, that has been discontinued for at least one year shall not be resumed or replaced by another nonconforming use as allowed under Subsection 9-2-15(f), B.R.C. 1981, unless an extension of time is requested in writing prior to the expiration of the one-year period.[96] The approving

[95] The green points system was removed several years ago and this language unintentionally remains in the code.
[96] Fixes incorrect cross-reference.

authority will grant such a request for an extension upon finding that an undue hardship would result if such extension were not granted.

...

Section 26. Section 9-10-3, "Changes to Nonstandard Buildings, Structures, and Lots and Nonconforming Uses," B.R.C. 1981, is amended to read as follows:

9-10-3. Changes to Nonstandard Buildings, Structures, and Lots and Nonconforming Uses

...

(c) Nonconforming Uses:

(1) Nonconforming Changes to Conforming Use Prohibited: No conforming use may be changed to a nonconforming use, notwithstanding the fact that some of the features of the lot or building are nonstandard or the parking is nonconforming.

(2) Standards for ~~Changes~~ Substitutions of~~to~~ Nonconforming Uses: The city manager will grant a request for a ~~change~~ substitution of nonconforming use, which is the replacement of one nonconforming use with another, if the ~~modified or~~ new use does not constitute an expansion of a nonconforming use. Any ~~other change of use that constitutes~~ expansion of a nonconforming use must be reviewed under procedures of Section 9-2-15, "Use Review," B.R.C. 1981.[97]

(3) Nonconforming Only as to Parking: The city manager will grant a request to change a use that is nonconforming only because of an inadequate amount of parking to any conforming use allowed in the underlying zoning district upon a finding that the new or modified use will have an equivalent or less parking requirement than the use being replaced.[98]

...

Section 27. Section 9-12-3, "Adjustment of Lot Lines," B.R.C. 1981, is amended to read as follows:

9-12-3. Adjustment of Lot Lines

...

[97] This process, which is specific to swapping one nonconforming use for another, has been called a substitution of nonconforming use for many years, so the language has been updated accordingly.
[98] Uses that are nonconforming to parking only may be modified using this section; it does not necessarily need to be a new use.

(d) City Manager Approval: No person shall transfer land under this section until after the city manager reviews the map and legal description of the property and all other information required under this section to verify that the transfer is exempt under this chapter. ~~The city manager shall sign the documents of transfer before they are recorded and will record the approved replat map after the applicant has recorded the documents of transfer.~~ The city manager shall sign the approved replat map and the city clerk shall record the replat map in the office of the Boulder County Clerk and Recorder. Any such approved replat not recorded within six months after the date it was approved shall automatically expire.[99]

Section 28. Section 9-12-4, "Elimination of Lot Lines," B.R.C. 1981, is amended to read as follows:

9-12-4. Elimination of Lot Lines

...

~~(e) City Manager Decision: The city manager shall notify the planning board in writing within seven days of the disposition of the replat application.~~[100]

(~~f~~e) City Manager Approval: The city manager shall sign all approved replats and~~, upon the payment of the recording fees prescribed by subsection 4-20-43(a), B.R.C. 1981,~~ the city clerk shall record all such replats in the office of the Boulder County Clerk and Recorder. Any such approved replat not recorded within six months after the date it was approved shall automatically expire.[101]

Section 29. Section 9-12-5, "Minor Subdivision," B.R.C. 1981, is amended to read as follows:

9-12-5. Minor Subdivision

(a) Scope: A minor subdivision is a division of land that is already served by city services, will not require the extension of streets or public improvements and will not result in more than one additional lot.

...

(f) Existing Streets or Alleys, Dedication and Vacation of Easements: Right-of-way necessary to bring an existing street or alley up to a current city standard, or public

[99] Staff does not sign documents of transfer, so this language has been removed to align with current practice. Similar language from 9-12-4 has been included to align the process of city manager signature and recording with that of lot line eliminations.
[100] Lot line eliminations currently require an informational item to be sent to the Planning Board, even though lot line adjustments are not required to do so. Additionally, they are not subject to call-up so it is purely informational.
[101] Recording fees are no longer described in this subsection so this has been removed.

easements for utilities or sidewalks may be dedicated on a minor subdivision plat. The City may approve the vacation of city utility easements on the replat.[102]

...

Section 30. Section 9-12-10, "Final Plat Procedure," B.R.C. 1981, is amended to read as follows:

9-12-10. Final Plat Procedure

...

(~~e~~d) Any person aggrieved by a decision of the city manager to approve or deny an application for a subdivision may appeal such decision to the planning board ~~by filing an appeal with the city manager within fourteen days of the decision~~pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981. A member of the planning board may call-up the city manager decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.~~The board shall hear the appeal or call-up of the subdivision application, after giving notice to all interested parties, within thirty days of the notice of appeal or call-up, under the procedures prescribed by Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981.~~ The board shall determine whether the subdivision application meets the requirements of this code and other ordinances of the City or those determined by the city manager to be necessary to protect the public health, safety and welfare and shall grant or deny the application.[103]

(~~f~~e) The city manager shall sign the city manager certification on all plats of the subdivision following planning board approval, or the expiration of the call-up period, as applicable. Within one week after any conditions of the subdivision agreement required to occur prior to recording have been met, the city clerk shall record all such plats and agreements in the office of the Boulder County Clerk and Recorder in a form acceptable to the office and consistent with state law.

(~~g~~f) A plat expires if not recorded within twenty-four months after the date it was submitted, unless the city manager extends final plat approval for not more than twelve months upon a showing of good cause.

Section 31. Section 9-16-1, "General Definitions," B.R.C. 1981, is amended to read as follows:

9-16-1. General Definitions

[102] Additional language to subsection leader for clarity.
[103] Specific language related to Planning Board call-ups added to align with charter requirements.

...

(c) The following terms as used in this title have the following meanings unless the context clearly indicates otherwise:

...

Conforming Use means any use of a building or use of a lot that is permitted by Section 9-6-1, "Schedule of Permitted Land Uses," B.R.C. 1981 and meets any applicable specific use standards. A conforming use also includes:[104]

(1) A legal existing use that is not prohibited but was not approved as a conditional use or use review use;

(2) A use approved pursuant to a valid use review or special review, except where the review was a nonconforming use review;

Expansion of a nonconforming use means any change or modification to a nonconforming use that constitutes:

(1) An increase in the occupancy, floor area, required parking, traffic generation, outdoor storage, or visual, noise, or air pollution;

(2) Any change in the operational characteristics which may increase the impacts or create adverse impacts to the surrounding area including, without limitation, the hours of operation, noise, or the number of employees;

(3) The addition of bedrooms to a dwelling unit, except a single-family detached dwelling unit; or

(4) The addition of one or more dwelling units.

...

Nonconforming use means any use of a building or use of a lot that is ~~not permitted~~prohibited by Section 9-6-1, "Schedule of Permitted Land Uses," B.R.C. 1981~~, but excludes a conforming use in a nonstandard building or on a nonstandard lot; a legal existing use that has not been approved as a conditional use or a use review use, or a use approved pursuant to a valid special review or use review approval~~. A nonconforming use also includes an otherwise conforming use, except a single dwelling unit on a lot, that does not meet the following parking ~~and~~ or residential density requirements, including, without limitation, the requirements for minimum lot area per dwelling unit~~,~~, useable open space

[104] The definition of "nonconforming use" currently includes many examples of situations that are not nonconforming. This pulls those situations into a new definition of "conforming use" to simplify the nonconforming use definition.

per dwelling unit, or required off-street parking requirements of Sections 9-8-1, "Schedule of Intensity Standards," ~~and~~ or 9-9-6, "Parking Standards," B.R.C. 1981.[105]

...

Nonstandard building or structure means any building or structure that does not conform to the setback, height, side yard bulk plane, side yard wall length articulation, or building coverage requirements of Section 9-7-1, "Schedule of Form and Bulk Standards," or the floor area ratio requirements of Section 9-8-1, "Schedule of Intensity Standards," and Section 9-8-2, "Floor Area Ratio Requirements," B.R.C. 1981, unless the nonstandard features of the building or structure were approved as part of a planned unit development or a site review, or as a variance. A nonstandard building or structure does not render a conforming use a nonconforming use.[106]

Nonstandard lot means any lot that does not conform to the minimum lot area requirement of Section 9-8-1, "Schedule of Intensity Standards," B.R.C. 1981, or frontage upon a public street required by Section 9-12-12, "Standards for Lots and Public Improvements," B.R.C. 1981, unless the nonstandard nature of the lot was approved as part of a planned unit development or a site review. A nonstandard lot does not render a conforming use a nonconforming use.[107]

[105] The exclusions have been relocated to a new definition of "conforming use" to make this easier to read.
[106] Clarification added to align with changes to nonconforming use definition.
[107] Clarification added to align with changes to nonconforming use definition.

ORDINANCE 8622

AN ORDINANCE AMENDING TITLE 9, "LAND USE CODE," B.R.C. 1981, TO SIMPLIFY CERTAIN DEVELOPMENT REVIEW PROCESSES, AND SETTING FORTH RELATED DETAILS.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF BOULDER, COLORADO:

Section 1. Section 4-20-43, "Development Application Fees," B.R.C. 1981, is amended to read as follows:

4-20-43. Development Application Fees.

(a) Subdivision fees:

…

(b) Land use regulation fees:

…

(3) An applicant for approval of a use review shall pay the following fees:

Standard

Initial application $3,420

Reapplication for same type of revision on same property within six months (if initial application is withdrawn or denied) .....$1,710.

Fee includes an initial and two subsequent staff reviews of the application. Each additional staff review of an application is .....$1,130.

Nonconforming uses and nonstandard lots and buildings

Initial application $2,870

Reapplication for same type of revision on same property within six months (if initial application is withdrawn or denied) $1,435

Fee includes an initial and two subsequent staff reviews of the application. Each additional staff review of an application is .....$950.

Minor use review

Initial application $1,710

Reapplication for same type of revision on same property within six months (if initial application is withdrawn or denied) $855

Fee includes an initial and two subsequent staff reviews of the application. Each additional staff review of an application is .....$560.

…

Section 2. Section 8-6-10, "Vacation of Public Easements," B.R.C. 1981, is amended to read as follows:

8-6-10. - Vacation of Public Easements

Vacation of city easements dedicated for any purpose, except public rights of way and access easements, may occur:

(a) Through the subdivision process; or

(b) By approval of the city manager upon a determination that no public need exists for such easement. The city manager will review the requested vacation pursuant to Section 9-2-2, "Administrative Review Procedures," B.R.C. 1981. ~~If the city manager approves an easement vacation, it is not effective until thirty days after the date of its approval. Promptly after approving the vacation, the manager will forward to the city council a written report, including a legal description of vacated portion of the easement and the reasons for approval. The manager will publish notice of the proposed vacation once in a newspaper of general circulation in the city within thirty days after the vacation is approved. Upon receiving such report and at any time before the effective date of the vacation, the council may rescind the manager's approval and call up the vacation request for its consideration at a public hearing, which constitutes a revocation of the vacation.~~

Section 3. Section 9-1-4, "Transitional Regulations," B.R.C. 1981, is amended to read as follows:

9-1-4. Transitional Regulations

This section addresses the applicability of new substantive standards enacted by amendments to this title to activities, actions and other matters that are pending or occurring as of the effective date ~~of this title~~thereof.

…

(e) Existing Uses Subject to Specific Use Standards or That Require a Use Review or Conditional Use Approval:

(1) Use Review or Conditional Use Approvals: Any previously approved use that was established prior to the adoption of new regulations that make ~~such~~ the use permitted only pursuant to a conditional use or a use review shall be allowed to continue in operation. Any ~~change or~~ expansion of ~~a~~

the use ~~that was established prior to the adoption of new regulations that make such use permitted pursuant to a conditional use or a use review~~ shall be made in conformance with the applicable ~~standards~~ procedure for use review or~~,~~ conditional uses~~, or for changes or expansions to nonconforming uses~~.

(2) Specific Use Standards: Any previously allowed use that was established prior to the adoption of new regulations that make such use allowed subject to specific use standards shall be allowed to continue in operation. Changes to ~~a~~ the use ~~that was established prior to adoption of the new regulations that imposed specific use standards~~ shall be made in conformance with the applicable specific use standards~~or in conformance with the applicable standards for changes or expansions to nonconforming uses~~.

(3) Discontinued Use: If active and continuous operations of a use subject to the standards of paragraphs (e)(1) or (e)(2) of this section are not carried on for a period of three years, it shall thereafter be occupied and used by a use meeting the requirements of this title~~, as required by Subsection 9-10-2(a), B.R.C. 1981~~.

(f) Nonconforming Uses: Nonconforming uses are subject to the standards in Chapter 9-10, "Nonconforming Standards," B.R.C. 1981.

(~~f~~g) Violations Continue: Any violation of the previous land development regulations of the city shall continue to be a violation under this title and shall be subject to the penalties and enforcement set forth in Chapter 9-15, "Enforcement," B.R.C. 1981, unless the use, development, construction or other activity is clearly consistent with the express terms of this title.

Section 4. Section 9-2-1, "Types of Reviews," B.R.C. 1981, is amended to read as follows:

9-2-1. Types of Reviews

(a) Purpose: This section identifies the numerous types of administrative and development review processes and procedures. The review process for each of the major review types is summarized in Table 2-1of this section.

(b) Summary Chart:

TABLE 2-1: REVIEW PROCESSES SUMMARY CHART

I. ADMINISTRATIVE REVIEWS	*II. DEVELOPMENT REVIEW AND BOARD ACTION*
Affordable housing design review pursuant to Section 9-13-4, B.R.C. 1981 Building permits	Annexation/initial zoning BOZA variances

Change of address	Concept plans
Change of street name	Demolition, moving, and removal of buildings with potential historic or architectural significance, per Section 9-11-23, "Review of Permits for Demolition, On-Site Relocation, and Off-Site Relocation of Buildings Not Designated," B.R.C. 1981
Conditional uses, as noted in Table 6-1: Use Table	Form-based code review
Demolition, moving, and removal of buildings with no historic or architectural significance, per Section 9-11-23, "Review of Permits for Demolition, On-Site Relocation, and Off-Site Relocation of Buildings Not Designated," B.R.C. 1981	Geophysical exploration permit
Easement vacation	Landmark alteration certificates other than those that may be approved by staff per Section 9-11-14, "Staff Review of Application for Landmark Alteration Certificate," B.R.C. 1981
Extension of development approval/staff level	Lot line adjustments
Landmark alteration certificates (staff review per Section 9-11-14, "Staff Review of Application for Landmark Alteration Certificate," B.R.C. 1981)	Lot line elimination
Landscape standards variance	Minor Subdivisions
Minor modification to approved site plan	Out of city utility permit
Minor modification to approved form-based code review	Rezoning
Noise barriers along major streets per Paragraph 9-9-15(c)(7), B.R.C. 1981	Site review
Nonconforming use ~~(~~extension~~, change of use (incl. parking))~~	Subdivisions
Parking deferral per Subsection 9-9-6(e), B.R.C. 1981	Use review
Parking reduction of up to 25 percent per Subsection 9-9-6(f), B.R.C. 1981	Vacations of street, alley, or access easement
Parking reductions and modifications for bicycle parking per Paragraph 9-9-6(g)(6), B.R.C. 1981	
Parking stall variances	
Public utility	
Rescission of development approval	
Revocable permit	
Right-of-way lease	
Setback variance	
Site access variance	
<u>Substitution of a nonconforming use</u>	
Solar exception	
Zoning verification	

<u>Section 5.</u> Section 9-2-2, "Administrative Review Procedures," B.R.C. 1981, is amended to read as follows:

9-2-2. Administrative Review Procedures

(a) Purpose: Administrative review of projects will occur at various times in project development to ensure compliance with the development standards of the city.

…

(d) Conditional Uses:

…

(5) Expiration: Any conditional use approval that is not established within one year of its approval, is discontinued for at least three years, or is replaced by another use of land shall expire.

…

Section 6. Section 9-2-7, "Development Review Action," B.R.C. 1981, is amended to read as follows:

9-2-7. Development Review Action

No development review application will be accepted unless and until it is determined to be complete. Such determination will be made within five days after the submission of the application. The city manager will review the application and provide the applicant with a list of any deficiencies.

…

(b) Planning Board Review and Recommendation: Development review applications requiring a decision by the planning board shall be reviewed as follows:

…

(3) Appeal and Call-Ups:

(A) The applicant or any interested person may appeal the city manager's decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.

(B) A member of the planning board may call-up an application for review pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981, except that minor use review processes are not subject to call-up by planning board.

(c) City Council Call-Up: The city council may call-up any planning board decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.

(d) Building Permit Pending Appeal: A building permit may be applied for after the initial approval of a development review application, but no building permit will be issued until

after any and all applicable call-up or appeal periods have expired. An applicant for such a permit bears all risks of subsequent disapproval and waives any claims arising from the permit application.

(e) Judicial Review: Any person aggrieved by the final decision of the city manager may seek judicial review pursuant to Subsection 9-4-4(g), B.R.C. 1981.

Section 7. Section 9-2-8, "Public Hearing Requirements," B.R.C. 1981, is amended to read as follows:

9-2-8. Public Hearing Requirements

Within sixty days after a referral, or an appeal or call-up pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981, the approving agency, after publishing notice pursuant to Section 9-4-3, "Public Notice Requirements," B.R.C. 1981, will hold a public hearing on the application.

Section 8. Section 9-2-9, "Final Approval Requirements," B.R.C. 1981, is amended to read as follows:

9-2-9. Final Approval Requirements

(a) Development Agreement: After the approving agency has finally approved an application for use review, site review, or form-based code review, the owner and the city manager will execute a development agreement that incorporates all conditions of the approval, including, without limitation, time limits for completion of the development, and, if applicable, requirements for appropriate easements or deed restrictions if unique conditions of approval apply. The development agreement shall be binding on all parties thereto, shall run with the land and will be recorded upon execution by the city clerk in the office of the County Clerk and Recorder of Boulder County. Any violation of a development agreement is a violation of this title.

(1) Exceptions: The city manager may waive the requirement for a development agreement for:

(A) A minor amendment to a site review;

(B) A minor use review process; and

(C) If there are no public improvements associated with a form-based code review application, a form-based code review~~the city manager can waive the requirements for a development agreement~~.

(b) Final Approved Plans: The applicant shall file a paper or electronic copy containing the approved site plan, any applicable restrictions or modifications to the underlying zoning district, and any conditions approved by the approving agency. The paper or electronic

copy shall be filed with the city manager, who will endorse and date the approved site plan. The location of the approved development will be included on an official map showing development in the City. The paper or electronic copy will remain on file in the planning department.

(c) Expiration: Unless expressly waived by the city manager for good cause, pursuant to a written request made prior to expiration of the approval, if the applicant fails to file the final approved plans according to the specifications in Subsection (b) above or sign the development agreement within ninety days of final approval, the approval expires.

Section 9. Section 9-2-10, "Amendment Procedures," B.R.C. 1981, is amended to read as follows:

9-2-10. Amendment Procedures

An approved use review may be amended pursuant to Subsection 9-2-15(~~h~~j), B.R.C. 1981. An approved site review may be amended pursuant to Subsection 9-2-14(l) or (m), B.R.C. 1981. The city manager may approve, without notice, minor modifications to a ~~use review or a~~ site review under the procedures prescribed by Subsection 9-2-14(k), B.R.C. 1981.

Section 10. Section 9-2-12, "Development Progress Required," B.R.C. 1981, is amended to read as follows:

9-2-12. Development Progress Required.

(a) Three-Year Rule: The applicant must obtain applicable building permit approvals and start construction within three years of the date of the final approval of the site review, use review, or form-based code review. For a use review without construction requiring a building permit, the use must be established within three years of the date of final approval. ~~begin and substantially complete the approved site review, use review, or form-based code review as specified in the development agreement within three years from the time of the final approval of the site, use, or form-based code review or as modified by a development schedule incorporated in the development agreement. For the purposes of this section, substantially complete means the time when the construction is sufficiently complete so the owner can occupy the work or portion thereof for the use for which it is intended. If the project is to be developed in stages, the applicant must begin and substantially complete the development of each stage within three years of the time provided for the start of construction of each stage in the development agreement. Failure to substantially complete the development or any development stage within three years of the approved development schedule shall cause the unbuilt portion of the development approval to expire.~~

(1) Phasing: For reviews with phased development established in the development agreement, for each development phase, the applicable building permits must be

obtained and construction must be started within three years of the start of the phase, or as modified by the development agreement.

(2) Expiration: Failure to comply with the three-year rule shall cause the development approval to expire. For phased development, if an approval for one phase expires, then all successive phases not completed or under construction shall expire. After an approval has expired, any new application for development is subject to all the procedures and standards of this title in effect at the time of such application.

(3) Vested Rights: Nothing in this section is deemed to create a vested property right in any applicant; such vested property right may only be created pursuant to the provisions of Section 9-2-20, "Creation of Vested Rights," B.R.C. 1981.

(b) Extension: If the applicant requests an extension prior to the expiration of a site review, use review, or form-based code review approval, the city manager may grant an extension of the approval pursuant to the following: ~~Prior to the expiration of a form-based code review, use review, or site review approval, the applicant may request an extension of the time allowed for the completion of the development.~~

(1) The city manager will grant up to two one-year extensions to obtain applicable building permit approvals and start construction or establish the use if the applicant demonstrates that it exercised reasonable diligence and has good cause as to why the extension should be granted. The extension must be requested in writing prior to the expiration of the approval. The first extension extends the approval by one year from the date of final approval. The second extension extends the approval by an additional year and can be requested only after the first extension has been granted and additional progress has been made. ~~City Manager Level Extension: The city manager may grant up to two six-month extensions for each phase of the development if such extension will enable the applicant to substantially complete the phase of development or is necessary to allow the applicant to request an extension from the planning board.~~

~~(2) Planning Board Level Extension: The planning board may grant an extension of a development approval, pursuant to a hearing conducted under the provisions of Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981, after the applicant has exhausted any extension granted pursuant to Paragraph (b)(1) of this section. The applicant shall be required to demonstrate that it exercised reasonable diligence in completing the project according to the approved development schedule and good cause as to why the extension should be granted.~~

(A) Criteria for Demonstrating Reasonable Diligence: An applicant may show that it has exercised reasonable diligence by providing evidence that it has done substantial work towards obtaining building permit approval or starting construction~~completing the project~~. Such evidence may include, without limitation, drafting plans for building permit or technical document review, applications for building permits or other permits that

are required prior to the issuance of building permits,~~,~~ or site preparation and grading~~, or commencement of the construction of a portion of the project~~.

(B) Criteria for Demonstrating Good Cause: An applicant may show good cause as to why an extension should be granted by providing evidence that includes, without limitation, the following: a demonstration of the applicant's ability to ~~complete the project~~obtain building permit approval and start construction within the extension; the extension is needed because of the size of the project or phasing of the development; or that economic cycles and market conditions ~~prevented~~ delayed the building permit approval process and start of construction ~~the construction of the project~~ during the original approval period.

~~(C) Additional Conditions: As part of a hearing to consider an extension, the planning board may impose additional conditions on the applicant in order to ensure compliance with any amendments to this title enacted after the date of the original approval.~~

(c) Building Permits: Upon issuance of a building permit pursuant to a development review approval, the applicant must adhere to the schedule for construction and inspection as defined in the city building code, Chapter 10-5, "Building Code," B.R.C. 1981. In addition to the provisions of this title, all provisions of the building code regarding expiration and termination of building permits shall apply.

(d) Annexations/Six-Month Rule: If an owner of property not located within the city, for which a development review application is approved, fails to annex the property to the city within six months of the date of approval, the approval shall expire unless the approving agency extends the time period, upon a finding of good cause predicated upon a written request of the applicant delivered to the city manager before the expiration of the six-month period.

(e) Rescission of Development Approval: If, after use review, special review, site review, Planned Development (PD), Planned Residential Development (PRD), or Planned Unit Development (PUD) approval is granted pursuant to this chapter, the owner of property desires to develop, instead, under the provisions of Chapters 9-6, "Use Standards," 9-7, "Form and Bulk Standards," and 9-8, "Intensity Standards," B.R.C. 1981, the owner may request rescission of such use review, site review, PD, PRD or PUD approval by filing a written request for rescission with the city manager. The manager will grant a rescission if:

(1) ~~The manager will grant a rescission of such use review, site review, PD, PRD, or PUD approval if no~~No building permit has been issued for the development and neither the city nor the developer has taken any actions in detrimental reliance on the terms of the development agreement~~.~~; ~~The manager may also rescind a site review, PD, PRD, or PUD approval if~~

(2) For a site review, PD, PRD, or PUD approval, the existing or proposed

development complies with all the use, form, and intensity requirements of Chapters 9-6, "Use Standards," 9-7, "Form and Bulk Standards," and 9-8, "Intensity Standards," B.R.C. 1981, and there is no substantial public benefit in maintaining the original approval~~.~~; or ~~An owner may also request a rescission of a use review or special review approval in order to~~

(3) For a use review or special review approval, the rescission will return the property to a use that is allowed by right or as a conditional use ~~if it~~and the owner is able to meet all applicable standards for such use under this title.

Section 11. Section 9-2-14, "Site Review," B.R.C. 1981, is amended to read as follows:

9-2-14. Site Review

…

(h) Criteria: No site review application shall be approved unless the approving agency finds that the project is consistent with the following criteria:

…

(6) Land Use Intensity and Height Modifications: Modifications to minimum open space on lots, floor area ratio (FAR), maximum height, and number of dwelling units per acre requirements will be approved pursuant to the standards of this subparagraph:

…

(C) Additional Criteria for a Height Bonus and Land Use Intensity Modifications: A building proposed with a fourth or fifth story or addition thereto that exceeds the permitted height requirements of Section 9-7-5, "Building Height," or 9-7-6, "Building Height, Conditional," B.R.C. 1981, together with any additional floor area or residential density approved under Subparagraph (h)(6)(B), may be approved if it meets the requirements of this Subparagraph (h)(6)(C). For purposes of this Subparagraph(h)(6)(C), bonus floor area shall mean floor area that is on a fourth or fifth story and is partially or fully above the permitted height and any floor area that is the result of an increase in density or floor area described in Subparagraph (h)(6)(B). The approving authority may approve a height up to fifty-five feet if one of the following criteria is met:

…

(iv) Alternative Community Benefit: Pursuant to the standard in this Subparagraph (iv), the approving authority may approve an alternative method of compliance to provide additional benefits to the community and qualify for a height bonus together with any additional floor area or density that may be approved under Subparagraph (h)(6)(B). The approving authority will approve the alternative method of compliance if the applicant proposes the

alternative method of compliance and demonstrates that the proposed method:

a. Will improve the facilities or services delivered by the city, including without limitation any police, fire, ~~library,~~ human services, parks and recreation, or other municipal facility, land or service, or will provide an arts, cultural, human services, housing, environmental or other benefit that is a community benefit objective in the BVCP, and

b. Is of a value that is equivalent to or greater than the benefits required by this Subparagraph (h)(6)(C).

…

(k) Minor Modifications to Approved Site Plans: The city manager reviews applications for minor modifications pursuant to the procedures in Section 9-2-2, "Administrative Review Procedures," B.R.C. 1981.

(1) Standards: Minor modifications may be approved if the proposed modification complies with the following standards:

(A) Scope: The proposed modification is to the approved plans.

(B) Intent: The modification does not alter the basic intent of the site plan approval;

(C) Residential Uses: The housing type is not changed;

(D) Height: No portion of any building is expanded above the height permitted under Sections 9-7-1, "Schedule or Form and Bulk Standards," or 9-7-6, "Building Height, Conditional," B.R.C. 1981;

(E) Parking: Any parking reduction is reviewed and approved through the process and criteria in Subsection 9-9-6(f), B.R.C. 1981;

(F) Solar Panels: Any solar panels do not substantially add to the mass or perceived height of the building and comply with all applicable building height, solar access, building coverage, and open space requirements;

(G) Other Requirements: The modification complies with all other applicable requirements of this title; and

(H) Modified Standards: The numeric standards in the site plan are not modified by more than allowed through Table 2-3.

Table 2-3: Minor Modification Standards

Standard modified	Maximum allowed as a minor modification
Setbacks: interior to the site plan area	No limit to setback modifications
Setbacks: along boundary of site plan area	Minimum zoning district requirement

Floor area (cumulative in minor modification processes)	Increase of up to 10 percent of the floor area granted in the site review approval, not to exceed the floor area ratio listed in Chapter 9-8, "Intensity Standards," B.R.C. 1981. These limitations on floor area do not apply to detached dwelling units on individual lots in zoning districts without a maximum floor area ratio.
Open space	Minimum zoning district requirement
Building location	Up to 10 percent of the length or width of the building
Building envelope	Increase of up to 10 percent in area

(2) Notification: If an applicant requests approval of a minor modification to an approved site review, the city manager will determine which properties within the development would be affected by the proposed change. The city manager will provide notice pursuant to Subsection 9-4-3(b), B.R.C. 1981, of the proposed change to all property owners so determined to be affected.

~~Changes to the site plan, building plans, and landscaping plans may be approved by the city manager without an amendment to the site plan if such changes are minor. All minor modifications shall be noted, signed, and dated on the approved site plan. For proposed minor modifications of site review projects that are partially or totally developed, the applicant shall provide notice to any owners of property within the development that might be affected, as determined by the manager. In determining whether a proposed change is a minor modification, the following standards shall apply:~~

~~(1) Setbacks along the boundary of the site plan area cannot be reduced by a minor modification to be less than the minimum setbacks permitted by the underlying zoning district;~~

~~(2) Excepting any site plan approval consisting of detached dwelling units on individual lots where no maximum floor area ratio applies, the floor area of the development, including principal and accessory buildings, may be expanded by the cumulative total of no more than the greater of ten percent or two hundred square feet or, in the case of a building that exceeds the permitted height, no more than five percent, except that the portion of any building over thirty-five feet in height may not be expanded under the provisions of this paragraph. However, the floor area or FAR shall not exceed the maximum floor area or FAR of a zoning district or granted in the site review approval, if such amount requires special approval through the site review process;~~

~~(3) Approved commercial and industrial building locations may be moved or expanded by no more than the greater of ten feet, or ten percent of the length of the building, measured along the building's axis in the direction that the building is being moved or expanded;~~

~~(4) Approved principal and accessory building locations may be moved or expanded by no more than ten feet in any direction within the development in residential~~

~~districts and lots abutting residential districts. The resulting setbacks shall not be less than the minimum allowed setback of the underlying zone;~~

~~(5) Dwelling unit type may not be changed;~~

~~(6) The portion of any building over the permitted height under Section 9-7-1, "Schedule of Form and Bulk Standards," B.R.C. 1981, may not be expanded under the provisions of this subsection;~~

~~(7) No increase may be granted to an open space reduction or to a parking reduction in excess of that allowed in Subsection 9-9-6(f), B.R.C. 1981;~~

~~(8) Solar panels that are proposed to be mounted on a building's roof may not substantially add to the mass or perceived height of the building and shall be consistent with Sections 9-7-7, "Building Height, Conditional," and 9-9-7, "Solar Access," B.R.C. 1981. Solar panels proposed to be ground mounted may not result in a building coverage greater than permitted by the zone and shall not result in open space less than required by Chapter 9-8, "Intensity Standards, " B.R.C. 1981; and~~

~~(9) No change may alter the basic intent of the site plan approval.~~

(l) Minor Amendments to Approved Site Plans: The city manager reviews applications for minor amendments for changes that exceed the limits of a minor modification in Subsection (k) pursuant to the procedures in Section 9-2-7, "Development Review Action," B.R.C. 1981.

(1) Standards: Minor amendments may be approved if the proposed amendment complies with the following standards:

(A) Scope: The proposed amendment is to the approved plans, conditions of approval, or written statement.

(B) Intent: The minor amendment does not alter the basic intent of the site plan approval.

(C) Site Review Criteria: The minor amendment complies with the site review criteria of Subparagraphs (h)(2) and (h)(3) of this section;

(D) Residential Uses: The housing type is not changed;

(E) Height: No portion of any building is expanded above the height permitted under Sections 9-7-1, "Schedule or Form and Bulk Standards," or 9-7-6, "Building Height, Conditional," B.R.C. 1981;

(F) Parking: Any additional parking that is provided is accommodated in the previously approved on-site parking design;

(G) Other Requirements: The minor amendment complies with all other applicable requirements of this title; and

(H) Modified Standards: The numeric standards in the site plan are not amended by more than allowed through Table 2-4.

Table 2-4: Minor Amendment Standards

Standard amended	Maximum allowed as a minor amendment, but not to exceed maximum or minimum zoning district requirements.
Floor area (cumulative in minor amendment processes)	20 percent
Open space (cumulative in minor amendment processes)	Decrease of up to 20 percent
Building location	Up to 20 percent of the length or width of the building

~~(1) Standards: Changes to approved building location or additions to existing buildings, which exceed the limits of a minor modification, may be considered through the minor amendment process if the following standards are met:~~

~~(A) In a residential zone as set forth in Section 9-5-2, "Zoning Districts," B.R.C. 1981, all approved dwelling units within the development phase have been completed;~~

~~(B) In residential zones, dwelling unit type is not changed;~~

~~(C) The required open space per dwelling unit requirement of the zone is met on the lot of the detached dwelling unit to be expanded;~~

~~(D) The total open space per dwelling unit in the development is not reduced by more than ten percent of the amount specified on the approved site plan and is not reduced to less than the minimum required for the zone;~~

~~(E) If the residential open space provided within the development or an approved phase of a development cannot be determined, the detached dwelling unit is not expanded by more than ten percent and there is no variation to the required setbacks for that lot;~~

~~(F) For a building in a nonresidential use module, the building coverage is not increased by more than twenty percent, the addition does not cause a reduction in required open space, and any additional required parking that is provided is substantially accommodated within the existing parking arrangement;~~

~~(G) The portion of any building over the permitted height under Section 9-7-1, "Schedule of Form and Bulk Standards," B.R.C. 1981, is not increased; and~~

~~(H) The proposed minor amendment does not require public infrastructure improvements or other off-site improvements.~~

(2) ~~Amendments to the Site Review Approval~~ Process: Applications for minor amendment shall be ~~approved~~ reviewed and approved according to the procedures

prescribed by this section for site review approval, except:

(A) If an applicant requests approval of a minor amendment to an approved site review, the city manager will determine which properties within the development would be affected by the proposed change. The city manager will provide notice pursuant to Subsection 9-4-3(b), B.R.C. 1981, of the proposed change to all property owners so determined to be affected, and to all property owners within a radius of 600 feet of the subject property.

(B) Only the owners of the subject property shall be required to sign the application.

~~(C) The minor amendment shall be found to comply with the review criteria of Subparagraphs (h)(2)and (h)(3)of this section.~~

~~(D) The minor amendment shall be substantially consistent with the intent of the original approval, including conditions of approval, the intended design character, and site arrangement of the development, and specific limitations on additions or total size of the building which were required to keep the building in general proportion to others in the surrounding area or minimize visual impacts.~~

(~~E~~C) The city manager may amend, waive, or create a development agreement.

…

Section 12. Section 9-2-15, "Use Review," B.R.C. 1981, is amended to read as follows:

9-2-15. Use Review

(a) Purpose: Each zoning district established in Section 9-5-2, "Zoning Districts," B.R.C. 1981, is intended for a predominant use, but other uses designated in Section 9-6-1, "Schedule of Permitted Land Uses," B.R.C. 1981, may be allowed by use review if a particular use is demonstrated to be appropriate in the proposed location. Nonconforming uses may be upgraded or expanded under this section if the change would not adversely affect the traffic and the environment of the surrounding area or if the change would reduce the degree of the nonconformity or improve the appearance of the structure or site without increasing the degree of nonconformity. Nonstandard buildings may be changed, expanded or modified consistent with the criteria and standards set forth in this section and Subsection 9-10-3(a), B.R.C. 1981.

…

(d) Review and Recommendation:

(1) The city manager will review applications for use review of ~~a nonresidential use in residential zoning districts, attached and detached dwelling units or a residential use in a P district, and~~ oil and gas operations and will submit a recommendation to the planning board for its final action pursuant to Subsection 9-2-7(b), B.R.C. 1981.

(2) The city manager shall review and make decisions on all other use review

applications pursuant to Subsection 9-2-7(a), B.R.C. 1981.

(3) Reviews by either the city manager or planning board shall be pursuant to Section 9-2-7, "Development Review Action," B.R.C. 1981, except that minor use review processes are not subject to call-up by planning board.

(e) Criteria for Review: No use review application will be approved unless the approving agency finds all of the following:

~~(1) Consistency With Zoning and Nonconformity: The use is consistent with the purpose of the zoning district as set forth in Section 9-5-2, "Zoning Districts," B.R.C. 1981, except in the case of a nonconforming use;~~

(~~2~~1) Rationale: The use either:

(A) Provides direct service or convenience to or reduces adverse impacts to the surrounding uses or neighborhood;

(B) Provides a compatible transition between higher intensity and lower intensity uses;

(C) Is necessary to foster a specific city policy, as expressed in the Boulder Valley Comprehensive Plan, including, without limitation, historic preservation, moderate income housing, residential and nonresidential mixed uses in appropriate locations, and group living arrangements for special populations; or

(D) Is an existing legal nonconforming use or ~~a change thereto~~an expansion that is permitted under Subsection (f) of this section;

(~~3~~2) Compatibility: The location, size, design, and operating characteristics of the ~~proposed development or change to an existing development are such that the~~ use will be reasonably compatible with and have minimal negative impact on the use of nearby properties, or, for residential uses or community, cultural, and educational uses in industrial zoning districts, the proposed development reasonably mitigates the potential negative impacts from nearby properties;

(43) Infrastructure: ~~As compared to development permitted under Section 9-6-1, "Schedule of Permitted Land Uses," B.R.C. 1981, in the zone, or as compared to the existing level of impact of a nonconforming use, the~~ The ~~proposed development~~use will not significantly adversely affect the infrastructure of the surrounding area, including, without limitation, water, wastewater and storm drainage utilities and streets, compared to an allowed use in the zoning district, or compared to the existing level of impact of a nonconforming use;

(~~5~~4) Character of Area: The use will not change the predominant character of the surrounding area or the character established by adopted design guidelines or plans for the area; and

(~~6~~5) Conversion of Dwelling Units to Nonresidential Uses: There shall be a presumption against approving the conversion of dwelling units in the residential zoning districts to nonresidential uses that are allowed pursuant to a use review, or through the ~~change~~ substitution of one nonconforming use with~~to~~ another

nonconforming use. The presumption against such a conversion may be overcome by a finding that the use to be approved serves another compelling social, human services, governmental or recreational need in the community, including, without limitation, a use for a daycare center, park, religious assembly, social service use, benevolent organization use, art studio or workshop, museum, or an educational use.

(f) Additional Criteria for ~~Modifications~~ Expansion ~~to~~ of a Nonconforming Use~~s~~: No application for ~~a change to~~an expansion of a nonconforming use shall be granted unless all of the following criteria are met in addition to the criteria set forth above:

(1) Reasonable Measures Required: The applicant has undertaken all reasonable measures to reduce or alleviate the effects of the nonconformity upon the surrounding area, including, without limitation, objectionable conditions, glare, adverse visual impacts, noise pollution, air emissions, vehicular traffic, storage of equipment, materials and refuse, and on-street parking, so that the ~~change~~ expansion will not adversely affect the surrounding area.

(2) Reduction in Nonconformity/Improvement of Appearance: The proposed ~~change or~~ expansion will either reduce the degree of nonconformity of the use or improve the physical appearance of the structure or the site without increasing the degree of nonconformity.

(3) Compliance With This Title~~/Exceptions~~: The ~~proposed change in use~~expansion complies with all ~~of the~~other applicable requirements of this title.~~:~~

~~(A) Except for a change of a nonconforming use to another nonconforming use; and~~

~~(B) Unless a variance to the setback requirements has been granted pursuant to Section 9-2-3, "Variances and Interpretations," B.R.C. 1981, or the setback has been varied through the application of the requirements of Section 9-2-14, "Site Review," B.R.C. 1981.~~

(4) Cannot Reasonably Be Made Conforming: The existing building or lot cannot reasonably be utilized or made to conform to the requirements of Chapter 9-6, "Use Standards," 9-7, "Form and Bulk Standards," 9-8, "Intensity Standards," or 9-9, "Development Standards," B.R.C. 1981. This paragraph (4) shall not apply to reconstruction or restoration permitted pursuant to Paragraph 9-10-3(c)(4), B.R.C. 1981, with respect to density and other pre-existing nonconformities of the use or nonstandard features of the building.

(5) No Increase in Floor Area Over Ten Percent: The ~~change or~~ expansion will not result in a cumulative increase in floor area of more than ten percent of the existing floor area.

(6) Approving Authority May Grant Zoning Variances: The approving authority may grant the variances permitted by Subsection 9-2-3(d), B.R.C. 1981, upon finding that the criteria set forth in Subsection 9-2-3(h), B.R.C. 1981, have been met.

(g) Conditions of Approval: The approving agency may impose modifications or conditions

on the use review approval ~~in order~~ to ~~assure~~ ensure compliance with the criteria set forth in Subsections (e) and (f) of this section. In the case of a nonconforming use, conditions may also be imposed to reduce nonconformity and to improve site design.

(h) Oil and Gas Operations: The criteria for review in Subsection (e) shall not apply to an application for oil and gas operations. An oil and gas operations use shall meet the criteria set forth in Section 9-6-7(b), "Oil and Gas Operations," B.R.C. 1981. Any use review approval for an oil and gas operations use shall expire, whether operational or not, in ten years from the date of final approval. Prior to such expiration for an oil and gas operations use, applicants will be responsible for submitting a new use review application for an oil and gas operations use proposed for operation beyond ten years. Following approval of any oil and gas operations use, the applicant shall have two years to obtain the necessary permits to establish the use.

(i) Minor Use Review Process: A use review for a nonresidential use that is proposed in a zoning district other than a residential district and proposed to occupy an existing nonresidential space without any site changes may be reviewed pursuant to a minor use review process. For the purposes of this subsection, site changes do not include changes to landscape plantings, pedestrian pathways, installation of bicycle parking, ordinary site maintenance or repair, signs, or site lighting.

(1) Process: The city manager shall review and make decisions on all minor use review process applications pursuant to Subsection 9-2-7(a), "City Manager Review and Recommendation," B.R.C. 1981. The applicant or any interested person may appeal the city manager's decision pursuant to Paragraph 9-2-15(l)(1), but the city manager's decision is not subject to call-up by the planning board pursuant to Paragraph 9-2-15(l)(2). The city manager may refer the application to the planning board for review or decision.

(2) Development Agreement: The city manager may waive the requirements for a development agreement for a minor use review.

(~~i~~j) Amendments and Minor Modifications: ~~No person shall expand or modify any approved use review use. However, the approved site plan may be modified as provided in Subsection 9-2-14(k), B.R.C. 1981, if it does not expand the use, any changes conform to Section 9-7-1, "Schedule of Form and Bulk Standards," B.R.C. 1981; the impact on other uses of the approved use review is not changed; and the change complies with all other provisions of this title and any other ordinance of the city.~~ No person shall modify an approved use review without a new use review approval, except that minor modifications may be approved pursuant to Section 9-2-2, "Administrative Review Procedures," B.R.C, 1981, provided that the minor modification meets the following standards:

(1) The use is not expanded and the modification is otherwise substantially consistent with the conditions of the original approval;

(2) The modification does not adversely increase impacts to other surrounding properties or adjacent uses; and

(3) The site plan complies with all other provisions of this title and any other ordinance of the city.

(~~j~~k) Expiration: Any use review approval or previously approved special review ~~which~~ that is discontinued for at least three years shall expire. The city manager, upon a finding of good cause, may grant an extension not to exceed six months from the original date of expiration. In addition, use review approvals for oil and gas operations are subject to expiration pursuant to the standards in Subsection (h) of this section.

(~~k~~l) Appeals and Call-Ups:

(1) The applicant or any interested person may appeal the city manager's decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.

(2) A member of the planning board may call-up the manager's decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981, except that decisions in minor use review processes are not subject to call-up by the planning board.

(3) The city council may call-up any planning board decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.

Section 13. Section 9-3-6, "Floodplain Development Permits," B.R.C. 1981, is amended to read as follows:

9-3-6. Floodplain Development Permits.

…

(h) Floodplain development permits that allow for development in the conveyance zone or the high hazard zone, or which will involve a change of watercourse, shall be decided by the city manager. The decision of the city manager ~~shall be subject to~~may be ~~call-up by the planning board, or~~ appeal~~ed~~ by any aggrieved party to the planning board, subject to the ~~call-up and~~ appeal procedure of Section 9-4-4, "Appeals, Call-Ups, and Public Hearings," B.R.C. 1981.

…

Section 14. Section 9-3-7, "Variances," B.R.C. 1981, is amended to read as follows:

9-3-7. Variances

(a) The city manager may grant a variance from the requirements of Subsection 9-3-2(i) and Sections 9-3-3, 9-3-4, and 9-3-5, B.R.C. 1981, except that no variance shall be granted for expansion or enlargement of any structure constructed after July 12, 1978, unless such expansion or enlargement conforms to the flood protection elevation requirement in effect at the time of the original construction.

…

(f) Any decision by the city manager to approve a variance may be ~~is subject to call-up by the planning board or~~ appeal~~ed~~ by any aggrieved party to the planning board as described by Section 9-4-4, "Appeals, Call-Ups, and Public Hearings," B.R.C. 1981.

…

Section 15. Section 9-3-9, "Stream, Wetlands, and Water Body Protection," B.R.C. 1981, is amended to read as follows:

9-3-9. Stream, Wetlands, and Water Body Protection

…

(c) Permitted, Allowed and Prohibited Uses within the Regulated Area: The purpose of this subsection is to describe activities that are exempted, conditionally permitted, requiring development review or prohibited:

(1) Explanation of Table Abbreviations: The abbreviations used in the cells in table 3-1 have the following meanings:

"E"(Exempted Activities): indicates that the use type is allowed as a matter of right and no stream, wetland or water body permit is required.

"C"(Conditional Use Review): indicates that the use type will be reviewed in accordance with the requirements in paragraph (e)(~~3~~2) of this section.

"S"(Standard Permit Review): indicates that the use type will be reviewed in accordance with the requirements in paragraph (e)(~~4~~3) of this section.

"P"(Prohibited Activities): indicates that the use type is prohibited in the zone.

"N"(Allowed with Notice): indicates that the use type is allowed as a matter of right subject to the application of best management practices as defined in chapter 9-16, "Definitions," B.R.C. 1981, and provision of notice in paragraph (5) of this subsection. Such activity shall not significantly alter the function of the stream, wetland or water body. No person shall conduct any activity that is allowed with notice in violation of the best management practices.

…

(e) Stream, Wetland and Water Body Permit Application Review:

(1) Acceptance of Application: Applicants for stream, wetland or water body permits shall submit an application as set forth in subsection (d) of this section. Upon receipt of an application, the city manager shall review the application for completeness. A permit application will be accepted when the city manager determines that it is complete.

~~(2) Public Notification of Application: Upon acceptance of a complete standard review application, public notice shall be provided according to the requirements shown in section 9-4-3, "Public Notice Requirements," B.R.C. 1981, using Public Notice Type 5 from table 4-2. Public notice of a conditional use review application is not required.~~

(~~3~~2) Criteria for Review: For an activity requiring conditional use or standard review, the applicant shall demonstrate that the stream, wetland or water body permit application meets the following criteria:

…

(B) Criteria for the Outer Buffer Zone: In the outer buffer zone, the following criteria shall apply:

(i) The provisions of Subparagraph (e)(~~3~~2)(A) of this section.

(ii) Impervious surface coverage: Any new building or attached structure, expansion of an existing building or attached structure, new surfacing or expansion of an existing surface that would result in a cumulative total of twenty percent or more impervious surface in the outer zone on the property shall provide mitigation according to the requirements in subsection (f) of this section for the loss of pervious surface.

(C) Criteria for the Inner Buffer Zone: In the inner buffer zone, the following criteria shall apply:

(i) The provisions of Subparagraph (e)(~~3~~2)(A) of this section.

(ii) The provisions of Subparagraph (e)(~~3~~2)(B) of this section.

(iii) Channel bank protection or stabilization shall utilize, to the extent feasible, techniques that involve landscaping with appropriate native plants rather than rock or artificially hardened structures.

(iv) All new plant material adjacent to wetlands or water bodies or along the banks of a stream shall be consistent with all applicable city rules concerning best management practices as described in chapter 9-16, "Definitions," B.R.C. 1981. Mitigation monitoring for restoration projects may be required by the city manager.

(v) "Vegetation removal - major" shall only be allowed to prevent noxious weed infestation, provide for native habitat restoration or for other permitted projects. Major removal of vegetation shall be mitigated within the inner buffer according to the requirements in subsection (f) of this section.

(vi) New steps, paths or other minor access to or over a stream on private property will be permitted if there is no more than one access on an individual property, the path or steps are designed to have minimal impact to the wetland, stream or water body, and the path and the area of impact does not exceed four feet in width.

(D) Criteria for the Wetland, Stream or Water Body: In the wetland, stream, or water body, the following criteria shall apply:

(i) The provisions of Subparagraph (e)(~~3~~2)(A) of this section.

(ii) The provisions of Subparagraph (e)(~~3~~2)(B) of this section.

(iii) The provisions of Subparagraph (e)(~~3~~2)(C) of this section.

(iv) Replacement or repair of an existing fence shall be generally in the same location and not result in additional impacts to the wetland, stream, or water body.

(v) Utility line or drop structure maintenance or repair shall not impact the existing functions of the wetland, stream, or water body.

(vi) Activities conducted solely for the purpose of removing stream sediment shall not alter the flood capacity as shown on the adopted floodplain maps. Vegetated channel bottoms shall be restored and stabilized.

(4) Criteria for Standard Review: In addition to the standards in paragraph (e)(~~3~~2) of this section, the applicant shall demonstrate that the stream, wetland or water body permit application meets the following criteria:

…

(g) Permit Issuance:

…

(5) Referrals, Call-up or Appeal:

(A) Conditional Use Permits: For conditional use permits, there shall be no referrals, call-ups or appeals. An applicant may resubmit a standard permit application for a denied conditional use application, pay the balance of the standard permit fee and proceed pursuant to the standard permit review process.

(B) Standard Review Permits: The decision of the city manager ~~shall be subject to call-up by the planning board~~may be~~, or~~ appealed by the applicant to the planning board, subject to the ~~call-up and~~ appeal procedure of ~~section~~Section~~,~~ 9-4-4 "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.

…

(k) Stream, Wetland and Water Body Boundaries:

…

(3) Map Revisions: At the request of a property owner and after submittal of an application and payment of the fee prescribed in section 4-20-53, "Stream, Wetland and Water Body Permit and Map Revision Fees," B.R.C. 1981, or at the city manager's initiative, adopted stream, wetland and water body boundaries may be modified by the city manager by means of the performance of a boundary determination in accordance with the requirements of this subsection:

…

(B) Review of Map Revision Applications:

(i) The city manager shall review the application in accordance with

subsection (l) of this section, and may approve the proposed boundary change, approve the proposed boundary change with modifications or deny the proposed boundary change.

(ii) The decision of the city manager ~~shall be subject to call-up by the planning board or~~may be appealed by the applicant to the planning board, subject to the ~~call-up and~~ appeal procedure of Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.

…

(m) Variances:

…

(7) The decision of the city manager ~~shall be subject to call-up by the planning board, or~~may be appealed by the applicant to the planning board, subject to the ~~call-up and~~ appeal procedure of Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.

…

Section 16. Table 4-1: Summary of Decision Authority by Process Type in Section 9-4-2, "Development Review Procedures," B.R.C. 1981, is amended to read as follows:

9-4-2. Development Review Procedures

(a) Development Review Authority: Table 4-1 of this section summarizes the review and decision-making responsibilities for the administration of the administrative and development review procedures described in this chapter. The table is a summary tool and does not describe all types of decisions made under this code. Refer to sections referenced for specific requirements. ~~Form and bulk standards may also be modified by site review.~~ Additional procedures that are required by this code but located in other chapters are:

(1) "Historic Preservation," chapter 9-11; and

(2) "Inclusionary Housing," chapter 9-13.

TABLE 4-1: SUMMARY OF DECISION AUTHORITY BY PROCESS TYPE

~~*Standard or Application Type*~~	~~*Staff/City Manager*~~	~~*BOZA*~~	~~*Planning Board*~~	~~*City Council*~~
~~Code Interpretation SECTION 9-2-3~~	~~D~~	~~CA(14)~~	~~CA(30)~~	~~CA~~
~~Setback variance ≤20% SECTION 9-2-3~~	~~D~~	~~D~~	~~—~~	~~—~~
~~Setback variance >20% SECTION 9-2-3~~	~~—~~	~~D~~	~~—~~	~~—~~
~~Parking access dimensions SECTION 9-2-2~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Parking deferral SECTION 9-2-2~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Parking reduction ≤25% SECTION 9-2-2~~	~~D~~	~~—~~	~~—~~	~~—~~

~~Parking reduction >25% but ≤50% SECTION 9-2-2~~	~~D(14)~~	~~—~~	~~CA, D(30)~~	~~CA~~
~~Parking reduction >50% SUBSECTION 9-9-6(f)~~	~~—~~	~~—~~	~~D(30)~~	~~CA~~
~~Building height, conditional SECTION 9-7-6~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Building height, less than principal or nonstandard building height max SECTION 9-2-14~~	~~D(14)~~	~~—~~	~~CA, D(30)~~	~~CA~~
~~Building height, greater than principal building height max SECTION 9-2-14~~	~~—~~	~~—~~	~~D(30)~~	~~CA~~
~~Building height SECTION 9-7-5~~	~~—~~	~~—~~	~~D(30)~~	~~CA~~
~~Conditional Use SECTION 9-2-1~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Site Review SECTION 9-2-14~~	~~D(14)~~	~~—~~	~~CA, D(30)~~	~~CA~~
~~Use Review SECTION 9-2-15~~	~~D(14)~~	~~—~~	~~CA, D(30)~~	~~CA~~
~~Form-Based Code Review SECTION 9-2-16~~	~~D(14)~~	~~—~~	~~CA, D(30)~~	~~CA~~
~~Form-Based Code Review, administrative SECTION 9-2-16~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Form-Based Code Review, minor modification SECTION 9-2-16~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Annexation SECTION 9-2-17~~	~~—~~	~~—~~	~~R~~	~~D~~
~~Rezoning SECTION 9-2-19~~	~~—~~	~~—~~	~~R~~	~~D~~
~~Wetland Permit-Simple SECTION 9-3-9~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Wetland Permit-Standard SECTION 9-3-9~~	~~D(14)~~	~~—~~	~~D(30)~~	~~CA~~
~~Extension of Dev't Approval ≤1 yr PARAGRAPH 9-2-12(b)(1)~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Extension of Dev't Approval >1 yr PARAGRAPH 9-2-12(b)(2)~~	~~—~~	~~—~~	~~D(30)~~	~~CA~~
~~Rescission of Dev't Approval SUBSECTION 9-2-12(e)~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Creation of Vested Rights >3 yrs SECTION 9-2-20~~	~~—~~	~~—~~	~~R~~	~~D~~
~~Floodplain Dev't Permit SECTION 9-3-6~~	~~D(14)~~	~~—~~	~~CA(30)~~	~~CA~~
~~Wetland Boundary change-Standard SUBSECTION 9-3-9(e)~~	~~—~~	~~—~~	~~R~~	~~D~~
~~Geophysical Exploration Permit SECTION 9-6-7(b)~~	~~D(14)~~	~~—~~	~~CA(30)~~	~~CA~~
~~Substitution of Nonconforming Use SECTION 9-10-3~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Expansion of Nonconforming Use SECTION 9-10-3~~	~~D(14)~~	~~—~~	~~CA(30)~~	~~CA~~
~~Subdivision, prelim plat SECTION 9-12-7~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Subdivision, final plat SECTION 9-12-8~~	~~D(14)~~	~~—~~	~~CA~~	~~—~~
~~Subdivision, minor SECTION 9-12-5~~	~~D(14)~~	~~—~~	~~CA(30)~~	~~CA~~
~~Subdivision, LLA or LLE SECTIONS 9-12-3 and 9-12-4~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Solar Exception SUBSECTION 9-9-17(f)~~	~~D~~	~~D~~	~~—~~	~~—~~
~~Solar Access Permit SUBSECTION 9-9-17(h)~~	~~D~~	~~D~~	~~—~~	~~—~~
~~Accessory Bldg Coverage SUBSECTION 9-7-8(a)~~	~~—~~	~~D~~	~~—~~	~~—~~

~~Minor Modification of Discretionary Approval SUBSECTION 9-2-14(k)~~	~~D~~	~~—~~	~~—~~	~~—~~
~~Minor Amendment of Discretionary Approval SUBSECTION 9-2-14(l)~~	~~D(14)~~	~~—~~	~~CA(30)~~	~~CA~~
~~Amendment of Discretionary Approval not involving height SUBSECTION 9-2-14(m)~~	~~D(14)~~	~~—~~	~~CA, D(30)~~	~~CA~~
~~Amendment of Discretionary Approval involving height SECTION 9-2-14~~	~~—~~	~~—~~	~~D(30)~~	~~CA~~
~~KEY:~~ ~~D = Decision Authority CA = Call-Up and Appeal Authority~~ ~~R = Recommendation only (n) = Maximum number of days for call-up or appeal~~				

Standard or Application Type	***Staff/City Manager***	***BOZA***	***Planning Board***	***City Council***
Section 9-2-2: Administrative Review Procedures				
Conditional Use Section 9-2-2	D	〓	〓	〓
Section 9-2-3: Variances and Interpretations				
Code Interpretation Section 9-2-3	D	CA(14)	CA(30)	CA
Setback Variance ≤20% Section 9-2-3	D	D	〓	〓
Setback Variance >20% Section 9-2-3	〓	D	〓	〓
Section 9-2-12: Development Progress Required				
Extension of Development Approval Paragraph 9-2-12(b)	D	〓	〓	〓
Rescission of Development Approval Subsection 9-2-12(e)	D	〓	〓	〓
Section 9-2-14: Site Review				
Amendment of Discretionary Approval - not involving height Subsection 9-2-14(m)	D(14)	〓	CA, D(30)	CA
Amendment of Discretionary Approval - involving height Section 9-2-14	〓	〓	D(30)	CA
Building Height - less than principal or nonstandard building height maximum Section 9-2-14	D(14)	〓	CA, D(30)	CA
Building Height - greater than principal building height maximum Section 9-2-14	〓	〓	D(30)	CA
Minor Amendment of Discretionary Approval Subsection 9-2-14(l)	D(14)	〓	CA(30)	CA
Minor Modification of Discretionary Approval Subsection 9-2-14(k)	D	〓	〓	〓
Site Review Section 9-2-14	D(14)	〓	CA, D(30)	CA
Section 9-2-15: Use Review				
Minor Use Review Subsection 9-2-15(i)	D(14)	〓	A	CA
Use Review Section 9-2-15	D(14)	〓	CA, D(30)	CA
Use Review Minor Modification Subsection 9-2-15(j)	D	〓	〓	〓
Section 9-2-16: Form-Based Code Review				

Administrative Form-Based Code Review Section 9-2-16	D	=	=	=
Form-Based Code Review Minor Modification Section 9-2-16	D	=	=	=
Form-Based Code Review Section 9-2-16	D(14)	=	CA, D(30)	CA
Section 9-2-17: Annexation Requirements				
Annexation Section 9-2-17	=	=	R	D
Section 9-2-19: Rezoning				
Rezoning Section 9-2-19	=	=	R	D
Section 9-2-20: Creation of Vested Rights				
Creation of Vested Rights >3 years Section 9-2-20	=	=	R	D
Section 9-3-6: Floodplain Development Permits				
Floodplain Development Permit Section 9-3-6	D(14)	=	A	CA
Section 9-3-9: Stream, Wetlands, and Water Body Protection				
Wetland Permit Conditional Section 9-3-9	D	=	=	=
Wetland Permit Standard Section 9-3-9	D(14)	=	A	CA
Wetland Boundary Revision Subsection 9-3-9(k)	D(14)	=	A	CA
Section 9-6-7: Specific Use Standards - Agriculture and Natural Resource Uses				
Geophysical Exploration Permit Section 9-6-7(b)	D(14)	=	CA(30)	CA
Chapter 9-7: Form and Bulk Standards				
Accessory Building Coverage Subsection 9-7-8(a)	=	D	=	=
Building Height Section 9-7-5	=	=	D(30)	CA
Conditional Building Height Section 9-7-6	D	=	=	=
Section 9-9-6: Parking Standards				
Parking Access Dimensions Section 9-9-5	D	=	=	=
Parking Deferral Subsection 9-9-6(e)	D	=	=	=
Parking Reduction ≤25% Subsection 9-9-6(f)	D	=	=	=
Parking Reduction >25% but ≤50% Section 9-9-6(f)	D(14)	=	CA, D(30)	CA
Parking Reduction >50% Subsection 9-9-6(f)	=	=	D(30)	CA
Section 9-9-17: Solar Access				
Solar Access Permit Subsection 9-9-17(h)	D	D	=	=
Solar Exception Subsection 9-9-17(f)	D	D	=	=
Section 9-10-3: Changes to Nonstandard Buildings, Structures, and Lots and Nonconforming Uses				
Expansion of a Nonconforming Use Section 9-10-3	D(14)	=	CA(30)	CA
Substitution of a Nonconforming Use Section 9-10-3	D	=	=	=
Chapter 9-12: Subdivision				
Final Plat Section 9-12-8	D(14)	=	CA	=
Lot Line Adjustment or Lot Line Elimination Sections 9-12-3 and 9-12-4	D	=	=	=
Minor Subdivision Section 9-12-5	D(14)	=	CA(30)	=

Preliminary Plat Section 9-12-7	D	=	=	=

KEY: D = Decision Authority CA = Call-Up and Appeal Authority (for City Council, call-up only)

R = Recommendation only (A) = Appeal Authority only (n) = Maximum number of days for call-up or appeal

Section 17. Section 9-4-3, "Public Notice Requirements," B.R.C. 1981, is amended to read as follows:

9-4-3. Public Notice Requirements

(a) Process and Options: When a process or procedure identified in this title requires public notice, the city manager shall provide such notice according to Table 4-2 of this section. If a code section does not reference a specific method, the city manager shall determine the most appropriate notification method to be used.

TABLE 4-2: PUBLIC NOTICE OPTIONS

Public Notice Type	*Type of Application, Meeting or Hearing*	*Mailed Notice*	*Posted Notice*
1	Administrative Reviews (except those identified below)	none	none
2	Preliminary Plats and Minor Subdivisions	To adjacent property owners a minimum of 10 days before final action and mineral rights owners a minimum of 30 days before initial hearing or decision	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing
3	Good neighbor meetings	To property owners within 600 feet of subject property a minimum of 10 days before meeting	none
4	Solar ~~exceptions, solar~~ access permits	To adjacent property owners a minimum of 10 days before final action	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing
5	Applications requiring BOZA action~~, wetland permit and boundary determination~~	To property owners within 300 feet of subject property a minimum of 10 days before final action	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing
6	Development Review Applications (site review, use review, annexation, rezoning, concept plans)	To property owners within 600 feet of subject property a minimum of 10 days before final action and mineral rights owners a minimum of 30 days before initial hearing or decision	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing
7	Form-based code review	To property owners and all addresses within 600 feet of the subject property a minimum of 10 days before final action and mineral rights owners a minimum of 30 days before initial hearing or decision	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing
8	Use review applications for oil and gas operations	To property owners, all addresses, and the local government designee of any local government within 5,280 feet (one mile) of the subject property upon finding an application complete	Post property a minimum of 10 days from receipt of application and prior to final action or any hearing

		and a minimum of 10 days before final action and any mineral rights owners at that time and a minimum of 30 days before initial hearing	

…

Section 18. Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981, is amended to read as follows:

9-4-4. Appeals, Call-Ups and Public Hearings

When a section of the land use ~~regulations~~ code indicates that a decision is subject to appeal or call-up, the following standards shall apply:

(a) Appeal: If a right to appeal is noted in this title, ~~If noted in Table 4-1, Section 9-4-2, "Development Review Procedures," B.R.C. 1981, in a specific section,~~ an applicant or, if applicable, any interested person may appeal the city manager's decision to grant or deny an application to the planning board by delivering a written notice of appeal to the city manager within fourteen days of the decision.

(b) Board Call-Up: If a planning board call-up of a city manager decision is noted in this title, ~~If noted in Table 4-1, Section 9-4-2, "Development Review Procedures," B.R.C. 1981~~, a member of the planning board may call up a city manager's decision upon written notification to staff or by making a verbal request, on the record, at a regularly scheduled board meeting within fourteen days of the manager's decision. A member of the BOZA may call up a city manager's decision regarding an interpretation upon written notification to staff or by making a verbal request, on the record, at a regularly scheduled board meeting within fourteen days of the manager's decision. ~~On any application that it calls up, the board will hold a public hearing under the procedures prescribed by Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981, after publishing notice as provided in Subsection 9-4-3(d), B.R.C. 1981. Within thirty days of the public hearing or within such other time as the board and the applicant mutually agree, the board will either grant the application in whole or in part, with or without modifications and conditions, or deny it. The decision will specifically set forth in what respects the development review application meets or fails to meet the standards and criteria required by Sections 9-2-14, "Site Review," 9-2-15, "Use Review," and 9-2-16, "Form-Based Code Review," B.R.C. 1981, for the type of review requested.~~

(c) City Council Call-Up: With the exception of minor subdivisions and plats, t~~T~~he city council may call up any board decision within thirty days of the board's action. The city manager may extend the call-up period until the council's next regular meeting, if the manager finds in writing within the original call-up period that the council will not receive notice of a decision of the board in time to enable it to call up the decision for review. ~~On any application that it calls up, the council will hold a public hearing under the procedures prescribed by Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981, after publishing notice as specified by Subsection 9-4-3(d), B.R.C. 1981, summarized in Subsection (b) of this section.~~ Together with the evidence presented at such public

hearing, the council may consider the record, or any portion thereof, of the hearing before the board. ~~Within thirty days of the public hearing or within such other time as the council and the applicant mutually agree, the council will either grant the application in whole or in part, with or without modifications and conditions, or deny it. The decision will specifically set forth in what respects the development review application meets or fails to meet the standards and criteria required by Sections 9-2-14, "Site Review," 9-2-15, "Use Review," and 9-2-16, "Form-Based Code Review," B.R.C. 1981, for the type of review requested.~~

(d) Public Hearing Requirements: Within sixty days after ~~a referral,~~ appeal or call-up under this section, the approving agency will hold a public hearing on the application. On any application that it calls up, the board or council will hold a public hearing under the procedures prescribed by Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981, after publishing notice as provided in Subsection 9-4-3(d), B.R.C. 1981. Within thirty days of the public hearing or within such other time as the board or council and the applicant mutually agree, the board or council will either grant the application in whole or in part, with or without modifications and conditions, or deny it. The decision will specifically set forth in what respects the development review application meets or fails to meet the standards and criteria required by Sections 9-2-14, "Site Review," 9-2-15, "Use Review," and 9-2-16, "Form-Based Code Review," B.R.C. 1981, for the type of review requested.

…

Section 19. Section 9-6-3, "Specific Use Standards - Residential Uses," B.R.C. 1981, is amended to read as follows:

9-6-3. Specific Use Standards - Residential Uses

(a) Residential Uses:

(1) This Subsection (a) sets forth standards for uses in the residential use classification that are subject to specific use standards pursuant to Table 6-1, Use Table.

(2) Residential Uses in the IG and IM Zoning Districts: The following standards apply in the IG and IM zoning districts to residential uses that may be approved pursuant to a use review:

(A) Location: Dwelling units may be constructed only on a lot or parcel that meets one or more of the following requirements (i), (ii), or (iii). If a lot or parcel meets this location standard, the approving authority shall presume that the standard in Paragraph 9-2-15(e)(~~5~~4), B.R.C. 1981, has been met.

…

(e) Dwelling Unit, Detached:

…

(2) In the RH-1, RH-2, RH-3, RH-4, RH-5, RH-7, MU-1, MU-2, and MU-4 Zoning Districts:

(A) Review Process: In the RH-1, RH-2, RH-3, RH-4, RH-5, RH-7, MU-1, MU-2, and MU-4 zoning districts, the following review process applies to detached dwelling units:

…

(ii) Use Review: A new detached dwelling unit that is not allowed by right may be approved pursuant to a use review if the approving authority finds that:

a. The use meets the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (4~~3~~), and (~~5~~4), "Use Review," B.R.C. 1981;

…

Section 20. Section 9-6-5, "Specific Use Standards - Commercial Uses," B.R.C. 1981, is amended to read as follows:

9-6-5. Specific Use Standards - Commercial Uses

…

(b) Brewery, Distillery, and Winery:

…

(2) In the IS-1, IS-2, and IMS Zoning Districts:

…

(A) In the IS-1, IS-2, and IMS zoning districts, breweries, distilleries, and wineries shall meet the following standards:

(i) Review Process: In the IS-1, IS-2, and IMS zoning districts, the following review process applies:

…

c. Use Review: If the use is not allowed by right or as a conditional use, the use may be approved only pursuant to a use review subject to the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (4~~3~~), and (~~5~~4) "Use Review," B.R.C. 1981.

(ii) General Standard: No brewery, distillery, or winery shall exceed 15,000 square feet in floor area.

(3) In the IG and IM Zoning Districts:

(A) In the IG and IM zoning districts, breweries, distilleries, and wineries shall meet the following standards:

(i) Review Process: In the IG and IM zoning districts, the following review process applies:

…

c. Use Review: If the use is not allowed by right or as a conditional use, the use may be approved only pursuant to a use review subject to the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (4~~3~~), and (~~5~~4) "Use Review," B.R.C. 1981.

…

(i) Office Uses:

…

(2) Office Uses in the MU-4 Zoning District:

(A) Review Process: In the MU-4 zoning district, the following review process applies to office uses:

…

(ii) Use Review: Office uses that may not be approved by right may be approved pursuant to a use review if the approving authority finds that the use:

a. Meets the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (4~~3~~), and (~~5~~4), "Use Review," B.R.C. 1981; and

…

(3) Office Uses in the BT-1, BT-2, BMS, BR-1, and BR-2 Zoning Districts:

(A) Review Process: In the BT-1, BT-2, BMS, BR-1, and BR-2 zoning districts, the following review process applies to office uses:

(i) Allowed Use: Office uses are allowed by right if they meet the following standards:

a. The use is located within the University Hill general improvement district;

b. The combined total amount of floor area of any office uses does not exceed 20,000 square feet on the lot or parcel; or

c. The use was legally established within the associated floor area prior to August 6, 2019. ~~Uses that exceed the 20,000 square feet limitation of Subparagraph (A)(i)b. shall be considered a nonconforming use.~~ Changes in operations, such as changes in ownership, tenancy, management, number of employees, hours of operation, or changes to other uses also within the office use category within the existing floor area referenced in this subsection, ~~shall~~ do not require city manager review.~~be considered an expansion of a nonconforming use. Such changes shall not require a request for a change of use pursuant to Section 9-~~

~~10-3(c)(2), "Standards for Changes to Nonconforming Uses," B.R.C. 1981.~~ Additions or changes to floor plans that result in the combined floor area of these uses exceeding ~~the~~ 20,000 square ~~foot~~ feet ~~limitation of Subparagraph (A)(i)b. for the nonconforming floor area may~~ are not ~~be~~ allowed by right and are subject to the standards of Subparagraphs (A)(ii) and (A)(iii).

(ii) Conditional Use: The use may be approved as a conditional use if the following standards are met:

a. The total amount of floor area of any office uses does not exceed 40,000 square feet on the lot or parcel;

b. Dwelling units are constructed on the same lot or parcel or within the area of the same approved site review, planned unit development, or form-based code review and at least thirteen percent of those dwelling units meet the requirements for permanently affordable units set forth in Chapter 9-13, "Inclusionary Housing," B.R.C. 1981; and

c. No less than two permanently affordable units are constructed on said lot or parcel or within said area of an approved site review, planned unit development, or form-based code review.

(iii) Use Review: Any use that is not allowed by right and may not be approved as a conditional use may be approved pursuant to a use review if the approving authority finds that the use:

a. Meets the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (~~4~~3), and (~~5~~4), "Use Review," B.R.C. 1981; and

b. The proposed use is part of a mixed-use development that includes residential or retail uses.

…

(k) Office:

…

(4) In the IG and IM Zoning Districts:

(A) Review Process: In the IG and IM zoning districts, the following review process applies to offices:

…

(ii) Use Review: If the office is not allowed by right, the use may be approved only pursuant to a use review. In addition to meeting the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (~~4~~3), and (~~5~~4) "Use Review," B.R.C. 1981, the applicant shall demonstrate that:

…

(r) Financial Institution:

…

(2) In the MU-4 Zoning District:

(A) Review Process: In the MU-4 zoning district, the following review process applies to financial institutions:

…

(ii) Use Review: Financial institutions that may not be approved by right may be approved pursuant to a use review if the approving authority finds that the use:

a. Meets the use review criteria in Paragraphs 9-2-15(e)~~(1),~~ (~~3~~2), (~~4~~3), and (~~5~~4), "Use Review," B.R.C. 1981; and

…

Section 21. Section 9-7-5, "Building Height," B.R.C. 1981, is amended to read as follows:

9-7-5. Building Height

(a) Permitted Height: The height permitted without review within the City is set forth in Section 9-7-1, "Schedule of Form and Bulk Standards," B.R.C. 1981, except as provided in Paragraph (b)(2) of this section. Buildings greater than the permitted height may be approved under Section 9-2-14, "Site Review," B.R.C. 1981.

…

(d) Nonconformity to Permitted Height: For existing buildings that exceed the height permitted in Section 9-7-1, "Schedule of Form and Bulk Standards," or Section 9-7-6, "Building Height, Conditional," B.R.C. 1981, the following changes require approval under Section 9-2-14, "Site Review," B.R.C. 1981:

(1) ~~There shall be no increase in~~ Increasing the building's highest point as established by Subsection 9-7-5(b), "Measurement of Height," B.R.C. 1981;

(2) Adding building elements or massing above the permitted or conditional height unless permitted by Section 9-7-7, "Building Height, Appurtenances," B.R.C. 1981; or

(3) ~~or~~ Adding ~~the~~ floor area of buildings ~~greater than the~~above the permitted or conditional height ~~but less than fifty-five feet in height, unless approved under Section 9-2-14, "Site Review," B.R.C. 1981~~.

…

Section 22. Section 9-8-5, "Occupancy of Dwelling Units," B.R.C. 1981, is amended to

read as follows:

9-8-5. Occupancy of Dwelling Units

…

(d) Nonconforming Uses: A nonconforming residential use that is ~~not permitted~~prohibited by Section 9-6-1, "Schedule of Permitted Land Uses," B.R.C. 1981, or is a lot or parcel that does not meet the density requirements of Chapter 9-8, "Intensity Standards," B.R.C. 1981, is subject to the following:

…

Section 23. Section 9-9-2, "General Provisions," B.R.C. 1981, is amended to read as follows:

9-9-2. - General Provisions

No person shall use or develop any land within the city except according to the following standards, unless modified through a use review under Section 9-2-15, "Use Review," B.R.C. 1981, or a site review, Section 9-2-14, "Site Review," B.R.C. 1981, or a variance granted under Section 9-2-3, "Variances and Interpretations," B.R.C., 1981.

(a) Fire and Life Safety: All development shall meet the applicable requirements of Chapter 10-8, "Fire Code," B.R.C. 1981.

(b) Maximum Permitted Buildings on a Lot: No more than one principal building shall be placed on a lot in the RR, RE, RL-1, and RM zoning districts unless approved under the provisions of Section 9-2-14, "Site Review," or 9-7-12, "Two Detached Dwellings on a Single Lot," B.R.C. 1981.

…

Section 24. Section 9-9-6, "Parking Standards," B.R.C. 1981, is amended to read as follows:

9-9-6. Parking Standards

(a) Rationale: The intent of this section is to provide adequate off-street parking for all uses, to prevent undue congestion and interference with the traffic carrying capacity of city streets, and to minimize the visual and environmental impacts of excessive parking lot paving.

…

(c) General Parking Requirements:

(1) Rounding Rule: For all motor vehicle and bicycle parking space requirements resulting in a fraction, the fraction shall be:

(A) Rounded to the next higher whole number when the required number of spaces is five or less; or

(B) Rounded to the next lower whole number when the required number of spaces is more than five.

(2) Parking Requirements for Lots in Two or More Zoning Districts: For lots that have more than one zoning designation, the required motor vehicle and bicycle parking for the use(s) on the lot may be provided on any portion of the lot, subject to the provisions of this title.

(3) Off-Street Parking Requirement for Unlisted Nonresidential Uses: If the city manager determines that the use type is not specifically listed in Table 6-1, Use Table, or Table 9-4, Use Specific Motor Vehicle Parking Requirements for Nonresidential Uses in All Zones, the city manager may apply one of the following standards that adequately meets the parking needs of the use:

(A) The applicable off-street parking requirement under Table 9-3, Nonresidential Motor Vehicle Parking Requirements by Zoning District;

(B) The off-street parking requirement under Table 9-4 for the listed use type most similar to the proposed use based on public parking demand, nature of the use type, number of employees, or any other factors deemed appropriate by the city manager;

(C) An off-street parking requirement established based on local or national best practices or by reference to standards or resources such as the Institute of Traffic Engineers, Urban Land Institute, International Council of Shopping Centers, American Association of State Highway and Transportation Officials, or American Planning Association; or

(D) An off-street parking requirement demonstrated by a parking demand study prepared by the applicant according to Paragraph 9-9-6(d)(6).

…

Section 25. Section 9-9-17, "Solar Access," B.R.C. 1981, is amended to read as follows:

9-9-17. Solar Access

…

(d) Basic Solar Access Protection:

(1) Solar Fence: A solar fence is hereby hypothesized for each lot located in SA Area I and SA Area II. Each solar fence completely encloses the lot in question, and its foundation is contiguous with the lot lines. Such fence is vertical, is opaque and lacks any thickness.

(A) SA Area I: No person shall erect an object or structure on any other lot that would shade a protected lot in SA Area I to a greater degree than the lot would be shaded by a solar fence twelve feet in height, between two hours before and two hours after local solar noon on a clear winter solstice day.

(B) SA Area II: No person shall erect an object or structure on any other lot that would shade a protected lot in SA Area II to a greater degree than the lot would be shaded by a solar fence twenty-five feet in height, between two hours before and two hours after local solar noon on a clear winter solstice day.

(C) SA Area III: Solar fences are not hypothesized for lots located in SA Area III. Solar access protection in SA Area III is available under this section only through permits, as hereinafter provided.

(D) Adjoining Duplex or Townhouse Lots in All Solar Areas: On duplex or townhouse lots, solar fences are not hypothesized on interior lot lines between adjoining units of a duplex or adjoining townhouses. Other lot lines are subject to the solar fence restrictions of subsection (A), (B), or (C), as applicable.

…

(f) Exceptions:

…

(5) Referral or Appeal of City Manager's Decision: The city manager may refer the application or the city manager's decision may be appealed by the applicant to the BOZA pursuant to the procedures of Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981. If an affidavit from each owner of each affected lot per subparagraph (f)(4)(A) cannot be obtained, the applicant may apply for consideration of the exception before the BOZA. Public notification of the hearing shall be provided pursuant to Section 9-4-3, "Public Notice Requirements," B.R.C. 1981. The sign posted shall remain posted until the conclusion of the hearing.

…

(g) Solar Siting:

…

(2) Waivers: Upon request of any applicant for a building permit or a subdivision or planned unit development approval, the approving authority may waive such of the requirements of this paragraph as it deems appropriate if it finds that any of the following criteria are met:

…

~~(D) The applicant's proposal incorporates the following additional energy resource and conservation option points in excess of the requirements of Subsection 10-5.5-2(y), "Resource Conservation - Green Points," B.R.C. 1981:~~

~~(i) 2 points - to qualify for a waiver of the requirement of Subparagraph (g)(1)(A) of this section;~~

~~(ii) 3 points - to qualify for a waiver of the requirement of Subparagraph (g)(1)(B) of this section; and~~

~~(iii) The city manager finds that adequate protection for any solar energy systems to be installed is provided either under the provisions of this section, or through covenants, easements, or other agreements among affected landowners.~~

…

Section 26. Section 9-10-2, "Continuation or Restoration of Nonconforming Uses and Nonstandard Buildings, Structures, and Lots," B.R.C. 1981, is amended to read as follows:

9-10-2. Continuation or Restoration of Nonconforming Uses and Nonstandard Buildings, Structures, and Lots

Nonconforming uses and nonstandard buildings and lots in existence on the effective date of the ordinance which first made them nonconforming may continue to exist subject to the following:

(a) One-Year Expiration for Nonconforming Uses: A nonconforming use, except for a use that is nonconforming only because it fails to meet the required off street parking standards ~~in~~ of Section~~s~~ 9-9-6, "Parking Standards," ~~and~~ or residential density requirements of Section 9-~~7~~8-1, " Schedule of Intensity Standards~~Schedule of Form and Bulk Standards~~," B.R.C. 1981, that has been discontinued for at least one year shall not be resumed or replaced by another nonconforming use as allowed under Subsection 9-2-15(f), B.R.C. 1981, unless an extension of time is requested in writing prior to the expiration of the one-year period. The approving authority will grant such a request for an extension upon finding that an undue hardship would result if such extension were not granted.

…

Section 27. Section 9-10-3, "Changes to Nonstandard Buildings, Structures, and Lots and Nonconforming Uses," B.R.C. 1981, is amended to read as follows:

9-10-3. Changes to Nonstandard Buildings, Structures, and Lots and Nonconforming Uses

Changes to nonstandard buildings, structures, or nonstandard lots and nonconforming uses shall comply with the following requirements:

…

(c) Nonconforming Uses:

(1) Nonconforming Changes to Conforming Use Prohibited: No conforming use may be changed to a nonconforming use, notwithstanding the fact that some of the features of the lot or building are nonstandard or the parking is nonconforming.

(2) Standards for ~~Changes~~ Substitutions of~~to~~ Nonconforming Uses: The city manager will grant a request for a ~~change~~ substitution of a nonconforming use, which is the

replacement of one nonconforming use with another, if the ~~modified or~~ new use does not constitute an expansion of a nonconforming use. Any ~~other change of use that constitutes~~ expansion of a nonconforming use must be reviewed under procedures of Section 9-2-15, "Use Review," B.R.C. 1981.

(3) Nonconforming Only as to Parking: The city manager will grant a request to change a use that is nonconforming only because of an inadequate amount of parking to any conforming use allowed in the underlying zoning district upon a finding that the new or modified use will have an equivalent or less parking requirement than the use being replaced.

…

Section 28. Section 9-12-3, "Adjustment of Lot Lines," B.R.C. 1981, is amended to read as follows:

9-12-3. Adjustment of Lot Lines

(a) Scope: The city manager is authorized to grant exemptions from the subdivision process for the transfer of part of one lot or parcel for the purpose of enlarging an existing adjacent lot or parcel if such transfer meets the requirements of this section. If an applicant cannot meet the standards of this section, then an adjustment may be approved, if it meets the applicable standards, as part of a minor subdivision or a subdivision.

…

(d) City Manager Approval: No person shall transfer land under this section until after the city manager reviews the map and legal description of the property and all other information required under this section to verify that the transfer is exempt under this chapter. ~~The city manager shall sign the documents of transfer before they are recorded and will record the approved replat map after the applicant has recorded the documents of transfer.~~ The city manager shall sign the approved replat map and the city clerk shall record the replat map in the office of the Boulder County Clerk and Recorder. Any such approved replat not recorded within six months after the date it was approved shall automatically expire.

Section 29. Section 9-12-4, "Elimination of Lot Lines," B.R.C. 1981, is amended to read as follows:

9-12-4. Elimination of Lot Lines

(a) Scope: Notwithstanding any other provisions of this chapter, existing lot lines forming the boundary between two or more conforming platted lots located within the same subdivision or lot lines between lots or parcels that have merged to form one building lot pursuant to subsection 9-9-2(c), B.R.C. 1981, may be removed or eliminated through a replatting process which conforms to the requirements of this section.

…

~~(e) City Manager Decision: The city manager shall notify the planning board in writing within seven days of the disposition of the replat application.~~

(~~f~~e) City Manager Approval: The city manager shall sign all approved replats and~~, upon the payment of the recording fees prescribed by subsection 4-20-43(a), B.R.C. 1981,~~ the city clerk shall record all such replats in the office of the Boulder County Clerk and Recorder. Any such approved replat not recorded within six months after the date it was approved shall automatically expire.

Section 30. Section 9-12-5, "Minor Subdivision," B.R.C. 1981, is amended to read as follows:

9-12-5. Minor Subdivision

(a) Scope: A minor subdivision is a division of land that is already served by city services, will not require the extension of streets or public improvements and will not result in more than one additional lot.

…

(f) Existing Streets or Alleys, Dedication and Vacation of Easements: Right-of-way necessary to bring an existing street or alley up to a current city standard, or public easements for utilities or sidewalks may be dedicated on a minor subdivision plat. The City may approve the vacation of city utility easements on the replat.

…

Section 31. Section 9-12-10, "Final Plat Procedure," B.R.C. 1981, is amended to read as follows:

9-12-10. Final Plat Procedure

(a) If the final plat and the required plans, specifications, agreements, guarantees and other documents meet the requirements of this code, the City of Boulder Design and Construction Standards and other ordinances of the City or requirements determined by the city manager to be necessary to protect the public health, safety or welfare, the manager shall approve the final plat (subject to the provisions of subsection (d) of this section) within ninety days of the date of submitting the required documents. The manager shall then execute a subdivision agreement that incorporates the final plat, the undertaking to provide public improvements prescribed by Section 9-12-12, "Standards for Lots and Public Improvements," B.R.C. 1981, the undertaking of financial guarantees prescribed by Section 9-12-13, "Subdivider Financial Guarantees," B.R.C. 1981, the public improvement warranty prescribed by Section 9-12-14, "Public Improvement Warranty," B.R.C. 1981, the subdivider's commitment to provide an update of the preliminary title report or attorney memorandum current as of the date of recording the plat and any other terms and conditions to which the parties agree.

…

(e) Any person aggrieved by a decision of the city manager to approve or deny an application for a subdivision may appeal such decision to the planning board ~~by filing an appeal with the city manager within fourteen days of the decision~~pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981. A member of the planning board may call-up the city manager decision pursuant to Section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981.~~The board shall hear the appeal or call-up of the subdivision application, after giving notice to all interested parties, within thirty days of the notice of appeal or call-up, under the procedures prescribed by Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981.~~ The board shall determine whether the subdivision application meets the requirements of this code and other ordinances of the City or those determined by the city manager to be necessary to protect the public health, safety and welfare and shall grant or deny the application.

…

Section 32. Section 9-16-1, "General Definitions," B.R.C. 1981, is amended to read as follows:

9-16-1. General Definitions

(a) The definitions contained in Chapter 1-2, "Definitions," B.R.C. 1981, apply to this title unless a term is defined differently in this chapter.

(b) Terms identified with the references shown below after the definition are limited to those specific sections or chapters of this title:

(1) Airport influence zone (AIZ).
(2) Floodplain regulations (Floodplain).
(3) Historic preservation (Historic).
(4) Inclusionary housing (Inclusionary Housing).
(5) Solar access (Solar).
(6) Wetlands Protection (Wetlands).
(7) Signs (Signs).

(c) The following terms as used in this title have the following meanings unless the context clearly indicates otherwise:

A—E

…

Conforming Use means any use of a building or use of a lot that is permitted by Section 9-6-1, "Schedule of Permitted Land Uses," B.R.C. 1981 and meets any applicable specific use standards. A conforming use also includes:

(1) A legal existing use that is not prohibited but was not approved as a conditional use or use review use;

(2) A use approved pursuant to a valid use review or special review, except where the review was a nonconforming use review;

Expansion of a nonconforming use means any change or modification to a nonconforming use that constitutes:

(1) An increase in the occupancy, floor area, required parking, traffic generation, outdoor storage, or visual, noise, or air pollution;

(2) Any change in the operational characteristics which may increase the impacts or create adverse impacts to the surrounding area including, without limitation, the hours of operation, noise, or the number of employees;

(3) The addition of bedrooms to a dwelling unit, except a single-family detached dwelling unit; or

(4) The addition of one or more dwelling units.

K—O

…

Nonconforming use means any use of a building or use of a lot that is ~~not permitted~~prohibited by Section 9-6-1, "Schedule of Permitted Land Uses," B.R.C. 1981~~, but excludes a conforming use in a nonstandard building or on a nonstandard lot; a legal existing use that has not been approved as a conditional use or a use review use, or a use approved pursuant to a valid special review or use review approval~~. A nonconforming use also includes an otherwise conforming use, except a single dwelling unit on a lot, that does not meet the following parking ~~and~~ or residential density requirements, including, without limitation, the requirements for minimum lot area per dwelling unit~~,~~; useable open space per dwelling unit, or required off-street parking requirements of Sections 9-8-1, "Schedule of Intensity Standards~~,~~" ~~and~~ or 9-9-6, "Parking Standards," B.R.C. 1981.

…

Nonstandard building or structure means any building or structure that does not conform to the setback, height, side yard bulk plane, side yard wall length articulation, or building coverage requirements of Section 9-7-1, "Schedule of Form and Bulk Standards," or the floor area ratio requirements of Section 9-8-1, "Schedule of Intensity Standards," and Section 9-8-2, "Floor Area Ratio Requirements," B.R.C. 1981, unless the nonstandard features of the building or structure were approved as part of a planned unit development or a site review, or as a variance. A nonstandard building or structure does not render a conforming use a nonconforming use.

Nonstandard lot means any lot that does not conform to the minimum lot area requirement of Section 9-8-1, "Schedule of Intensity Standards," B.R.C. 1981, or frontage upon a public street

required by Section 9-12-12, "Standards for Lots and Public Improvements," B.R.C. 1981, unless the nonstandard nature of the lot was approved as part of a planned unit development or a site review. A nonstandard lot does not render a conforming use a nonconforming use.

…

Section 33. This ordinance shall apply to any application under Title 9, "Land Use Code," B.R.C. 1981, (hereafter referred as "Application") applied for on or after the effective date of this ordinance. Any project for which a complete Application has been submitted to the city or which has received an approval prior to the effective date of this ordinance shall be subject to the standards in effect at the time such Application was submitted to the city.

Section 34. If any section, paragraph, clause, or provision of this ordinance shall for any reason be held to be invalid or unenforceable, such decision shall not affect any of the remaining provisions of this ordinance.

Section 35. This ordinance is necessary to protect the public health, safety, and welfare of the residents of the city and covers matters of local concern.

Section 36. The city council deems it appropriate that this ordinance be published by title only and orders that copies of this ordinance be made available in the office of the city clerk for public inspection and acquisition.

INTRODUCED, READ ON FIRST READING, AND ORDERED PUBLISHED BY TITLE ONLY this 16th day of May 2024.

_____
Aaron Brockett,
Mayor

Attest:

_____
Elesha Johnson,
City Clerk

READ ON SECOND READING, PASSED AND ADOPTED this 6th day of June 2024.

_____
Aaron Brockett,
Mayor

Attest:

_____
Elesha Johnson,
City Clerk

Process Simplification Stakeholder Meeting Notes

Attendees: Don "Dash" Ash, Erin Bagnall, Bryan Bowen, Jim Bray, Mike Cooper, Stephen Eckert, Andrew Fairbairn, Liz Hanson, Ross Holbrook, Bill Holicky, Joe Keresey, Kim Lord, Charlotte Roth, Danica Powell, Laura Sheinbaum, Jonathan Singer, Pete Weber

Meeting 1: Tuesday, January 30, Hybrid, 3:30-5 pm

Meeting 2: Wednesday, January 31, Hybrid, 10:30 – noon

Use Review

- Many examples of restaurants where the criteria doesn't necessitate any site changes, especially those that are just required because of their patio. Never had any public comment – why are we still doing this? (*staff clarified that the patio requirement for use review has already been removed*)
- Usually only change is bike racks or management plan
- Idea for "minor use review" if not new construction. The list of use review requirements is very long for just tenant improvements versus a new building. Should not be a barrier to new businesses. Even cost is a barrier for application fee.
- Over the counter approval would be great – what are we worried about with these uses? Businesses are paying double rent while they are waiting. Zoe Ma Ma for example.
- The requirement for survey and plans is challenging. Especially for existing buildings – nonresidential example in residential districts. Have to look for plans from 30 years ago, difficult to work with landlords. Commercial leases say it is on the tenant to confirm the use is allowed. Planning Board has even asked "Why is the board reviewing this?"
- Landlords just encourage the tenants not to seek city approval (but then get caught by business license)
- New Local example, will need Use Review – retail sales and teaching gallery.
- Planning Board doesn't need to see this kind of stuff. It should be staff level.
- These could just be conditional uses.
- Agree with recommendations in the Planning Board memo, especially for nonresidential uses in residential zoning districts. More conditional uses than Use Reviews.
- Tenants are stuck – fine to meet the criteria and potential Planning Board.
- The level of scrutiny required for no consequence shows that it is out of sync.
- Often waiting 90 days for an answer. Use Reviews often require a second or third round of reviews, stuck in this indefinite review cycle. There should be a shot clock.
- The ban on nonconforming uses is a little much. The level of scrutiny is out of sync.
- Increase opportunities for art uses like studio space, art selling out of homes, live/work. Martial Arts studios also a problem with Use Review.
- What takes most time – paying rent. We would pay for an expedited process. Think about what is the impediment, does this affect small businesses. 7 months will deter most applicants

- If we're doing a tenant finish and they need a use review, we tell clients it is infeasible. Use Review is an artifact of segregated uses, predates an understanding of mix of uses and 15 minute neighborhoods. Good changes with use table but we're still 20 years behind for good 15 minute neighborhoods. Every use should be by right unless there is an actual real conflict like a slaughterhouse. Unless problem. Silly thing to have it to change from a restaurant to a restaurant. I did a Use Review to park in a parking lot. I don't think staff wants to do these either if there are no problems. There could be a voluntary level of Use Review to go to Planning Board – but most things should be by right and appeal option to Planning Board.

Development Agreements

- Very difficult to get the development agreement after Planning Board – should be a clear process, maybe part of EnerGov submittal. Should get process started earlier with handouts describing what is needed and progress made during the review. It is like pulling teeth to get the Development Agreement uploaded. Could it be more boilerplate? It usually takes the full 90 days.
- Used to be a staff person focused on Development Agreements.
- It is really strange to do Development Agreements for Use Review. The property owner has to sign – the agreement states the owner is making public improvements and financial guarantees when they don't always apply. CAO would not strike this language for us which increases risk, just got an email saying it was not applicable. This is perpetuating incorrect information in our real property record. We can't get it terminated and bonds. Should not have Development Agreement for Use Review, and if we have it, we should be able to revise it. Often the property owner and tenant then have to create sub-agreements – creates a legal mess.
- Indemnify with attorney – can't it just be enforced as a zoning violation?
- It puts case managers in an awkward position between the applicant and the CAO. Not efficient use of time. Development agreements often force private agreements to be developed between tenants and property owners, which increases time.
- Erie has 2 example templates, one with improvements one without.
- Subdivision agreements should also be simplified. Agrees that a guide or handout on process for agreements would help.
- Requirement for Development Agreement in Use Review is a problem.
- Issue is that Development Agreement can't be changed. Mentions personal guaranty and public improvements. This will still run with the title. Development Agreement should be able to be revised and actually match what the Use Review was for. If there is not applicable wording, people don't want to sign it.
- We have conditions of approval, if they are not in compliance with their zoning approval use that enforcement. This is a clumsy tool to use.

Planning Board Call-Ups

- The threat of Planning Board call up deters many businesses and applicants because it only takes one Planning Board member to call something up. It should be a majority vote. It

should work more like the Landmarks process where there needs to be a majority to call something up.

- Floodplain applications- eliminate call-ups. Would also like to remove call-up for plats, minor subdivisions (may be charter issues). Definitely get rid of wetland permit call up. Had one minor subdivision get called up by neighbors.
- Should require a majority vote, not just one Planning Board member.
- Scheduling a call-up with the memo and finding time on agenda we think this adds 6 weeks.
- If the Board is calling something up, they need to give a reason why – put that in ordinance or board's procedural rules. Hard to know what to address without reason why.
- I only saw one call-up the whole time I was on Planning Board and the board member wouldn't even explain why they wanted to call it up.
- Ambiguity of call-up keeps every project at risk. Affects project in many ways, we want to lower our risk. Asked which ones of that 6 total had the staff decision reversed.
- City of Boulder staff writes great memos – hate that they spend all that time for no outcome.
- Do final plat and floodplain need to be subject to call-up?

Concept Plan

- Love concept plan – get feedback from staff, board, and council.
- Agree to look at when renderings are required, they are expensive. Are they needed for concept review?
- Call up – Actually really like City Council can call up of Concept Review. We get Planning Board, staff, and Council feedback all at the same time at the beginning stages of the project.
- I like concept review if it is favorable.

Minor Amendments/Minor Mods

- It is brain damage to change anything in Site Reviews moving forward.
- Minor mod has creeped too (become required more often even for really minor changes) – if move a door by 1 ft. Solana might be reason for it. But it is over the top now. Need to redefine what the minor amendment is. Relook at intent criterion and consider language that relates to potential for off-site impacts.
- Shining Mountain kicked into Site Review Amendment just to reconfigure lots because of condition of approval wording.
- Moving of doors, shifting windows, moving plantings – can this be documented without a minor mod. Why so much review of these internal site changes?
- Timing of minor mod request issues, can slow things down. Timing, when submitted, what they can and cannot halt.
- Minor mods at Millenium, need to know the approval for engineering will happen. Goodwill example – condense an as-built.
- Could there be language that only do a minor mod for "substantial" changes?
- Hear a lot about "design intent"

- Agree with minor amendment issue. We had to do a Site Review Amendment for a fence from 4 to 6 feet, even though it is otherwise allowed by-right. Phasing Plan restrictions need to be more flexible.
- Denver has an SDP process that is similar. They made changes to distinguish between a SDP minor mod and major, it has really helped. Look at code example.
- Have to do minor mods for silly changes, like changing single-hung to casement windows, not even worth a minor mod. Why can't it just be documented in Tec Doc?
- What if there was a threshold of "substantive" change – paper trail not for minor mods.
- We need faster approval of minor mods – often ordering windows on site, minor mod can add 4 weeks.
- Used to be able to get a minor mod over the counter for a site review, adding square footage. Worth looking at, thinking through what is practical, suggesting thinking about who needs to see what. Should non-planning items like changes to sidewalk and landscape require a minor mod?
- Minor mod has been efficient for us, not going into abyss. But if goes all the way to a site review amendment, different story.

Tec Docs

- Can be weeks between TEC doc approval and permit – why? While everything is being stamped. It is a time suck. TEC for Site Reviews should be eliminated.
- TEC was created because engineering was holding up permits – maybe set thresholds with engineers for when TEC is really necessary.
- There is value in TEC for by-right projects.
- Annexations take time to get through but TEC docs usually stick to the 3-week review track.
- Could there be a combination of Site Review and TEC Docs? Often not many changes to TEC doc.
- Could get rid of Tec and just increase requirements for Site Review.

Site Review

- The last 10% of the Site Review process is challenging with dealing with corrections and getting call ups or hearings scheduled on the calendar is frustrating. Can take like 6 weeks.
- There's too much detail required for Site Review like "Why do we have to argue about curb heights at that point?". However, more detail at Site Review would be ok if we got rid of TEC Docs.
- Agrees with increasing requirements in Site Review if no TEC Docs.
- In Erie, for Site Plan Review of a commercial structure, you have to have full engineering plans and landscape.
- Denver also requires more at earlier stage.
- Why do we need to know the tree species at site review? Those should be construction level.
- Look at thresholds for Site Review – are they at the right place – something to look at.

Subdivision / Plats

- Similar to Development Agreement, can the Subdivision Agreement start earlier? It takes a while and also has to get recorded.
- Supports consistency in reviewing Prelim Plat at the same time as Site Review and run Final Plat and Tec Doc at the same time. This did not work with the Ralley Sport project.
- Can we do Prelim and Final plat together?
- Final plat can often hold up project.

Development Review Extensions

- Look into phasing plan requirements and how they can be more flexible.
- Change to "substantially complete" language would be very helpful. Current language causes a lot of stress for applicants.
- No one is going to leave a big gaping hole. Change extension to 7 years.
- Erie just uses the start of construction, which is more straightforward.
- Conditions should be written with more flexibility to allow extensions.
- I saw some development review extensions while on the board, always approved. Not much harm in approving, but these approvals should be more staff level, easier to get. We have used this to simulate phasing for projects – double the duration would be an easy and non-controversial change. Maybe do a fee for longer vesting period (Denver does this).

Staffing and Review

- Staff is in this nanny state, there seems to be a culture or political environment causing it. Culture of fear of things going wrong.
- Many reviews take 3 rounds, department is chronically understaffed. Hard to get answers in a timely fashion. Could be much more efficient.
- I have seen improvements with the 3 week track lately
- The growing level of sophistication and scrutiny of review is an issue.
- Corrections should be scheduled on ADR track so it is more predictable.
- Loves the 3-week tracks. Other cities take much longer to get review comments.
- Most of the issues are right at the beginning or at the end of the process. Used to have delays on tracks but things have gotten better. Some issues with applications not being routed (cost $70k for applicant and two months). I check dashboard a lot. Could make improvements to EnerGov.
- Used to be able to get answers over the counter, more collaborative. Bring back more in person opportunities to meet.
- Staff turnover has been an issue, I've been pleased with our new case manager who has experience in Boulder from before. We need to have certainty and trust in our case manager when we get feedback. It can be frustrating when you're not getting a clear answer.
- Have to hedge my bets when talking to staff, it seems like they feel like they will get chewed out for making any mistake.

Pre-Application Meetings

- Site Review submittals would benefit from pre-apps

- Pre-apps are very helpful. Can we have them and the city charges for them? We would pay. Having initial conversation is so helpful.
- Would be nice to have a pre-app that is just a discussion, not necessarily recorded discussion. Sometimes owners can't share project publicly yet.
- Having a comprehensive pre-application meeting would be so helpful. We would pay for that meeting. It would be helpful to meet with relevant planner, then we are co-collaborating. In Longmont, we get a two-hour meeting, brainstorming together, very helpful. It would save time down the road.
- One caution is to not get too comprehensive with pre-apps – that is key. Important to have the key players but maybe not every single department if they're not needed. Want to check that it is a viable land use, look for fatal flaws. Formalized process.
- What is the standard duration of a pre-app meeting? I concur that pre-apps would be helpful.
- I've done lots of pre-apps in other jurisdictions, really valuable, can get concrete answers. Boulder's convoluted rules lead to convoluted answers from staff. In Wheat Ridge, just had a pre-app with all the directors, helped give the project some certainty.

Application Materials

- Reduce materials for what is required for applications. There has been creep over time. Example- renderings have to be picture perfect. Look at Site Review submittal and talk through what has actually been needed.
- The forms to fill out are very time-consuming. The forms are very redundant – why do you have to say in several places the sq ft of the project.
- Redundant to fill out the Land Use Review form and the Concept Review form. Lots of things on the forms that don't apply. Should build some web thing that asks questions to see what is applicable and then you only fill that out. Could really slim it down. Any submittal I expect 6 hours of time for just filling out the form – this money could go towards something more important like more affordable housing.

Other Comments

- Memos are too long, have gotten longer. Could save staff hours on memos. Planning Board and Council may not even be reading them.
- Approvals have gone from about 6 months to 1.5 years.
- Can we have a CSP – Cool Shit Permit? Often come to city with creative ideas – no way, door is closed. It would be great to get staff feedback for these creative ideas, more flexibility. Could be linked to Use Review.
- Look at fees for rezonings when in line with the comp plan but out of cycle – why so expensive if BVCP supports it?
- Building permit timelines are frustrating. Would pay more for expedited reviews.
- Would be great to have a "suggestion box" or location where issues that applicants or staff identify could be kept to fix later. Could coauthor these changes. Good to have a formal place for this.

- Would be great to have a meeting with case manager when you get the first round of comments to explain everything. In person/zoom/phone call, just run through it all. It would save so much time and back and forth.
- Concern about getting so complicated that we need permit expediters.
- It seems like in the past there was not a concern about the convoluted rules. Staff has a fear of getting in trouble, get hung up to dry, only get negative feedback from leadership.

Process Streamlining Improvements

Land Use Code Amendment
Project Charter – *Working Draft*

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Project Purpose & Goals

Background

Over the last few years, Planning and Development Services (P&DS) staff have been working on a reimagination of the department's business practices and business model. This has included transitioning all development review services online, while also integrating in-person and telephone assistance as the public health concerns of the pandemic have improved. The department has already undertaken many steps to implement the goal of operational excellence.

At the 2023 City Council retreat, council members asked P&DS to also investigate potential policy or code changes that could make development review processes simpler and more predictable for applicants. Specifically, council members asked that staff identify any processes that are preventing work from being done efficiently. Council members regularly hear about challenges from community members regarding the duration of land use approvals and permit approvals in the city. Staff hears similar concerns regarding application timing as well. In addition, recent analysis of the city's boards and commissions highlighted increased workload issues for the appointed groups that could be reduced by making more decisions administrative.

Many development review procedural improvements were made throughout 2023, including improvements to the accessory dwelling unit approval process, changes to the use table and standards that streamlined review processes for common uses, amendments that provided flexibility on when approvals expire, as well as other general procedural improvements. There remain several other improvements that could be made to further streamline city processes.

Problem/Issue Statement

Like most cities, Boulder has a complex regulatory system that determines the current development review process. Some procedures and standards outlined in the Land Use Code add unnecessary time or complexity to the application process. While many of the procedures in place help to support important city values and principles, there are opportunities to further improve processes and increase efficiency.

Project Purpose Statement

Identify process improvements that could be made through amendments to the Land Use Code to streamline development review processes and increase predictability and efficiency.

Guiding BVCP Policies

The project is guided by several key BVCP policies:

5.01 Revitalizing Commercial & Industrial Areas

The city supports strategies unique to specific places for the redevelopment of commercial and industrial areas. Revitalization should support and enhance these areas, conserve their strengths, minimize displacement of users and reflect their unique characteristics and amenities and those of nearby neighborhoods. Examples of commercial and industrial areas for revitalization identified in

previous planning efforts are Diagonal Plaza, University Hill commercial district, Gunbarrel and the East Boulder industrial area. The city will use a variety of tools and strategies in area planning and in the creation of public/ private partnerships that lead to successful redevelopment and minimize displacement and loss of service and retail uses. These tools may include, but are not limited to, area planning with community input, infrastructure improvements, shared parking strategies, transit options and hubs and changes to zoning or development standards and incentives (e.g., financial incentives, development potential or urban renewal authority).

5.05 Support for Local Business & Business Retention

The city and county value the diverse mix of existing businesses, including primary and secondary employers of different sizes, in the local economy. Nurturing, supporting and maintaining a positive climate for the retention of existing businesses and jobs is a priority. The city recognizes the vital role of small, local and independent businesses and non-profits that serve the community and will balance needs of redevelopment in certain areas with strategies that minimize displacement of existing businesses and create opportunities for startups and growing businesses. The city will continue to proactively analyze trends in market forces to shape its activities, plans and policies regarding local business and business retention. The city and county will consider the projected needs of businesses and their respective employees, such as commercial and office space, when planning for transportation infrastructure, programs and housing.

5.06 Affordable Business Space & Diverse Employment Base

The city and county will further explore and identify methods to better support businesses and non-profits that provide direct services to residents and local businesses by addressing rising costs of doing business in the city, including the cost of commercial space. The city will consider strategies, regulations, policies or new programs to maintain a range of options to support a diverse workforce and employment base and take into account innovations and the changing nature of the workplace.

5.14 Responsive to Changes in the Marketplace

The city recognizes that development regulations and processes have an impact on the ability of businesses to respond to changes in the marketplace. The city will work with the local business community and residents to make sure the city's regulations and development review processes provide a level of flexibility to allow for creative solutions while meeting broader community goals. This could involve modifying regulations to address specific issues and make them more responsive to emerging technologies and evolving industry sectors.

7.01 Local Solutions to Affordable Housing

The city and county will employ local regulations, policies and programs to meet the housing needs of low, moderate and middle-income households. Appropriate federal, state and local programs and resources will be used locally and in collaboration with other jurisdictions. The city and county recognize that affordable housing provides a significant community benefit and will continually monitor and evaluate policies, processes, programs and regulations to further the region's affordable housing goals. The city and county will work to integrate effective community engagement with funding and development requirements and other processes to achieve effective local solutions.

10.01 High-Performing Government

The city and county strive for continuous improvement in stewardship and sustainability of financial, human, information and physical assets. In all business, the city and county seek to enhance and facilitate transparency, accuracy, efficiency, effectiveness and quality customer service. The city and county support strategic decision-making with timely, reliable and accurate data and analysis.

Project Timeline

	NOV				DEC				JAN				FEB				MARCH				APRIL				MAY				JUNE			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Project scoping																																
Internal staff scoping and research																																
Drafting																																
Initial draft																																
CAO review																																
External review																																
Stakeholder meetings																																
Planning Board review																																
PB matters											1/16																					
PB public hearing																									5/7							
City Council review																																
CC 1st reading																										5/16						
CC 2nd reading																													6/6			
Implementation																																
… Effective date 6/2																																

Background Research | Q4 2023 | Planning

- Develop initial scope of work for process streamlining based on council retreat discussion
- Interview internal stakeholders to identify issues and opportunities for process streamlining: planners, permit specialists
- Analyze land use applications: type, Planning Board call ups, average time of approval
- Meet with interested stakeholders as requested

Deliverables

- *Project charter*
- *Application data*
- *New website*

Project Scoping and Initial Drafts | Jan/Feb 2023 | Shared Learning & Options

- Present data and potential changes as Matters item to Planning Board to refine scope
- Continued internal staff stakeholder engagement

- Develop project website
- External engagement – stakeholders
- Begin drafting changes

Deliverables

- *Project website*
- *Planning Board Matters memo*
- *Summary of stakeholder input*
- *Initial draft*

Draft Ordinance and Adoption | March 2023 | Decision

- Draft ordinance of process streamlining changes
- Engagement – feedback on draft ordinance
- Public hearings at Planning Board and City Council

Deliverables

- *Draft ordinance*
- *Planning Board memo*
- *City Council memos*

Engagement & Communication

Level of Engagement

The City of Boulder has committed to considering four possible levels when designing future public engagement opportunities (see chart in the appendix). For this project, the public will be ***Informed*** about any proposed changes to processes and stakeholders will be ***Consulted*** on potential changes. Public feedback will be obtained on the changes to simplify the code and increase efficiency.

Who Will be Impacted by Decision/Anticipated Interest Area

- **Applicants** who submit development review applications.
- **Residents and neighborhoods** who may be impacted from procedural changes in the neighborhoods where they live/work/play.
- **Under-represented groups** that may be unfamiliar with the methods to offer input.
- **City staff, City boards, and City Council** who will administer any updated processes.

Overall Engagement Objectives

- Model the engagement framework by using the city's decision-making wheel, levels of engagement and inclusive participation.
- Involve people who are affected by or interested in the outcomes of this project.
- Be clear about how the public's input influences outcomes to inform decision-makers.
- Provide engagement options.

- Remain open to new and innovative approaches to engaging the community.
- Provide necessary background information in advance to facilitate meaningful participation.
- Be efficient with the public's time.
- Show why ideas were or were not included in the staff recommendation.

Engagement Strategies

STAKEHOLDER MEETING

Purpose: While the majority of this project will focus on an "inform" level of engagement, this consultation is vital to the work. City staff will develop a list of potential interested residents, current and former development review applicants to discuss areas of process improvement.

A hybrid stakeholder meeting will be held virtually to introduce the project, present initial recommendations, receive feedback, and brainstorm additional improvements. This offers a way for interested stakeholders to hear options for proposed changes, ask questions of staff, and suggest modifications prior to the formal adoption process. Staff is already aware of feedback from customers about difficulties with application processing; the meeting will attempt to draw out potential improvements that would have the greatest impact.

Logistics: One meeting will be held. The meeting will be hybrid with an online option and in-person option for attendees. The meeting will include time for presentation and questions and answers. Staff will ensure that the invited attendees provide a balanced composition of perspectives including applicants of large, medium, and small projects who may have a varying level of experience with submitting development applications in Boulder. Staff will also engage the Planning Board at their Matters meeting in January about any particular feedback they are interested in hearing.

Project Team & Roles

Team Goals

- Follow City Council and Planning Board direction regarding changes to code language and application processes.
- Seek community feedback on proposed standards or criteria and incorporate relevant ideas.
- Solution must be legal, directly address the purpose and issue statement, and must have application citywide.

Critical Success Factors

- Conduct a successful public engagement process.
- Improve process timelines and customer satisfaction.

Expectations

Each member is an active participant by committing to attend meetings; communicate the team's activities to members of the departments not included on the team; and demonstrate candor,

openness, and honesty. Members will respect the process and one another by considering all ideas expressed, being thoroughly prepared for each meeting, and respecting information requests and deadlines.

Potential Challenges/Risks

The primary challenge of this project is making sure that proposed code changes minimize unintended consequences and over-complication of the code.

Administrative Procedures

The core team will meet regularly throughout the duration of the project. An agenda will be set prior to each meeting and will be distributed to all team members. Meeting notes will be taken and will be distributed to all team members after each meeting.

CORE TEAM		
Executive Sponsor	Brad Mueller	
Executive Team	Brad Mueller, Charles Ferro, Karl Guiler	
Project Leads		
Project Manager	Lisa Houde	
Other Department Assistance		
Legal	Hella Pannewig & David Gehr	
Comprehensive Planning	Kathleen King	Principal planner
Communications	Cate Stanek	Communications specialist
I.R.	Sean Metrick	Mapping analysis assistance
Community Vitality	TBD	
Public Engagement	Vivan Castro-Wooldridge	Engagement strategist

Executive Sponsor: The executive sponsor provides executive support and strategic direction. The executive sponsor and project manager coordinates and communicates with the executive team on the status of the project, and communicate and share with the core team feedback and direction from the executive team.

Project Manager: The project manager oversees the development of the Land Use Code amendment. The project manager coordinates the core team and provides overall project management. The project manager will be responsible for preparing (or coordinating) agendas and notes for the core team meetings, coordinating with team members on the project, and coordinating public outreach and the working group. The project manager coordinates the preparation and editing of all council/board/public outreach materials for the project, including deadlines for materials.

Other Department Assistance: Staff from other departments coordinate with the project manager on the work efforts and products. These staff members will assist in the preparation and editing of all council/board/public outreach materials including code updates as needed.

Project Costs/Budget

No consultant costs have been identified for this project at this time. The project will be undertaken by P&DS staff.

Decision-Makers

- **City Council:** Decision-making body.
- **Planning Board:** Will provide input throughout the process, and make a recommendation to council that will be informed by other boards and commissions.
- **City Boards and Commissions:** Will provide input throughout process and ultimately, a recommendation to council around their area of focus.

Boards & Commissions

City Council – Will be kept informed about project progress and issues; periodic check-ins to receive policy guidance; invited to public events along with other boards and commissions. Will ultimately decide on the final code changes.

Planning Board – Provides key direction on the development of options periodically. Will make a recommendation to City Council on the final code changes.

Appendix: Engagement Framework

City of Boulder Engagement Strategic Framework

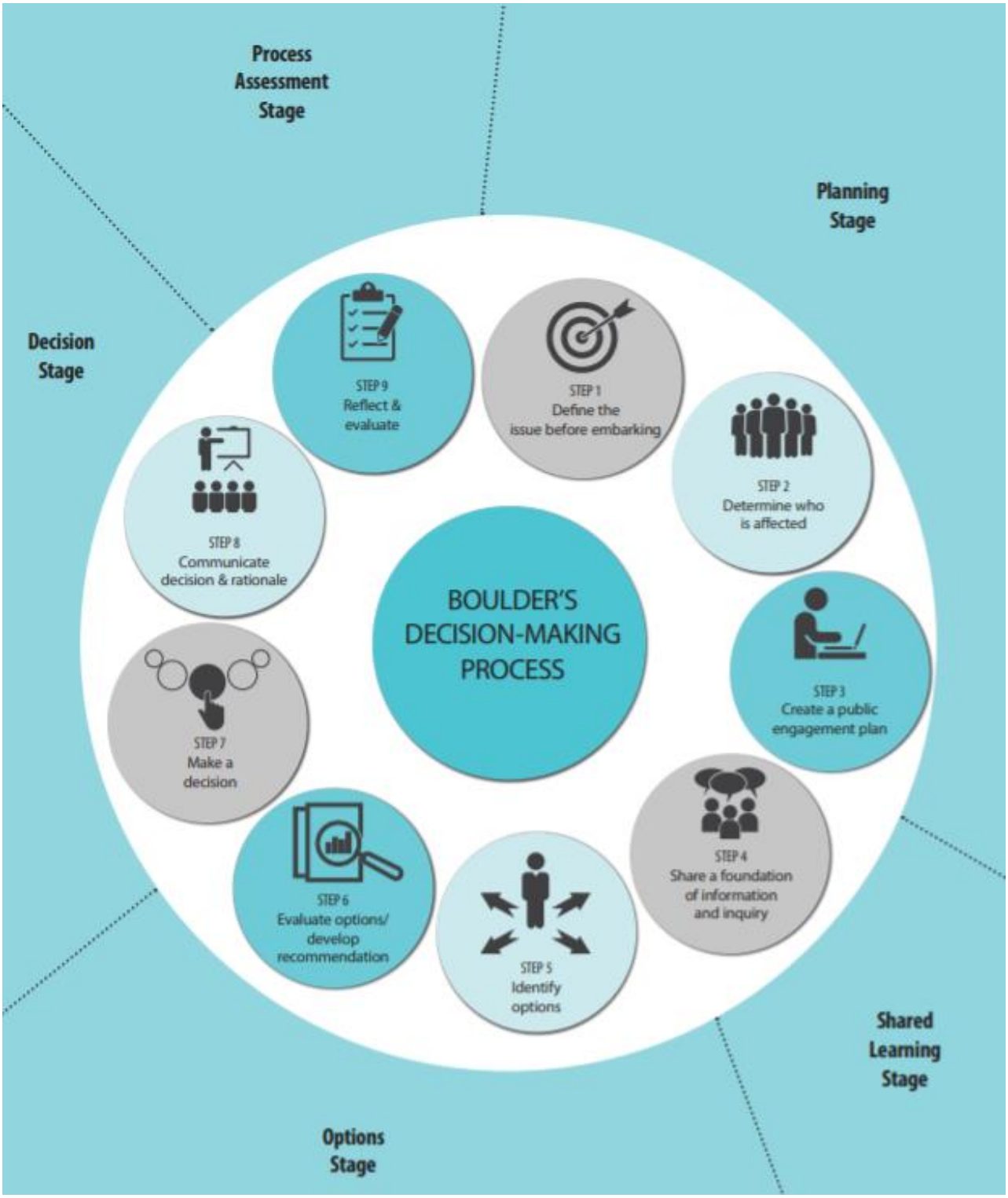
BOULDER'S ENGAGEMENT SPECTRUM

The city will follow a modified version of IAP2's engagement spectrum to help identify the role of the community in project planning and decision-making processes.

INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE
PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding a problem, alternatives, opportunities and/or solutions.	To obtain public feedback on public analysis, alternatives and/or decisions.	To work directly with the public throughout a process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and identification of a preferred solution.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge your concerns and aspirations, and share feedback on how public input influenced the decision. We will seek your feedback on drafts and proposals.	We will work with you to ensure that your concerns and aspirations are reflected in any alternatives and share feedback on how the public input influenced the decision.	We will work together with you to formulate solutions and to incorporate your advice and recommendations into the decisions to the maximum extent possible.

Boulder's Decision Making Process



COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Introduction, first reading and consideration of a motion to order published by title only, Ordinance 8632 approving annual supplemental appropriations to the 2024 Budget

PRIMARY STAFF CONTACT
Charlotte Huskey, Budget Officer

REQUESTED ACTION OR MOTION LANGUAGE
Motion to introduce and order published by title only Ordinance 8632 approving supplemental appropriations to the 2024 Budget.

ATTACHMENTS:

Description

- **Item 3H - 2024 ATB1 Final Packet**

CITY OF BOULDER
CITY COUNCIL AGENDA ITEM

MEETING DATE: May 16, 2024

AGENDA TITLE: Introduction, first reading and consideration of a motion to order published by title only, Ordinance 8632 approving annual supplemental appropriations to the 2024 Budget.

PRESENTERS:
Nuria Rivera-Vandermyde, City Manager
Chris Meschuk, Deputy City Manager
Kara Skinner, Chief Financial Officer
Charlotte Huskey, Budget Officer

EXECUTIVE SUMMARY

As described in the *Budget Policies* section of the online budget book, there are opportunities during the fiscal year for changes to the annual budget appropriation. Each year at least two supplemental appropriation ordinances known as adjustments-to-base (ATB), or budget supplementals, are presented to City Council for review and approval. Council receives the First Budget Supplemental, or ATB1, in May and the Second and Final Budget Supplemental, or ATB2, in November.

Mid-year adjustments to the original budget are necessary for governmental operations as Colorado law requires an annual budget appropriation by December 31st of each year, however government business continues year-round. Given that mid-year adjustments are performed outside of the annual budget cycle, careful consideration is given before advancing recommended adjustments. There are common instances when adjustments are required, such as appropriating new grant funds. In special circumstances, new investments may be necessary due to emergencies, voter-approved changes, and emerging community needs. These special circumstances are generally presented as one-time investments and adjustments to the original budget.

In the 2024 ATB1, staff recommends a total of $46,390,256 in adjustments, including $31,101,097 from fund balance, $12,965,120 from new grants received, and $2,324,039 from additional unbudgeted revenue, including revenue from donations, interlocal agreements, or additional anticipated revenue above forecast that was not captured in the original budget. Staff recommends the below appropriation increases to respond to unanticipated needs and citywide priorities where it is projected that existing

appropriation is not sufficient, including unbudgeted city building maintenance issues and advancing key city projects.

A proposed ordinance is provided in **Attachment A** and an itemized list of appropriations by fund and department is included in **Attachment B**.

STAFF RECOMMENDATION

Suggested Motion Language:
Staff requests council consideration of this matter and action in the form of the following motion:

Motion to introduce and order published by title only Ordinance 8632 approving supplemental appropriations to the 2024 Budget.

OVERVIEW

- Fiscal: This ordinance will appropriate a total of $46,390,256 across funds.
- In the **General Fund**, this ordinance will appropriate a total of $22,277,153, $937,187 from additional revenues, $15,983,959 from fund balance, and $5,356,006 from grant revenues.
- In **restricted funds**, this ordinance will appropriate a total of $24,113,104 $1,386,852 from additional revenues, $15,117,138 from fund balance, and $7,609,114 from grant revenues.
- Appropriation authority for capital projects, encumbrances that cross fiscal years is included in the annual adoption of the budget and therefore are not included in this adjustment.
- Staff also is performing an amendment to the budget appropriations ordinance to include multi-year appropriation for grant-funded projects. This is included as part of the ATB packet, with additional detail provided below.

ANALYSIS

There are three types of supplemental appropriations:

Supplement appropriations from fund balance are the most common and are only for one-time expenses as fund balance is a one-time source of funds. Fund balance arises when revenue exceeds budget or expenditures are under budget. In some instances grant revenue is received in one year but not all spent in that budget year, so the dollars fall to fund balance and need to be reappropriated to authorize spending of those dollars in the following year. Interfund transfers, including the expense appropriation between funds, are included in this category, when applicable.

Supplement appropriations from additional revenues includes unanticipated funds received for city programs and services, including donations, reimbursements for services, fundraisers, or cooperative agreements between municipalities as well as

additional revenues above forecasted amounts based on revised revenue projections.

Supplemental appropriations from grant revenues are required throughout the year since either the grant was not anticipated and was therefore not included in the original budget, or because the amount received was more than expected and budgeted, and expenditure activities cannot be carried out with the existing budget appropriation.

Table 1: Type of Supplemental Request – All Funds

Source of Funds	Amount
Additional Revenues	$2,324,039
Fund Balance	$31,101,097
Grant Revenues	$12,965,120
Total	**$46,390,256**

Supplementals can also be categorized according to fund and source. **Table 2** provides a summary of all supplementals in this 1st ATB totaling $46,390,256 across funds.

Table 2: 1st ATB Supplemental Appropriations by Fund and Source

Fund	Additional Revenue	Fund Balance	Grant Revenue	Total
General	$937,187	$15,983,959	$5,356,006	$22,277,153
.25 Cent Sales Tax	$16,100	$197,049	$0	$213,149
Affordable Housing	$1,109,302	$306,743	$0	$1,416,045
Boulder Junction Improvement	$0	$316,527	$0	$316,527
Capital Development	$0	$300,000	$0	$300,000
Climate Tax	$150,000	$400,550	$0	$550,550
Community, Culture, Resilience, and Safety	$0	$2,306,743	$0	$2,306,743
Computer Replacement	$0	$106,000	$0	$106,000
Equipment Replacement	$0	$25,488	$0	$25,488
Facility Renovation and Replacement	$0	$414,000	$0	$414,000
Fleet Operations and Replacement	$0	$2,721,127	$7,241,018	$9,962,145
Open Space	$98,250	$163,154	$152,596	$414,000
Permanent Parks and Recreation	$13,200	$13,343	$0	$26,543
Planning and Development Services	$0	$101,413	$0	$101,413
Property and Casualty Insurance	$0	$625,000	$0	$625,000
Recreation Activity	$0	$0	$75,500	$75,500
Transportation	$0	$7,120,000	$140,000	$7,260,000
Total	$2,324,039	$31,101,097	$12,965,120	$46,390,256

Overview of Select Requests

The recommended adjustment of $46,390,256 includes several investments to address emerging community needs and inflationary pressures.

Below are several highlights of specific initiatives and programming proposed through the supplemental appropriation. A line-item summary table of the supplemental requests by fund and type can be found in **Attachment B**.

Capital Maintenance Needs and Infrastructure Replacement – $6.2M

City Facility Maintenance and Renovations. Aging building infrastructure across the city's facility portfolio has resulted in several repair and renovation needs. These costly repairs underscore the need for funding the initiatives outlined within the Facilities Master Plan, as many of the city's buildings are reaching an inflection point in which repair and maintenance costs will rapidly increase if significant infrastructure upgrades are not performed. This includes:

- *Municipal Service Center Renovations* – An additional $164,000 is requested for Municipal Services Center (MSC) renovations due to escalation of project costs, including generator replacement that provides critical systems back-up and HVAC replacement costs. The HVAC system components have either failed or are close to failing and the equipment is past its useful life.
- *Facility Parking Lot Maintenance* – The Facilities & Fleet Department is responsible for the maintenance of multiple parking lots around the city. Two city parking lots, including at the Public Safety Building and the Brenton Building, are in need of immediate repair. Staff recommends $30,000 in additional one-time appropriation from the General Fund to support these maintenance costs.

Maintenance and Infrastructure Funding Transfer to Governmental Capital Fund. Staff recommends transferring $6.0M in General Fund fund balance after reserves to the Governmental Capital Fund to support continued city infrastructure and maintenance funding for key planned projects, such as the Alpine-Balsam Western City Campus project. Based on 2023 unaudited year-end fund balances, staff is projecting an anticipated $15.0–20.0M in fund balance after reserves in the General Fund. It is best practice to apply one-time savings (fund balance after reserves) to capital projects or other one-time needs. In recent years, staff has utilized this one-time funding to support the advancement of one-time initiatives and projects, such as the Alpine-Balsam Western City Campus Development and the Day Services Center.

Homelessness and Affordable Housing Projects – $3.5M

Transformational Homelessness Response Grant. A total of $2.0M in grant funds awarded to the Housing & Human Services Department for the State of Colorado's Department of Local Affairs (DOLA) Transformational Homelessness Response Grant will support the implementation of respite services as part of the day services center operations with Boulder Shelter for the Homeless. Grant funds will help support start-up costs, clinical services, and additional operational expenses.

HUD Section 108 Loan and Grants for the Affordable Housing Modular Factory Project. In 2023, the Housing & Human Services (HHS) Department received a $4.0M loan from the a Housing and Urban Development (HUD) Section 108 Guarantee Program for the project, which will be repaid over ten years from annual Community Development Block Grant (CDBG) allocation through the Affordable Housing Fund. In addition, HHS anticipated receiving an Economic Development Initiative Grant of $506,000 through the federal earmarking process to support the Affordable Housing Modular Factory Project, which was originally included in 2023 ATB2. In 2024 ATB1, HHS requests $1.1M to

reappropriate remaining unspent balances of the HUD Section 108 loan, and $506,000 of federal earmark grant revenue that will fund the project in 2024. The Modular Factory Project provides space for the production and assembly of modular homes to produce much needed affordable housing for Boulder Valley residents while providing workforce training for Boulder Valley School District students.

Investments in Arts & Cultural Funding – $450,000

Dushanbe Teahouse Artist Restoration. The city, in coordination with the University of Colorado (CU), will support $250,000 in paint and restoration work for the Dushanbe Teahouse by an artist from Tajikistan. CU sponsors foreign scholars for this effort, including items such as visa support, while the city provides funding for the artist restoration and sponsorship of the artist. Funding for this work originates from the Facilities & Fleet Department from lease payments received by the Dushanbe Teahouse.

Experiments in Public Art. The Arts & Culture Office requests $200,000 in one-time funding to support an extension of the Experiments in Public Art Program, which is a visiting artist residency program that provides opportunities for temporary artworks in public spaces. This one-time funding will support an artist residency invitational for temporary art, lectures, and community workshops.

Fleet Electrification and Additional Capital Infrastructure – $15.7M

Electric Fire Apparatuses. The city has ordered two electric fire trucks, one of which was planned to be delivered in 2025. The fire truck planned for 2025 delivery is now anticipated to be delivered in 2024, so additional appropriation is needed to pay for the new fire truck. Of the estimated total cost of $1.8M, $1.1M is expected to be funded by reimbursement through grant proceeds and the remaining funding of approximately $726,000 comes from accumulated balances set aside for the replacement of fire trucks.

Electric HOP Buses. Per the 2019 Transportation Master Plan and the city's climate goals, the city seeks to convert its HOP fixed-route bus fleet from diesel buses to zero-emission battery electric buses by 2030. The city has secured $6.2M in Colorado Department of Transportation (CDOT) grant funding for the purchase of seven (7) battery electric HOP buses that will replace 2004 and 2006 HOP diesel buses that have reached useful life thresholds. The city seeks to procure seven 35-foot Gillig battery electric buses through piggyback purchase options available through the State of Washington Cooperative Purchasing Agreement for Transit Buses. Total purchase for the seven buses will be approximately $8.1M which will be offset by $6.2M in reimbursable CDOT grants, requiring net local match of $2.0M. This appropriation allows the city to issue a purchase order for the seven buses and lock in prices and a build slot with Gillig, with bus delivery and payment to Gillig expected in the second quarter of 2026.

East Arapahoe Multi-Use Path Project. Project costs have escalated due to delays in construction to support Xcel undergrounding efforts. The Transportation & Mobility Department requests $1.0M in additional appropriation for the East Arapahoe Multi-Use Path Project to support the costs of delays of the original project schedule, which accommodated approximately three years of delays to support the completion of undergrounding in the project area.

Downtown Boulder Station. A total of $500,000 in additional appropriation to the Downtown Boulder Station will support additional security and pedestrian amenities added to scope and increased project cost. This is a planned capital project with funds supported by the city. The Regional Transportation District (RTD) is a financial partner, contributing $200,000 to the project.

19th Street Project. The 19th Street Project scope has expanded and construction inflation escalated during course of planning & design for the project. The original estimate for the project was $4.2M, however finalized contractual agreements, including updated estimates, construction testing and inspections, and staff time, anticipate total project cost at $7.2M. The Transportation & Mobility Department requests $2.0M in additional funding from the Transportation Fund fund balance to support the project and will utilize $1.0M of existing capital appropriation to support the remainder of project costs.

Fire Station #2. The 2024-29 CIP included $18.5M in total planned spending from Community, Culture, Resilience, and Safety Tax funds to support the replacement of Fire Station #2. The 2024 original budget included $6.0M for land acquisition cost for the project, however, land acquisition costs were higher by approximately $1.8 million, bringing the total land acquisition costs to approximately $7.8 million. Additionally, design work that was included as 2025 planned spending in the six-year CIP is proposed to commence in 2024 ahead of project schedule. While the total project cost will remain at $18.5M, a total of $2.0M in CCRS funding will support the land acquisition costs and initial design costs ahead of schedule in 2024.

North Boulder Library. Additional appropriation of $300,000 is requested for the final construction costs of the North Boulder Library project due to adjustments in project scope. This additional funding comes from dedicated library development impact fees within the Capital Development Fund.

ARPA Programming and Other Grant-Funded City Services - $8.7M

A total of $8.3M of American Rescue Plan Act (ARPA) reappropriation is included in ATB1 to support the continuation of ARPA programming through 2024, including ARPA programs supporting expanded city services such as behavioral health services, financial and rental assistance services, economic recovery and workforce training implementation, and winter sheltering for the unhoused population. and services. ARPA federal stimulus funding must be fully committed or obligated by December 31, 2024, and approved to spend through December 31, 2026. Additional detail on ARPA programming and funding can be found on the city's ARPA Dashboard.

In addition, the city has successfully secured grant funding for several programs and initiatives. In most instances, after departments have been awarded grants, the city must first expend city funding for grant-awarded services and programming to then receive reimbursement of those expenses at a later date. A summary of select grant-funded projects in ATB1 include:

- The Parks & Recreation Department has received approximately $105,000 in grants, donations, and anticipated reimbursement revenues to support programming such as tree mitigation and forestry services and operations and maintenance for the Harbeck House historic asset currently leased to the Women's Wilderness Institute.

- The Open Space Department has received $251,000 in grant and donation revenue to fund riparian restoration projects, wetland and riparian mapping, trail repairs, and wildland and urban fuel mitigation.
- The Police Department has received $35,000 in new grant revenue from the Boulder County Twentieth Judicial District for the Victims Assistance and law Enforcement Grant. The grant will be used to pay a portion of staff salary and benefits of the department's Victim Services Senior Program staffing, who support volunteer advocates who provide direct service to crime victims.

The city's Grants Office, in partnership with departments across the organization, continues to focus on seeking grant funding for high-priority initiatives, including current city programs supported by one-time funding, key council priorities such as the high utilizer program, and supporting grant coordination for regional partnerships. Recent examples of grant submissions or awards include federal earmark requests for $3.0M in funding for the high utilizers program, $5.0M for Utilities Main Sanitary Sewer Line Improvement Phase III, and a Denver Regional Council of Governments (DRCOG) regional grant of $199.7M for climate action efforts.

Finally, as part of ATB1, staff recommends an amendment to the budget appropriations ordinance to include multi-year appropriation approval for grant-funded projects. Similar to the multi-year capital appropriation language within the ordinance, appropriating new grant funding on a multi-year basis instead of an annual basis will support the administration of grant-funded projects as well as the implementation of grant-funded projects. Instead of returning to council each year to reappropriate previously awarded grant funding, this change will instead perform a one-time appropriation approval of new grant funding to carryforward on a multi-year basis until the grant funding is fully expended or until the grant period ends. This updated ordinance language is included within Attachment A – Ordinance 8632 (Section 2).

Next Steps

The second reading and public hearing of this item is scheduled for the June 6, 2024 City Council meeting.

ATTACHMENTS

A. Ordinance 8632 containing supplemental appropriations to the 2024 Budget
B. Supplemental Appropriations to the 2024 Budget by Fund and Department

ORDINANCE 8632

AN ORDINANCE APPROPRIATING MONEY TO DEFRAY EXPENSES AND LIABILITIES OF THE CITY OF BOULDER, COLORADO, FOR THE 2024 FISCAL YEAR OF THE CITY OF BOULDER; AND SETTING FORTH RELATED DETAILS

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF BOULDER, COLORADO:

Section 1. The following appropriations are made for the City of Boulder's 2024 fiscal year for payment of 2024 city operating expenses, capital improvements, and general obligation and interest payments:

General Fund	
Appropriation from Additional Revenue	$6,293,194
Appropriation from Fund Balance	$15,983,959
.25 Cent Sales Tax Fund	
Appropriation from Additional Revenue	$16,100
Appropriation from Fund Balance	$197,049
Affordable Housing Fund	
Appropriation from Additional Revenue	$1,109,302
Appropriation from Fund Balance	$306,743
Boulder Junction Improvement Fund	
Appropriation from Fund Balance	$316,527
Capital Development Fund	
Appropriation from Fund Balance	$300,000
Climate Tax Fund	
Appropriation from Additional Revenue	$150,000
Appropriation from Fund Balance	$400,550
Community, Culture, Resilience and Safety Fund	
Appropriation from Fund Balance	$2,306,743

Computer Replacement Fund	
Appropriation from Fund Balance	$106,000
Equipment Replacement Fund	
Appropriation from Fund Balance	$25,488
Facility Renovation and Replacement Fund	
Appropriation from Fund Balance	$414,000
Fleet Operations and Replacement Fund	
Appropriation from Additional Revenue	$7,241,018
Appropriation from Fund Balance	$2,721,127
Open Space Fund	
Appropriation from Additional Revenue	$250,846
Appropriation from Fund Balance	$163,154
Permanent Parks and Recreation Fund	
Appropriation from Additional Revenue	$13,200
Appropriation from Fund Balance	$13,343
Planning and Development Services Fund	
Appropriation from Fund Balance	$101,413
Property and Casualty Insurance Fund	
Appropriation from Fund Balance	$625,000
Recreation Activity Fund	
Appropriation from Additional Revenue	$75,500
Transportation Fund	
Appropriation from Additional Revenue	$140,000
Appropriation from Fund Balance	$7,120,000

Section 2. Appropriations for individual capital projects or encumbrances or any grant-funded projects in the above mentioned funds for fiscal year 2024 shall not lapse at year end but continue until the project is completed or cancelled.

Section 3. The council may transfer unused balances appropriated for one purpose to another purpose.

Section 4. These appropriations are necessary for the protection of the public peace, property, and welfare of the residents of the city and cover matters of local concern.

Section 5. Pursuant to Section 18 of the Boulder City Charter, this ordinance shall take effect immediately upon publication after final passage.

Section 6. The City Council deems it appropriate that this ordinance be published by title only and orders that copies of this ordinance be made available in the office of the city clerk for public inspection and acquisition.

INTRODUCED, READ ON FIRST READING, AND ORDERED PUBLISHED BY TITLE ONLY this 16th day of May 2024.

_____
Aaron Brockett,
Mayor

Attest:

_____
City Clerk

READ ON SECOND READING, PASSED AND ADOPTED this 6th day of June 2024.

_____
Aaron Brockett,
Mayor

Attest:

_____
City Clerk

Request by Fund	Additional Unbudgeted Revenue	Donations Revenue	Grant Revenue	Fund Balance	Grand Total
1100-General	**$937,187**		**$5,356,006**	**$15,983,959**	**$22,277,153**
110-City Manager's Office				**$460,073**	**$460,073**
Business Flexible Rebate Incentive Program				$494,108	$494,108
CVB Payment Adjustment				-$34,035	-$34,035
135-Municipal Court				**$166,929**	**$166,929**
Community Court				$166,929	$166,929
255-Police	**$171,952**		**$46,690**	**$440,760**	**$659,402**
2024 Victims Assistance and Law Enforcement (VALE) Grant			$20,000		$20,000
Beating Auto Theft Through Law Enforcement (BATTLE) Grant - 2023/2024				$16,958	$16,958
Behavioral Health Crises in the City of Boulder Grant				$81,400	$81,400
Boulder County Digital Forensics Laboratory Task Force				$81,908	$81,908
BRETSA funding for two current Dispatch positions & various expenses	$171,952				$171,952
Dept of Local Affairs Peace Officer Mental Health Grant - 2023/2024				$20,000	$20,000
FY2021 Edward Byrne Justice Assistance Grant (JAG)				$45,169	$45,169
FY2022 Edward Byrne Justice Assistance Grant (JAG)				$63,075	$63,075
FY2023 Edward Byrne Justice Assistance Grant (JAG)				$70,369	$70,369
High Visibility Impaired Driving Enforcement (DUI) Grant			$16,690		$16,690
Police Foundation Donation				$48,442	$48,442
US Marshals Fugitive Task Force			$10,000		$10,000
Explosive Technician Training				$13,439	$13,439
620-Community Vitality				**$200,000**	**$200,000**
Experiments in Public Art				$200,000	$200,000
515-Parks and Recreation				**-$48,000**	**-$48,000**
Park Operations Maintenance				-$48,000	-$48,000
120-Communications & Engagement	**$25,488**			**$3,140**	**$28,628**
Software licences	$8,288				$8,288
Council chamber remodel				$3,140	$3,140
Podcast support	$17,200				$17,200
260-Fire			**$16,941**	**$28,697**	**$45,638**
Cost-share for Project Manager for Closest Unit Dispatch Project				$28,697	$28,697
Boulder County Sheriff's Office Search and Rescue/EMS Supplemental Grant			$16,941		$16,941
315-Facilities & Fleet				**$328,528**	**$328,528**
Carryover from 2022 and 2023 for Vehicles not purchased in 2022 and 2023				$257,528	$257,528
Facility Parking Lot Maintenance				$30,000	$30,000
Radio Infrastructure Maintenance Contract				$41,000	$41,000
405 and 410-Housing & Human Services	**$739,747**		**$5,292,375**	**$67,130**	**$6,099,252**
Afford Hsng - Modular Factory - COHF			$1,753,091		$1,753,091
ARPA - BoCo Regional Hsng/Mediation and Compliance			$1,255,629		$1,255,629
Behav Hlth - Byrne Grant (yr2)	-$35,253				-$35,253
Homelessness - DOLA grant for Respite			$2,000,000		$2,000,000
Homelessness - DOLA grant for TSS (Tenant Support Service)			$108,000		$108,000
HUD earmark (Economic Development Initiative) grant for Modular Factory project.			$506,000		$506,000
Silver Sneakers revenue	$25,000				$25,000
Community Foundation of Boulder Co grant - Guaranteed Income (Elevate Boulder)				$67,130	$67,130
Homelessness - Day Services Center Operations	$750,000				$750,000
COBHA Grant			-$330,345		-$330,345
951-Fundwide / Citywide				**$14,336,702**	**$14,336,702**
ARPA Re-Appropriation				$8,336,702	$8,336,702
Maintenance and Infrastructure Funding Transfer to Governmental Capital Fund				$6,000,000	$6,000,000
2100-Capital Development				**$300,000**	**$300,000**
315-Facilities & Fleet				**$300,000**	**$300,000**
North Boulder Library				$300,000	$300,000
2120-Planning and Development Svc				**$101,413**	**$101,413**
380-Planning & Development Services				**$101,413**	**$101,413**

Development Code Updates				$96,413	$96,413
State Historic Tax Credit Plaques				$5,000	$5,000
2140-Affordable Housing	**$1,109,302**			**$306,743**	**$1,416,045**
315-Facilities & Fleet				**$306,743**	**$306,743**
HHS and F&F MOU				$306,743	$306,743
405 and 410-Housing & Human Services	**$1,109,302**				**$1,109,302**
HUD Section 108 loan for Modular Factory Project	$1,109,302				$1,109,302
2180-.25 Cent Sales Tax	**$16,100**			**$197,049**	**$213,149**
515-Parks and Recreation	**$16,100**			**$197,049**	**$213,149**
Tree Mitigation and Forestry Donations	$16,100				$16,100
Tree Mitigation				$73,409	$73,409
NLC - Youth, Education and Families and Children & Nature Network Grant				$16,000	$16,000
Fixed Term Sr. Project Manager for CAPRA Accreditation				$25,000	$25,000
Capital Equipment- Forestry				$34,640	$34,640
Park Operations Maintenance				$48,000	$48,000
2300-Recreation Activity			**$75,500**		**$75,500**
515-Parks and Recreation			**$75,500**		**$75,500**
Mobile Rec Van SSBDT Grant (YSI)			$30,000		$30,000
Recquity Program- Recreation Center Visits SSBDT Grant (Recreation Centers)			$45,500		$45,500
2400-Climate Tax	**$150,000**			**$400,550**	**$550,550**
145-Climate Initiatives	**$150,000**			**$400,550**	**$550,550**
2023 Desertification Risk Assessment Reimbursement	$150,000				$150,000
2024 Ebike Program				$300,000	$300,000
Transfer of 2022 Bag Fee Funds				$100,550	$100,550
2500-Open Space		**$98,250**	**$152,596**	**$163,154**	**$414,000**
555-Open Space & Mountain Parks		**$98,250**	**$152,596**	**$163,154**	**$414,000**
OSMP Fire Reimbursements				$48,728	$48,728
Boulder Open Space Conservancy Donations		$58,250			$58,250
EPA Wetland Program Development Grant			$110,896		$110,896
Colorado State Forest Service Grant with Colorado Chautauqua Association			$41,700		$41,700
Jr Ranger Program Donations				$11,626	$11,626
Arthur Moss Estate Donation				$102,800	$102,800
Audubon Society Riparian Restoration Projects		$40,000			$40,000
2800-Transportation			**$140,000**	**$7,120,000**	**$7,260,000**
310-Transportation			**$140,000**	**$7,120,000**	**$7,260,000**
19th St				$2,000,000	$2,000,000
HSIP Traffic Signals			$140,000	$2,000,000	$2,140,000
Valmont MUP				$720,000	$720,000
CMPI Ped Crossing Project				$900,000	$900,000
Downtown Boulder Station				$500,000	$500,000
East Arapahoe MUP				$1,000,000	$1,000,000
3300-Permanent Park & Recreation	**$13,200**			**$13,343**	**$26,543**
515-Parks and Recreation	**$13,200**			**$13,343**	**$26,543**
Memorial Bench Program				$13,343	$13,343
Harbeck House Lease Revenue	$13,200				$13,200
3500-Bldr Junction Cap Imprvmt				**$316,527**	**$316,527**
310-Transportation				**$316,527**	**$316,527**
2022 Capital Carryover correction				$316,527	$316,527
3700-Capital Improvement CCS				**$2,306,743**	**$2,306,743**
315-Facilities & Fleet				**$2,306,743**	**$2,306,743**
HHS and F&F MOU				$306,743	$306,743
Fire Station 2				$2,000,000	$2,000,000
7110-Property & Casualty Self Ins				**$625,000**	**$625,000**
185-Finance				**$625,000**	**$625,000**
Digital Accessibility Program Manager				$0	$0
Claims & Settlements				$625,000	$625,000
7210-Fleet			**$7,241,018**	**$2,721,127**	**$9,962,145**

315-Facilities & Fleet				**$7,241,018**	**$2,721,127**	**$9,962,145**
	Electric Fire Apparatus Grant			$1,090,419		$1,090,419
	Electric Fire Apparatus				$726,946	$726,946
	Electric Buses Grant			$6,150,599		$6,150,599
	Electric Buses				$1,994,181	$1,994,181
7300-Computer Replacement					**$106,000**	**$106,000**
190-Information Technology					**$106,000**	**$106,000**
	Asset Management System				$106,000	$106,000
7400-Equipment Replacement					**$25,488**	**$25,488**
315-Facilities & Fleet					**$25,488**	**$25,488**
	Software licences				$8,288	$8,288
	Podcast support				$17,200	$17,200
	Radio Infrastrucure Replacement				$0	$0
7500-Facility Renovation & Replace					**$414,000**	**$414,000**
315-Facilities & Fleet					**$414,000**	**$414,000**
	MSC Renovations				$164,000	$164,000
	Dushanbe Teahouse Paint & Restoration				$250,000	$250,000
Grand Total		**$2,225,789**	**$98,250**	**$12,965,120**	**$31,101,097**	**$46,390,256**

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Introduction, first reading, and consideration of a motion to order published by title only Ordinance 8633 amending Section 2-1-2, "Council Meetings," B.R.C. 1981 allowing for regular meetings once a month during the summer months; and setting forth related details

PRIMARY STAFF CONTACT
Teresa Taylor Tate, City Attorney, 303.441.3020

REQUESTED ACTION OR MOTION LANGUAGE
Motion to introduce and order published by title only Ordinance 8633 amending Section 2-1-2, "Council Meetings," B.R.C. 1981 allowing for regular meetings once a month during the summer months; and setting forth related details.

ATTACHMENTS:
Description

- **Item 3I - 1st Rdg Ord. 8633 Amending 2-1-2 Council Meetings**

CITY OF BOULDER
CITY COUNCIL AGENDA ITEM

MEETING DATE: May 16, 2024

AGENDA TITLE

Introduction, first reading, and consideration of a motion to order published by title only Ordinance 8633 amending Section 2-1-2, "Council Meetings," B.R.C. 1981 allowing for regular meetings once a month during the summer months; and setting forth related details.

PRESENTERS

Nuria Rivera-Vandermyde, City Manager
Teresa Taylor Tate, City Attorney

EXECUTIVE SUMMARY

At the Council Retreat held April 4, 2024, City Council requested the ability to meet only once a month in the summer months. This amendment is necessary to effectuate that change. The requested amendment complies with City Charter Sec. 9.

Ordinance 8633 is set to be adopted by council on second reading as an emergency measure on June 6, 2024, and would go into effect immediately. If it was not adopted as an emergency measure on second reading it would go into effect July 6, 2024.

STAFF RECOMMENDATION

Staff recommends council adopt the ordinance.

Suggested Motion Language:

Staff requests council consideration of this matter and action in the form of the following motion:

Motion to introduce and order published by title only Ordinance 8633 amending Section 2-1-2, "Council Meetings," B.R.C. 1981 allowing for regular meetings once a month during the summer months; and setting forth related details.

COMMUNITY SUSTAINABILITY ASSESSMENTS AND IMPACTS

- **Economic** – none
- **Environmental** - none
- **Social** – Allowing for regular meetings once a month during the summer will permit the staff and council important time to focus on other projects.

OTHER IMPACTS

- **Fiscal** – None.
- **Staff time** - Allowing for regular meetings once a month will permit the staff important time to focus on projects.

RESPONSES TO QUESTIONS FROM COUNCIL AGENDA COMMITTEE

None.

BOARD AND COMMISSION FEEDBACK

None.

PUBLIC FEEDBACK

None.

BACKGROUND

At the Council Retreat held April 4, 2024, City Council requested the ability to meet only once a month in the summer months.

ANALYSIS

The proposed amendment would permit the city council to meet only once a month in the summer months of June, July, and August. This amendment complies with City Charter Sec. 9 which requires a regular meeting at least once a month. The amendment provides the flexibility for council to schedule a break during the summer without limiting the ability of council to meet more regularly if desired. This will also allow staff time to focus on other projects and city business.

NEXT STEPS

Council has the option to adopt the ordinance or not.

ATTACHMENT

Attachment A – Proposed Ordinance 8633

ORDINANCE 8633

AN ORDINANCE AMENDING SECTION 2-1-2, "COUNCIL MEETINGS," B.R.C. 1981 ALLOWING FOR REGULAR MEETINGS ONCE A MONTH DURING THE SUMMER MONTHS; AND SETTING FORTH RELATED DETAILS.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF BOULDER, COLORADO:

Section 1. Section 2-1-2, "Council Meetings," B.R.C. 1981, is amended to read as follows:

2-1-2. Council Meetings.

The city council shall hold two regular meetings in each calendar month of each year on the first and third Thursdays of each month commencing at 6 p.m. in the city council chambers of the Municipal Building, 1777 Broadway, Boulder, Colorado, except that the city council may hold one regular meeting in each month of June, July, and August.

The council may by motion prescribe a different date, time, or place for such regular meetings in any month, but no such motion affects the time, date, or place for regularly scheduled meetings of the council in any other month.

The city council or city manager may allow for meetings that permit simultaneous in-person and remote attendance, exclude, or limit the public from in-person attendance at meetings provided that the meeting is available to the public either by telephone, over the internet or on television and the city council or city manager provides a means for public participation. The city council or city manager's ability to exclude or limit the public from in-person attendance shall be limited to meetings where a public health or safety concern exists.

Individual members of the city council may either participate in-person or remotely in a meeting and if remotely, through telephonic or other remote means, provided that such means allow for the public to hear the city council member and for the city council member to hear both members of the public recognized to speak and other members of the city council.

Any member of city council participating remotely shall be deemed present for purposes of determining a quorum. Remote participation in any meeting in accordance with this section shall

not be considered to be an absence or failure to attend for determining whether a vacancy has occurred.

Section 2. This ordinance is necessary to protect the public health, safety, and welfare of the residents of the city and covers matters of local concern.

Section 3. The city council deems it appropriate that this ordinance be published by title only and orders that copies of this ordinance be made available in the office of the city clerk for public inspection and acquisition.

INTRODUCED, READ ON FIRST READING, AND ORDERED PUBLISHED BY TITLE ONLY this 16th day of May 2024.

_____
Aaron Brockett,
Mayor

Attest:

_____
Elesha Johnson,
City Clerk

READ ON SECOND READING, PASSED AND ADOPTED AS AN EMERGENCY MEASURE BY TWO-THIRDS COUNCIL MEMBERS PRESENT this 6th day of June 2024.

_____
Aaron Brockett,
Mayor

Attest:

_____
Elesha Johnson,
City Clerk

K:\CCAD\o-8633 1st rdg Amending 2-1-2 Allowing a Summer Mtg Schedule-1110.docx

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM

Concept Plan Review for a proposed Boulder Housing Partners redevelopment on 3.74 acres located at 6400-6570 Gunpark Drive and 6560 Spine Road with 23 townhomes in two buildings, 124 apartments in five buildings, and one community building. The site is largely undeveloped; two existing office buildings on the property would be demolished. Reviewed under case no. LUR2023-00060

PRIMARY STAFF CONTACT

Shannon Moeller, Planning Manager

ATTACHMENTS:

Description

- **Item 4A - 6570 Gunpark Drive Concept Review**

CITY OF BOULDER
CITY COUNCIL AGENDA ITEM

MEETING DATE: May 16, 2024

AGENDA TITLE: Concept Plan Review and Comment Request on a proposed Boulder Housing Partners redevelopment on 3.74 acres located at 6400-6570 Gunpark Drive and 6560 Spine Road with 23 townhomes in two buildings, 124 apartments in five buildings, and one community building. The site is largely undeveloped; two existing office buildings on the property would be demolished. Reviewed under case no. LUR2023-00060.

PRESENTERS
Nuria Rivera-Vandermyde, City Manager
Brad Mueller, Director Planning & Development Services
Charles Ferro, Senior Planning Manager
Shannon Moeller, Planning Manager

EXECUTIVE SUMMARY

The purpose of this item is for the City Council to consider whether to call up the above-referenced application for review and comment at a public hearing. On **April 16, 2024**, the Planning Board held a virtual meeting and reviewed and commented on the proposal. The 30-day call up period concludes on **May 16, 2024**. City Council is scheduled to consider this application for call-up at its **May 16, 2024** meeting.

The staff memorandum to Planning Board, recorded video, and the applicant's submittal materials along with other related background materials are available in the city archives for Planning Board. The recorded video from the hearing can be found here. The applicant's submittal package is provided in **Attachment A**. The draft meeting minutes from the Planning Board meeting are provided in **Attachment B**.

REVIEW PROCESS

In a concept plan review, no formal action is required on behalf of City Council. Public, staff, Planning Board, and Council comments will be documented for the applicant's use in a future Site Review application.

The proposal requires Concept Plan review and comment prior to Site Review because the site is over 3 acres and the proposal is greater than 50,000 square feet in floor area (Table 2-2 of Section 9-2-14, B.R.C. 1981).

The purpose of the Concept Plan review is to determine the general development plan for a particular site and to help identify key issues in advance of a site review submittal. This step in the development process is intended to give the applicant an opportunity to solicit comments from the Planning Board, City Council (if called up) as well as the public early in the development process as to whether a development concept is consistent with the requirements of the city as set forth in its adopted plans, ordinances, and policies (Section 9-2-13, B.R.C. 1981).

In addition to a public hearing at City Council, City Council has authority to refer Concept Plan Review proposals to the Design Advisory Board (DAB) and/or Transportation Advisory Board (TAB) for their respective opinions. The purpose of such a review by DAB is to encourage thoughtful, well-designed development projects that are sensitive to the existing character of an area, or the character established by adopted design guidelines or plans for the area. TAB's opinion can be requested by council on transportation matters implicated in a Concept Plan Review proposal.

COMMUNITY SUSTAINABILITY ASSESSMENTS AND IMPACTS

- **Economic** - The proposed project would provide up to 147 units of permanently affordable housing. The social, economic and environmental well-being of the community is enhanced when individuals and families are retained, workforce housing is available and residents with changing or special housing needs are served.
- **Environmental** - By redeveloping a largely-vacant infill site with permanently affordable housing, the proposal would reduce the need for low- and moderate-income residents to find housing outside of the city, thereby reducing the environmental impacts associated with in-commuting.
- **Social** - The provision of up to 147 units of new permanently affordable housing units will help to offset the continued escalation of housing costs that disproportionately impact low- and moderate-income households.

OTHER IMPACTS

- **Fiscal** - The review of this application and a potential Site Review application fall within staff's normal scope of work, and as such do not present any unusual fiscal impacts.

- **Staff time** - The application was completed under standard staff review time. If the proposal moves forward, staff anticipates that the review will also be completed under standard staff review time.

BOARD AND COMMISSION FEEDBACK

At the public hearing on April 16, 2024, the Planning Board heard presentations by staff and the applicant, and asked questions following each presentation. Three community members spoke during the public comments portion of the hearing. While one of the community members expressed support for the affordable housing proposal, all noted concerns including: access to services and amenities in the Gunbarrel area such as transit and emergency services; provision of parks, play areas for children, and dog parks; declining enrollment at Heatherwood Elementary; as well as development concerns such as blocking of views and demolition of existing buildings.

The Planning Board discussed the following key issues at the public hearing:

1. Is the proposed concept plan generally compatible with the goals, objectives, and recommendations of the Boulder Valley Comprehensive Plan (BVCP)?
2. Is the proposed concept plan generally compatible with the Gunbarrel Community Center Plan?
3. Does the Board have feedback on the conceptual site plan and building design?

Regarding Key Issue One and Two, the Board found the proposal to be compatible with BVCP goals and policies and with the Gunbarrel Community Center Plan.

Regarding Key Issue Three, the Planning Board discussed issues related to site and building design, with key themes including:

- Explore the best location for the multi-use path to traverse the site and how access points and vehicle connections can be best laid out to allow for internal pedestrian circulation, permeability, and movement through the site.
- Look for ways to create more people-oriented and green spaces between buildings, such as by adjusting the community building location closer to the street and relating it to the curve of the street and by removing excess paving.
- Several planning board members supported a future height modification request in particular to support sloped roof forms, while one planning board member was not supportive of buildings that would be taller surrounding structures. Consider how the buildings can be designed to provide transitions at edges of the buildings to mitigate the height.
- Continue to take into account comments from neighbors as the project moves into further design stages.

PUBLIC FEEDBACK

Required public notice was given in the form of written notification mailed to all property owners within 600 feet of the subject property. A sign was posted on the property a minimum of 10 days prior to the hearing. Staff received some written comments prior to the Planning Board hearing and one additional comment after the hearing with specific

feedback on the proposal and relationship to surrounding properties. Written comments are included in the staff memorandum to Planning Board (link provided above) and **Attachment C**.

ANALYSIS

The staff memorandum to Planning Board that includes staff analysis, neighbor comments along with the meeting audio, and the applicant's submittal materials are available on the Records Archive for Planning Board.

MATRIX OF OPTIONS

The City Council may call up a Concept Plan application within thirty days of the Planning Board's review. Any application that it calls up, the City Council will review at a public meeting within sixty days of the call-up vote, or within such other time as the city and the applicant mutually agree. The City Council is scheduled to consider this application for call-up at its **May 16, 2024** meeting.

ATTACHMENTS

Attachment A – Applicant Concept Plans and Written Statement
Attachment B – Draft April 16, 2024 Planning Board Meeting Minutes
Attachment C – Additional Public Comment Received After Hearing

COBURN
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December 27, 2023

Sunset Park
6570 Gunpark Road, Boulder, CO
Concept Plan Review – Written Statement

Introduction

This new neighborhood for Gunbarrel is bordered by Spine Road on the west, Gunpark Drive to the north, an office complex to the east (6550 Gunpark) and the Meadow Creek Apartments to the south. The site is currently occupied by two small office buildings and associate parking with the majority of the site being undeveloped. The land is owned by the Lukas Family Limited Partnership and is currently under contract to Boulder Housing Partners to purchase for the purpose of providing the Gunbarrel area with much needed affordable housing. The intent is to transform the largely vacant land into a thriving community of residents adjacent to one the City's transit served commercial centers.

Project Site

The project site is well located in Gunbarrel, immediately adjacent to the Core of the Gunbarrel Center including King Soopers grocery store, coffee shop, sandwich shop and restaurants, liquor store – the majority of daily needs are a short walk away. 25-acre Eaton Park is just over a quarter mile to the south and connects up to the Twin Lakes open space. RTD runs the 205 bus line down Spine Road immediately abutting the site. The 205 connects Gunbarrel to the Downtown Boulder bus station via 63rd, Jay Road, 28th Street and Canyon.

Site Plan

The 3.73 acre site is proposed to include an arrangement of 8 buildings around a central park area. Two townhome buildings on east of the site contain a total of 23 units with garage parking for each unit. A multi-use path called for in the Connections Plan separates anchors a green space between the townhomes and the series of apartment buildings contaoning a total of 124 units on the western portion of the site. A community building fronting on Gunpark forms the northern edge of the Community Green. Parking is handled around the perimeter of the site with primarily tuck-under spaces.

Buildings

The townhomes are proposed to be approximately 1200 square feet with garage parking of about 300 square feet. The apartments will be comprised of studios, 1, 2 and 3 bedroom units with the final mix and counts to be determined as the demands evolve. All units are proposed to be affordable at this time with the possibility that some portion may be carved off for a market-rate or middle income component as economic conditions continue to change.

COBURN
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The buildings are proposed to be primarily 3 stories, with the exception of the Community Building which is planned to be a single story. While the design is still in the concept stage it appears likely that we will be seeking some additional height through Site Review beyond the code limit of 35' to get adequate ceiling height and get some movement in the shape of the buildings.

Community Benefits

This project will satisfy a host of city goals. It will provide a large amount of affordable housing in Gunbarrel where very little exists today. It will provide a host of residential units for the general population near employers, mass transit and neighborhood-serving retail. The project will infill the largely vacant missing tooth of the Gunbarrel unban fabric, it will bring new customers to the retail uses helping their viability and it will bring more riders to the 205 bus route serving the area.

Parking

The parking is arranged in a ring around the perimeter of the site to keep the center open for green space. The townhomes include a single car garage in each unit with some surface spaces to the south. The apartment buildings feature tuck-under parking with a row of surface spaces along the southern property boundary. Overall, the project is parked at a rate of 1.2 parking spaces per unit.

Gunbarrel Center Plan - 2006

The project site is located at the southern edge of the study area included in the Gunbarrel Community Center Plan. The Land-use designation in the Plan for this parcel is Office/Mixed-Use with proposed uses being Transitional Business. This category is noted to be zoned to allow for a mix of uses including residential. This is matched by the current zoning of BR-2 which also allows residential.

Sunset Park helps meet several of the goals of the Plan by installing multi-family affordable housing adjacent to the Commercial Core and with ready access to public transportation. And the jobs/population balance is helped by reducing the current office use and replacing it with residential.

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Concept Plan Written Statement Requirements

(A) Techniques and Strategies for environmental impact avoidance, minimization, or mitigation:

The project site has been slated for development since it was originally subdivided. Located adjacent to the Commercial Core of Gunbarrel, it is an ideal site to develop a significant amount of housing on a property well served by existing utilities, adjacent to retail uses and directly on an RTD bus line.

(B) Techniques and strategies for practical and economically feasible travel demand management techniques, including without limitation, site design, land use, covenants, transit passes, parking restrictions, information or education materials, or programs that may reduce single-occupant vehicle trip generation to and from the site.

The site plan includes a multi-use path connection centered on a green space between buildings on the eastern portion of the site. The alignment allows for easy access to the retail center to the north and the possibility that connection serving the apartment complex to the south. Spine Road provides bike access to the multi-use path along 63rd which then offers multiple bike connections to central Boulder as well as access to the coming BRT bus service along 119 to/from Longmont. Ample bike parking facilities will be provided throughout the site. It is likely Eco-passes will be provided to all residents to encourage use of the 205 and/or the BOLT.

(C) Proposed land uses and, if it is a development that includes residential housing type, mix, sizes, and anticipated sale prices, the percentage of affordable units to be included; special design characteristics that may be needed to assure affordability:

The project is currently proposed to be 100% permanently affordable with AMI's to be determined. There will be a mix of unit types from Townhomes to studio apartments.

Specific examples of consistency with the purposes and policies of the Boulder Valley Comprehensive Plan have been added below:

1.11 Jobs: Housing Balance: This project creates housing where there are services to support them, and additionally adds community uses within the development. The housing will replace current office uses, further helping achieve the right balance.

1.22 Channeling Development to Areas with Adequate Infrastructure: This development is planned in an area that has been planned for development and already has excellent infrastructure of all types.

COBURN
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2718 Pine Street, Suite 100
Boulder, CO 80302
coburnpartners.com

2.03 Compact Development Pattern: While Gunbarrel is generally suburban in nature, the addition of affordable units adjacent to the Commercial Core will bring a concentration of housing where it is most appropriate – near neighborhood services and transit.

2.09 Neighborhoods as Building Blocks: The addition of apartments and townhomes near to the neighborhood center will aid in creating a sense of community and neighborhood around the Commercial Core.

2.14 Mix of Complementary Land Uses: The proposal would add needed affordable residential units to Gunbarrel. It will help balance the retail, office and light industrial uses adjacent and nearby with customers and employees who live within walking and biking distance.

2.15 Compatibility of Adjacent Land Uses: The proposal will continue the apartment use pattern on the County project to the south and put residential uses adjacent to the Gunbarrel Commercial Core.

2.16 Mixed Use & Higher-Density Development: This project will provide higher density affordable housing in an appropriate area adjacent to neighborhood retail and transit.

2.19 Neighborhood Centers: The proposal promotes all of the guiding principles of neighborhood centers as outlined by the BVCP

- Affordable housing will be adjacent to services for the everyday needs of the surrounding communities (service uses, grocer, restaurants, retail, walkable connections, etc)
- Ensure appropriate scale transitions (concentration of affordable residential adjacent to Commercial core.)
- Encourage a richness of transportation amenities (robust bike and ped connections including a new path through the eastern portion of the site, and RTD 205 bus route service.)
- Encourage parking management strategies (dispersed, hidden, shared parking that is aligned with SUMP principles.)
- Ensure comfort and safety (unimpeded connections and pedestrian enhancements throughout the site.)

2.24 Commitment to a walkable city: The project will add and create walkable paths through the site and allow connections to the Gunbarrel Commercial Core.

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2.33 Sensitive Infill & Redevelopment: Sunset Park will be an infill project building on largely vacant land within the Gunbarrel community.

2.38 Importance of Urban Canopy, Street Trees, and Streetscapes: There are a handful of trees currently on the site. Viable trees along Gunpark will remain as will any good trees along the southern edge. Street trees will be added along Gunpark and Spine Road along with trees internal to the site, totaling substantially more trees than are on the site today.

2.41 Enhanced Design for All Projects:

- Context: the project will infill a largely undeveloped vacant parcel surrounded by developed land and adjacent to the Commercial Core of Gunbarrel.
- Transportation connections: the project is located adjacent to transit and will provide the possibility of bike and pedestrian through connections to the Commercial Core.
- Parking: the vast majority of the parking will be hidden from the public ways utilizing tuck-under spaces, garages and surface parking shielding from the streets and public sidewalks.
- Permeability: the site will allow multiple opportunities for connection through the property to the Commercial Core.
- On-site open spaces: the arrangement of buildings on the site creates multiple interior - focused open spaces to benefit the residents and neighbors.
- Buildings: the buildings will be designed around the open spaces, creating community and interaction within the neighborhood

4.07 Energy Efficient Land Use: The project will create a compact development pattern in an area well served by businesses and alternative transportation. It is ideal for sustainable land use.

6.05 Reduction of Single Occupancy Auto Trips: This project's location is in central Gunbarrel and proximate to a host of alt transportation options, including biking trails and bus lines. It is ideally located for sustainable transportation options.

7.02 Affordable Housing Goals: This project is currently proposed to be 100% affordable.

7.07 Mixture of Housing Types: Sunset Park will contain a mixture of townhomes, studio, one, two and three bedroom apartments.

7.10 Housing for a Full Range of Households: The proposed mix of affordable housing types will bring much needed affordable options to Gunbarrel.

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7.11 Balancing Housing Supply with Employment Base: This project meets the goal of increased housing for Boulder workers in proximity to transit, employment and services.

7.15 Integration of Permanently Affordable Housing: Sunset Park is currently planned to be 100% affordable with the possibility that some portion may convert to market rate or middle income.

CONCEPT PLAN REVIEW
SUNSET PARK

SCOPE OF WORK

SCOPE OF WORK: APPROXIMATELY 124 AFFORDABLE RESIDENTIAL UNITS WITH ASSOCIATED COMMUNITY AMENITIES, 23 TOWNHOME UNITS AND A LARGE OUTDOOR OPEN SPACE
ZONING: BR-2
SETBACK MINIMUMS: TBD
BUILDING TYPE: MULTI-FAMILY RESIDENTIAL
NUMBER OF BUILDINGS: 8
PROPOSED BUILDING AREA: APPROXIMATELY 148,534 SF

SHEET INDEX

A0 COVER SHEET
A1 CONTEXT / TRANSIT DIAGRAM
A2 SITE PLAN
A3 ILLUSTRATIVE SITE PLAN
A4 SITE AXO
A5 BUILDING USES SITE AXO
A6 PROJECT METRICS
A7 PRECEDENTS
A8 RENDERINGS
A9 RENDERINGS

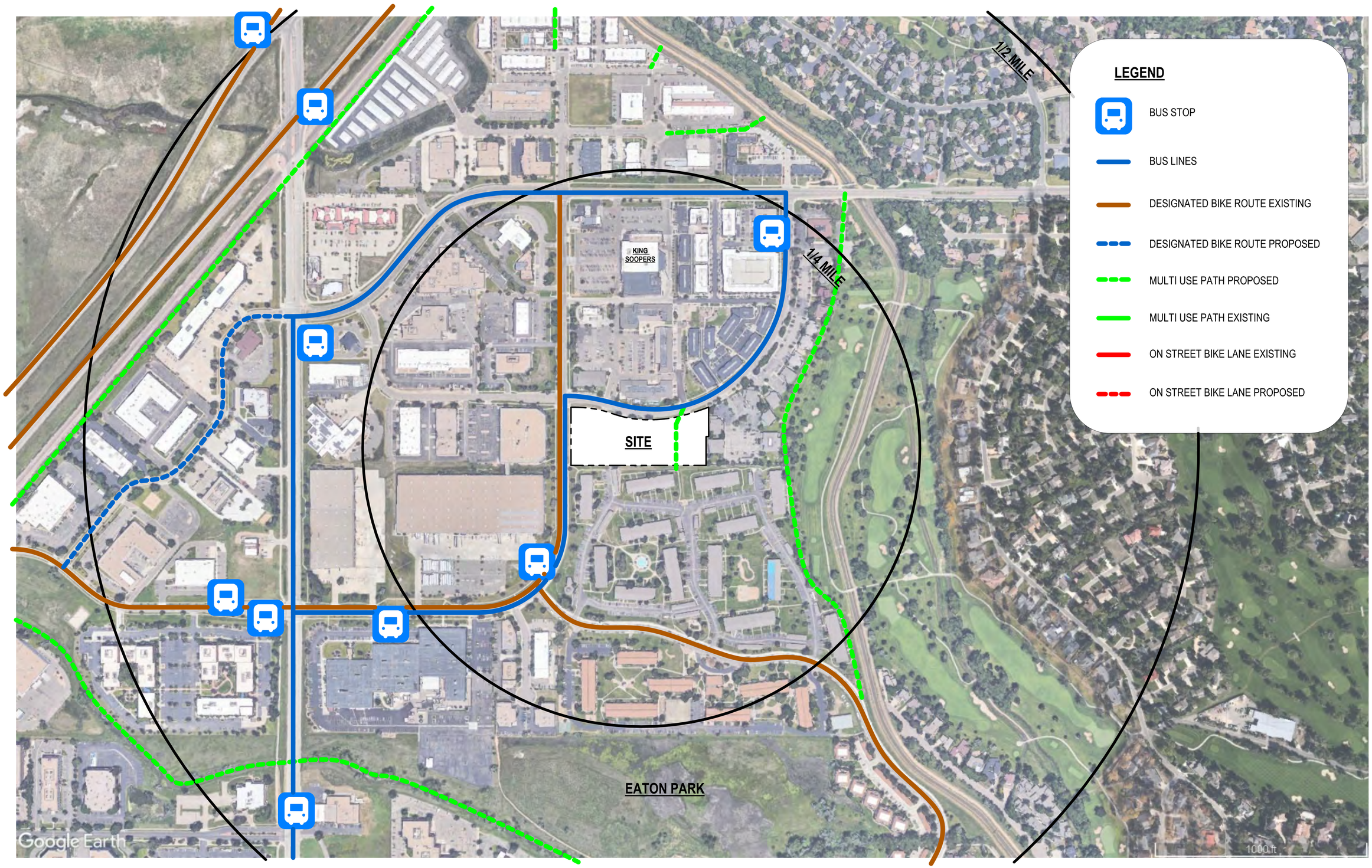
ARCHITECT

COBURN ARCHITECTURE
2718 PINE ST #100
BOULDER, COLORADO 80302
P: (303) 442-3351

OWNER

BOULDER HOUSING PARTNERS
4800 BROADWAY
BOULDER, COLORADO 80304
P: (720) 564-4610

VICINITY MAP
1" = 200'-0"



COBURN ARCHITECTURE
2718 Pine Street #100
Boulder, Colorado
p: 303-442-3351

BOULDER HOUSING PARTNERS

6570 GUNPARK DRIVE, BOULDER CO 80301,
AND ADJACENT PROPERTIES

CONCEPT PLAN REVIEW
2023.12.29
LUR2023-00060

PLAN TRUE

CONTEXT / TRANSIT DIAGRAM

A1

0 15' 30' 60'
SCALE: 1" = 30'-0"

RESIDENTIAL - BROWN | COMMUNITY - BLUE | SIDEWALKS - GREY | OUTDOOR SPACE - GREEN

COBURN ARCHITECTURE
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BOULDER HOUSING PARTNERS

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AND ADJACENT PROPERTIES

CONCEPT PLAN REVIEW
2023.12.29
LUR2023-00060

PLAN TRUE

SITE PLAN

A2

1 SITE PLAN ILLUSTRATIVE
1/16" = 1'-0"

0 15' 30' 60'
SCALE: 1" = 30'-0"

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BOULDER HOUSING PARTNERS

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AND ADJACENT PROPERTIES

CONCEPT PLAN REVIEW
2023.12.29
LUR2023-00060

PLAN TRUE

ILLUSTRATIVE SITE PLAN

A3

SUNSET PARK - BHP

RESIDENTIAL - BROWN

COMMUNITY - BLUE

SIDEWALKS - GREY

OUTDOOR SPACE - GREEN

COBURN ARCHITECTURE
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BOULDER HOUSING PARTNERS

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AND ADJACENT PROPERTIES

CONCEPT PLAN REVIEW
2023.12.29
LUR2023-00060

PLAN TRUE

SITE AXO

A4

SUNSET PARK - BHP

RESIDENTIAL - BROWN COMMUNITY - BLUE SIDEWALKS - GREY OUTDOOR SPACE - GREEN

COBURN ARCHITECTURE
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BOULDER HOUSING PARTNERS

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AND ADJACENT PROPERTIES

CONCEPT PLAN REVIEW
2023.12.29
LUR2023-00060

PLAN TRUE

BUILDING USES SITE AXO

A5

SUNSET PARK - BHP: METRICS

BUILDING A

TYPE	GROSS SQ. FOOTAGE	
LEVEL 1		
RESIDENTIAL	5800	SF
LEVEL 2		
RESIDENTIAL	10800	SF
LEVEL 3		
RESIDENTIAL	10800	SF
TOTALS		
TOTAL RESIDENTIAL SQUARE FOOTAGE	**27,400**	SF
TOTAL RESIDENTIAL NET RENTABLE SF (ASSUMING 12% CIRC)	**24,112**	SF
TOTAL UNITS	**30**	DU
AVERAGE UNIT SIZE(ASSUMING 12% CIRC)	**804**	SF

BUILDING B

TYPE	GROSS SQ. FOOTAGE	
LEVEL 1		
RESIDENTIAL	5490	SF
LEVEL 2		
RESIDENTIAL	10224	SF
LEVEL 3		
RESIDENTIAL	10224	SF
TOTALS		
TOTAL RESIDENTIAL SQUARE FOOTAGE	**25,938**	SF
TOTAL RESIDENTIAL NET RENTABLE SF (ASSUMING 12% CIRC)	**22,825**	SF
TOTAL UNITS	**28**	DU
AVERAGE UNIT SIZE(ASSUMING 12% CIRC)	**815**	SF

BUILDING C

TYPE	GROSS SQ. FOOTAGE	
LEVEL 1		
RESIDENTIAL	4524	SF
LEVEL 2		
RESIDENTIAL	8424	SF
LEVEL 3		
RESIDENTIAL	8424	SF
TOTALS		
TOTAL RESIDENTIAL SQUARE FOOTAGE	**21,372**	SF
TOTAL RESIDENTIAL NET RENTABLE SF (ASSUMING 12% CIRC)	**18,807**	SF
TOTAL UNITS	**22**	DU
AVERAGE UNIT SIZE(ASSUMING 12% CIRC)	**855**	SF

BUILDING D

TYPE	GROSS SQ. FOOTAGE	
LEVEL 1		
RESIDENTIAL	3925	SF
LEVEL 2		
RESIDENTIAL	7308	SF
LEVEL 3		
RESIDENTIAL	7308	SF
TOTALS		
TOTAL RESIDENTIAL SQUARE FOOTAGE	**18,541**	SF
TOTAL RESIDENTIAL NET RENTABLE SF (ASSUMING 12% CIRC)	**16,316**	SF
TOTAL UNITS	**20**	DU
AVERAGE UNIT SIZE(ASSUMING 12% CIRC)	**816**	SF

BUILDING E

TYPE	GROSS SQ. FOOTAGE	
LEVEL 1		
RESIDENTIAL	4968	SF
LEVEL 2		
RESIDENTIAL	9252	SF
LEVEL 3		
RESIDENTIAL	9252	SF
TOTALS		
TOTAL RESIDENTIAL SQUARE FOOTAGE	**23,472**	SF
TOTAL RESIDENTIAL NET RENTABLE SF (ASSUMING 12% CIRC)	**20,655**	SF
TOTAL UNITS	**24**	DU
AVERAGE UNIT SIZE(ASSUMING 12% CIRC)	**861**	SF

TOWNHOMES A

TYPE	GROSS SQ. FOOTAGE	
LEVEL 1		
RESIDENTIAL	3300	SF
LEVEL 2		
RESIDENTIAL	6600	SF
LEVEL 3		
RESIDENTIAL	3713	SF
TOTALS		
TOTAL RESIDENTIAL SQUARE FOOTAGE	**13,613**	SF
TOTAL UNITS	**11**	DU
AVERAGE UNIT SIZE(+300sf GARAGE)	**1,238**	SF

TOWNHOMES B

TYPE	GROSS SQ. FOOTAGE	
LEVEL 1		
RESIDENTIAL	3600	SF
LEVEL 2		
RESIDENTIAL	7200	SF
LEVEL 3		
RESIDENTIAL	4050	SF
TOTALS		
TOTAL RESIDENTIAL SQUARE FOOTAGE	**14,850**	SF
TOTAL UNITS	**12**	DU
AVERAGE UNIT SIZE(+300sf GARAGE)	**1,238**	SF

COMMUNITY BUILDING

TYPE	GROSS SQ. FOOTAGE	
LEVEL 1		
COMMERCIAL / COMMUNITY SPACE	3200	SF

OVERALL

GROSS SITE AREA	3.73	AC
DWELLING UNITS	147	DU
DENSITY	39.4	DU/AC
FAR	0.91	
TOTAL RESIDENTIAL SQUARE FOOTAGE	145,186	SF
TOTAL RESIDENTIAL NET RENTABLE SF (ASSUMING 15% CIRC)	131,179	SF
TOTAL COMMERCIAL SQUARE FOOTAGE	3,200	SF
TOTAL BUILDING SQUARE FOOTAGE	148,386	SF
TOTAL OPEN SPACE	52341	SF
OPEN SPACE CALC	32.3%	
TOTAL PARKING PROVIDED	172	SF
PARKING SPACE PER UNIT	1.17	SP
GROSS SITE AREA FOR FAR CALC (NO PRINT)	162273	SF

PLAY

0310

COBURN ARCHITECTURE
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p: 303-442-3351

BOULDER HOUSING PARTNERS

6570 GUNPARK DRIVE, BOULDER CO 80301,
AND ADJACENT PROPERTIES

CONCEPT PLAN REVIEW
2023.12.29
LUR2023-00060

PLAN TRUE

RENDERINGS

A9

CITY OF BOULDER
PLANNING BOARD ACTION MINUTES
April 16, 2024
Virtual Meeting

A permanent set of these minutes and a tape recording (maintained for a period of seven years) are retained in Central Records (telephone: 303-441-3043). Minutes and streaming audio are also available on the web at: http://www.bouldercolorado.gov/

PLANNING BOARD MEMBERS PRESENT:
Laura Kaplan
Mark McIntyre
ml Robles
Jorge Boone, Vice Chair
Kurt Nordback
Claudia Hanson Thiem
Mason Roberts

PLANNING BOARD MEMBERS ABSENT:

STAFF PRESENT:
Brad Mueller, Director Planning & Development Services
Charles Ferro, Development Review Planning Senior Manager
Shannon Moeller, Planning Manager
Alison Blaine, City Planner Senior
Laurel Witt, Assistant City Attorney II
Thomas Remke, Board Specialist
Vivian Castro-Wooldridge, Planning Engagement Strategist

1. CALL TO ORDER

2. PUBLIC PARTICIPATION

3. DISCUSSION OF DISPOSITIONS, PLANNING BOARD CALL-UPS / CONTINUATIONS

A. CALL UP ITEM: Use review for the Lab Bar and Bites restaurant to extend their operating hours at 1155 13th St. The existing restaurant is 1,855 square feet (48 interior seats) with an outdoor patio (29 exterior seats). The restaurant and patio will operate Monday- Wednesday and Sunday from 11:00 a.m. to 11:00 p.m., and Thurs-Sat from 11:00 a.m. to 1:00 a.m. The call-up period expires on April 17, 2024.

B. CALL UP ITEM: Minor Site Review Amendment to the Eleventh & Pearl Site Review (LUR2012-00008) to improve user safety and reduce ongoing maintenance of an existing stairway, of which the existing finishes are deteriorating due to weather exposure. The proposal would

DRAFT

result in the existing open-air stairway at 1023 Walnut being partially enclosed with areas of glazing and updates to façade louver system, roof covering, stairway lighting, and stair treads.

C. **CALL UP ITEM:** 1833 Folsom St. Floodplain Development Permit (FLD2024-00009): Floodplain development permit application for the replacement of a private pedestrian bridge over Boulder Slough Left-Hand Ditch. The call up period expires on April 26th, 2024.

4. PUBLIC HEARING ITEMS

A. **AGENDA TITLE:** Concept Plan Review and Comment for the development of a vacant parcel at the northwest corner of Spine Rd. and Gunbarrel Ave., addressed as 4600 HWY 119 in City mapping. The proposal includes the development of 79 two- and three-bedroom townhouses within 10 buildings around a central courtyard. Reviewed under case no. LUR2024-00013.

Staff Presentation:
A. Blaine introduced the item and presented to the board.

Board Questions:
A. Blaine answered questions from the board.

Applicant Presentation:
John Grant and **Adrian Sopher** presented the item to the board.

Applicant Questions:
Adrian Sopher answered questions from the board.

Public Comment:
1) Chris Goodman
2) Julie Dye
3) Rhona Unsell
4) Irene Hillson
5) Angie Mashaw
6) April Lyons
7) Dorothy Donohue
8) Randall Erica Clarke
9) Lynn Segal
10) Regina Macy

Board Discussion:

KEY QUESTION #1: Is the proposal generally compatible with the goals, objectives, and recommendations of the BVCP?

KEY QUESTION #2: Does Planning Board have feedback for the applicant on the conceptual site plan and building design?

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KEY QUESTION #3: Other key issues identified by the Board?

K. Nordback noted that he is familiar with the site and worked in the area for many years. He was concerned about the floor area transfer, which seems like a significant change to the PUD. He feels that it is an appropriate place for residential use. He was also concerned about the amount of usable open space. He was supportive of townhouse style development in Boulder, but finds these units to be oversized. He found the designs to be incompatible with BVCP policies 7.02 "Affordable Housing Goals", 7.07 "Mixture of Housing Types", and 7.17 "Market Affordability". He found the parking proposal to be inconsistent with SUMP (shared, unbundled, managed, priced) polices.

M. McIntyre appreciated that there is demand from larger family sizes for homes like this. He believes that the project generally fulfills the BVCP requirements based on housing type and location. He noted that there needs to be connections from this site to the Celestial property and to Pioneer Street. He agreed with Kurt's concerns regarding the amount of usable and programmed open space. He encouraged the applicant to work with staff to see what can be done to improve the open space.

C. Hanson Thiem believes the project is generally consistent with the BVCP policies. She echoed Kurt's comments about achieving market affordability in this area by reducing the scale of the units. She agreed that the open space and connections need restructured. She raised concerns with noise mitigation from the railroad and from Diagonal Highway.

M. Roberts noted that he was mostly aligned with **K. Nordback's** opinion and stated that 1,500-1,800 sq. ft. might be a more appropriate scale. He agreed with **C. Hanson Thiem's** perspective on the need for noise mitigation. He noted that the plan included no mention of green building concepts or goals of carbon minimization.

ml Robles noted that this development does not address walkability or alternative means of transportation in a direct or creative way. ml encouraged a rethink of the conceptual site plan and building design. She encouraged the developers to consider community connections and how this project can contribute to them.

L. Kaplan believes the project is generally consistent with the BVCP policies. She agreed and noted that one of her top concerns is the amount of usable open space. She also agreed with Kurt that if this project comes back for Site Review, she would want a better understanding of the floor area transfer. Regarding the size of units, she noted that a mix of smaller and larger units could meet the needs of a wider range of individuals.

J. Boone noted that he is supportive of a future subcommunity plan in Gunbarrel. He believes the current proposal is very car-oriented, and he agreed with his colleagues' concerns regarding open space and connections to the overall community. He encouraged the developer to take a step back and review the density that they are proposing and focus on how they can make this a communal space. He also noted that the development doesn't seem green at all. He does not believe that the project is consistent with BVCP policies.

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B. AGENDA TITLE: Concept Plan Review and Comment Request on a proposed Boulder Housing Partners redevelopment on 3.74 acres located at 6400-6570 Gunpark Drive and 6560 Spine Road with 23 townhomes in two buildings, 124 apartments in five buildings, and one community building. The site is largely undeveloped; two existing office buildings on the property would be demolished. Reviewed under case no. LUR2023-00060.

Staff Presentation:
S. Moeller introduced the item and presented to the board.

Board Questions:
S. Moeller answered questions from the board.

Applicant Presentation:
Laura Shienbaum and **Pete Weber** presented the item to the board.

Applicant Questions:
Pete Weber answered questions from the board.

Public Comment:
1) Julie Dye
2) Irene Hillson
3) Lynn Segal

Board Discussion:

KEY QUESTION #1: Is the proposed concept plan generally compatible with the goals, objectives, and recommendations of the BVCP?

KEY QUESTION #2: Is the proposed concept plan generally compatible with the Gunbarrel Community Center Plan?

KEY QUESTION #3: Does the Board have feedback on the conceptual site plan and building design?

KEY QUESTION #4: Other key issues identified by the Board?

M. Roberts stated that he believes this is generally compatible with the goals, objectives, and recommendations of the BVCP and the Gunbarrel Community Center Plan. He agreed with comments about exploring the best connections possible to the multi-use path, road connections on the west side, and potential reorientation of some of the buildings.

K. Nordback noted that he is excited about this project and finds it to be consistent with the BVCP and the Gunbarrel Community Center Plan. His main concern was with the site design and the awkwardness of accessing the site. He would like to see the portion west of the multi-use path more grid-based to increase permeability.

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ml Robles agreed with her colleagues and appreciated that the project proposed 100% affordable housing. She suggested that the project should not seek a height increase. She suggested that the applicants consider incorporating on-site renewable energy in their roof design.

C. Hanson Thiem stated that she believes this is a great location for housing and could strengthen the core of the Gunbarrel community. She agreed that the proposed concept plan is generally compatible with the BVCP and Gunbarrel Community Center Plan. She mentioned that she would like to see this project find ways to appeal to families and particularly families with children.

L. Kaplan agreed that the proposed concept plan is generally compatible with the BVCP and Gunbarrel Community Center Plan. She would like to see more open space amenities and improvements to circulation and connections. She believed that extra height for sloped roofs would be appropriate and noted that having three stories is important to ensure the 100% affordability component of this site.

J. Boone agreed with his colleagues that the proposed concept plan is generally compatible with the BVCP and Gunbarrel Community Center Plan. He echoed comments from his colleagues regarding reducing asphalt and increasing open space, especially useable gathering spaces. Regarding height modification, he suggested that trimming the edges of some buildings to create a transition would be helpful.

6. ADDITIONAL MATTERS FROM THE PLANNING BOARD, PLANNING DIRECTOR, AND CITY ATTORNEY

7. DEBRIEF MEETING/CALENDAR CHECK

8. ADJOURNMENT

The Planning Board adjourned the meeting at 10:18 p.m.

APPROVED BY

_____

Board Chair

_____

DATE

DRAFT

Additional Public Comment Received After Planning Board Hearing

From: Susan <susansosinre@gmail.com>
Sent: Monday, April 22, 2024 10:22 AM
To: Moeller, Shannon <moellers@bouldercolorado.gov>
Subject: RE: Sunset Park - Planning

Thank you for emailing the link to the recent planning board meeting of April 16, 2024, regarding Sunset Park, which I was unable to virtually attend.

As the owner of the office building at 6610 Gunpark Dr., immediately to the east of the proposed Sunset Park, I have some serious concerns which may negatively impact the seven small business tenants in the building; these concerns may be able to be addressed early on in the site design. Can you please pass this on to the planning board members, Boulder Housing Partners, and Coburn?

I understand the need for affordable housing - hopefully this can be accomplished without severe disadvantages to the nearby small business tenants in the building - the disadvantages:
1. The height and size of the 2 proposed townhouse buildings.
Because of the size and very close proximity to the lot 6610 Gunpark, a three-story building with a pitched roof will be very high, very claustrophobic, and destroy any views to the west, including views of the open air.
2. I have been struggling to keep the office building occupied with vibrant, small business tenants.
Three of the five larger adjacent buildings in the "office park" are totally vacant, appearing almost blighted except for their contemporary appearance. My current lease rates are gross and well-below any other Boulder market office lease rates for occupancy. It would be very difficult, as a landlord, to reduce these lease rates even further to keep the building appealing. The current small business tenants, acupuncture, speech therapy, etc., may want to relocate if the close-by townhouse/garages are noisy and the tenants feel squished next to the windows and roof of the adjacent property. Please consider the impact on these small business tenants.

Possible modifications to the Sunset Park plan:
1. Reduce the height of the townhouse buildings to two stories, without pitched roofs. This will enable a feeling of space, air, and some views for my two-story building at 6610 Gunpark. This would also be advantageous to the senior housing occupants you hope to attract, as most seniors don't want to climb three floors inside their unit.
2. Angle the townhome building(s) or re-arrange them significantly to provide a greater setback from the eastern edge. This extra space will provide some breathing room between the buildings and may also help with any drainage issues, as well.
3. Re-configure the site plan so that the one-story community building is on the eastern side of the development.

I'm certainly not an expert in determining development solutions, but there must be a way to consider and mitigate the disadvantages to my adjacent property and the small business tenants/occupants.

Please confirm consideration of the above and let me know if I can provide any additional, greater input to you, the planning board, Boulder Housing Partners, and Coburn. Thank you very much,

Susan Sosin, owner/landlord
6610 Gunpark Dr., Boulder
Phone: 303-946-8819
E-mail: SusanSosinRE@gmail.com

--
Susan Sosin
Real Estate
cell: 303-946-8819
SusanSosinRE@gmail.com

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Second reading and consideration of a motion to amend and pass Ordinance 8629, repealing the "2020 City of Boulder Energy Conservation Code," adopting by reference the "2024 City of Boulder Energy Conservation Code," and amending Title 10, "Structures," B.R.C. 1981, and other sections of the Boulder Revised Code in relation thereto, and setting forth related details

PRIMARY STAFF CONTACT
Josh Hanson, Energy Code Compliance Examiner

REQUESTED ACTION OR MOTION LANGUAGE
Motion to amend and pass on second reading Ordinance 8629, repealing the "2020 City of Boulder Energy Conservation Code," adopting by reference the "2024 City of Boulder Energy Conservation Code," and amending Title 10, "Structures," B.R.C. 1981, and other sections of the Boulder Revised Code in relation thereto, and setting forth related details

ATTACHMENTS:
Description
- **Item 5A - 2nd Rdg Ord 8629 Energy Conservation Code Adoption**

CITY OF BOULDER
CITY COUNCIL AGENDA ITEM

MEETING DATE: MAY 16, 2024

AGENDA TITLE

Second reading and consideration of a motion to amend and pass Ordinance 8629, repealing the "2020 City of Boulder Energy Conservation Code," adopting by reference the "2024 City of Boulder Energy Conservation Code," and amending Title 10, "Structures," B.R.C. 1981, and other sections of the Boulder Revised Code in relation thereto, and setting forth related details.

PRESENTERS

Nuria Rivera-Vandermyde, City Manager
Mark Woulf, Assistant City Manager
Brad Mueller, Director - Planning and Development Services
Jonathan Koehn, Director – Climate Initiatives
Rob Adriaens, Chief Building Official
Carolyn Elam, Sustainability Senior Manager
Hella Pannewig, Senior Council
Josh Hanson, Energy Code Compliance Principal Examiner

EXECUTIVE SUMMARY

The purpose of this item is for City Council to consider proposed Ordinance 8629 (**Attachment A**) updating the City of Boulder's energy code. The ordinance would amend Title 10, "Structures" by repealing the current 2020 City of Boulder Energy Conservation Code and adopting the new 2024 City of Boulder Energy Conservation Code (**Attachment B**). The ordinance also includes changes to various sections of the

Boulder Revised Code, that are being updated in association with the adoption of the 2024 City of Boulder Energy Conservation Code. Council approved the ordinance at First Reading on March 21, 2024.

The City of Boulder Energy Conservation Code (CoBECC) sets the minimum energy efficiency and conservation standards for new buildings and additions and alterations to existing buildings. The requirements of the CoBECC are intended to promote public health, safety and welfare by requiring the design and construction of buildings in the City of Boulder to be consistent with the city's energy, climate and sustainability goals; national safety standards; and best practices for engineering and construction technology.

The City of Boulder's energy code was last updated July 1, 2020. The proposed code focuses on carbon reduction through electrification and improved energy efficiency in continued pursuit of the City of Boulder's aggressive climate action goals of a 70% reduction in greenhouse gas (GHG) emissions by 2030, targeting carbon neutrality by 2035 and being carbon/climate positive by 2040. The proposed code is also intended to ensure that buildings are high performing and resilient to the effects of climate change and insulate future occupants from the volatility of utility costs.

At the study session with council on June 22, 2023, feedback was provided to consider looking into embodied carbon, updated EV requirements, affordable housing impacts and more community outreach. In response, the ordinance has been updated to include embodied carbon credits, updated EV requirements, and additional outreach was performed as detailed herein. Responding to affordable housing impacts, staff have emphasized the authority of the Chief Building Office to amend requirements on a case-by-case basis based on technical infeasibility, which would include a situation where requirements impeded the construction of an affordable housing project.

Staff are recommending the adoption of the 2024 CoBECC, which is a localized version of the International Energy Conservation Code (IECC). The 2024 CoBECC is updated from the 2020 CoBECC and designed to meet, and in some places to exceed, the 2021 IECC, the minimum code edition required by state law. The 2024 CoBECC will provide a reduction in carbon by electrifying new building construction. Through the update process, staff also worked to provide flexibility for existing buildings, pursuing additions and/or alterations without sacrificing efficiency.

The proposed updates to the CoBECC include:

- Residential
    - Incorporation of all-electric appliance requirements for new building construction targeting an overall carbon emissions reduction.
    - Incorporation of all-electric space and water heating requirements for substantial renovations that include mechanical system replacement and substantial envelope alteration targeting overall carbon emissions reduction.

    - Incorporation of a pre-solar performance requirement for residential new building construction.
    - Simplification and alleviation of requirements for small residential construction (<1000 square feet)
    - Elimination of the need for off-site solar if solar requirements cannot be fully met on-site.
    - Creation of an additional energy conservation objective that is set up as a conservation credit/point system. The credit/point system allows an applicant to choose from a variety of conservation measures to reach the required number of credits, each measure is assigned a number of credits based on the energy use of the measure with the goal of efficiency gains in the design of the building. The measures also include credits for low embodied carbon materials.
    - Modifications to align requirements with the 2021 International Energy Conservation Code (IECC) and the State minimum requirements for adoption of this code.
    - Simplification of requirements throughout.

- Commercial (including multi-family)
    - Incorporation of all-electric appliance requirements for new building construction with exceptions for commercial cooking, hospitals, laboratory facilities, emergency generators and certain large industrial spaces targeting overall carbon emissions reductions.
    - Incorporation of requirements for 100% offset of natural gas usage through on-site solar for new building construction with exceptions for commercial cooking and process heat targeting overall carbon emissions reductions.
    - Modification and increase in electric vehicle (EV) charging infrastructure requirements.
    - Addition of new construction performance targets for large office, retail, and restaurant occupancy types which provides more compliance path flexibility for mixed-use buildings.
    - Creation of an additional energy conservation objective that is set up as a credit/point system. The credit/point system allows an applicant to choose from a variety of measures to reach the required number of credits. The measures also include credits for installation of low embodied carbon material.
    - General modifications to align requirements with the 2021 International Energy Conservation Code (IECC), ASHRAE 90.1 and the State minimum requirements for adoption of this code.
    - Simplification of requirements throughout.

City Council passed Ordinance 8629 at first reading on March 21, 2024.

Following first reading, staff worked with the International Code Council (ICC) to make minor adjustments to correct an error and to clarify two provisions in the 2024 CoBECC after these were noted by public participants in the process. These changes have been included in the 2024 CoBECC that was published with the ICC and have been available for review in the City Clerk's office since April 1, 2024. These minor modifications include refining the requirements for demand responsive water heating (C404.7), eliminating the additional conservation requirements from the commercial performance pathway (an error correction), and streamlining the energy modeling calculations in Appendix CA. These updates are shown in **Attachment** D, 2024 CoBECC Modifications. Regarding each of these minor changes, the scope of demand-responsive water heating has been expanded to encompass all capable units, additional conservation measures have been corrected to be only prescriptively required to bridge the gap between prescriptive and performance projects, and the modeling equations in Appendix CA were revised by excluding solar components to prevent confusion from the current modeling process.

Since first reading, Ordinance 8629 has also been minimally revised to remove two energy conservation options for commercial buildings to ensure compliance with federal law (an error correction). The two credit options related specifically to HVAC heating and HVAC cooling performance. The remaining credit options continue to provide a variety of choices for commercial buildings to meet the required energy conservation objective.

The 2024 CoBECC is provided in **Attachment B** to the memo. The revised Ordinance 8629 is provided in **Attachment A** to the memo. The second reading changes can be found on page 2, lines 10 through 25 and page 3, lines 1 through 4 of the revised ordinance. The ordinance as read on first reading can be found as Attachment A to the March 21 staff memo.

Due to the amendments at second reading, a third reading is required, at which the ordinance may be adopted. The third reading and final adoption is proposed to be scheduled on the consent agenda of Council's June 6, 2024, meeting. Ordinances may not take effect until 30 days after their final passage. In light of this later adoption date, the effective date for the ordinance and new code has been changed in the revised ordinance to be Monday, July 8, 2024 (previously July 1).

A summary of public feedback to the energy code draft through the website is provided in **Attachment C** to the memo.

STAFF RECOMMENDATION

Staff requests City Council consideration of this matter and action in the form of the following motion:

Motion to amend and pass on second reading Ordinance 8629, repealing the "2020 City of Boulder Energy Conservation Code," adopting by reference the "2024 City of Boulder Energy Conservation Code," and amending Title 10, "Structures," B.R.C. 1981, and other sections of the Boulder Revised Code in relation thereto, and setting forth related details.

COMMUNITY SUSTAINABILITY ASSESSMENTS AND IMPACTS

- **Economic** – Some of the updates to the city's energy code may result in higher upfront construction costs. While solar represents the largest cost contributor, some cost impacts may result from requirements for more efficient, lower carbon, and superior products to meet the enhanced performance standards. While upfront construction cost may be higher, up to $4 per square foot depending on solar and electric vehicle infrastructure requirements, investments in energy efficiency and reduction of dependency on natural gas is expected to lead to reduced operational and lifecycle costs for buildings, with paybacks less than 10 years for most if not all projects.
- **Environmental** – This project represents a crucial advancement towards achieving the city's goal to reduce greenhouse gas (GHG) emissions by 70% by 2030, carbon neutrality by 2035 and carbon/climate positive by 2040. In addition to a focus on carbon emission reduction through electrification and efficiency measures, efforts are also focused on reducing embodied carbon associated with construction materials, deconstruction and construction waste. Additionally, there will be a continued emphasis on on-site renewable energy sources as the community aims to transition away from fossil fuels. These measures will not only enhance the performance and resiliency of buildings but also create a healthier indoor environment for occupants. This code update is expected to more aggressively address the environmental and health impacts associated with natural gas use.
- **Social** – One of the objectives of this project is to examine the equity aspect as the city progresses towards achieving carbon neutrality and becoming climate/carbon positive. These updates will prioritize the equitable impact on the community, by recognizing the need for energy efficiency across all new construction and acknowledging a need for flexibility with the existing building stock without sacrificing energy efficiency. The focus of this code is on improving efficiency, resilience, and sustainability in buildings as well as providing a level of energy independence, thus improving the well-being of the community as a whole (lower utility bills, lower maintenance, cleaner air, etc.).

OTHER IMPACTS

- **City Resources** – This project is included in the 2023 work plan for Planning and Development Services and is also supported by staff in the Climate Initiatives department. The city contracted with NORESCO, an engineering consulting firm, to support the analysis and code development project. Resources will also be allocated in 2024 to provide training to city plan review, inspection and code compliance personnel, and to develop and publish templates and other resources for the city website pertaining to implementation of the new energy code requirements.

PUBLIC/STAKEHOLDER FEEDBACK

The scope of this project has been informed by feedback from City Council, Planning Board, the Environmental Advisory Board, design professionals, builders, developers, consultants, and the broad community. The project is also informed by peer exchange with other municipalities and aligns with Boulder County's Code Cohort adopted roadmap.

A list of key consultations and feedback received is summarized below and detailed summaries of the public feedback of the energy code are in **Attachment C**.

- Environmental Advisory Board offered their unanimous support for the proposed code updates in a meeting on Oct. 4, 2023.
- Staff held an open house on October 20, 2023, with over 20 people in attendance to elicit feedback on support and concerns related to the new 2024 CoBECC.
- Staff met with Boulder Area Housing and Rental Association (BARHA) on December 28, 2023. BARHA's main concern was the impact on existing buildings and system electrification, which is not impacted by the proposed changes.
- Staff met with Boulder Housing Partners (BHP) on January 9, 2024. BHP confirmed the new energy code would not represent an incremental cost of construction for them as all-electric construction is already part of their standard of construction.
- Planning Board offered unanimous support for the 2024 CoBECC as drafted in a meeting on Feb. 27, 2024.

Below is a summary of the feedback from the open house and other stakeholder engagement.

Stakeholder: Energy Code Open House Group	
Comment / Feedback	**Staff Response**
Concerns for infeasibility for affordable housing projects that rely on natural gas, primarily for water heating.	We hear your concern and would urge these projects to reach out as we do have the ability for allowance of alternatives means and methods.
Concerns over increased efficiency requirements and being compared against a building with a relatively cheap fuel source (i.e. natural gas) Denver has moved away from the Performance Cost Index (PCI) baseline to a site Energy Use Intensity (EUI) baseline.	This is valuable feedback and we have moved to a site based EUI target instead of the performance cost index target (PCIt) that is based on energy cost which is the current metric.
Look at incentivizing more level 3 charging (i.e. DC fast charging)	Thank you for this feedback. The new code allows commercial occupancies up to 10 space requirements to be satisfied with 1 level 3 charger; for multifamily up to 5 space requirements could be satisfied with 1 level 3 charger. In the commercial spaces level 3 chargers make a lot of sense.
Stakeholder: Boulder Area Rental and Housing Association	
Comment / Feedback	**Response**
Concerns over replacing an existing gas appliance	The code is structured to allow this to happen; only if it is a gut-rehab (50% building area, a mechanical system is replaced and 50% of thermal envelope is altered) would you be required to install all-electric equipment for primary space conditioning or water heating; the existing appliance can remain if desired as a backup system. No point in leaving stranded appliances.
Stakeholder: Boulder Housing Partners	
Comment / Feedback	**Response**
Concerns over funding, in particular, that with the increase in efficiency requirements in the new code market rate construction could slow and, in turn slow affordable housing funding	We encourage affordable projects, for that matter any projects, to reach out if feasibility comes into question. It is not the intent to impede construction in the City of Boulder.

A draft of the 2024 CoBECC was published on the energy code project website on November 30, 2023. Any member of the public could submit feedback to the project team through the website from November 30th, 2023, through the end of January 2024; 12 comments have been received through this channel. Feedback received has been

incorporated into the 2nd draft which the project team has released on the energy code website at the beginning of March. Key themes emerging from the feedback received online includes the following requests:

- Exceptions for commercial cooking offset requirements.
- Consideration to make slab-edge insulation mandatory.
- Increased solar-ready zone size requirements for alignment with actual panel sizing.
- Consideration for additional options for energy sources outside of all-electric (i.e. carbon free power).

The project team also heard some feedback that was not incorporated into the updated code. This feedback and the reasons the project team does not recommend incorporating them are summarized in **Attachment C** of the memo.

BACKGROUND

On November 9, 2023, city staff presented an in-depth overview of the energy code changes being proposed in the 2024 CoBECC project and sought City Council's feedback on the areas of focus using Key Questions. These areas have been summarized below.

- *Did City Council support the draft 2024 CoBECC code elements as presented?* City Council was in support of staff's proposal but also wanted consideration for embodied carbon, a look at greater integration/collaboration across city departments and services and higher electric vehicle (EV) charging infrastructure requirements for multi-family and larger commercial projects. Based on this feedback, staff have initiated a 2024 work plan item to begin developing an overall embodied carbon strategy. Staff also anticipate integrated embodied carbon requirements as part of the 2024 planned adoption of the 2024 International Building codes. Staff also updated the EV charging requirements for the proposed 2024 CoBECC.

- *Did City Council support allowance of natural gas water heating for affordable multi-family projects on a case-by-case basis?* City Council supported this allowance to ensure feasibility for affordable projects when pursuing electrification. Staff have provided additional clarity in the 2024 CoBECC in the alternative means and measures section, as well as added provisions for technical infeasibility within the commercial all-electric provisions.

- *Were there revisions or additional analysis/consideration City Council wanted staff to address prior to bringing forward the ordinance?* City Council encouraged more community outreach and allowing more time if needed to fine tune the new code. It was also recommended to work with builders, developers (including those in the affordable housing space), design professionals, homeowners, and tenants. Staff conducted additional outreach as discussed in this memo.

With this feedback, the feedback received from the Environmental Advisory Board and the feedback solicited from City Council at their June 22, 2023, and November 9, 2023, study sessions, staff proceeded with preparing the 2024 City of Boulder Energy Conservation Code. Staff are now recommending that City Council adopt Ordinance 8629 that would adopt the 2024 City of Boulder Energy Conservation Code by reference and sets forth other related details.

ANALYSIS

The significant changes proposed for the 2024 CoBECC are summarized in the November 9, 2023, City Council Study Session. The *most* significant changes proposed are as follows:

All Electric Appliance Requirements

Natural gas combustion appliances in buildings significantly contribute to GHG emissions, urban air pollution and poor indoor air quality. The reliance on natural gas appliances also leaves building occupants vulnerable to volatile fuel costs as well as unforeseen health problems.[1] Achieving carbon and air quality goals, as well as mitigating future energy cost burdens, necessitates the elimination of natural gas use, at least in any application for which there is a technically viable and economically feasible electric alternative.

Based on unanimous support from City Council, Planning Board and the Environmental Advisory Board in study sessions, staff have proceeded with a drafting code that limits the use of gas combustion appliances in most instances. The 2024 CoBECC requires:

Residential

- New Building Construction: All installed appliances, indoor and outdoor, must be electric.
- Additions: All **new** appliances installed as part of the addition must be electric.
- Substantial Alterations (Level 3+): Alterations that modify 50% or more of the floor area and include replacement of major mechanical systems and substantial thermal envelope modifications must install electric equipment as the primary source of space and water heating. Gas appliances would still be allowed for backup space and water heating or small loads, such as cooking and drying.
- Major Alterations (Level 3): Alterations that modify 50% or more of the floor area and involve replacement of mechanical equipment, will be required to make the equipment space electric ready. Installation of electric appliances is not required.
- Minor Alterations (Level 1-2): Must comply with efficiency requirements only.

[1] https://www.lung.org/policy-advocacy/healthy-air-campaign/healthy-efficient-homes/residential-combustion

Discussion

For construction of new residential buildings, cost-effective electric technology solutions exist to meet all equipment and appliance needs. Since the CoBECC was first adopted by the city in 2017, the majority of new homes in Boulder have already successfully been built to be all or predominantly electric. Similarly, projects where new equipment or appliances are installed as part of or to serve an addition are conducive to all electric requirements.

For substantial alterations, where a large enough portion of the thermal envelope is modified (50% or greater) and mechanical systems are replaced (often referred to as a gut rehabilitation), transitioning to electric space and water heating is also considered cost effective. The proposed code would limit electric requirements to space and water heating, while allowing natural gas to serve as a backup and for smaller appliance use. This recommendation is based on the likelihood that gas infrastructure is already in place and may not be modified in full as part of the project. Legal considerations and a concern about promulgating unpermitted appliance installations have guided this approach.

For major alterations affecting 50% or more of the floor area and that include the replacement of space conditioning and/or water heating equipment, but would otherwise leave mechanical systems and envelope intact, if adopted, the code would require that this equipment space be made electric ready for future installation of an electric appliance. This would align city requirements with those of the state model code for electric ready requirements, meaning dedicated electric circuits appropriate for a future electric appliance would have to be installed along with any gas combustion appliance included in the project.

For clarification, when just replacing a gas water heater or furnace, there is no requirement for the replacement equipment to be all-electric unless that replacement is part of a substantial level 3 alteration. Similarly, when a level 3 alteration does not include replacement of HVAC equipment, there is also no requirement that electric equipment be installed.

Commercial

- New Building Construction: All appliances, indoor and outdoor, must be electric.
    - Exemptions:
        - Hospitals, Laboratories, Commercial Kitchens and some Large S-1 Industrial spaces reliant on radiant heating.
        - Consideration for instances that can be approved by the Chief Building Official based on technology and equipment availability.
    - Where exceptions apply, natural gas use must be 100% offset by an on-site solar system. Exemptions apply for commercial cooking and process loads.
- Additions: All new appliances installed as part of an addition must be electric.
- Substantial Alterations (Level 3+): Alterations that modify 50% or more of the floor area and include replacement of major mechanical systems and substantial

thermal envelope modifications must install electric equipment as the primary source of space and water heating. Gas equipment and appliances would still be allowed for backup space and water heating and for small loads, such as cooking and drying.

- Major Alterations (Level 3): Alterations that modify 50% or more of the floor area and involve replacement of mechanical equipment, but largely leave the balance of mechanical systems and envelope intact, will be required to make the equipment space electric ready. Installation of electric appliances is not required.
- Alterations (Level 1-2): Must comply with efficiency requirements only.

Discussion

For construction of new commercial buildings, cost-effective technology solutions exist to meet appliance needs for most, but not all applications. Of particular concern are instances where tight environmental control is needed, such as in hospitals or laboratories; high-volume industrial bays with in-and-out vehicle traffic; and commercial kitchens. Another area of concern raised during stakeholder engagement is water heating for multi-family affordable housing projects in some instances. There remain limited electric technology options suitable for centralized domestic water systems. Dedicated systems to serve individual residential units can increase costs of both construction and operations and maintenance, again in some, but not all instances. Finally, there may be project types not already considered where technological limitations, including supply chain constraints, make moving forward under all-electric requirements infeasible. Based on this analysis, staff have proposed to allow exceptions for all-electric requirements for the pre-identified projects – hospitals, laboratories, some industrial S-1 facilities – as well as through approval by the Chief Building Official on a case-by-case basis. This approach is consistent with approaches used by other jurisdictions.

Like residential, all-electric requirements would apply to additions and to substantial renovations that include replacement of mechanical systems along with substantial modification to the thermal envelope. However, smaller alterations would only be required to meet the efficiency components of the code.

For new construction projects and additions, where gas combustion appliances are allowed, the project would be required to offset the equivalent amount of energy used by gas appliances with on-site solar with some exceptions for commercial cooking and process heat applications.

Residential Performance for Construction of New Buildings, Additions and Substantial Alterations

Under the 2017 and 2020 CoBECC, projects were required to achieve a final performance outcome using an Energy Rating Index (ERI). In addition to the final ERI, prescriptive backstop requirements also had to be maintained. The backstops were the prescriptive values used in the energy code to ensure efficiency was not sacrificed by just adding more solar to achieve the required ERI target. To retain the same intent, while

simplifying the process and allowing for greater design flexibility, the 2024 CoBECC shifts to a pre- and post-solar ERI approach. Specifically, all projects following the ERI path would need to achieve a maximum ERI score of 50 without solar. Solar or additional efficiency would then credit towards the final required ERI based on the project size. Table 1 outlines the pre- and post-solar ERI requirements proposed for the 2024 CoBECC, as well as the anticipated adjustments that would be made in future code updates.

Table 1 – Proposed Residential New Construction Performance Roadmap

≥3000 Square Feet ERI Compliance Scores		
Code Cycle	**Pre-Solar**	**Post-Solar**
2024	50	0
2027	47	0
2030	45	0
0 to 2999 Square Feet ERI Compliance Scores		
Code Cycle	**Pre-Solar**	**Post-Solar**
2024	50	30
2027	47	20
2030	45	0

For projects less than 3,000 square feet, the code update would result in additional resilience through requirements for incorporation of solar energy systems. For projects less than 1,000 square feet, only solar-ready zone requirements would apply. Also, for these smaller projects (<1,000sf) the prescriptive pathway can be followed to streamline and simplify the construction process for smaller projects.

Commercial Performance for New Building Construction, Additions and Substantial Alterations

With the 2020 CoBECC, the city introduced the Energy Use Intensity (EUI) pathway for commercial construction. The EUI pathway prescribes the maximum energy use (kBTU) allowed per square foot of building area over a year. The 2024 CoBECC adds additional EUI targets for large (≥50,000 square foot) office buildings, retail stores and restaurants. These additional Fixed EUI targets will provide more flexibility for mixed-use buildings by expanding the categories available so more projects can pursue this pathway. Because of the transition to all-electric requirements, no change was made to the EUI targets for the building types that had targets previously set under the 2020 CoBECC. The proposed targets for all building types are shown in Table 2.

Table 2 – Comparison between the 2020 and proposed 2024 EUI targets for new Commercial Construction

Building Type	2020 CoBECC	2024 CoBECC (proposed)
	90.1-2016	90.1-2022[a]
	20-25%	10-15%
Small Office (<5,000 sqft)	19	19
Medium Office (5,000-50,000 sqft)	23	23
Large Office (>50,000 sqft)	--[b]	40
Primary School	34	34
Secondary School	31	31
Mid-rise Apartment	32	32
Warehouse	11	11
Retail Store	--[b]	40
Restaurant	--[b]	200
Mixed Use	--[b]	Weighted average based on use types

[a] Staff are working with the consulting team to determine equivalency for using the 2022 standards to provide greater flexibility.
[b] This building type previously did not have a EUI target per the 2020 CoBECC.

The modeled baseline pathway remains available for buildings that elect to use it or for those that do not have a Fixed EUI target available. The modeled approach specifies a percent better than the baseline model established by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1 standard. The 2020 CoBECC uses the 2016 version of the standard. The 2024 CoBECC aims to update to the ASHRAE 90.1-2022 version of the standard.

A challenge of the previous ASHRAE standard approach is that it utilizes a cost-based approach for demonstrating the percent better improvement. The baseline is a mixed fuel building, and modeling an all-electric building compared to the mixed-fuel baseline is challenging for demonstrating percent better since costs are not a good identifier of efficiency. In adopting their code, Denver developed an energy-based modeling template (2022 DEC companion tool) that can be used in lieu of the cost methodology. Along similar lines, the 2024 CoBECC utilizes a new appendix to ASHARE's 90.1-2022 Standard that modifies this and moves away from the cost -based approach to allow for the use of a site based EUI.

Electric Vehicle (EV) Charging Infrastructure

The 2024 CoBECC also refines EV charging infrastructure requirements, and ensures alignment with the new state model codes, as mandated by state law. In particular, the state's EV capable light category was included in the 2024 CoBECC, which focuses on

installation of conduit and physical space for future electrical service expansion. This class of EV infrastructure can be employed to increase the number of parking spaces that can more cost effectively be retrofitted if charging demand grows beyond initially installed infrastructure without adversely driving up the initial cost of construction. Table 3 outlines staff's proposed EV infrastructure requirements for commercial projects under the 2024 CoBECC. The changes from the 2020 CoBECC include (see table footnotes for definitions of different charging infrastructure requirements):

- Adjusting the definition of small parking lots from 25 or less spaces to 10 or less spaces to align with the state minimum code requirement, which is ten or less spaces.
- Adding EV Capable Light requirements for R-2 (i.e., multi-family) occupancies to allow 100% of spaces to be served by at least conduit. [Exceeds state minimum requirements.]
- Requiring 100% of the spaces in small parking lots serving R-2 occupancies be electric ready (pre-wired with a dedicated circuit). [Exceeds state minimum requirements.]
- Increasing the percent of EV Ready spaces for parking lots with more than ten spaces that serve R-2 occupancies to align with the state minimum code.
- Adding EV Capable Light requirements to other commercial group occupancies, increasing the number of spaces served by at least conduit by 20%. [Exceeds state minimum requirements.]
- Increasing the space substitution count from the current 5 to 10 to try and encourage more fast charging installations.

Table 3 – Proposed EV Charging Infrastructure Requirements

	Number of EVSE Installed Spaces[a]	Number of EV Ready Spaces[b]	Number of EV Capable Spaces[c]	Number of EV Capable Light Spaces[d]	Change from 2020 CoBECC
Group R Occupancies (e.g., multi-family, hotels)					
1-10[f] Spaces	-	100% of spaces	-	-	Changed from just 1 EV ready space to 100% of spaces
>10[f] Spaces including parking garages[e]	5% (min. 1 dual port)	15% of spaces	40% of spaces	40% of spaces	Increased EV Ready spaces from 10% to 15% Added 40% EV Capable Light

	Number of EVSE Installed Spaces[a]	Number of EV Ready Spaces[b]	Number of EV Capable Spaces[c]	Number of EV Capable Light Spaces[d]	Change from 2020 CoBECC
Group A, B, E, I, M and S-2 Occupancies					
1-10[f] Spaces	2 spaces	2 spaces	0	Remaining spaces	Increased EV Ready and Capable from 1 space and added all remaining to be EV light
>10[f] Spaces including parking garages[e]	5% (min. 1 dual port)	10% of spaces	10% of spaces	20% of spaces[e]	Added 20% EV Capable Light

[a] Charging equipment installed
[b] Pre-wired circuit terminated at an outlet or junction box
[c] Service capacity and panel space available for future installation; conduit from panel to parking space
[d] Physical space for future service; conduit to parking space
[e] Parking garages will require 100% of remaining spaces to, at a minimum, have conduit installed
[f] Parking space categories were updated from 2020 CoBECC to align with state code. Small lots are now considered 10 or less spaces (previously 25 or less).

Additional Conservation Requirements

Under the proposed updates, in addition to meeting the minimum code requirements, projects would also need to earn points by implementing additional conservation measures to achieve an energy conservation objective. These points-based systems are detailed in Sections C406 and R408. Examples of proposed eligible measures, include:

- Whole building lifecycle analysis
- Low Embodied Carbon Materials
    - Concrete products, rebar, cross-laminated timber, insulation, steel, floor/wall coverings,
- Roof Reflectance/Cool Roof
- Reduced Air Leakage w/ Energy Recovery Ventilation (ERV) installed
- Ground Source Heat Pump
- Heat Pump Water Heater/Solar Water Heating
- Battery Storage
- Energy Efficient Appliances
- All Electric Equipment (Commercial Kitchens)

NEXT STEPS

- **May–July 2024**: Provide staff and community outreach training on code changes. Update the supporting documentation and resources on the city's website to help explain the energy code and documentation materials required to demonstrate compliance.
- **May 16, 2024**: City Council Second Reading to amend and pass the 2024 CoBECC.
- **June 6, 2024**: City Council Third Reading to adopt the 2024 CoBECC
- **July 8, 2024**: New 2024 CoBECC takes effect for all newly permitted projects (with the exception of pending site and form-based code review applications and existing approvals of such applications which may proceed through the process subject to the 2020 CoBECC, provided all progress deadlines and code requirements are met and building permit applications are filed before July 8, 2027.)

ATTACHMENTS

Attachment A: Ordinance 8629

Attachment B: 2024 City of Boulder Energy Conservation Code (CoBECC)

Attachment C: 2024 CoBECC feedback – with responses

Attachment D: 2024 CoBECC Modifications

ORDINANCE 8629

AN ORDINANCE REPEALING THE "2020 CITY OF BOULDER ENERGY CONSERVATION CODE," ADOPTING BY REFERENCE THE "2024 CITY OF BOULDER ENERGY CONSERVATION CODE," AND AMENDING TITLE 10, "STRUCTURES," B.R.C. 1981, AND OTHER SECTIONS OF THE BOULDER REVISED CODE IN RELATION THERETO; AND SETTING FORTH OTHER RELATED DETAILS.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF BOULDER, COLORADO:

Section 1. Section 4-20-47, "Zoning Adjustment and Building Appeals Filing Fees," B.R.C. 1981, is amended to read as follows:

4-20-47. Zoning Adjustment and Building Appeals Filing Fees.

(a) The fee for filing an appeal to or requesting a variance from the board of zoning adjustment under Subsection 9-9-21(s) or Section 10-3-9, "Temporary License Appeals," 10-2-2, "Adoption of International Property Maintenance Code With Modifications," 10-5-2, "Adoption of International Building Code With Modifications," 10-6-2, "Adoption of the National Electrical Code With Modifications," 10-7-2, "Energy Conservation Code," 10-8.5-2, "Adoption of the International Wildland-Urban Interface Code With Modifications," 10-9-2, "Adoption of the International Mechanical Code With Modifications," 10-9.5-2, Adoption of the International Fuel Gas Code With Modifications," 10-10-2, "Adoption of the International Plumbing Code With Modifications," or 10-12-24, "Appeals and Variances," B.R.C. 1981, is $106, except that the fee for an emergency appeal is $210.

. . .

Section 2. Section 9-9-12, "Landscaping and Screening Standards," B.R.C. 1981 is amended to read as follows:

9-9-12. Landscaping and Screening Standards.

…

(d) General Landscaping and Screening Requirements:

(1) Landscaping Plan: A landscaping plan designed in accordance with this section and Sections 9-9-13, "Streetscape Design Standards," and 9-9-14, "Parking Lot Landscaping Standards," B.R.C. 1981, shall be provided for all developments. The site plan shall include the following:

…

(L) The landscaping plan shall consider and attempt to avoid shading of new trees onto a solar-ready zone required under the ~~2017~~ City of Boulder Energy Conservation Code.

…

Section 3. Section 10-5-2, "Adoption of International Building Code With Modifications," B.R.C. 1981, is amended to read as follows:

10-5-2. Adoption of International Building Code With Modifications.

(a) The 2018 edition of the *International Building Code* of the International Code Council is hereby adopted by reference as the City of Boulder Building Code and has the same force and effect as though fully set forth in this chapter, except as specifically amended by the provisions of this chapter.

…

(cc) Section 1404.3, "Vapor retarders," is amended by adding two exceptions:

4. Commercial and multiple-residence buildings complying with the 2024~~0~~ City of Boulder Energy Conservation Code Section C402.5, Air leakage – thermal envelope (mandatory).

5. Residential buildings complying with the 202~~0~~4 City of Boulder Energy Conservation Code Section R402.4, Air leakage (mandatory).

…

(ll) A new Chapter 36 is added to read:

CHAPTER 36. COMMERCIAL CONSTRUCTION WASTE RECYCLING.

3601.1 Commercial construction recycling requirement. An applicant for a building permit to construct a new building shall demonstrate all recyclable wood, metal and cardboard materials were donated, reused or recycled.

3601.1.1 Reporting. Within sixty days following rough inspections ~~the completion~~ of the

project and prior to final inspection, the applicant shall submit documentation to the city manager which proves that all recyclable wood, metal and cardboard was donated, reused, or recycled. The documentation shall consist of a final completed waste diversion report in a form as prescribed by the city manager showing the tonnage of materials salvaged for recycling and reuse, supported by original weight receipts or other waste documentation that reasonably verifies that materials generated from the site have been accepted for recycling, reuse, salvage or otherwise diverted. For construction debris for which weighing is not practical due to size, lack of scales at the facility, or other considerations, a volumetric measurement shall be used. For conversion of volumetric measurements to weight, the applicant shall use the standardized conversion rates established by the city manager.

3601.2 Commercial deconstruction waste recycling. An applicant for a full demolition shall adhere to the requirements of Sections 3601.2.1 through 3601.2.5.

3601.2.1 Diversion requirements. The applicant shall divert from landfills at least seventy-five percent of the waste tonnage of demolition debris generated from the project by using recycling, reuse, and diversion programs. The city manager may modify this requirement if the applicant demonstrates it is unfeasible as set forth in Section 3601.2.2. The materials diverted must also include at least three of the material types set forth in the deconstruction plan form established by the city manager.

3601.2.2 Information required before issuance of demolition permit. The applicant shall submit a properly completed deconstruction plan in a form as established by the city manager. The applicant must propose to divert at least three of the material types identified by the city manager in the deconstruction plan form. No building permit or demolition permit shall be issued prior to the approval of the deconstruction plan by the city manager. In estimating the volume or weight of materials identified in the deconstruction plan, the applicant shall use the standardized conversion rates established by the city manager. The city manager may modify the required diversion percentage if the applicant demonstrates in the deconstruction plan that the percentage is not feasible because the maximum weight of materials that can be reused or recycled is less than the required diversion rate, or due to the presence of materials that are unable to be diverted due to special waste conditions such as environmental hazards.

3601.2.3 Administrative fee and deposit required. Prior to issuance of a permit for a full demolition ~~or a level 4 alteration as defined in the 2020 City of Boulder Energy Conservation Code,~~, the applicant shall post a cash deposit and pay the administrative fee described in Section 4-20-72, B.R.C. 1981. The cash deposit shall be one dollar per square foot of the demolition or work area of the alteration as identified in the permit application, or $1,500, whichever is greater.

…

Section 4. Section 10-5.5-2, "Adoption of the International Residential Code with Modifications," B.R.C. 1981, is amended to read as follows:

10-5.5-2. Adoption of the International Residential Code With Modifications.

(a) The 2018 edition of the International Residential Code of the International Code Council is hereby adopted by reference as the City of Boulder Residential Building Code and has the same force and effect as though fully set forth in this chapter, except as specifically amended by the provisions of this chapter.

…

(q) A new Section R328, Construction Waste Management, is added to read:

SECTION R328 CONSTRUCTION WASTE MANAGEMENT

R328.1 Residential construction waste recycling. An applicant for a building permit to construct a new dwelling unit shall demonstrate all recyclable wood, metal and cardboard materials were donated, reused or recycled.

R328.1.1 Reporting. Within sixty days following ~~the completion~~rough inspection of the project and prior to final inspection, the applicant shall submit documentation to the city manager which proves that all recyclable wood, metal and cardboard was donated, reused, or recycled. The documentation shall consist of a final completed waste diversion report in a form as prescribed by the city manager showing the tonnage of materials salvaged for recycling and reuse, supported by original weight receipts or other waste documentation that reasonably verifies that materials generated from the site have been accepted for recycling, reuse, salvage or otherwise diverted. For construction debris for which weighing is not practical due to size, lack of scales at the facility, or other considerations, a volumetric measurement shall be used. For conversion of volumetric measurements to weight, the applicant shall use the standardized conversion rates established by the city manager.

R328.2 Residential deconstruction waste recycling. An applicant for a full demolition ~~or level 4 alteration as defined in the *2020 City of Boulder Energy Conservation Code*~~ shall adhere to the requirements of Sections R328.2.1 through R328.2.5.

R328.2.1 Diversion requirements. The applicant shall divert from landfills at least seventy-five percent of the waste tonnage of demolition debris generated from the project by using recycling, reuse, and diversion programs. The city manager may modify this requirement if the applicant demonstrates it is unfeasible as set forth in Section R328.2.2. The materials diverted must also include at least three of the material types set forth in the deconstruction plan form established by the city manager.

R328.2.2 Information required before issuance of demolition and/or building permit. The applicant shall submit a properly completed deconstruction plan in a form as established by the city manager. The applicant must propose to divert at least three of the material types identified by the city manager in the deconstruction plan form. No building permit or demolition permit shall be issued prior to the approval of the deconstruction plan by the city manager. In estimating the volume or weight of materials identified in the deconstruction plan, the applicant shall use the standardized conversion rates established

by the city manager. The city manager may modify the required diversion percentage if the applicant demonstrates in the deconstruction plan that the percentage is not feasible because the maximum weight of materials that can be reused or recycled is less than the required diversion rate, or due to the presence of materials that are unable to be diverted due to special waste conditions such as environmental hazards.

R328.2.3 Administrative fee and deposit required. Prior to issuance of a permit for a full demolition ~~or a level 4 alteration as defined in the *2020 City of Boulder Energy Conservation Code*~~, the applicant shall post a cash deposit and pay the administrative fee described in Section 4-20-72, B.R.C. 1981. The cash deposit shall be one dollar per square foot of the demolition or work area of the alteration as identified in the permit application, or $1,500, whichever is greater.

R328.2.4 Reporting. Within sixty days following the completion of the demolition ~~or alteration~~, the applicant shall submit documentation to the city which proves compliance with the requirements of Sections R328.2.1 and R328.2.2. The documentation shall consist of a final completed waste diversion report in a form established by the city manager showing the tonnage of materials salvaged for recycling and reuse, supported by original weight receipts or other waste documentation that reasonably verifies that materials generated from the site have been accepted for recycling, reuse, salvage or otherwise diverted at the required diversion percentage. The documentation shall further demonstrate that the diverted materials include at least three material types. For demolition debris for which weighing is not practical due to size, lack of scales at facility, or other considerations, a volumetric measurement shall be used. For conversion of volumetric measurements to weight, the applicant shall use the standardized conversion rates established by the city manager.

R328.2.5 Deposit refunded or forfeited. No applicant shall fail to comply with Sections R328.2.1 through R328.2.4. The deposit shall be refunded to the applicant in proportion to the ratio of the actual diversion rate to the required diversion rate. If the required diversion percentage is not fully complied with, the remainder of the deposit shall be forfeited to the city as a civil penalty for failure to comply with the requirements of this chapter, after notice and an opportunity for hearing under the procedures prescribed by Chapter 1-3, "Quasi-Judicial Hearings," B.R.C. 1981. The city manager may adjust the amount of the refund or forfeiture where the applicant demonstrates that the required diversion percentage was not feasible based on the factors identified in Section R328.2.2 for modification of the diversion percentage. The forfeiture remedy is cumulative and is in addition to any other action the city manager is authorized to take, including suspension or revocation of a building contractor license or prosecution in the municipal court. Each 2,500 square feet of the demolition or alteration shall give rise to a separate violation, and each violation is subject to a maximum fine of $2,500.

…

(z) Chapter 11, "Energy Efficiency." Sections N1101 through N1105 are repealed. A new Section N1101 is added to read:

N1101 Scope. Regulations concerning the design and construction of buildings for the

effective use of energy and requirements for green building practices shall be administered in accordance with the ~~2020~~ *City of Boulder Energy Conservation Code* as adopted by Chapter 10-7, "Energy Conservation Code," B.R.C. 1981.

Section 5. Section 10-7-2, "Energy Conservation Code," B.R.C. 1981, is amended to read as follows:

10-7-2. Energy Conservation Code.

(a) Council adopts by reference the ~~*2020*~~ *2024 City of Boulder Energy Conservation Code* ~~of~~ published by the International Code Council which shall have the same force and effect as though fully set forth in the Boulder Revised Code, 1981, except as specifically amended by the provisions of this chapter. This code shall also be known as the City of Boulder Energy Conservation Code. This chapter and the ~~*2020*~~ *2024 City of Boulder Energy Conservation Code* shall be administered, applied, and interpreted in accordance with and as part of Chapter 10-5, "Building Code," B.R.C. 1981.

(b) Section C406.2.2, "More efficient HVAC performance," is repealed and reenacted to read as follows:

C406.2.2 More efficient HVAC performance. To achieve credits for more efficient HVAC performance, all heating and cooling systems shall meet the minimum requirements of Section C403 and efficiency improvements shall be referenced to minimum efficiencies listed in tables referenced by Section C403.3.3. Where multiple efficiency requirements are listed, equipment shall meet the seasonal or part-load efficiencies, including SEER/SEER2, EER/integrated energy efficiency ratio (IEER), integrated part load value (IPLV), or AFUE. Equipment that is larger than the maximum capacity range indicated in tables referenced by Section C403.3.3 shall meet the efficiencies listed for the largest capacity for the associated equipment type shown in the table. Where multiple individual heating or cooling systems serve a project, the HVAC performance improvement of the project shall be the weighted average improvement based on individual system capacity. Projects will achieve HVAC efficiency credits for one or several of the following measures:

1. C406.2.2.4 H04
2. C406.2.2.5 H05

(c) Section C406.2.2.2, "H02 More efficient HVAC equipment heating performance," is repealed and reenacted to read as follows:

C406.2.2.2 H02. Reserved.

(d) Section C406.2.2.3, "H03 More efficient HVAC equipment cooling and fan performance," is repealed and reenacted to read as follows:

C406.2.2.3 H03. Reserved.

(e) Lines H02 and H03 in Table C406.2, "Base Credit for Additional Conservation Measures," are repealed to read as follows:

H02	Reserved
H03	Reserved

Section 6. Section 10-7.7-8, "Large Industrial Campus," B.R.C. 1981, is amended to read as follows:

10-7.7-8. Large Industrial Campus.

...

(c) By June 1, 2025, each owner of a large industrial campus shall:

(1) Replace or upgrade any interior lighting fixtures necessary to meet the lighting power allowances for interior lighting established in the *2017~~20~~ City of Boulder Energy Conservation Code*.

(2) Replace or upgrade any exterior lighting fixtures as necessary to meet the lighting power allowances for exterior lighting established in the *2012~~20~~ International Energy Conservation Code*.

(3) Comply with the requirements for automatic time switch control devices, occupancy sensors, and exterior lighting controls as necessary to meet the ~~*2020*~~ *2017 City of Boulder Energy Conservation Code*.

(4) Provide to the city manager a summary of any actions taken pursuant to this subsection. The city manager may grant an owner of a large industrial campus a reasonable extension of time in which to comply with this upon proof of technical difficulties or financial hardship.

Section 7. The city council deems it appropriate to repeal the *2020 City of Boulder Energy Conservation* and adopt by reference the "2024 City of Boulder Energy Conservation Code." The *2024 City of Boulder Energy Conservation Code* prescribes minimum energy efficiency and conservation standards for new buildings and for additions and alterations to existing buildings. The city council orders that at least one copy of the *2024 City of Boulder Energy Conservation Code* being considered for adoption by reference in this ordinance be on file with the city clerk, Municipal Building, 1777 Broadway, City of Boulder, County of

Boulder, State of Colorado, and open for public inspection during the business hours of the city. Such copy shall be certified to be true by the mayor and the clerk.

Section 8. Unless expressly provided otherwise, any violation of the provisions of the 2024 City of Boulder Energy Conservation Code adopted herein by reference shall be punishable as provided in Section 5-2-4, "General Penalties," B.R.C. 1981, by a fine of up to $2,650 per violation, as adjusted by inflation, or by incarceration of not more than 90 days in jail, or by both such fine and incarceration. The maximum fine was adjusted for inflation on January 1, 2022, and again was and is adjusted on January 1 of each year thereafter, as set forth in Section 5-2-4, B.R.C. 1981.

Section 9. The city council orders and directs the city manager to make any additional citation, renumbering, and reference changes not included in this ordinance that are necessary to properly implement this ordinance and the code adopted herein. The city council authorizes the city manager to change the formatting and layout of the *2024 City of Boulder Energy Conservation Code*.

Section 10. The city council intends that the sections, paragraphs, clauses, phrases, items, and compliance options of this ordinance and the code adopted herein by reference be severable. If any compliance option, item, phrase, clause, sentence, paragraph or section of this ordinance or the code adopted herein by reference is declared unconstitutional or invalid by the valid judgement or decree of any court of competent jurisdiction, such unconstitutionality or invalidity does not affect any of the remaining compliance options, items, phrases, clauses, sentences, paragraphs and sections of this ordinance or the code adopted herein, unless it appears to the court that the valid provisions of the section or ordinance are so essentially and inseparably connected with, and so dependent upon, the void provision that it cannot be presumed the

council would have enacted the valid provisions without the void one; or unless the court determines that the valid provisions, standing alone, are incomplete and are incapable of being executed in accordance with the legislative intent. If the provision of an exception invalidates a prohibition, but the prohibition without the exception would be valid, then it is council's intent in such cases that the exception be severed, and the prohibition upheld.

Section 11. This ordinance shall take effect on July 8, 2024 ("effective date"). It shall be applied to building permit applications submitted on or after the effective date. Building permits applied for before the effective date shall be considered under the City of Boulder Energy Conservation Code in effect at the time of application. Notwithstanding the foregoing, if the construction of a new building or an addition, alteration, or renovation of an existing building requires a site review or form-based code review and a complete application for such site or form-based code review has been submitted to the city, or such site or form-based code review has been approved, on or before the effective date of this ordinance, then the initial building permits issued to implement the approval of such site review or form-based code review application will be permitted to be reviewed under the City of Boulder Energy Conservation Code in effect on the date of submittal of the complete site or form-based code review application provided that the building permit is application is submitted no later than three years following the effective date. Such applicants shall be required to pursue all development approvals and meet all requirements deadlines set by the city manager or her delegates and the Boulder Revised Code necessary to establish the proposed development. The applicants for such projects shall demonstrate compliance with all applicable laws. Any failure to meet the requirements of the city manager, her delegates, this section of this ordinance, or the Boulder Revised Code will result in a denial of such application. Any subsequent building permit

applications shall be reviewed under the standards in effect at the time of building permit application.

Section 12. This ordinance is necessary to protect the public health, safety, and welfare of the residents of the city, and covers matters of local concern.

Section 13. The city council deems it appropriate that this ordinance be published by title only and orders that copies of this ordinance be made available in the office of the city clerk for public inspection and acquisition.

INTRODUCED, READ ON FIRST READING, AND ORDERED PUBLISHED BY TITLE ONLY this 21st day of March 2024.

_____
Aaron Brockett,
Mayor

Attest:

_____
Elesha Johnson,
City Clerk

READ ON SECOND READING, AMENDED AND PASSED this 16th day of May 2024.

_____
Aaron Brockett,
Mayor

Attest:

_____
Elesha Johnson,
City Clerk

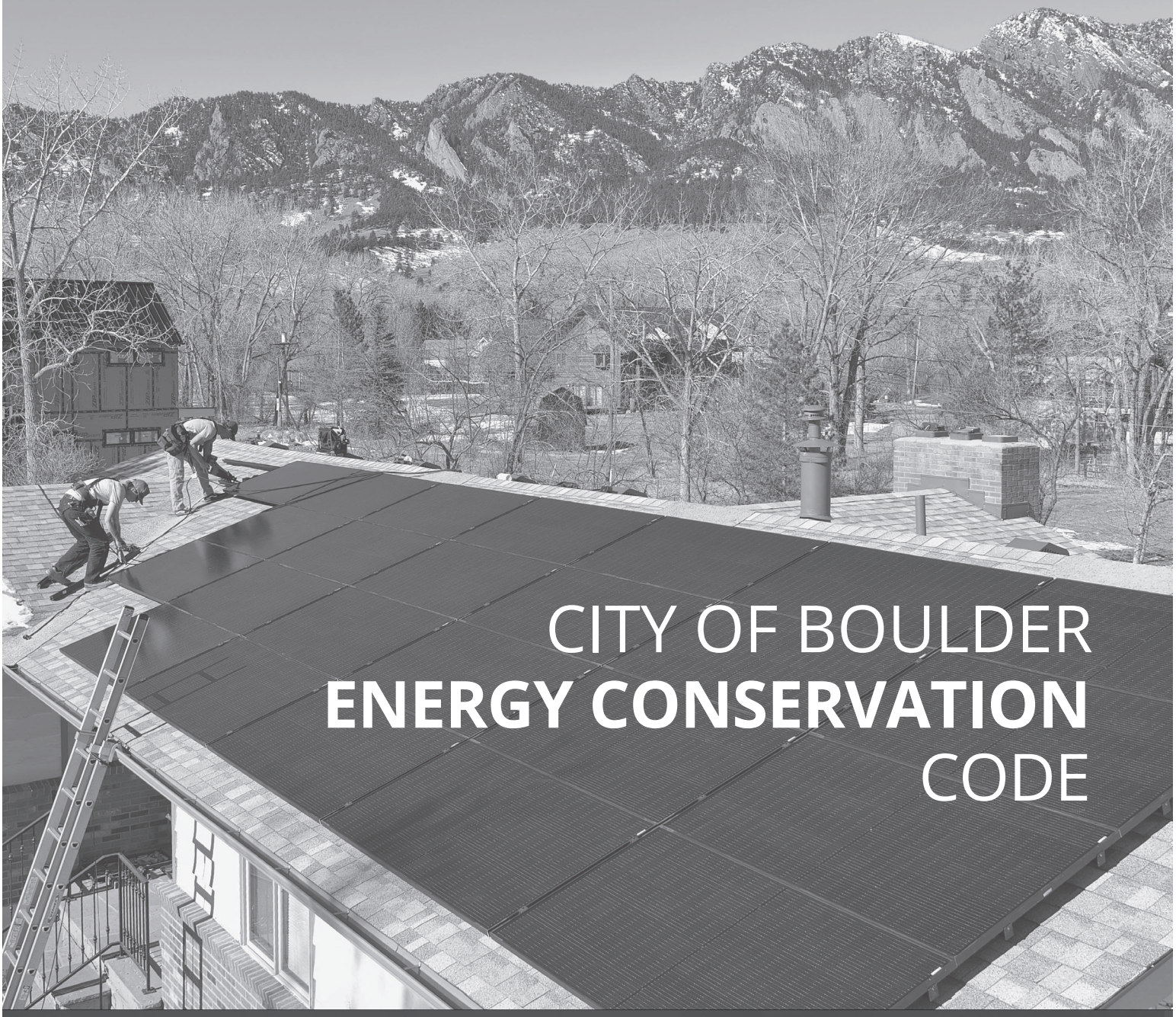
READ ON THIRD READING, PASSED AND ADOPTED this _____ day of _____ 2024.

_____
Aaron Brockett,
Mayor

Attest:

_____
Elesha Johnson,
City Clerk

2024



CITY OF BOULDER
ENERGY CONSERVATION
CODE

2024 City of Boulder Energy Conservation Code

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PREFACE

Introduction

The 2024 *City of Boulder Energy Conservation Code* (COBECC) prescribes minimum energy efficiency and conservation standards for new buildings and for additions and alterations to existing buildings. The requirements of the COBECC are intended to promote public health, safety and welfare by requiring the design and construction of buildings in the City of Boulder consistent with the city's energy, climate and sustainability goals; national safety standards; and best practices for engineering and construction technology.

The COBECC introduces new energy efficiency measures and improves the energy performance requirements for residential buildings and prescriptive requirements for commercial buildings.

The COBECC is based on the 2021 edition of the *International Energy Conservation Code*® (IECC®), published by the International Code Council® (ICC®), and incorporates local amendments to the model code. The COBECC eliminates portions of the model code that do not apply to Boulder and incorporates Boulder's local energy conservation requirements in one document.

Since 1996, the city has adopted local amendments to the IECC to impose more stringent energy efficiency requirements than the model code. Like previous local amendments, the COBECC imposes more stringent energy efficiency requirements than the model code. The COBECC requirements support the climate action plan adopted by the City of Boulder in 2021:

- 70 percent reduction of the community's greenhouse gas emissions below 2018 levels by 2030.
- Net Zero carbon emissions by 2035.
- Carbon/Climate Positive by 2040

In support of these goals, Boulder has set a target of reaching net zero energy construction by 2031 for new buildings and major alterations through building and energy code requirements. Boulder has developed a strategy to achieve that target; adopting increasingly aggressive energy codes is a key part of the strategy.

Adoption

The 2024 *City of Boulder Energy Conservation Code* was adopted at _____ reading by the City Council of the City of Boulder on _____, 2024, with the passage of City of Boulder Ordinance 8629.

Information regarding the adoption of Ordinance 8629 can be reviewed at the City of Boul-der Central Records Office as part of the City Council agenda materials for _____, 2024.

Marginal Markings

| = Indicates a City of Boulder amendment has been made to the 2018 *International Energy Conservation Code*.

> = Indicates model code language deleted by the City of Boulder.

Italicized Terms

Selected words and terms defined in Chapter 2, Definitions, are italicized where they appear in code text and the Chapter 2 definition applies. Where such words and terms are not italicized, common-use definitions apply. The words and terms selected have code-specific definitions that the user should read carefully to facilitate better understanding of the code.

EFFECTIVE USE OF THE INTERNATIONAL ENERGY CONSERVATION CODE

The 2024 *City of Boulder Energy Conservation Code* (COBECC) is a model code that regulates minimum energy conservation requirements for new buildings and for additions, alterations, and repairs of existing buildings. This code addresses energy conservation requirements for all aspects of energy uses in both commercial and residential construction, including heating and ventilating, lighting, water heating, and power usage for appliances and building systems.

This code is a design document. For example, before one constructs a building, the designer must determine the minimum insulation *R*-values and fenestration *U*-factors for the building exterior envelope. Depending on whether the building is for residential use or for commercial use, the COBECC sets forth minimum requirements for exterior envelope insulation, window and door *U*-factors and SHGC ratings, duct insulation, lighting and power efficiency, and water distribution insulation.

Arrangement and Format of the 2024 COBECC

The COBECC contains two separate sets of provisions—one for commercial buildings and one for residential buildings. Each set of provisions is applied separately to buildings within their scope. The Commercial Provisions apply to all buildings except for residential buildings three stories or less in height. The Residential Provisions apply to detached one- and two-family dwellings and multiple single-family dwellings as well as Group R-3 and R-4 buildings three stories or less in height. These scopes are based on the definitions of "Commercial building" and "Residential building," respectively, in Chapter 2 of each set of provisions. Note that the Commercial Provisions therefore contain provisions for R-2 buildings and occupancies not included as per the definition of residential building. Each set of provisions is divided into six different parts:

Chapters	Subjects
1–2	Administration and Definitions
3	General Materials Requirements
4	Energy Efficiency Requirements
5	Existing Buildings
6	Referenced Standards

The following is a chapter-by-chapter synopsis of the scope and intent of the provisions of the *City of Boulder International Energy Conservation Code* and applies to both the commercial and residential energy provisions:

Chapter 1 Scope and Administration. This chapter contains provisions for the application, enforcement and administration of subsequent requirements of the code. In addition to establishing the scope of the code, Chapter 1 identifies which buildings and structures come under its purview. Chapter 1 is largely concerned with maintaining "due process of law" in enforcing the energy conservation criteria contained in the body of this code. Only through careful observation of the administrative provisions can the *code official* reasonably expect to demonstrate that "equal protection under the law" has been provided.

Chapter 2 Definitions. Chapter 2 is the repository of the definitions of terms used in the body of the code. Codes are technical documents and every word, term and punctuation mark can impact the meaning of the code text and the intended results. The code often uses terms that have a unique meaning in the code and the code meaning can differ substantially from the ordinarily understood meaning of the term as used outside of the code.

The terms defined in Chapter 2 are deemed to be of prime importance in establishing the meaning and intent of the code text. The user of the code should be familiar with and consult this chapter because the definitions are essential to the correct interpretation of the code and the user may not be aware that a term is defined.

Where understanding of a term's definition is especially key to or necessary for understanding of a particular code provision, the term is shown in *italics*. This is true only for those terms that have a

meaning that is unique to the code. In other words, the generally understood meaning of a term or phrase might not be sufficient or consistent with the meaning prescribed by the code; therefore, it is essential that the code-defined meaning be known.

Guidance regarding tense, gender and plurality of defined terms as well as guidance regarding terms not defined in this code is provided.

Chapter 3 General Requirements. Chapter 3 provides interior design conditions that are used as a basis for assumptions in heating and cooling load calculations, and provides basic material requirements for insulation materials and fenestration materials.

Chapter 4 Energy Efficiency. Chapter 4 of each set of provisions contains the technical requirements for energy efficiency.

Commercial Energy Efficiency. Chapter 4 of the Commercial Provisions contains the energy-efficiency-related requirements for the design and construction of most types of commercial buildings, including buildings with residential uses and occupancies that do not meet the definition of a residential building. This chapter defines requirements for the portions of the building and building systems that impact energy use in new commercial construction and promote the effective use of energy. In addition to energy conservation requirements for the building envelope, this chapter contains requirements that impact energy efficiency for the HVAC systems, the electrical systems and the plumbing systems. It should be noted, however, that requirements are contained in other codes that have an impact on energy conservation. For instance, requirements for water flow rates are regulated by the *International Plumbing Code*.

Residential Energy Efficiency. Chapter 4 of the Residential Provisions contains the energy-efficiency-related requirements for the design and construction of residential buildings regulated under this code. It should be noted that the definition of a *residential building* in this code is unique for this code, a *residential building* is defined as detached one- and two-family dwellings and townhouses, and *Group* R-3 and R-4 buildings three stories or less in height above grade plane with separate means of egress. All other buildings, including those containing Group R-2 occupancies, shall be regulated by the energy conservation requirements in the Commercial Provisions. The applicable portions of a residential building must comply with the provisions within this chapter for energy efficiency. This chapter defines requirements for the portions of the building and building systems that impact energy use in new residential construction and promote the effective use of energy. The provisions within the chapter promote energy efficiency in the building envelope, the heating and cooling system and the service water heating system of the building.

Chapter 5 Existing Buildings. Chapter 5 of each set of provisions contains the technical energy efficiency requirements for existing buildings. Chapter 5 provisions address the maintenance of buildings in compliance with the code as well as how additions, alterations, repairs and changes of occupancy need to be addressed from the standpoint of energy efficiency. Specific provisions are provided for historic buildings.

Chapter 6 Referenced Standards. The code contains numerous references to standards that are used to regulate materials and methods of construction. Chapter 6 contains a comprehensive list of all standards that are referenced in the code. The standards are part of the code to the extent of the reference to the standard. Compliance with the referenced standard is necessary for compliance with this code. By providing specifically adopted standards, the construction and installation requirements necessary for compliance with the code can be readily determined. The basis for code compliance is, therefore, established and available on an equal basis to the *code official*, contractor, designer and owner.

Chapter 6 is organized in a manner that makes it easy to locate specific standards. It lists all of the referenced standards, alphabetically, by acronym of the promulgating agency of the standard. Each agency's standards are then listed in either alphabetical or numeric order based on the standard identification. The list also contains the title of the standard; the edition (date) of the standard referenced; any addenda included as part of the ICC adoption; and the section or sections of this code that reference the standard.

Appendix CA, Boulder Modified Appendix G Protocol. This appendix is part of this code for the commercial provisions as referenced in Section C407. This appendix provides guidance on modifications to the ASHRAE 90.1–2022, Appendix G for the purpose of energy modeling for compliance with C407.3.

Abbreviations and Notations

The following is a list of common abbreviations and units of measurement used in this code. Some of the abbreviations are for terms defined in Chapter 2. Others are terms used in various tables and text of the code.

AFUE	Annual fuel utilization efficiency
bhp	Brake horsepower (fans)
Btu	British thermal unit
Btu/h-ft^2	Btu per hour per square foot
C-factor	See Chapter 2—Definitions
CDD	Cooling degree days
cfm	Cubic feet per minute
cfm/ft^2	Cubic feet per minute per square foot
ci	Continuous insulation
COP	Coefficient of performance
DCV	Demand control ventilation
°C	Degrees Celsius
°F	Degrees Fahrenheit
DWHR	Drain water heat recovery
DX	Direct expansion
E_c	Combustion efficiency
E_v	Ventilation efficiency
E_t	Thermal efficiency
EER	Energy efficiency ratio
EF	Energy factor
ERI	Energy rating index
EUI	Energy use intensity
F-factor	See Chapter 2—Definitions
FDD	Fault detection and diagnostics
FEG	Fan efficiency grade
FL	Full load
ft^2	Square foot
gpm	Gallons per minute
HDD	Heating degree days
hp	Horsepower
HSPF	Heating seasonal performance factor
HVAC	Heating, ventilating and air conditioning
IEER	Integrated energy efficiency ratio
IPLV	Integrated Part Load Value
Kg/m^2	Kilograms per square meter
kW	Kilowatt
LPD	Light power density (lighting power allowance)

L/s	Liters per second
Ls	Liner system
m^2	Square meters
MERV	Minimum efficiency reporting value
NAECA	National Appliance Energy Conservation Act
NPLV	Nonstandard Part Load Value
Pa	Pascal
PF	Projection factor
pcf	Pounds per cubic foot
psf	Pounds per square foot
PTAC	Packaged terminal air conditioner
PTHP	Packaged terminal heat pump
R-value	See Chapter 2—Definitions
SCOP	Sensible coefficient of performance
SEER	Seasonal energy efficiency ratio
SEER2	Seasonal energy efficiency ratio 2
SHGC	Solar Heat Gain Coefficient
SPVAC	Single packaged vertical air conditioner
SPVHP	Single packaged vertical heat pump
SRI	Solar reflectance index
SWHF	Service water heat recovery factor
U-factor	See Chapter 2—Definitions
VAV	Variable air volume
VRF	Variable refrigerant flow
VT	Visible transmittance
W	Watts
w.c.	Water column
w.g.	Water gauge

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CHAPTER 1 [CE]
SCOPE AND ADMINISTRATION

User note:

About this chapter: *Chapter 1 establishes the limits of applicability of the code and describes how the code is to be applied and enforced. Chapter 1 includes two parts: Part 1—Scope and Application and Part 2—Administration and Enforcement. Section 101 identifies what buildings, systems, appliances and equipment fall under its purview and references other I-Codes as applicable. Standards and codes are scoped to the extent referenced.*

The provisions of Chapter 1 establish the authority and duties of the code official appointed by the authority having jurisdiction and also establish the rights and privileges of the design professional, contractor and property owner.

PART 1—SCOPE AND APPLICATION

SECTION C101
SCOPE AND GENERAL REQUIREMENTS

C101.1 Title. This code shall be known as the 2024 *City of Boulder Energy Conservation Code* and shall be cited as such. It is referred to herein as "this code."

C101.2 Scope. This code applies to *commercial buildings* and the buildings' sites and associated systems and equipment.

C101.3 Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

C101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

C101.4.1 Mixed residential and commercial buildings. Where a building includes both *residential building* and *commercial building* portions, each portion shall be separately considered and meet the applicable Commercial Provisions of this code or Residential Provisions of this code.

C101.5 Compliance. *Residential buildings* shall meet the Residential Provisions of this code. *Commercial buildings* shall meet the Commercial Provisions of this code.

C101.5.1 Compliance materials. The *code official* is authorized to require compliance documentation, certificates, or reports prior to issuance of the building permit, the certificate of occupancy, or prior to passing inspections. The production of this documentation shall be in support of demonstrating compliance with the applicable requirements, construction installation method, or the energy compliance path being utilized.

SECTION C102
ALTERNATIVE MATERIALS, DESIGN AND METHODS OF CONSTRUCTION AND EQUIPMENT

C102.1 General. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. The *chief building official* shall have the authority to approve an alternative material, design or method of construction upon the written application of the owner or the owner's authorized agent. The *chief building official* shall first find that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, *fire resistance*, durability, energy conservation and safety. The *code official* shall respond to the applicant in writing, stating the reasons why the alternative was approved or was not *approved*.

C102.1.1 Above code programs. The *chief building official* shall be permitted to deem a national, state or local energy efficiency program exceeding the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered to be in compliance with this code. The requirements identified in Table C407.2 shall still be met.

C102.1.2 Technical infeasibility. The *chief building official* has the authority to modify this code where equipment, as mandated by this code, is unavailable.

C102.1.3 Compliance with federal and state law and regulations. The *chief building official* may modify, for individual cases, the provisions of this code to allow a design, installation, or construction not in compliance with the provisions of this code, if otherwise the provisions of this code would result in a violation of federal or state legislation or regulations and the modification would be the minimum modification that provides relief.

PART 2—ADMINISTRATION AND ENFORCEMENT

SECTION C103
CONSTRUCTION DOCUMENTS

C103.1 General. Construction documents and other supporting data shall be submitted in one or more sets, or in a digital format where allowed by the *building official*, with each application for a permit. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

Exception: The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.

C103.2 Information on construction documents. Construction documents shall be drawn to scale on suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, the following as applicable:

1. Energy compliance path.
2. Insulation materials and their R-values.
3. Fenestration *U*-factors and solar heat gain coefficients (SHGCs).
4. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
5. Mechanical system design criteria.
6. Mechanical and service water heating systems and equipment types, sizes, and efficiencies.
7. Economizer description.
8. Equipment and system controls.
9. Fan motor horsepower (hp) and controls.
10. Duct sealing, duct and pipe insulation and location.
11. Lighting fixture schedule with wattage and control narrative.
12. Location of *daylight* zones on floor plans.
13. Air barrier and air sealing details, including the location of the air barrier.
14. Details of additional electric infrastructure, including branch circuits, conduit, or pre-wiring, and panel capacity in compliance with the provisions of this code.
15. Location and size of the solar-ready zone.
16. Structural design loads of roof dead load and roof live load.
17. Pathways for routing of conduit from the solar-ready zone to the electrical service panel.
18. Number and location of EV capable light spaces.
19. Number and location of EV capable spaces.
20. Number and location of EV ready spaces.
21. Number and location of EVSE installed spaces.
22. Locations of conduit and termination points serving the aforementioned parking spaces.
23. Location for condensate drainage where combustion equipment for space heating and water heating is installed.
24. Additional Conservation measures selected for compliance with C406.

C103.2.1 Building thermal envelope depiction. The *building thermal envelope* shall be represented on the construction drawings in both plan and trans-sectional views and shall outline the extent of the *building thermal* envelope.

C103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. The *code official* is authorized to utilize a registered design professional, or other *approved* entity not affiliated with the building design or construction, in conducting the review of the plans and specifications for compliance with the code.

C103.3.1 Approval of construction documents. When the *code official* issues a permit where construction documents are required, the construction documents shall be endorsed in writing and stamped "Reviewed for Code Compliance." Such *approved* construction documents shall not be changed, modified or altered without authorization from the *code official*. Work shall be done in accordance with the *approved* construction documents.

One set of construction documents so reviewed shall be retained by the *code official*. The other set shall be returned to the applicant, kept at the site of work and shall be open to inspection by the *code official* or a duly authorized representative.

C103.3.2 Previous approvals. This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

C103.3.3 Phased approval. The *code official* shall have the authority to issue a permit for the construction of part of an energy conservation system before the construction documents for the entire system have been submitted or *approved*, provided that adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holders of such permit shall proceed at their own risk without assurance that the permit for the entire energy conservation system will be granted.

C103.4 Amended construction documents. Changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.

C103.5 Retention of construction documents. One set of *approved* construction documents shall be retained by the *code official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

C103.6 Building documentation and closeout submittal requirements. The construction documents shall specify that the documents described in this section be provided to the building owner or owner's authorized agent within 90 days of the date of receipt of the certificate of occupancy.

C103.6.1 Record documents. Construction documents shall be updated to convey a record of the completed work. Such updates shall include mechanical, electrical and control drawings that indicate all changes to size, type and location of components, equipment, and assemblies.

C103.6.2 Compliance documentation. Energy code compliance documentation and supporting calculations shall be delivered in one document to the building owner as part of the project record documents or manuals, or as a standalone document. This document shall include the specific energy code edition utilized for compliance determination for each system, documentation demonstrating compliance with Section C303.1.3 for each fenestration product installed, and the interior lighting power compliance path, building area or space-by-space, used to calculate the lighting power allowance.

For projects complying with the Prescriptive Pathway per Section C401.2, the documentation shall include:

1. The envelope insulation compliance path.
2. All compliance calculations including those required by Sections C402.1.5, C403.8.1, C405.3 and C405.5.

C103.6.3 Systems operation control. Training shall be provided by the builder or design professional to those responsible for maintaining and operating equipment included in the manuals required by Section C103.6.2.

The training shall include:

1. Review of manuals and permanent certificate.
2. Hands-on demonstration of all normal maintenance procedures, normal operating modes, and all emergency shutdown and startup procedures.
3. Training completion report.

SECTION C104
FEES

C104.1 Fees. A permit shall not be issued until the fees prescribed in Section C104.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

C104.2 Schedule of permit fees. A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

C104.3 Work commencing before permit issuance. Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the *code official* that shall be in addition to the required permit fees.

C104.4 Related fees. The payment of the fee for the construction, *alteration*, removal or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

C104.5 Refunds. The *code official* is authorized to establish a refund policy.

SECTION C105
INSPECTIONS

C105.1 General. Construction or work for which a permit is required shall be subject to inspection by the code official, his or her designated agent or an approved agency, and such construction or work shall remain visible and able to be accessed for inspection purposes until *approved*. Approval as a result 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 visible and able to be accessed for inspection purposes. Neither the code official nor the jurisdiction shall be liable for the expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

C105.2 Required inspections. The *code official,* his or her designated agent or an approved agency, upon notification, shall make the inspections set forth in Sections C105.2.1 through C105.2.6.

C105.2.1 Footing and foundation insulation. Inspections shall verify the footing and foundation insulation *R*-value, location, thickness, depth of burial and protection of insulation as required by the code, *approved* plans and specifications.

C105.2.2 Thermal envelope. Inspections shall verify the correct type of insulation, *R*-values, location of insulation, fenestration, *U*-factor, SHGC and VT, and that air leakage controls are properly installed, as required by the code, *approved* plans and specifications.

C105.2.3 Plumbing system. Inspections shall verify the type of insulation, *R*-values, protection required, controls and heat traps as required by the code, *approved* plans and specifications.

C105.2.4 Mechanical system. Inspections shall verify the installed HVAC equipment for the correct type and size, controls, insulation, R-values, system and damper air leakage, minimum fan efficiency, energy recovery and economizer as required by the code, *approved* plans and specifications.

C105.2.5 Electrical system. Inspections shall verify lighting system controls, components, meters, and additional electric infrastructure as required by the code, *approved* plans, and specifications.

C105.2.6 Solar ready. As required by the code, approved plans and specifications, inspections shall verify the location and size of the *solar-ready zone* or the capacity of an installed on-site renewable energy system and the electrical capacity and reserved physical space for circuit breakers in the main electrical service panel that are properly labeled.

R105.2.7 Electric Vehicle Ready. As required by this code, approved plans and specifications, inspections shall verify the EV power transfer infrastructure requirements, the branch circuits, conduit and/or raceway, junction boxes, receptacles and EVSE are properly labeled and installed for each parking space type. The electrical capacity and reserved physical space for circuit breakers in the main electrical service panel are properly labeled, if applicable shall also be verified.

R105.2.8 Electric ready. As required by this code, approved plans and specifications, inspections shall verify the branch circuits, conduit and/or raceways, wiring, junction boxes and receptacles for *future electric equipment* or appliances are properly labeled and installed, as applicable. Reserved physical space for *future electric equipment* or appliances as well as electrical capacity and reserved physical space for circuit breakers in the main electrical service panel are properly labeled shall also be verified.

C105.2.9 Final inspection. The final inspection shall include verification of the installation and proper operation of all required building controls, proper labeling, and documentation verifying activities associated with required *building commissioning* have been conducted in accordance with Section C408.

C105.3 Reinspection. A building shall be reinspected where determined necessary by the *code official*.

C105.4 Approved inspection agencies. The *code official* is authorized to accept reports of third-party inspection agencies not affiliated with the building design or construction, provided that such agencies are *approved* as to qualifications and reliability relevant to the building components and systems that they are inspecting.

C105.5 Inspection requests. It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

C105.6 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

SECTION C106
NOTICE OF APPROVAL

C106.1 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.

C106.2 Revocation. The *code official* is authorized to suspend or revoke, in writing, a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the *building* or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

SECTION C107
VALIDITY

C107.1 General. If a portion of this code is held to be illegal or void, such a decision shall not affect the validity of the remainder of this code.

SECTION C108
REFERENCED STANDARDS

C108.1 Referenced codes and standards. The codes and standards referenced in this code shall be those listed in Chapter 6, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections C108.1.1 and C108.1.2.

C108.1.1 Conflicts. Where conflicts occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

C108.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

C108.2 Application of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

C108.3 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state, or federal law. This code is intended to comply with and be interpreted and enforced so as to comply with 42 U.S.C. Section 6297(f)(3) and any other federal requirements to avoid pre-emption. For purposes of 42 U.S.C. Section 6297(f)(3), "new construction" shall be interpreted to include all work that triggers the requirements established by this code.

SECTION C109
STOP WORK ORDER

C109.1 Authority. Where the *code official* finds any work regulated by this code being performed in a manner contrary to the provisions of this code or in a dangerous or unsafe manner, the *code official* is authorized to issue a stop work order.

C109.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property, the owner's authorized agent, or the person performing the work. Upon

issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work is authorized to resume.

C109.3 Emergencies. Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work.

C109.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to fines established by the authority having jurisdiction.

SECTION C110
BOARD OF BUILDING APPEALS

C110.1 General. Appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code, shall be heard by the board of building appeals established under Section 2-3-4, "Board of Building Appeals," B.R.C. 1981, unless the city manager determines that, due to the nature of the issues in a particular appeal, to appoint a hearing officer under Section 1-3-5, "Hearings and Determinations," B.R.C. 1981.

C110.2 Limitations on authority. An application for appeal shall be based on a claim that the provisions of this code or the rules legally adopted thereunder have been incorrectly interpreted or applied or that an equally good or better material, design, or method of construction is proposed. The board or hearing officer has no authority to waive the requirements of this code.

C110.3 Application. Application for appeal must be filed in writing with the city manager within fourteen days after the date of refusal of the building permit or refusal of approval of the work performed under the permit or revocation or suspension of the building permit or certificate of occupancy or certificate of completion stating the basis for appeal.

C110.4 Fee. An applicant for an appeal shall pay the fee prescribed by Section 4-20-47, "Zoning Adjustment and Building Appeals Filing Fees," B.R.C. 1981. The fee for an appeal heard by a hearing officer shall be the same as the fee for an appeal heard by the board of building appeals.

SECTION C111
VIOLATIONS

C111.1 General. The provisions for violations set forth in Chapter 1 of the City of Boulder Building Code as part of Chapter 10-5, "Building Code," B.R.C 1981, shall apply to violations of this code.

CHAPTER 2 [CE]
DEFINITIONS

User note:

About this chapter: *Codes, by their very nature, are technical documents. Every word, term and punctuation mark can add to or change the meaning of a technical requirement. It is necessary to maintain a consensus on the specific meaning of each term contained in the code. Chapter 2 performs this function by stating clearly what specific terms mean for the purposes of the code.*

SECTION C201
GENERAL

C201.1 Scope. Unless stated otherwise, the following words and terms in this code shall have the meanings indicated in this chapter and Section R202 when applicable.

C201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural includes the singular.

C201.3 Terms defined in other codes. Terms that are not defined in this code but are defined in the *International Building Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code* or the *International Residential Code* shall have the meanings ascribed to them in those codes.

C201.4 Terms not defined. Terms not defined by this chapter shall have ordinarily accepted meanings such as the context implies.

SECTION C202
GENERAL DEFINITIONS

ABOVE-GRADE WALL. See "Wall, above-grade."

ACCESS (TO). That which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel, or similar obstruction.

ADDITION. An extension or increase in the *conditioned space* floor area, number of stories or height of a building or structure.

AIR BARRIER. One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies.

AIR CURTAIN. A device, installed at the building entrance, generates, and discharges a laminar air stream intended to prevent the infiltration of external, unconditioned air into the conditioned spaces, or the loss of interior, conditioned air to the outside.

ALL-ELECTRIC. Refers to an energy source for a system, appliance or piece of equipment that is fueled by electricity.

ALL-ELECTRIC BUILDING. A building that uses a permanent supply of electricity as the source of energy for all space heating, water heating (including pools and spas), cooking appliances, and clothes drying appliances, and has no natural gas, propane or fuel-oil plumbing installed in the building.

ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.

ALTERATION, LEVEL 1. An *alteration* that includes the removal and replacement or the covering of existing materials, elements, equipment or fixtures using new materials, elements, equipment or fixtures that serve the same purpose.

ALTERATION, LEVEL 2. An *alteration* that includes the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment.

ALTERATION, LEVEL 3. An *alteration* where the work exceeds 50 percent of the building floor area.

APPROVED. Acceptable to the code official.

APPROVED AGENCY. An established and recognized agency that is regularly engaged in conducting tests or furnishing inspection services, or furnishing product certification, where such agency has been approved by the *code official*.

AUTOMATIC. Self-acting, operating by its own mechanism when actuated by some impersonal influence, such as, for example, a change in current strength, pressure, temperature or mechanical configuration (see "Manual").

BELOW-GRADE WALL. See "Wall, below-grade."

BIOGAS. A mixture of hydrocarbons that is a gas at 60°F (15.5°C) and 1 atmosphere of pressure that is produced through the anaerobic digestion of organic matter.

BIOMASS. Nonfossilized and biodegradable organic material originating from plants, animals and/or microorganisms, including products, by-products, residues and waste from agriculture, forestry, and related industries as well as the nonfossilized and biodegradable organic fractions of industrial and municipal wastes, including gases and liquids recovered from the decomposition of nonfossilized and biodegradable organic material.

BOILER, MODULATING. A boiler that is capable of more than a single firing rate in response to a varying temperature or heating load.

BOILER SYSTEM. One or more boilers, their piping and controls that work together to supply steam or hot water to heat output devices remote from the boiler.

BUBBLE POINT. The refrigerant liquid saturation temperature at a specified pressure.

BUILDING. Any structure used or intended for supporting or sheltering any use or occupancy, including any mechanical systems, service water heating systems and electric power and lighting systems located on the building site and supporting the building.

BUILDING COMMISSIONING. A process that verifies and documents that the selected building systems have been designed, installed, and function according to the owner's project requirements and construction documents, and to minimum code requirements.

BUILDING ENTRANCE. Any door, set of doors, doorway, or other form of portal that is used to gain access to the building from the outside by the public.

BUILDING SITE. A contiguous area of land that is under the ownership or control of one entity.

BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, floors, ceilings, roofs and any other building element assemblies that enclose conditioned space or provide a boundary between conditioned space and exempt or unconditioned space.

CAPTIVE KEY OVERRIDE. A lighting control that will not release the key that activates the override when the lighting is on.

CAVITY INSULATION. Insulating material located between framing members.

***C*-FACTOR (THERMAL CONDUCTANCE).** The coefficient of heat transmission (surface to surface) through a building component or assembly, equal to the time rate of heat flow per unit area and the unit temperature difference between the warm side and cold side surfaces (Btu/h • ft^2 • °F) [W/(m^2 • K)].

CHANGE OF OCCUPANCY. A change in the use of a building or a portion of a building that results in any of the following:

1. A *change of occupancy* classification.
2. A change from one group to another group within an occupancy classification.
3. Any change in use within a group for which there is a change in the application of the requirements of this code.

CHIEF BUILDING OFFICIAL. The authority responsible for the administration and enforcement of building codes as well as interpretation of policy and procedure as adopted by the city; head code official.

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to the fixture supply and back to the water-heating equipment.

CLIMATE ZONE. A geographical region based on climatic criteria as specified in this code.

CODE OFFICIAL. The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

COEFFICENT OF PERFORMANCE (COP) – COOLING. The ratio of the rate of heat removal to the rate of energy input, in consistent units, for a complete refrigerating system or some specific portion of that system under designated operating conditions.

COEFFICIENT OF PERFORMANCE (COP) – HEATING. The ratio of the rate of heat delivered to the rate of energy input, in consistent units, for a complete heat pump system, including the compressor and, if applicable, auxiliary heat, under designated operating conditions.

COMBUSTION EQUIPMENT. Any equipment or appliances used for space heating, cooling, water heating (including pools and spas), cooking, clothes drying or lighting that uses natural gas, propane, other fuel gas, or fuel oil.

COMMERCIAL BUILDING. For this code, all buildings that are not included in the definition of "Residential building."

COMMISSIONING. See *building commissioning*.

COMPUTER ROOM. A room whose primary function is to house equipment for the processing and storage of electronic data which has a design total information technology equipment (ITE) equipment power density greater than or equal to 20 watts per square foot (20 watts per 0.092 m^2) of conditioned area or a design total ITE equipment load less than or equal to 10 kW.

CONDENSING UNIT. A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. The unit consists of one or more refrigerant compressors, refrigerant condensers (air-cooled, evaporatively cooled, or water-cooled), condenser fans and motors (where used) and factory-supplied accessories.

CONDITIONED FLOOR AREA. The horizontal projection of the floors associated with the *conditioned space*.

CONDITIONED SPACE. An area, room or space that is enclosed within the building thermal envelope and is directly or indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors or ceilings, or where they contain uninsulated ducts, piping or other sources of heating or cooling.

CONSTRUCTION VALUATION. The total value of work requiring building, mechanical, plumbing and electrical permits; to be determined consistent with the standards of Subsection 4-20-4(d), B.R.C. 1981. The higher of the two valuations considered under Subsection 4-20-4(d), B.R.C. 1981, shall be the total value of work.

CONTINUOUS INSULATION (ci). Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.

CRAWL SPACE WALL. The opaque portion of a wall that encloses a crawl space and is partially or totally below grade.

CURTAIN WALL. Fenestration products used to create an external nonload-bearing wall that is designed to separate the exterior and interior environments.

DATA CENTER. A room or series of rooms that share data center systems, whose primary function is to house equipment for the processing and storage of electronic data and that has a design total ITE equipment power density

exceeding 20 watts per square foot (20 watts per 0.092 m^2) of conditioned area and a total design ITE equipment load greater than 10 kW.

DATA CENTER SYSTEMS. HVAC systems and equipment, or portions thereof, used to provide cooling or ventilation in a data center.

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

DAYLIGHT ZONE. That portion of a building's interior floor area that is illuminated by natural light.

DEMAND CONTROL VENTILATION (DCV). A ventilation system capability that provides for the automatic reduction of outdoor air intake below design rates when the actual occupancy of spaces served by the system is less than design occupancy.

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system where one or more pumps prime the service hot water piping with heated water upon demand for hot water.

DIRECT CURRENT FAST CHARGER (DCFC) EVSE. Equipment capable of fast charging on a 100A or higher 480VAC three-phase branch circuit. AC power is converted into a controlled DC voltage and current within the EVSE that will then directly charge the electric vehicle.

DIRECT DIGITAL CONTROL (DDC). A type of control where controlled and monitored analog or binary data, such as temperature and contact closures, are converted to a digital format for manipulation and calculations by a digital computer or microprocessor, then converted back to analog or binary form to control physical devices.

DUCT. A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.

DUCT SYSTEM. A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling equipment and appliances.

DWELLING UNIT. A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

DWELLING UNIT ENCLOSURE AREA. See "*Testing Unit Enclosure Area*".

DYNAMIC GLAZING. Any fenestration product that has the fully reversible ability to change its performance properties, including *U*-factor, solar heat gain coefficient (SHGC), or visible transmittance (VT).

ECONOMIZER, AIR. A duct and damper arrangement and automatic control system that allows a cooling system to supply outside air to reduce or eliminate the need for mechanical cooling during mild or cold weather.

ECONOMIZER, WATER. A system where the supply air of a cooling system is cooled indirectly with water that is itself cooled by heat or mass transfer to the environment without the use of mechanical cooling.

ELECTRIC VEHICLE (EV). A motorized vehicle registered for on-road use, powered by an electric motor that draws current from rechargeable storage that is charged by being plugged into an electrical source.

ELECTRIC VEHICLE CAPABLE LIGHT SPACE (EV CAPABLE LIGHT SPACE). A designated vehicle parking space that has conduit and/or raceway installed to support future implementation of electric vehicle charging installation and has sufficient physical space adjacent to the existing electrical equipment for future electric upgrades.

ELECTRIC VEHICLE CAPABLE SPACE (EV CAPABLE SPACE). A designated vehicle parking space that has the electric panel capacity and conduit and/or raceway installed to support future implementation of *electric vehicle* charging.

ELECTRIC VEHICLE READY SPACE (EV READY SPACE). A designated vehicle parking space that has the electric panel capacity, raceway wiring, receptacle, and circuit overprotection devices installed to support future implementation of *electrical vehicle* charging.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). An *electric vehicle* charging system or device that is used to provide electricity to a plug-in *electric vehicle* or *plug-in hybrid electric vehicle*, is designed to ensure that a safe connection has been made between the electrical grid and the vehicle, and is able to communicate with the vehicle's control system so that electricity flows at an appropriate voltage and current level.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) INSTALLED SPACE. A vehicle parking space that is provided with a dedicated EVSE connection and a circuit capable of supplying a minimum current of 40 amps at 208/ 220 volt.

ENCLOSED SPACE. A volume surrounded by solid surfaces such as walls, floors, roofs, and openable devices such as doors and operable windows.

ENERGY ANALYSIS. A method for estimating the annual energy use of the *proposed design* and *standard reference design* based on estimates of energy use.

ENERGY COST. The total estimated annual cost for purchased energy for the building functions regulated by this code, including applicable demand charges.

ENERGY IMPACT OFFSET FUND. A city-approved and city-managed offset fund providing a payment option in lieu of complying with city program renewable energy and/or offset requirements.

ENERGY RECOVERY VENTILATION SYSTEM. Systems that employ air-to-air heat exchangers to recover energy from exhaust air for the purpose of preheating, precooling, humidifying or dehumidifying outdoor ventilation air prior to supplying the air to a space, either directly or as part of an HVAC system.

ENERGY SIMULATION TOOL. An *approved* software program or calculation-based methodology that projects the annual energy use of a building.

ENTHALPY RECOVERY RATIO. Change in the enthalpy of the *outdoor air* supply divided by the difference

between the *outdoor air* and entering exhaust air enthalpy, expressed as a percentage.

ENTRANCE DOOR. A vertical fenestration product used for occupant ingress, egress and access in nonresidential buildings, including, but not limited to, exterior entrances utilizing latching hardware and automatic closers and containing over 50 percent glazing specifically designed to withstand heavy-duty usage.

EQUIPMENT POWER DENSITY (EPD). The power per unit area of equipment serving plug and process loads of the building or space, expressed in W/ft^2 of building gross floor area.

EQUIPMENT ROOM. A space that contains either electrical equipment, mechanical equipment, machinery, water pumps or hydraulic pumps that are a function of the building's services.

EXTERIOR WALL. Walls including both above-grade walls and basement walls.

FAN, EMBEDDED. A fan that is part of a manufactured assembly where the assembly includes functions other than air movement.

FAN ARRAY. Multiple fans in parallel between two plenum sections in an air distribution system.

FAN BRAKE HORSEPOWER (BHP). The horsepower delivered to the fan's shaft. Brake horsepower does not include the mechanical drive losses such as that from belts and gears.

FAN ENERGYH INDEX (FEI). The ratio of the electrical input power of a reference fan to the electric input power of the actual fan as calculated in accordance with AMCA 208.

FAN NAMEPLATE ELECTRICAL INPUT POWER. The nominal electrical input power rating stamped on a fan assembly nameplate.

FAN SYSTEM BHP. The sum of the fan brake horsepower of all fans that are required to operate at fan system design conditions to supply air from the heating or cooling source to the *conditioned spaces* and return it to the source or exhaust it to the outdoors.

FAN SYSTEM DESIGN CONDITIONS. Operating conditions that can be expected to occur during normal system operation that result in the highest supply fan airflow rate to conditioned spaces served by the system, other than during air economizer operation.

FAN SYSTEM ELECTRICAL INPUT POWER. The sum of the fan electrical power of all fans that are required to operate at fan system design conditions to supply air from the heating or cooling source to the conditioned spaces and/or return it to the source or exhaust it to the outdoors.

FAN SYSTEM MOTOR NAMEPLATE HP. The sum of the motor nameplate horsepower of all fans that are required to operate at design conditions to supply air from the heating or cooling source to the *conditioned spaces* and return it to the source or exhaust it to the outdoors.

FAULT DETECTION AND DIAGNOSTICS (FDD) SYSTEM. A software platform that utilizes building analytic algorithms to convert data provided by sensors and devices to automatically identify faults in building systems and provide a prioritized list of actionable resolutions to those faults based on cost or energy avoidance, comfort, and maintenance impact.

FENESTRATION. Products classified as either skylights or vertical fenestration.

Skylights. Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal, including unit skylights, tubular daylighting devices and glazing materials in solariums, sunrooms, roofs and sloped walls.

Vertical fenestration. Windows that are fixed or operable, opaque doors, glazed doors, glazed block and combination opaque and glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of not less than 60 degrees (1.05 rad) from horizontal.

FENESTRATION PRODUCT, FIELD-FABRICATED. A fenestration product whose frame is made at the construction site of standard dimensional lumber or other materials that were not previously cut, or otherwise formed with the specific intention of being used to fabricate a fenestration product or exterior door. Field fabricated does not include site-built fenestration.

FENESTRATION PRODUCT, SITE-BUILT. A fenestration designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory- formed framing and glazing units. Examples of site-built fenestration include storefront systems, curtain walls, and atrium roof systems.

***F*-FACTOR.** The perimeter heat loss factor for slab-on-grade floors (Btu/h • ft • °F) [W/(m • K)].

FLOOR AREA, NET. The actual occupied area not including unoccupied accessory areas such as corridors, stairways, toilet rooms, mechanical rooms and closets.

GENERAL LIGHTING. Interior lighting that provides a substantially uniform level of illumination throughout a space.

GREENHOUSE. A structure or a thermally isolated area of a building that maintains a specialized sunlit environment exclusively used for, and essential to, the cultivation, protection or maintenance of plants. *Greenhouses* are those that are erected for a period of 180 days or more.

GROUP R. Buildings or portions of buildings that contain any of the following occupancies as established in the *International Building Code*:

1. *Group R*-1.
2. *Group R*-2 where located more than three stories in height above grade plane.
3. *Group R*-4 where located more than three stories in height above grade plane.

HEAT TRAP. An arrangement of piping and fittings, such as elbows, or a commercially available heat trap that prevents thermosyphoning of hot water during standby periods.

HEATED SLAB. Slab-on-grade construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under, the slab.

HIGH-END TRIM. Also known as "Task Tuning", this is a strategy that utilizes the built-in dimming features found in the majority of LED lighting to allow for customization of light level to match the task needs of the occupant preferences.

HIGH SPEED DOOR. A nonswinging door used primarily to facilitate vehicular access or material transportation, with a minimum opening rate of 32 inches (813 mm) per second, a minimum closing rate of 24 inches (610 mm) per second and that includes an automatic-closing device.

HISTORIC BUILDING, DESIGNATED. Any building or structure that is locally designated by ordinance as an individual landmark or recognized as a contributing resource within a historic district.

HORTICULTURAL LIGHTING. Electric lighting used for horticultural production, cultivation or maintenance.

IEC DESIGN H MOTOR. An electric motor that meets all of the following:

1. It is an induction motor designed for use with three-phase power.
2. It contains a cage rotor.
3. It is capable of direct-on-line starting.
4. It has four, six or eight poles.
5. It is rated from 0.4 kW to 1600 kW at a frequency of 60 hertz.

IEC DESIGN N MOTOR. An electric motor that meets all of the following:

1. It is an induction motor designed for use with three-phase power.
2. It contains a cage rotor.
3. It is capable of direct-on-line starting.
4. It has two, four, six or eight poles.
5. It is rated from 0.4 kW to 1600 kW at a frequency of 60 hertz.

INDUSTRY-WIDE TYPE III ENVIRONMENTAL PRODUCT DECLARATION (IW-EPD). Type III environmental product declaration (EPD) that estimates the average global warming potential of a specific product within an industry. Complies with the goal and scope for the production stage of at least cradle-to-gate in accordance with ISO Standards 14025 and 21930 and be available in a publicly accessible database. The EPD results represent production weighted average data across multiple manufacturers.

INFILTRATION. The uncontrolled inward air leakage into a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.

INFORMATION TECHNOLOGY EQUIPMENT (ITE). Items including computers, data storage devices, servers and network and communication equipment.

INTEGRATED PART LOAD VALUE (IPLV). A single-number figure of merit based on part-load EER, COP or kW/ton expressing part-load efficiency for air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for equipment.

INTEGRATED CURTAIN SYSTEM. A system consisting of movable panels of fabric or plastic film used to cover and uncover the space enclosed in a greenhouse on a daily basis.

ISOLATION DEVICES. Devices that isolate HVAC zones so that they can be operated independently of one another. *Isolation devices* include separate systems, isolation dampers, and controls providing shutoff at terminal boxes.

LABELED. Equipment, materials or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, approved agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

LARGE DIAMETER CEILING FAN. A ceiling fan that is greater than 7 feet (2134 mm) in diameter. These fans are sometimes referred to as High-Volume, Low-Speed (HVLS) fans.

LINER SYSTEM (Ls). A system that includes the following:

1. A continuous vapor barrier liner membrane that is installed below the purlins and that is uninterrupted by framing members.
2. An uncompressed, unfaced insulation resting on top of the liner membrane and located between the purlins.

For multilayer installations, the last rated *R*-value of insulation is for unfaced insulation draped over purlins and then compressed when the metal roof panels are attached.

LISTED. Equipment, materials, products or services included in a list published by an organization acceptable to the *code official* and concerned with evaluation of products or services that maintains periodic inspection of production of *listed* equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

LOW-SLOPED ROOF. A roof having a slope less than 2 units vertical in 12 units horizontal.

LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMER. A transformer that is air-cooled, does not use oil as a coolant, has an input voltage less than or equal to 600 volts and is rated for operation at a frequency of 60 hertz.

LUMINAIRE-LEVEL LIGHTING CONTROLS. A lighting system consisting of one or more luminaires with em-bedded lighting control logic, occupancy and ambient light sensors, wireless networking capabilities and local override switching capability, where required.

MANUAL. Capable of being operated by personal intervention (see "Automatic").

MIXED-FUEL BUILDING. A *building* and building site that contains *combustion equipment*, or plumbing for *combustion equipment*, for space heating, cooling, water heating (including pools and spas), cooking, or clothes drying.

NAMEPLATE HORSEPOWER. The nominal motor output power rating stamped on the motor nameplate.

NEMA DESIGN A MOTOR. A squirrel-cage motor that meets all of the following:

1. It is designed to withstand full-voltage starting and develop locked-rotor torque as shown in paragraph 12.38.1 of NEMA MG 1.
2. It has pull-up torque not less than the values shown in paragraph 12.40.1 of NEMA MG 1.
3. It has breakdown torque not less than the values shown in paragraph 12.39.1 of NEMA MG 1.
4. It has a locked-rotor current higher than the values shown in paragraph 12.35.1 of NEMA MG 1 for 60 hertz and paragraph 12.35.2 of NEMA MG 1 for 50 hertz.
5. It has a slip at rated load of less than 5 percent for motors with fewer than 10 poles.

NEMA DESIGN B MOTOR. A squirrel-cage motor that meets all of the following:

1. It is designed to withstand full-voltage starting.
2. It develops locked-rotor, breakdown, and pull-up torques adequate for general application as specified in Sections 12.38, 12.39 and 12.40 of NEMA MG1.
3. It draws locked-rotor current not to exceed the values shown in Section 12.35.1 for 60 hertz and Section 12.35.2 for 50 hertz of NEMA MG1.
4. It has a slip at rated load of less than 5 percent for motors with fewer than 10 poles.

NEMA DESIGN C MOTOR. A squirrel-cage motor that meets all of the following:

1. Designed to withstand full-voltage starting and develop locked-rotor torque for high-torque applications up to the values shown in paragraph 12.38.2 of NEMA MG1 (incorporated by reference, see A§431.15).
2. It has pull-up torque not less than the values shown in paragraph 12.40.2 of NEMA MG1.
3. It has breakdown torque not less than the values shown in paragraph 12.39.2 of NEMA MG1.
4. It has a locked-rotor current not to exceed the values shown in paragraph 12.35.1 of NEMA MG1 for 60 hertz and paragraph 12.35.2 for 50 hertz.
5. It has a slip at rated load of less than 5 percent.

NETWORKED GUESTROOM CONTROL SYSTEM. A control system, with access from the front desk or other central location associated with a *Group R*-1 building, that is capable of identifying the rented and unrented status of each guestroom according to a timed schedule, and is capable of controlling HVAC in each hotel and motel guestroom separately.

NONSTANDARD PART LOAD VALUE (NPLV). A single-number part-load efficiency figure of merit calculated and referenced to conditions other than IPLV conditions, for units that are not designed to operate at AHRI standard rating conditions.

OCCUPANT SENSOR CONTROL. An automatic control device or system that detects the presence or absence of people within an area and causes lighting, equipment or appliances to be regulated accordingly.

ON-SITE RENEWABLE ENERGY. Energy from renewable energy resources harvested at the building project site.

OPAQUE DOOR. A door that is not less than 50-percent opaque in surface area.

PHOTOSYNTHETIC PHOTON EFFICACY (PPE). Photosynthetic photon flux emitted by a light source divided by its electrical input power in units of micromoles per second per watt, or micromoles per joule (µmol/J) between 400-700nm as defined by ANSI/ASABE S640.

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics, and other components, exclusive of tracker, designed to generate DC power.

PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

POWER PURCHACE AGREEMENT (PPA). A contract for the purchase of power and associated renewable energy from a specific renewable energy generator to a purchaser of renewable electricity.

PLUG-IN HYBRID ELECTRIC VEHICLE. An electric vehicle having a second source of motive power.PHOTOSYNTHETIC PHOTON EFFICACY (PPE). Photosynthetic photon flux emitted by a light source divided by its electrical input power in units of micromoles per second per watt, or micromoles per joule (µmol/J) between 400-700nm as defined by ANSI/ASABE S640.

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PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

POWER PURCHACE AGREEMENT (PPA). A contract for the purchase of power and associated renewable energy from a specific renewable energy generator to a purchaser of renewable electricity.

PLUG-IN HYBRID ELECTRIC VEHICLE. An *electric vehicle* having a second source of motive power.

POWERED ROOF/WALL VENTILATORS. A fan consisting of a centrifugal or axial impeller with an integral driver in a weather-resistant housing and with a base designed to fit, usually by means of a curb, over a wall or roof opening.

PROCESS HEAT. The thermal energy used directly in the preparation or production of basic materials and commodities; excludes space and water heating.

PRODUCT-SPECIFIC TYPE III, ENVIRONMENTAL PRODUCT DECLARATION aka EPD. Also known as manufacturer specific EPD. Type III environmental product declaration (EPD) complying with the goal and scope for the production stage of at least cradle-to-gate in accordance with ISO Standards 14025 and 21930 and be available in a publicly accessible database. The data can represent the impacts of a specific design and manufacturers across multiple facilities or be facility specific.

PROPOSED DESIGN. A description of the proposed building used to estimate annual energy use for determining compliance based on total building performance.

RADIANT HEATING SYSTEM. A heating system that transfers heat to objects and surfaces within a conditioned space, primarily by infrared radiation.

READY ACCESS (TO). That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel or similar obstruction.

REFRIGERANT DEW POINT. The refrigerant vapor saturation temperature at a specified pressure.

REFRIGERATED WAREHOUSE COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F (0°C), that can be walked into and has a total chilled storage area of not less than 3,000 square feet (279 m^2).

REFRIGERATED WAREHOUSE FREEZER. An enclosed storage space capable of being refrigerated to temperatures at or below 32°F (0°C), that can be walked into and has a total chilled storage area of not less than 3,000 square feet (279 m^2).

REFRIGERATION SYSTEM, LOW TEMPERATURE. Systems for maintaining food product in a frozen state in refrigeration applications.

REFRIGERATION SYSTEM, MEDIUM TEMPERATURE. Systems for maintaining food product above freezing in refrigeration applications.

REGISTERED DESIGN PROFESSIONAL. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

RENEWABLE ENERGY RESOURCES. Energy derived from solar radiation, wind, waves, tides, landfill gas, biogas, biomass or extracted from hot fluid or steam heated within the earth.

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

REROOFING. The process of recovering or replacing an existing roof covering. See "Roof recover" and "Roof replacement."

RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and townhouses, and *Group* R-3 and R-4 buildings three stories or less in height above grade plane with separate means of egress.

ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof covering, underlayment, roof deck, insulation, vapor retarder and interior finish.

ROOF RECOVER. The process of installing an additional roof covering over an existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purpose of its maintenance.

ROOF REPLACMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

ROOFTOP MONITOR. A raised section of a roof containing vertical fenestration along one or more sides.

***R*-VALUE (THERMAL RESISTANCE).** The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area (h • ft^2 • °F/Btu) [(m^2 • K)/W].

SATURATED CONDENSING TEMPERATURE. The saturation temperature corresponding to the measured refrigerant pressure at the condenser inlet for single component and azeotropic refrigerants, and the arithmetic average of the dew point and *bubble point* temperatures corresponding to the refrigerant pressure at the condenser entrance for zeotropic refrigerants.

SERVICE WATER HEATING. Supply of hot water for purposes other than comfort heating.

SLEEPING UNIT. A room or space in which people sleep, that can include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are part of a dwelling unit are not *sleeping units*.

SMALL ELECTRIC MOTOR. A general purpose, alternating current, single speed induction motor.

SOLAR HEAT GAIN COEFFICIENT (SHGC). The ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation, that is then reradiated, conducted or convected into the space.

SOLAR-READY ZONE. A section or sections of the roof or building overhang designated and reserved for future installation of a solar photovoltaic system or solar thermal system.

STANDARD REFERENCE DESIGN. A version of the *proposed design* that meets the minimum requirements of this code and is used to determine the maximum annual energy use requirement for compliance based on total building performance.

STOREFRONT. A system of doors and windows mulled as a composite fenestration structure that has been designed to resist heavy use. *Storefront* systems include, but are not limited to, exterior fenestration systems that span from the floor level or above to the ceiling of the same story on commercial buildings, with or without mulled windows and doors.

SUBSTANTIAL THERMAL ENVELOPE ALTERATION. An alteration greater than or equal to 50 percent of the building thermal envelope.

SUBSTANTIAL MECHANICAL ALTERATION. An *alteration* in which the *space conditioning equipment* or *service water heating equipment* is replaced.

TESTING UNIT ENCLOSURE AREA. The area sum of all the boundary surfaces that define the *dwelling unit*, *sleeping unit*, or occupiable *conditioned space* including top/ ceiling, bottom/floor, and all side walls. This does not include interior partition walls within the *dwelling unit*, *sleeping unit*, or *occupiable conditioned space*. Wall height shall be measured from the finished floor of the conditioned space to the finished floor or ceiling/roof above if the unit separation walls and corridor wall have blocking above in the ceiling/ roof cavity. If blocking is not present then the wall height shall be measured to the unit ceiling.

THERMAL DISTRIBUTION EFFICIENCY (TDE). The resistance to changes in air heat as air is conveyed through a distance of air duct. TDE is a heat loss calculation evaluating the difference in the heat of the air between the air duct inlet and outlet caused by differences in temperatures between the air in the duct and the duct material. TDE is expressed as a percent difference between the inlet and outlet heat in the duct.

THERMOSTAT. An automatic control device used to maintain temperature at a fixed or adjustable setpoint.

TIME SWITCH CONTROL. An automatic control device or system that controls lighting or other loads, including switching off, based on time schedules.

***U*-FACTOR (THERMAL TRANSMITTANCE).** The coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h • ft^2 • °F) [W/(m^2 • K)].

UNIVERSAL VEHICLE CHARGING SPACES. Parking spaces provided for electric vehicle charging stations that can be utilized for all users and complies with Chapter 11 of the *International Building Code* as amended by the City of Boulder.

VARIABLE REFRIGERANT FLOW SYSTEM. An engineered direct-expansion (DX) refrigerant system that incorporates a common condensing unit, at least one variable-capacity compressor, a distributed refrigerant piping network to multiple indoor fan heating and cooling units each capable of individual zone temperature control, through integral zone temperature control devices and a common communications network. Variable refrigerant flow utilizes three or more steps of control on common interconnecting piping.

VEGETATIVE ROOF. An assembly of interacting components designed to waterproof a building's top surface that includes, by design, vegetation, and related landscape elements.

VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

VENTILATION AIR. That portion of supply air that comes from outside (outdoors) plus any recirculated air that has been treated to maintain the desired quality of air within a designated space.

VISIBLE TRANSMITTANCE [VT]. The ratio of visible light entering the space through the fenestration product assembly to the incident visible light. Visible transmittance includes the effects of glazing material and frame and is expressed as a number between 0 and 1.

VISIBLE TRANSMITTANCE, ANNUAL (VT_{annual}). The ratio of visible light entering the space through the fenestration product assembly to the incident visible light, which includes the effects of glazing material, frame, and light well or tubular conduit, and is expressed as a number between 0 and 1.

VOLTAGE DROP. A decrease in voltage caused by losses in the wiring systems that connect the power source to the load.

WALK-IN COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F (0°C) and less than 55°F (12.8°C) that can be walked into, has a ceiling height of not less than 7 feet (2134 mm) and has a total chilled storage area of less than 3,000 square feet (279 m^2).

WALK-IN FREEZER. An enclosed storage space capable of being refrigerated to temperatures at or below 32°F (0°C) that can be walked into, has a ceiling height of not less than 7 feet (2134 mm) and has a total chilled storage area of less than 3,000 square feet (279 m^2).

WALL, ABOVE-GRADE. A wall associated with the *building thermal envelope* that is more than 15 percent above grade and is on the exterior of the building or any wall that is associated with the *building thermal envelope* that is not on the exterior of the building. This includes, but is not limited to, between-floor spandrels, peripheral edges of floors, roof knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.

WALL, BELOW-GRADE. A wall associated with the basement or first story of the building that is part of the *building thermal envelope*, is not less than 85 percent below grade and is on the exterior of the building.

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

ZONE. A space or group of spaces within a building with heating or cooling requirements that are sufficiently similar so that desired conditions can be maintained throughout using a single controlling device.

CHAPTER 3 [CE]
GENERAL REQUIREMENTS

User note:

About this chapter: *Chapter 3 addresses broadly applicable requirements that would not be at home in other chapters having more specific coverage of subject matter. This chapter contains product rating, marking and installation requirements for materials such as insulation, windows, doors and siding.*

SECTION C301
LOCATION

C301.1 General. This code applies to projects located in the City of Boulder and the City Boulder is located in *Climate Zone* 5B.

SECTION C302
DESIGN CONDITIONS

C302.1 Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

SECTION C303
MATERIALS, SYSTEMS AND EQUIPMENT

C303.1 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

C303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternatively, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown-in or sprayed fiberglass and cellulose insulation, the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. For insulated siding, the *R*-value shall be labeled on the product's package and shall be *listed* on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

Exception: For roof insulation installed above the deck, the *R*-value shall be labeled as required by the material standards specified in Table 1508.2 of the *International Building Code*.

C303.1.1.1 Blown-in or sprayed roof/ceiling insulation. The thickness of blown-in or sprayed fiberglass and cellulose roof/ceiling insulation shall be written in inches (mm) on markers and one or more of such markers shall be installed for every 300 square feet (28 m^2) of attic area throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers not less than 1 inch (25 mm) in height. Each marker shall face the attic *access* opening. Spray polyurethane foam thickness and installed *R*-value shall be *listed* on certification provided by the insulation installer.

C303.1.2 Insulation mark installation. Insulating materials shall be installed such that the manufacturer's *R*-value mark is readily observable upon inspection. For insulation materials that are installed without an observable manufacturer's R-value mark, such as blown or draped products, an insulation certificate complying with Section C303.1.1 shall be left immediately after installation by the installer, in a conspicuous location within the building, to certify the installed R-value of the insulation material.

C303.1.3 Fenestration product rating. *U*-factors of fenestration products shall be determined as follows:

1. For windows, doors and skylights, *U*-factor ratings shall be determined in accordance with NFRC 100.
2. Where required for garage doors and rolling doors, *U*-factor ratings shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

U-factors shall be determined by an accredited, independent laboratory, and *labeled* and certified by the manufacturer.

Products lacking such a *labeled U*-factor shall be assigned a default *U*-factor from Table C303.1.3(1) or C303.1.3(2). The solar heat gain coefficient (SHGC) and

TABLE C303.1.3(1)
DEFAULT GLAZED WINDOW, GLASS DOOR, AND SKYLIGHT *U*-FACTORS

FRAME TYPE	WINDOW AND GLASS DOOR		SKYLIGHT	
	Single	Double	Single	Double
Metal	1.20	0.80	2.00	1.30
Metal with Thermal Break	1.10	0.65	1.90	1.10
Nonmetal or Metal Clad	0.95	0.55	1.75	1.05
Glazed Block	0.60			

TABLE C303.1.3(2)
DEFAULT OPAQUE DOOR *U*-FACTORS

DOOR TYPE	OPAQUE *U*-FACTOR
Uninsulated Metal	1.20
Insulated Metal (Rolling)	0.90
Insulated Metal (Other)	0.60
Wood	0.50
Insulated, nonmetal edge, max 45% glazing, any glazing double pane	0.35

TABLE C303.1.3(3)
DEFAULT GLAZED FENESTRATION SHGC AND VT

	SINGLE GLAZED		DOUBLE GLAZED		GLAZED BLOCK
	Clear	Tinted	Clear	Tinted	
SHGC	0.8	0.7	0.7	0.6	0.6
VT	0.6	0.3	0.6	0.3	0.6

visible transmittance (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and *labeled* and certified by the manufacturer. Products lacking such a *labeled* SHGC or VT shall be assigned a default SHGC or VT from Table C303.1.3(3).

C303.1.4 Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (CFR Title 16, Part 460) in units of h • ft^2 • °F/Btu at a mean temperature of 75°F (24°C).

C303.1.4.1 Insulated siding. The thermal resistance (*R*-value) of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's instructions.

C303.2 Installation. Materials, systems and equipment shall be installed in accordance with the manufacturer's recommended installation instructions and the *International Building Code*.

C303.2.1 Protection of exposed foundation insulation. Insulation applied to the exterior of basement walls, crawl space walls and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend not less than 6 inches (153 mm) below grade.

C303.2.2 Multiple layers of continuous insulation board. Where two or more layers of continuous insulation board are used in a construction assembly, the continuous insulation boards shall be installed in accordance with Section C303.2. Where the continuous insulation board manufacturer's instructions do not address installation of two or more layers, the edge joints between each layer of continuous insulation boards shall be staggered.

CHAPTER 4 [CE]
COMMERCIAL ENERGY EFFICIENCY

User note:

About this chapter: *Chapter 4 presents the paths and options for compliance with the energy efficiency provisions. Chapter 4 contains energy efficiency provisions for the building envelope, mechanical and service water-heating systems, lighting, and other conservation requirements that reduce carbon emission overall. A prescriptive alternative is also provided for projects meeting the required criteria.*

SECTION C401
GENERAL

C401.1 Scope. The provisions in this chapter are applicable to commercial *buildings* and their *building sites.*

C401.2 Application. Commercial buildings shall comply with the requirements of Section C407. New buildings with a construction valuation less than $500,000 may alternatively follow the Prescriptive Pathway which requires compliance with Sections C401, C402, C403, C404, C405, C406, Table C407.2 and Section C408.

C401.2.1 Core and shell buildings. Commercial core and shell buildings may take credit for energy efficiency that is part of the future interior tenant finish design, provided that the efficiency measures are shown on the final tenant build-out drawings. A Letter of Completion shall be issued upon completion of the core and shell building. A permanent certificate of occupancy shall be issued once the tenant build out is completed and any tenant finishes that were credited towards the building's efficiency requirements are complete.

C401.3 Existing buildings. Alterations, repairs, additions, and changes of use to existing buildings shall comply with the requirements of Chapter 5 of this code.

C401.4 Thermal envelope certificate. A permanent thermal envelope certificate shall be completed by an *approved* party. Such certificate shall be posted on a wall in the space where the space conditioning equipment is located, a utility room or other *approved* location. If located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. A copy of the certificate shall also be included in the construction files for the project. The certificate shall include the following:

1. R-values of insulation installed in or on ceilings, roofs, walls, foundations and slabs, basement walls, crawl space walls and floor and ducts outside *conditioned spaces*.
2. U-factors and *solar heat gain coefficients (SHGC)* of fenestrations.
3. Results from any *building* envelope air leakage testing performed on the building.

Where there is more than one value for any component of the building envelope, the certificate shall indicate the area-weighted average value where available. If the area-weighted average is not available, the certificate shall list each value that applies to 10 percent or more of the total component area.

SECTION C402
BUILDING ENVELOPE REQUIREMENTS

C402.1 General. Building thermal envelope assemblies for buildings that are intended to comply with the code on a prescriptive basis in accordance with the prescriptive compliance path described in Section C401.2, shall comply with the following:

1. The opaque portions of the building thermal envelope shall comply with the specific insulation requirements of Section C402.2 and the thermal requirements of either the *R*-value-based method of Section C402.1.3; the *U*-, *C*- and *F*-factor-based method of Section C402.1.4; or the component performance alternative of Section C402.1.5.
2. Fenestration in building envelope assemblies shall comply with Section C402.4.
3. Air leakage of building envelope assemblies shall comply with Section C402.5.

Alternatively, where buildings have a vertical fenestration area or skylight area exceeding that allowed in Section C402.4, the building shall comply with Section C407.

Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C403.11.

C402.1.1 Low-energy buildings and greenhouses. The following low- energy buildings, or portions thereof separated from the remainder of the building by *building thermal envelope* assemblies complying with this section, shall be exempt from the *building thermal envelope* provisions of Section C402.

1. Those with a peak design rate of energy usage less than 3.4 Btu/h • ft^2 (10.7 W/m^2) or 1.0 watt per square foot (10.7 W/m^2) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.

C402.1.1.1 Greenhouses. Greenhouse structures or areas that are mechanically heated or cooled and that comply with all of the following shall be exempt from the building envelope requirements of this code:

1. Exterior opaque envelope assemblies comply with Sections C402.2 and C402.4.5.

Exception: Low energy greenhouses that comply with Section C402.1.1.

2. Interior partition *building thermal envelope* assemblies that separate the greenhouse from *conditioned space* comply with Sections C402.2, C402.4.3 and C402.4.5.
3. Fenestration assemblies that comply with the thermal envelope requirements in Table C402.1.1.1. The *U-factor* for a roof shall be for the roof assembly of a roof that includes the assembly and an internal curtain system.

Exception: Unconditioned greenhouses.

TABLE C402.1.1.1
FENESTRATION THERMAL ENVELOPE MAXIMUM REQUIREMENTS

COMPONENT	U-FACTOR (BTU/h × ft² × °F)
Skylight	0.5
Vertical Fenestration	0.7

C402.1.2 Equipment buildings. Buildings that comply with the following shall be exempt from the *building thermal envelope* provisions of this code:

1. Are separate buildings with floor area not more than 1,200 square feet (110 m^2).
2. Are intended to house electric equipment with installed equipment power totaling not less than 7 watts per square foot (75 W/m^2) and not intended for human occupancy.
3. Have a heating system capacity not greater than (17,000 Btu/h) (5 kW) and a heating thermostat setpoint that is restricted to not more than 50°F (10°C).
4. Have an average wall and roof *U*-factor less than 0.120.

C402.1.3 Insulation component *R*-value-based method. *Building thermal envelope* opaque assemblies shall comply with the requirements of Sections C402.2 and C402.4. For opaque portions of the *building thermal envelope* intended to comply on an insulation component *R-value* basis, the *R*-values for cavity insulation and continuous insulation shall be not less than that specified in Table C402.1.3. Where cavity insulation is installed in multiple layers, the cavity insulation R-values shall be summed to determine compliance with the cavity insulation R-value requirements. Where continuous insulation is installed in multiple layers, the continuous insulation R-values shall be summed to determine compliance with the continuous insulation R-value requirements. Cavity insulation R-values shall not be used to determine compliance with the continuous insulation R-value requirements in Table C402.1.3. Commercial buildings or portions of commercial buildings enclosing *Group R* occupancies shall use the *R*-values from the "*Group R*" column of Table C402.1.3. Commercial buildings or portions of commercial buildings enclosing occupancies other than *Group R* shall use the *R*-values from the "All other" column of Table C402.1.3.

C402.1.4 Assembly *U*-factor, *C*-factor, or *F*-factor-based method. Building thermal envelope opaque assemblies shall meet the requirements of Sections C402.2 and C402.4. Building thermal envelope opaque assemblies intended to comply on an assembly *U*-, *C*- or *F*-factor basis shall have a *U*-, *C*- or *F*-factor not greater than that specified in Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing *Group R* occupancies shall use the *U*-, *C*- or *F*-factor from the "*Group R*" column of Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing occupancies other than *Group R* shall use the *U*-, *C*- or *F*-factor from the "All other" column of Table C402.1.4

TABLE C402.1.3
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, *R*-VALUE METHOD[a]

	ALL OTHER	GROUP R
Roofs		
Insulation entirely above roof deck	R-33ci	R-33ci
Metal buildings[b]	R-19 + R-11 LS	R-19 + R-11 LS
Attic and other	R-53	R-53
Walls, above grade		
Mass[g]	R-13.3ci	R-13.3ci
Metal building	R-13 + R-19.5ci	R-13 + R-13ci
Metal framed	R-13 + R-11ci	R-13 + R-11ci
Wood framed and other	R-13 + R-9ci or R-19 + R-5ci	R-13 + R-9ci or R-19 + + R-5ci
Walls, below grade		
Below-grade wall[d]	R-7.5ci	R-10ci
Floors		
Mass[e]	R-15ci	R-16.7ci
Joist/framing	R-30	R-30
Slab-on-grade floors		
Unheated slabs	R-15 for 24″ below	R-15 for 24″ below
Heated slabs[h]	R-20 for 48″ below + R-5 full slab	R-20 for 48″ below + R-5 full slab

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3.

ci = Continuous insulation, NR = No Requirement, LS = Liner System.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA 90.1 Appendix A.
b. Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.4.
c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f^2 °F.
d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
e. "Mass floors" shall be in accordance with Section C402.2.3.
f. Steel floor joist systems shall be insulated to R-38.
g. "Mass walls" shall be in accordance with Section C402.2.2.
h. The first value is for perimeter insulation and the second value is for full, under-slab insulation. Perimeter insulation is not required to extend below the bottom of the slab.

C402.1.4.1 Roof/ceiling assembly. The maximum roof/ceiling assembly U-factor shall not exceed that specified in Table C402.1.4 based on construction materials used in the roof/ceiling assembly.

C402.1.4.1.1 Tapered, above-deck insulation based on thickness. Where used as a component of maximum roof/ ceiling assembly U-factor calculation, the sloped roof insulation R-value contribution to that calculation shall use the average thickness in inches (mm) along with the material R-value-per-inch (per-mm) solely for U-factor compliance as prescribed in Section C402.1.4.

C402.1.4.1.2 Suspended ceilings. Insulation installed on suspended ceilings having removable ceiling tiles shall not be considered part of the assembly U-factor of the roof/ceiling construction.

C402.1.4.1.3 Joints staggered. Continuous insulation board shall be installed in not less than two layers, and the edge joints between each layer of insulation shall be staggered, except where insulation tapers to the roof deck at a gutter edge, roof drain or scupper.

TABLE C402.1.4
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, *U*-FACTOR METHOD[a, b]

	ALL OTHER	GROUP R
Roofs		
Insulation entirely above roof deck	U-0.030	U-0.030
Metal buildings	U-0.035	U-0.035
Attic and other	U-0.020	U-0.020
Walls, above grade		
Mass[f]	U-0.086	U-0.076
Metal building	U-0.048	U-0.048
Metal framed	U-0.052	U-0.052
Wood framed and other[c]	U-0.048	U-0.042
Walls, below grade		
Below-grade wall[c]	C-0.119	C-0.092
Floors		
Mass[d]	U-0.057	U-0.051
Joist/framing	U-0.033	U-0.033
Slab-on-grade floors		
Unheated slabs	F-0.52	F-0.51
Heated slabs[e]	F-0.62	F-0.62
Opaque doors		
Nonswinging door[h]	U-0.31	U-0.31
Swinging door	U-0.37	U-0.37

For SI: 1 pound per square foot = 4.88 kg/m^2, 1 pound per cubic foot = 16 kg/m^3.
ci = Continuous insulation, NR = No Requirement, LS = Liner System.

a. Where assembly *U*-factors, *C*-factors, and *F*-factors are established in ANSI/ASHRAE/IESNA 90.1 Appendix A, such opaque assemblies shall be a compliance alternative where those values meet the criteria of this table, and provided that the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ ASHRAE/ISNEA 90.1 Appendix A.

b. Where *U*-factors have been established by testing in accordance with ASTM C1363, such opaque assemblies shall be a compliance alternative where those values meet the criteria of this table. The *R*-value of continuous insulation shall be permitted to be added to or subtracted from the original tested design.

c. Where heated slabs are below grade, below-grade walls shall comply with the *U*-factor requirements for above-grade mass walls.

d. "Mass floors" shall be in accordance with Section C402.2.3.

e. The first value is for perimeter insulation and the second value is for full under-slab insulation.

f. "Mass walls" shall be in accordance with Section C402.2.2.

g. Swinging door U-factors shall be determined in accordance with NFRC-100.

h. Garage doors having a single row of fenestration shall have an assembly U-factor less than or equal to 0.44, provided that the fenestration area is not more than 25 percent of the total door area.

C402.1.4.2 Thermal resistance of cold-formed steel walls. *U*-factors of walls with cold-formed steel studs shall be permitted to be determined in accordance with Equation 4-1:

$$U = 1/[R_s + (ER)] \quad \textbf{(Equation 4-1)}$$

where:

R_s = The cumulative *R*-value of the wall components along the path of heat transfer, excluding the *cavity insulation* and steel studs.

ER = The effective *R*-value of the *cavity insulation* with steel studs as specified in Table C402.1.4.2.

C402.1.5 Component performance alternative. Building envelope values and fenestration areas determined in accordance with Equation 4-2 shall be an alternative to compliance with the *U*-, *F*- and *C*-factors in Tables C402.1.4 and C402.4 and the maximum allowable fenestration areas in Section C402.4.1. *Fenestration* shall meet the applicable SHGC requirements of Section C402.4.3.

$$A + B + C + D + E \le \text{Zero} \quad \textbf{(Equation 4-2)}$$

where:

A = Sum of the (UA Dif) values for each distinct assembly type of the building thermal envelope, other than slabs on grade and below-grade walls.

UA Dif = UA Proposed - UA Table.

UA Proposed = Proposed *U*-value × Area.

UA Table = (*U*-factor from Table C402.1.3, C402.1.4 or C402.4) × Area.

B = Sum of the (FL Dif) values for each distinct slab-on-grade perimeter condition of the building thermal envelope.

FL Dif = FL Proposed - FL Table.

FL Proposed = Proposed *F*-value × Perimeter length.

FL Table = (*F*-factor specified in Table C402.1.4) × Perimeter length.

C = Sum of the (CA Dif) values for each distinct below-grade wall assembly type of the building thermal envelope.

CA Dif = CA Proposed - CA Table.

CA Proposed = Proposed *C*-value × Area.

CA Table = (Maximum allowable *C*-factor specified in Table C402.1.4) × Area.

Where the proposed vertical glazing area is less than or equal to the maximum vertical glazing area allowed by Section C402.4.1, the value of D (Excess Vertical Glazing Value) shall be zero. Otherwise:

D = (DA × UV) - (DA × U Wall), but not less than zero.

DA = (Proposed Vertical Glazing Area) - (Vertical Glazing Area allowed by Section C402.4.1).

UA Wall = Sum of the (UA Proposed) values for each opaque assembly of the exterior wall.

U Wall = Area-weighted average *U*-value of all above-grade wall assemblies.

UAV = Sum of the (UA Proposed) values for each vertical glazing assembly.

UV = UAV/total vertical glazing area.

Where the proposed skylight area is less than or equal to the skylight area allowed by Section C402.4.1, the value of E (Excess Skylight Value) shall be zero. Otherwise:

E = (EA × US) - (EA × U Roof), but not less than zero.

EA = (Proposed Skylight Area) - (Allowable Skylight Area as specified in Section C402.4.1).

U Roof = Area-weighted average *U*-value of all roof assemblies.

UAS = Sum of the (UA Proposed) values for each skylight assembly.

US = UAS/total skylight area.

C402.2 Specific building thermal envelope insulation requirements. Insulation in building thermal envelope opaque assemblies shall comply with Sections C402.2.1 through C402.2.8 and Table C402.1.3.

C402.2.1 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.1.3, based on construction materials used in the roof assembly.

C402.2.1.1 Tapered, above-deck insulation based on thickness. Where used as a component of a roof/ceiling assembly R-value calculation, the sloped roof insulation R-value contribution to that calculation shall use the average thickness in inches (mm) along with the material R-value-per-inch (per-mm) solely for R-value compliance as prescribed in Section 402.1.3.

C402.2.1.2 Minimum thickness, lowest point. The minimum thickness above-deck roof insulation at its lowest point, gutter edge, roof drain or scupper, shall be not less than 1 inch (25 mm).

C402.2.1.3 Suspended ceilings. Insulation installed on suspended ceilings having removable ceiling tiles shall not be considered part of the minimum thermal resistance (R-value) of roof insulation in roof/ceiling construction.

C402.2.1.4 Joists staggered. Continuous insulation board shall be installed in not less than two layers and the edge joints between each layer of insulation shall be staggered, except where insulation tapers to the roof deck at a gutter edge, roof drain or scupper.

C402.2.1.5 Skylight curbs. Skylight curbs shall be insulated to the level of roofs with insulation entirely above the deck or R-5, whichever is less.

Exception: Unit skylight curbs included as a component of a skylight listed and labeled in accordance with NFRC 100 shall not be required to be insulated.

C402.2.2 Above-grade walls. The minimum thermal resistance (*R*-value) of materials installed in the wall cavity between framing members and continuously on the walls shall be as specified in Table C402.1.3, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units shall not be used in determining compliance with Table C402.1.3 except as otherwise noted in the table. In determining compliance with Table C402.1.4, the use of the *U*-factor of concrete masonry units with integral insulation shall be permitted.

"Mass walls" where used as a component in the thermal envelope of a building shall comply with one of the following:

1. Weigh not less than 35 pounds per square foot (171 kg/m^2) of wall surface area.

TABLE C402.1.4.2
EFFECTIVE *R*-VALUES FOR STEEL STUD WALL ASSEMBLIES

NOMINAL STUD DEPTH (inches)	SPACING OF FRAMING (inches)	CAVITY *R*-VALUE (insulation)	CORRECTION FACTOR (F_c)	EFFECTIVE *R*-VALUE (ER) (Cavity *R*-Value × F_c)
3 1/2	16	13	0.46	5.98
		15	0.43	6.45
3 1/2	24	13	0.55	7.15
		15	0.52	7.80
6	16	19	0.37	7.03
		21	0.35	7.35
6	24	19	0.45	8.55
		21	0.43	9.03
8	16	25	0.31	7.75
	24	25	0.38	9.50

2. Weigh not less than 25 pounds per square foot (122 kg/m^2) of wall surface area where the material weight is not more than 120 pcf (1900 kg/m^3).
3. Have a heat capacity exceeding 7 Btu/ft^2 • °F (144 kJ/m^2 • K).
4. Have a heat capacity exceeding 5 Btu/ft^2 • °F (103 kJ/m^2 • K), where the material weight is not more than 120 pcf (1900 kg/m^3).

C402.2.3 Floors. The thermal properties (component *R*-values or assembly *U*-, *C*- or *F*-factors) of floor assemblies over outdoor air or unconditioned space shall be as specified in Table C402.1.3 or C402.1.4 based on the construction materials used in the floor assembly. Floor framing *cavity insulation* or structural slab insulation shall be installed to maintain permanent contact with the underside of the subfloor decking or structural slabs.

"Mass floors" where used as a component of the thermal envelope of a building shall provide one of the following weights:

1. 35 pounds per square foot (171 kg/m^2) of floor surface area.
2. 25 pounds per square foot (122 kg/m^2) of floor surface area where the material weight is not more than 120 pounds per cubic foot (1923 kg/m^3).

Exceptions:

1. The floor framing *cavity insulation* or structural slab insulation shall be permitted to be in contact with the top side of sheathing or continuous insulation installed on the bottom side of floor assemblies where combined with insulation that meets or exceeds the minimum *R*-value in Table C402.1.3 for "Metal framed" or "Wood framed and other" values for "Walls, Above Grade" and extends from the bottom to the top of all perimeter floor framing or floor assembly members.
2. Insulation applied to the underside of concrete floor slabs shall be permitted an airspace of not more than 1 inch (25 mm) where it turns up and is in contact with the underside of the floor under walls associated with the *building thermal envelope.*

C402.2.4 Slabs-on-grade. The minimum thermal resistance (*R*-value) of the insulation for unheated or heated slab-on-grade floors designed in accordance with the *R*-value method of Section C402.1.3 shall be as specified in Table C402.1.3.

C402.2.4.1 Insulation installation. Where installed, the perimeter insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The perimeter insulation shall extend downward from the top of the slab for the minimum distance shown in the table or to the top of the footing, whichever is less, or downward to not less than the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. Insulation extending away from the building shall be protected by pavement or by not less than of 10 inches (254 mm) of soil. Where installed, full slab insulation shall be continuous under the entire area of the slab-on-grade floor, except at structural column locations and service penetrations. Insulation required at the heated slab perimeter shall not be required to extend below the bottom of the heated slab and shall be continuous with the full slab insulation.

Exception: Where the slab-on-grade floor is greater than 24 inches (61mm) below the finished exterior grade, perimeter insulation is not required.

C402.2.5 Below-grade walls. The *C*-factor for the below-grade exterior walls shall be in accordance with Table C402.1.4. The *R*-value of the insulating material installed continuously within or on the below-grade exterior walls of the building envelope shall be in accordance with Table C402.1.3. The *C*-factor or *R*-value required shall extend to a depth of not less than 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor of the conditioned space enclosed by the below-grade wall, whichever is less.

C402.2.6 Insulation of radiant heating systems. *Radiant heating system* panels, and their associated components that are installed in interior or exterior assemblies shall be insulated to an *R*-value of not less than R-3.5 on all surfaces not facing the space being heated. *Radiant heating system* panels that are installed in the *building thermal envelope* shall be separated from the exterior of the building or unconditioned or exempt spaces by not less than the *R*-value of insulation installed in the opaque assembly in which they are installed or the assembly shall comply with Section C402.1.4.

Exception: Heated slabs on grade insulated in accordance with Section C402.2.4.

C402.2.7 Airspaces. Where the R-value of an airspace is used for compliance in accordance with Section C402.1, the airspace shall be enclosed in an unventilated cavity constructed to minimize airflow into and out of the enclosed airspace. Airflow shall be deemed minimized where the enclosed airspace is located on the interior side of the continuous air barrier and is bounded on all sides by building components.

Exception: The thermal resistance of airspaces located on the exterior side of the continuous air barrier and adjacent to and behind the exterior wall-covering material shall be determined in accordance with ASTM C1363 modified with an airflow entering the bottom and exiting the top of the airspace at an air movement rate of not less than 70 mm/second.

C402.3 Reserved.

C402.4 Fenestration. Fenestration shall comply with Sections C402.4.1 through C402.4.5 and Table C402.4. Daylight responsive controls shall comply with this section and Section C405.2.4.

C402.4.1 Maximum area. The vertical fenestration area, not including opaque doors and opaque spandrel panels, shall be not greater than 30 percent of the gross above-grade wall area. The skylight area shall be not greater than 3 percent of the gross roof area.

TABLE C402.4
BUILDING ENVELOPE FENESTRATION MAXIMUM *U*-FACTOR AND SHGC REQUIREMENTS

VERTICAL FENESTRATION		
***U*-factor for vertical curtain walls, storefronts and site-built fenestration products**		
Fixed fenestration	0.36	
Operable fenestration	0.45	
***U*-factor for entrance doors**		
0.63		
***U*-factor for all other vertical fenestration**		
0.30		
SHGC		
Orientation	Fixed	Operable
PF < 0.2	0.38	0.33
0.2 ≤ PF < 0.5	0.46	0.40
PF ≥ 0.5	0.61	0.53
Skylights		
U-factor	0.50	
SHGC	0.40	

PF = Projection Factor.

C402.4.1.1 Increased vertical fenestration area with daylight responsive controls. Not more than 40 percent of the gross above-grade wall area shall be vertical fenestration, provided that all of the following requirements are met:

1. In buildings not greater than two stories above grade, not less than 50 percent of the net floor area is within a *daylight zone.*
2. In buildings three or more stories above grade, not less than 25 percent of the net floor area is within a *daylight zone.*
3. *Daylight responsive controls* are installed in *daylight zones.*
4. Visible transmittance (VT) of vertical fenestration is not less than 1.1 times solar heat gain coefficient (SHGC).

   Exception: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 4.

C402.4.1.2 Increased skylight area with daylight responsive controls. The skylight area shall be not more than 6 percent of the roof area provided that *daylight responsive controls* are installed in *toplit daylight zones*.

C402.4.2 Minimum skylight fenestration area. Skylights shall be provided in enclosed spaces greater than 2,500 square feet (232 m^2) in floor area, directly under a roof with not less than 75 percent of the ceiling area with a ceiling height greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage space, gymnasium/exercise center, convention center, automotive service area, space where manufacturing occurs, nonrefrigerated warehouse, retail store, distribution/sorting area, transportation depot or workshop. The total *toplit daylight zone* shall be not less than half the floor area and shall comply with one of the following:

1. A minimum skylight area to *toplit daylight zone* of not less than 3 percent where all skylights have a VT of not less than 0.40, or VT_{annual} of not less than 0.26 as determined in accordance with Section C303.1.3.
2. A minimum skylight effective aperture, determined in accordance with Equation 4-3, of:
   2.1. Not less than 1 percent, using a skylight's VT or
   2.2. Not less than 0.66 percent using a Tubular Daylighting Device's VT_{annual} rating.

$$\text{Skylight Effective Aperture} = \frac{0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF}}{\text{Toplit Zone}} \quad \textbf{(Equation 4-3)}$$

where:

Skylight area = Total fenestration area of skylights.

Skylight VT = Area weighted average visible transmittance of skylights.

WF = Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater, or 1.0 for Tubular Daylight Devices with VT_{annual} ratings.

Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exception: Skylights above *daylight zones* of enclosed spaces are not required in:

1. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft^2 (5.4 W/m^2).
2. Areas where it is documented that existing structures or natural objects block direct beam sunlight on not less than half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.
3. Spaces where the *daylight zone* under rooftop monitors is greater than 50 percent of the enclosed space floor area.
4. Spaces where the total area minus the area of sidelit *daylight zones* is less than 2,500 square feet (232 m^2), and where the lighting is controlled in accordance with Section C405.2.4.
5. Spaces designed as storm shelters complying with ICC 500.

C402.4.2.1 Lighting controls in toplit daylight zones. *Daylight responsive controls* shall be provided in *toplit daylight zones*.

C402.4.2.2 Haze factor. Skylights in office, storage, automotive service, manufacturing, nonrefrigerated warehouse, retail store and distribution/sorting area spaces shall have a glazing material or diffuser with a

haze factor greater than 90 percent when tested in accordance with ASTM D1003.

Exception: Skylights and tubular daylighting devices designed and installed to exclude direct sunlight entering the occupied space by the use of fixed or automated baffles, the geometry of skylight and light well or the use of optical diffuser components.

C402.4.3 Maximum *U*-factor and SHGC. The maximum *U*-factor and solar heat gain coefficient (SHGC) for fenestration shall be as specified in Table C402.4.

The window projection factor shall be determined in accordance with Equation 4-4.

$PF = A/B$ **(Equation 4-4)**

where:

PF = Projection factor (decimal).

A = Distance measured horizontally from the farthest continuous extremity of any overhang, eave or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave or permanently attached shading device.

Where different windows or glass doors have different *PF* values, they shall each be evaluated separately.

C402.4.3.1 Increased skylight SHGC. Skylights shall be permitted a maximum SHGC of 0.60 where located above *daylight zones* provided with *daylight responsive controls*.

C402.4.3.2 Increased skylight *U*-factor. Where skylights are installed above *daylight zones* provided with *daylight responsive controls*, a maximum *U*-factor of 0.75 shall be permitted.

C402.4.3.3 Dynamic glazing. Where dynamic glazing is intended to satisfy the SHGC and VT requirements of Table C402.4, the ratio of the higher to lower labeled SHGC shall be greater than or equal to 2.4, and the *dynamic glazing* shall be automatically controlled to modulate the amount of solar gain into the space in multiple steps. Dynamic glazing shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

Exception: Dynamic glazing is not required to comply with this section where both the lower and higher labeled SHGC already comply with the requirements of Table C402.4.

C402.4.3.4 Area-weighted *U*-factor. An area-weighted average shall be permitted to satisfy the *U*-factor requirements for each fenestration product category listed in Table C402.4. Individual fenestration products from different fenestration product categories listed in Table C402.4 shall not be combined in calculating area-weighted average *U*-factor.

C402.4.4 Daylight zones. Daylight zones referenced in Sections C402.4.1.1 through C402.4.3.2 shall comply with Sections C405.2.4.2 and C405.2.4.3, as applicable. Daylight zones shall include *toplit daylight zones* and *sidelit daylight zones*.

C402.4.5 Doors. Opaque swinging doors shall comply with Table C402.1.4. Opaque nonswinging doors shall comply with Table C402.1.4. Opaque doors shall be considered as part of the gross area of above-grade walls that are part of the building thermal envelope. Opaque doors shall comply with Section C402.4.5.1 or C402.4.5.2. Other doors shall comply with the provisions of Section C402.4.3 for vertical fenestration.

C402.4.5.1 Opaque swinging doors. Opaque swinging doors shall comply with Table C402.1.4.

C402.4.5.2 Nonswinging doors. Opaque nonswinging doors that are horizontally hinged sectional doors with a single row of fenestration shall have an assembly U-factor less than or equal to 0.440 provided that the fenestration area is not less than 14 percent and not more than 25 percent of the total door area.

Exception: Other doors shall comply with the provisions of Section C402.4.3 for vertical fenestration.

C402.5 Air leakage—thermal envelope. The *building thermal envelope* shall comply with Sections C402.5.1 through C402.5.9.

C402.5.1 Air barriers. A continuous *air barrier* shall be provided throughout the *building thermal envelope*. The continuous *air barrier* shall be located on the inside or outside of the *building thermal envelope*, located within the assemblies composing the *building thermal envelope*, or any combination thereof. The air barrier shall comply with Sections C402.5.1.1, C402.5.1.2 and C402.5.1.3.

C402.5.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Sealing shall allow for expansion, contraction and mechanical vibration. Joints and seams associated with penetrations shall be sealed in the same manner or taped. Sealing materials shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair the penetrations' ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation. Sealing of concealed fire sprinklers, where required, shall be in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants

shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.

4. Recessed lighting fixtures shall comply with Section C402.5.8. Where similar objects are installed that penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

C402.5.1.2 Building thermal envelope testing. The *building thermal envelope* shall be tested in accordance with ASTM E779, ANSI/RESNET/ICC 380, ASTM E3158 or ASTM E1827 or an equivalent method *approved* by the *code official.* The measured air leakage shall not exceed 0.25 cfm/ft^2 (1.27 L/s • m^2) of the *building thermal envelope* area at a pressure differential of 0.3 inch water gauge (75 Pa). Alternatively, portions of the building shall be tested and the measured air leakages shall be area weighted by the surface areas of the *building thermal envelope* in each portion. The weighted- average test results shall not exceed the whole building leakage limit. In the alternative approach, the following portions of the building shall be tested:

1. The entire envelope area of all stories that have any spaces directly under a roof.
2. The entire envelope area of all stories that have a building entrance, exposed floor or loading dock, or are below grade.
3. Representative above-grade sections of the building totaling at least 25 percent of the wall area enclosing the remaining conditioned space.
4. For R-2 occupancies, *dwelling units* when tested in accordance with Section C402.5.1.3.

Testing and inspection shall be conducted by a third-party *approved agency*. A written report of the test results shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after completion of all penetrations of the *building thermal envelope*.

Exception: Where the measured air leakage rate exceeds 0.25cfm/ft^2 (1.27 L/s × m^2) but does not exceed 0.40 cfm/ft^2 (2.03 L/s × m^2), a diagnostic evaluation using smoke tracer or infrared imaging shall be conducted while the building is pressurized along with a visual inspection of the air barrier. Any leaks noted shall be sealed where such sealing can be made without destruction of existing building components. An additional report identifying the corrective actions taken to seal leaks shall be submitted to the code official and the building owner and shall be deemed to comply with the requirements of this section.

C402.5.1.3 Dwelling and sleeping unit enclosure installation. The components of the *dwelling unit enclosure* as indicated in Table R402.4.1.1 shall be installed in accordance with the manufacturer's installation instructions and the criteria indicated in Table R402.4.1.1, as applicable to the method of construction. The enclosure shall also be tested per section C402.5.1.2 or C402.5.1.4. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

C402.5.1.4 Dwelling and sleeping unit enclosure testing. The dwelling or sleeping unit envelope shall be tested in accordance with ASTM E779, ANSI/RESNET/ICC 380, ASTM E1827 or an equivalent method approved by the code official. The measured air leakage shall not exceed 0.20 cfm/ft^2 (1.02 L/s • m^2) of the testing unit enclosure area at a pressure differential of 0.2-inch water gauge (50Pa). Where multiple dwelling units or sleeping units or other occupiable conditioned spaces are contained within one building thermal envelope, each unit shall be considered an individual testing unit, and the building air leakage shall be the weighted average of all testing unit results, weighted by each unit's enclosure area. Units shall be tested separately with an unguarded blower door test as follows:

1. Where the buildings have fewer than eight testing units, each testing unit shall be tested.
2. For buildings with eight or more testing units, the greater of seven or 20 percent of the testing units in the building shall be tested evenly across all floors and shall encompass each unique unit type in the building. For each unit that exceeds the maximum air leakage rate, an additional two units shall be tested.

C402.5.2 Air leakage of fenestration. The air leakage of fenestration assemblies shall meet the provisions of Table C402.5.2. Testing shall be in accordance with the applicable reference test standard in Table C402.5.2 by an accredited, independent testing laboratory and *labeled* by the manufacturer.

Exceptions:

1. Field-fabricated fenestration assemblies that are sealed in accordance with Section C402.5.1.
2. Fenestration in buildings that comply with the testing alternative of Section C402.5 are not required to meet the air leakage requirements in Table C402.5.2.

C402.5.3 Rooms containing fuel-burning appliances. Where combustion air is supplied through openings in an exterior wall to a room or space containing a space-conditioning fuel-burning appliance, one of the following shall apply:

1. The room or space containing the appliance shall be located outside of the *building thermal envelope*.
2. The room or space containing the appliance shall be enclosed and isolated from conditioned spaces inside the building thermal envelope. Such rooms shall comply with all of the following:

    2.1. The walls, floors and ceilings that separate the enclosed room or space from conditioned spaces shall be insulated to be not less than equivalent to the insulation requirement of below-grade walls as specified in Table C402.1.3 or C402.1.4.

2.2. The walls, floors and ceilings that separate the enclosed room or space from conditioned spaces shall be sealed in accordance with Section C402.5.1.1.

2.3. The doors into the enclosed room or space shall be fully gasketed.

2.4. Water lines and ducts in the enclosed room or space shall be insulated in accordance with Section C403.

2.5. Where an air duct supplying combustion air to the enclosed room or space passes through conditioned space, the duct shall be insulated to an *R*-value of not less than R-8.

Exception: Fireplaces and stoves complying with Sections 901 through 905 of the *International Mechanical Code*, and Section 2111.14 of the *International Building Code*.

TABLE C402.5.2
MAXIMUM AIR LEAKAGE RATE FOR FENESTRATION ASSEMBLIES

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT^2)	TEST PROCEDURE
Windows	0.20 [a]	AAMA/WDMA/ CSA101/I.S.2/A440 or NFRC 400
Sliding doors	0.20 [a]	
Swinging doors	0.20 [a]	
Skylights – with condensation weepage openings	0.30	
Skylights – all other	0.20 [a]	
Curtain walls	0.06	NFRC 400 or ASTM E283 at 1.57 psf (75 Pa)
Storefront glazing	0.06	
Commercial glazed swinging entrance doors	1.00	
Power-operated sliding doors and power-operated folding doors	1.00	
Revolving doors	1.00	
Garage doors	0.40	ANSI/DASMA 105, NFRC 400, or ASTM E283 at 1.57 psf (75 Pa)
Rolling doors	1.00	
High-speed doors	1.30	

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093 m^2.

a. The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of fenestration or door area when tested in accordance with AAMA/WDMA/CSA101/I.S.2/A440 at 6.24 psf (300 Pa).

C402.5.4 Doors and *access* openings to shafts, chutes, stairways and elevator lobbies. Doors and *access* openings from conditioned space to shafts, chutes stairways and elevator lobbies not within the scope of the fenestration assemblies covered by Section C402.5.2 shall be gasketed, weatherstripped or sealed.

Exceptions:

1. Door openings required to comply with Section 716 of the *International Building Code.*
2. Doors and door openings required to comply with UL 1784 by the *International Building Code.*

C402.5.5 Air intakes, exhaust openings, stairways and shafts. Stairway enclosures, elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be provided with dampers in accordance with Section C403.7.7.

C402.5.6 Loading dock weather seals. Cargo door openings and loading door openings shall be equipped with weather seals that restrict infiltration and provide direct contact along the top and sides of vehicles that are parked in the doorway.

C402.5.7 Vestibules. Building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions: Vestibules are not required for the following:

1. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
2. Doors opening directly from a *sleeping unit* or dwelling unit.
3. Doors that open directly from a space less than 3,000 square feet (298 m^2) in area.
4. Revolving doors.
5. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.
6. Doors that have an air curtain with a velocity of not less than 6.56 feet per second (2 m/s) at the floor that have been tested in accordance with ANSI/AMCA 220 and installed in accordance with the manufacturer's instructions. Manual or automatic controls shall be provided that will operate the air curtain with the opening and closing of the door. Air curtains and their controls shall comply with Section C408.2.3.

C402.5.8 Recessed lighting. Recessed luminaires installed in the *building thermal envelope* shall be all of the following:

1. IC-rated.
2. Labeled as having an air leakage rate of not more 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E283 at a 1.57 psf (75 Pa) pressure differential.
3. Sealed with a gasket or caulk between the housing and interior wall or ceiling covering.

C402.5.9 Operable openings interlocking. Where occupancies utilize operable openings to the outdoors that are larger than 40 square feet (3.7 m^2) in area, such openings shall be interlocked with the heating and cooling system so as to raise the cooling setpoint to 90°F (32°C) and lower the heating setpoint to 55°F (13°C) whenever the operable opening is open. The change in heating and cool-

ing setpoints shall occur within 10 minutes of opening the operable opening.

Exceptions:

1. Separately zoned areas associated with the preparation of food that contain appliances that contribute to the HVAC loads of a restaurant or similar type of occupancy.
2. Warehouses that utilize overhead doors for the function of the occupancy, where approved by the *code official*.
3. The first entrance doors where located in the exterior wall and are part of a vestibule system.

C402.5.9.1 Operable Controls. Controls shall comply with Section C403.14.

SECTION C403
BUILDING MECHANICAL SYSTEMS

C403.1 General. Mechanical systems and equipment serving the building's heating, cooling, ventilating or refrigerating needs shall comply with this section.

Exception: Data center systems are exempt from the requirements of Sections C403.4 and C403.5.

C403.1.1 Calculation of heating and cooling loads. Design loads associated with heating, ventilating and air conditioning of the building shall be determined in accordance with ANSI/ASHRAE/ACCA Standard 183 or by an *approved* equivalent computational procedure using the design parameters specified in Chapter 3. Heating and cooling loads shall be adjusted to account for load reductions that are achieved where energy recovery systems are utilized in the HVAC system in accordance with the ASHRAE *HVAC Systems and Equipment Handbook* by an approved equivalent computational procedure.

C403.1.2 Data centers. Data center systems shall comply with Sections 6 and 8 of ASHRAE 90.4 with the following changes:

1. Replace design mechanical load component (MLC) values specified in Table 6.2.1.1 of the ASHRAE 90.4 with maximum 0.23 Design MLC at 100% and at 50% ITE load.
2. Replace annualized MLC values specified in Table 6.2.1.2 of the ASHRAE 90.4 with maximum 0.16 HVAC annualized MLC at 100% and at 50% ITE load.

C403.2 System design. Mechanical systems shall be designed to comply with Sections C403.2.1 through C403.2.3. Where elements of a building's mechanical systems are addressed in Sections C403.3 through C403.13, such elements shall comply with the applicable provisions of those sections.

C403.2.1 Zone isolation required. HVAC systems serving *zones* that are over 25,000 square feet (2323 m^2) in floor area or that span more than one floor and are designed to operate or be occupied nonsimultaneously shall be divided into isolation areas. Each isolation area shall be equipped with *isolation devices* and controls configured to automatically shut off the supply of conditioned air and outdoor air to and exhaust air from the isolation area. Each isolation area shall be controlled independently by a device meeting the requirements of Section C403.4.2.2. Central systems and plants shall be provided with controls and devices that will allow system and equipment operation for any length of time while serving only the smallest isolation area served by the system or plant.

Exceptions:

1. Exhaust air and outdoor air connections to isolation areas where the fan system to which they connect is not greater than 5,000 cfm (2360 L/s).
2. Exhaust airflow from a single isolation area of less than 10 percent of the design airflow of the exhaust system to which it connects.
3. Isolation areas intended to operate continuously or intended to be inoperative only when all other isolation areas in a *zone* are inoperative.

C403.2.2 Ventilation. Ventilation, either natural or mechanical, shall be provided in accordance with Chapter 4 of the *International Mechanical Code*. Where mechanical ventilation is provided, the system shall provide the capability to reduce the outdoor air supply to the minimum required by Chapter 4 of the *International Mechanical Code*.

C403.2.3 Fault detection and diagnostics. New buildings with an HVAC system serving a gross conditioned floor area of 25,000 square feet (2,322.5 m^2) or larger shall include a fault detection and diagnostics (FDD) system to monitor the HVAC system's performance and automatically identify faults. The FDD system shall:

1. Include permanently installed sensors and devices to monitor the HVAC system's performance.
2. Sample the HVAC system's performance at least once every 15 minutes.
3. Automatically identify and report HVAC system faults.
4. Automatically notify authorized personnel of identified HVAC system faults.
5. Automatically provide prioritized recommendations for repair of identified faults based on analysis of data collected from the sampling of HVAC system performance.
6. Be capable of transmitting the prioritized fault repair recommendations to remotely located authorized personnel.

Exception: R-1 and R-2 occupancies.

C403.3 Mechanical system energy source. All mechanical systems such as for heating, cooling, water heating, clothes drying and cooking shall be all-electric or fueled by other non-fossil fuel derived energy sources.

Exceptions:

1. systems serving laboratories.
2. systems serving hospitals.
3. systems serving large industrial S-1 occupancies, with constant vehicle traffic
4. emergency generators
5. commercial cooking equipment

For all systems serving the exceptions listed where the energy source is not electric, fossil fuel energy usage shall be 100 percent offset by on-site renewable energy. The power generated to offset the fossil fuel energy source for the exceptions shall not offset greater than 10 percent of the building's total energy use for the purposes of complying with Section C407. Fossil fuel energy sources for emergency generators, commercial cooking appliances and scientific or industrial process loads are exempt from the offset requirements.

C403.3.1 Heating and cooling equipment efficiencies (Mandatory). Heating and cooling equipment installed in mechanical systems shall be sized in accordance with Section C403.3.2 and shall be not less efficient in the use of energy than as specified in Section C403.3.3.

C403.3.2 Equipment sizing (Mandatory). The output capacity of heating and cooling equipment shall not be greater than that of the smallest available equipment size that exceeds the loads calculated in accordance with Section C403.1.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that are configured to sequence the operation of each unit based on load.

C403.3.3 HVAC equipment performance requirements. Equipment shall meet the minimum efficiency requirements of Tables C403.3.2(1) through C403.3.2(16) when tested and rated in accordance with the applicable test procedure. Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of AHRI 400. The efficiency shall be verified through certification under an approved certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

C403.3.3.1 Water-cooled centrifugal chilling packages. Equipment not designed for operation at AHRI Standard 550/590 test conditions of 44°F leaving and 54°F entering chilled fluid temperatures and with 85°F entering and 94.3°F leaving condenser fluid temperatures shall have maximum full-load kW/ton (FL) and part-load ratings requirements adjusted using the following equations:

$$FL_{adj} = FL/K_{adj} \quad \textbf{(Equation 4-5)}$$

$$PLV_{adj} = IPLV/K_{adj} \quad \textbf{(Equation 4-6)}$$

where:

K_{adj}	=	A × B
FL	=	Full-load kW/ton value from Table C403.3.2(3).
FL_{adj}	=	Maximum full-load kW/ton rating, adjusted for nonstandard conditions.
$IPLV$	=	Value from Table C403.3.2(3).
PLV_{adj}	=	Maximum $NPLV$ rating, adjusted for nonstandard conditions.
A	=	$0.00000014592 \times (\text{LIFT})^4 - 0.0000346496 \times (LIFT)^3 + 0.00314196 \times (LIFT)^2 - 0.147199 \times (LIFT) + 3.9302$
B	=	$0.0015 \times L_{vg}E_{vap} + 0.934$
$LIFT$	=	$L_{vg}Cond - L_{vg}E_{vap}$
$L_{vg}Cond$	=	Full-load condenser leaving fluid temperature (°F).
$L_{vg}E_{vap}$	=	Full-load evaporator leaving temperature (°F).

The FL_{adj} and PLV_{adj} values are only applicable for centrifugal chillers meeting all of the following full-load design ranges:

- 36°F < $L_{vg}E_{vap}$ < 60°F.
- 115°F.
- 20°F ≤ LIFT ≤ 80°F.

Manufacturers shall calculate the FL_{adj} and PLV_{adj} before determining whether to label the chiller. Centrifugal chillers designed to operate outside of these ranges are not covered by this code.

TABLE C403.3.2(1)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Air conditioners, air cooled	< 65,000 Btu/h[b]	All	Split system[b]	13.0 SEER[d] 13.4 SEER2	before 1/1/2023 AHRI 210/240-2017 after 1/1/2023 AHRI 210/240-2023
			Single package[b]	14.0 SEER[d] 13.4 SEER2	
Space constrained, air cooled	≤ 30,000 Btu/h[b]	All	Split System and Single Package[b]	12.0 SEER[d] 11.7 SEER2	
Small-duct high-velocity, air cooled	< 65,000 Btu/h[b]	All	Split System[b]	12.0 SEER[d] 12.1 SEER2	
Air conditioners, air cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.2 EER[d] 12.9 IEER[d] 14.8 IEER	AHRI 340/360
		All other		11.0 EER[d] 12.7 IEER[d] 14.6 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)		11.0 EER[d] 12.4 IEER[d] 14.2 IEER	
		All other		10.8 EER[d] 12.2 IEER[d] 14.0 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.0 EER[d] 11.6 IEER[d] 13.2 IEER	
		All other		9.7 EER[d] 11.42 IEER[d] 12.5 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)		9.8 EER[d] 11.4 IEER[d] 13.0 IEER	
		All other		9.5 EER[d] 11.0 IEER[d] 12.3 IEER	
Air conditioners, water cooled	< 65,000 Btu/h[b]	All	Split System and Single Package	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)		12.1 EER 13.9 IEER	AHRI 340/360
		All other		11.9 EER 13.7 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)		12.5 EER 13.9 IEER	
		All other		12.3 EER 13.7 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)		12.4 EER 13.6 IEER	
		All other		12.2 EER 13.4 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)		12.2 EER 13.5 IEER	
		All other		12.0 EER 13.3 IEER	

(continued)

TABLE C403.3.2(1)—continued
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUB-CATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Air conditioners, evaporatively cooled	< 65,000 Btu/h[b]	All	Split System and Single Package	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)		12.1 EER 12.3 IEER	AHRI 340/360
		All other		11.9 EER 12.1 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)		12.0 EER 12.2 IEER	
		All other		11.8 EER 12.0 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)		11.9 EER 12.1 IEER	
		All other		11.7 EER 11.9 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)		11.7 EER 11.9 IEER	
		All other		11.5 EER 11.7 IEER	
Condensing units, air cooled	≥ 135,000 Btu/h	—	—	10.5 EER 11.8 IEER	AHRI 365
Condensing units, water cooled	≥ 135,000 Btu/h	—	—	13.5 EER 14.0 IEER	
Condensing units, evaporatively cooled	≥ 135,000 Btu/h	—	—	13.5 EER 14.0 IEER	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, US air-cooled air conditioners less than 65,000 Btu/h are regulated as consumer products by the US Department of Energy Code of Federal Regulations DOE 10 CFR 430. SEER and SEER2 values for single-phase products are set by the US Department of Energy.

c. This table is a replica of ASHRAE 90.1 Table 6.8.1-1 Electrically Operated Unitary Air Conditioners and Condensing Units-Minimum Efficiency Requirements less the values for equipment for applications outside the US.

d. This efficiency value shall be used for equipment manufactured prior to January 1, 2023.

TABLE C403.3.2(2)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED AIR-COOLED UNITARY HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Air cooled (cooling mode)	< 66,000 Btu/h	All	Split System[b]	14.0 SEER[d] 14.3 SEER2	before 1/1/2023 AHRI 210/240-2017 after 1/1/2023 AHRI 210/240-2023
			Single Package[b]	14.0 SEER[d] 13.4 SEER2	
Space constrained, air cooled (cooling mode)	≤ 30,000 Btu/h	All	Split System and Single Package[b]	12.0 SEER[d] 11.7 SEER2	
Single-duct high-velocity, air cooled (cooling mode)	< 65,000 Btu/h	All	Split System[b]	12.0 SEER[d] 12.0 SEER2	
Air cooled (cooling mode)	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.0 EER[d] 12.2 IEER[d] 14.1 IEER	AHRI 340/360
		All other	Split System and Single Package	10.8 EER[d] 12.0 IEER[d] 13.9 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.6 EER[d] 11.6 IEER[d] 13.5 IEER	
		All other	Split System and Single Package	10.4 EER[d] 11.4 IEER[d] 13.3 IEER	
	≥ 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.5 EER[d] 10.6 IEER[d] 12.5 IEER	
		All other	Split System and Single Package	9.3 EER[d] 10.4 IEER[d] 12.3 IEER	
Air cooled (heating mode)	< 65,000 Btu/h	All	Split System[b]	8.2 HSPF[d] 7.5 HSPF2	before 1/1/2023 AHRI 210/240-2017 after 1/1/2023 AHRI 210/240-2023
		All	Single Package[b]	8.0 HSPF[d] 6.7 HSPF2	
Space constrained, air cooled (heating mode)	≤ 30,000 Btu/h	All	Split System and Single Package[b]	7.4 HSPF[d] 6.3 HSPF2	
Small-duct high velocity (air cooled, heating mode)	< 65,000 Btu/h	All	Split System[b]	7.4 HSPF[d] 6.1 HSPF2	

(continued)

TABLE C403.3.2(2)—continued
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Air cooled (heating mode)	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)	All	47ºF db/43ºF wb outdoor air	3.30 COP_H[d] 3.40 COP_H	AHRI 340/360
			17ºF db/15ºF wb outdoor air	2.25 COP_H	
	≥ 135,000 Btu/h < 240,000 Btu/h (cooling capacity)	All	47ºF db/43ºF wb outdoor air	3.20 COP_H[d] 3.30 COP_H	
			17ºF db/15ºF wb outdoor air	2.05 COP_H	
	≥ 240,000 Btu/h (cooling capacity)	All	47ºF db/43ºF wb outdoor air	3.20 COP_H	
			17ºF db/15ºF wb outdoor air	2.05 COP_H	

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, US air-cooled heat pumps less than 65,000 Btu/h are regulated as consumer products by the US Department of Energy Code of Federal Regulations DOE 10 CFR 430. SEER, SEER2 and HSPF values for single-phase products are set by the US Department of Energy.

c. This table is a replica of ASHRAE 90.1 Table 6.8.1-2 Electrically Operated Air-cooled Unitary Heat Pumps-Minimum Efficiency Requirements less the values for equipment for applications outside the US.

d. This efficiency value shall be used for equipment manufactured prior to January 1, 2023.

TABLE C403.3.2(3)
WATER CHILLING PACKAGES—EFFICIENCY REQUIREMENTS[a, b, e, f]

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	PATH A	PATH B	TEST PROCEDURE[a]
Air-cooled chillers	< 150 Tons	EER (Btu/Wh)	≥ 10.100 FL	≥ 9.700 FL	AHRI 550/590
			≥ 13.700 IPLV.IP	≥ 15.800 IPLV.IP	
	≥ 150 Tons		≥ 10.100 FL	≥ 9.700 FL	
			≥ 14.000 IPLV.IP	≥ 16.100 IPLV.IP	
Air cooled without condenser, electrically operated	All capacities	EER (Btu/Wh)	Air-cooled chillers without condenser shall be rated with matching condensers and comply with air-cooled chiller efficiency requirements.		
Water cooled, electrically operated positive displacement	< 75 Tons	kW/ton	≤ 0.750 FL	≤ 0.780 FL	
			≤ 0.600 IPLV.IP	≤ 0.500 IPLV.IP	
	≥ 75 tons and < 150 tons		≤ 0.720 FL	≤ 0.750 FL	
			≤ 0.560 IPLV.IP	≤ 0.490 IPLV.IP	
	≥ 150 tons and < 300 tons		≤ 0.660 FL	≤ 0.680 FL	
			≤ 0.540 IPLV.IP	≤ 0.440 IPLV.IP	
	≥ 300 tons and < 600 tons		≤ 0.610 FL	≤ 0.625 FL	
			≤ 0.520 IPLV.IP	≤ 0.410 IPLV.IP	
	≥ 600 tons		≤ 0.560 FL	≤ 0.585 FL	
			≤ 0.500 IPLV.IP	≤ 0.380 IPLV.IP	
Water cooled, electrically operated centrifugal	< 150 Tons	kW/ton	≤ 0.610 FL	≤ 0.695 FL	
			≤ 0.550 IPLV.IP	≤ 0.440 IPLV.IP	
	≥ 150 tons and < 300 tons		≤ 0.610 FL	≤ 0.635 FL	
			≤ 0.550 IPLV.IP	≤ 0.400 IPLV.IP	
	≥ 300 tons and < 400 tons		≤ 0.560 FL	≤ 0.595 FL	
			≤ 0.520 IPLV.IP	≤ 0.390 IPLV.IP	
	≥ 400 tons and < 600 tons		≤ 0.560 FL	≤ 0.585 FL	
			≤ 0.500 IPLV.IP	≤ 0.380 IPLV.IP	
	≥ 600 tons		≤ 0.560 FL	≤ 0.585 FL	
			≤ 0.500 IPLV.IP	≤ 0.380 IPLV.IP	
Air cooled, absorption, single effect	All capacities	COP (W/W)	≥ 0.600 FL	NA[d]	AHRI 560
Water cooled absorption, single effect	All capacities	COP (W/W)	≥ 0.700 FL	NA[d]	
Absorption, double effect, indirect fired	All capacities	COP (W/W)	≥ 1.000 FL	NA[d]	
			≥ 0.150 IPLV.IP		
Absorption, double effect direct fired	All capacities	COP (W/W)	≥ 1.000 FL	NA[d]	
			≥ 1.000 IPLV		

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.

b. The requirements for centrifugal chiller shall be adjusted for nonstandard rating conditions in accordance with Section C403.3.2.1 and are only applicable for the range of conditions listed there. The requirements for air-cooled, water-cooled positive displacement and absorption chillers are at standard rating conditions defined in the reference test procedure.

c. Both the full-load and IPLV.IP requirements shall be met or exceeded to comply with this standard. Where there is a Path B, compliance can be with either Path A or Path B for any application.

d. NA means the requirements are not applicable for Path B and only Path A can be used for compliance.

e. FL is the full-load performance requirements and IPLV.IP the part-load performance requirements.

f. This table is a replica of ASHRAE 90.1 Table 6.8.1-3 Water-Chilling Packages- Minimum Efficiency Requirements less the values for equipment for applications outside the US.

TABLE C403.3.2(4)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS,
PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS,
SINGLE PACKAGE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY[d]	TEST PROCEDURE[a]
PTAC (cooling mode) standard size	< 7,000 Btu/h	95°F/75°F wb outdoor air[c]	11.9 EER	AHRI 310/380
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		14.0 - (0.300 × Cap/1000) EER[d]	
	> 15,000 Btu/h		9.5 EER	
PTAC (cooling mode) nonstandard size[a]	< 7,000 Btu/h	95°F/75°F wb outdoor air[c]	4 EER	
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		10.9 - (0.213 × Cap/1000) EER[d]	
	> 15,000 Btu/h		7.7 EER	
PTHP (cooling mode) standard size	< 7,000 Btu/h	95°F/75°F wb outdoor air[c]	11.9 EER	
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		14.0 - (0.300 × Cap/1000) EER[d]	
	> 15,000 Btu/h		9.5 EER	
PTHP (cooling mode) nonstandard size[b]	< 7,000 Btu/h	95°F/75°F wb outdoor air[c]	9.3 EER	
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		10.8 - (0.213 × Cap/1000) EER[d]	
	> 15,000 Btu/h		7.6 EER	
PTHP (heating mode) standard size	< 7,000 Btu/h	95°F/75°F wb outdoor air[c]	3.3 COP_H	
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		3.7 - (0.052 × Cap/1000) COP_H[d]	
	> 15,000 Btu/h		2.90 COP_H	
PTHP (heating mode) nonstandard size[b]	< 7,000 Btu/h	95°F/75°F wb outdoor air[c]	2,7 COP_H	
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		2.9 - (0.026 × Cap/1000) COP_H[d]	
	> 15,000 Btu/h		2.5 COP_H	
SPVAC (cooling mode) single and three phase	< 65,000 Btu/h	95°F db/75°F wb outdoor air	11.0 EER	AHRI 390
	≥ 65,000 Btu/h and ≤ 135,000 Btu/h	95°F db/75°F wb outdoor air	10.0 EER	
	≥ 135,000 Btu/h and ≤ 240,000 Btu/h	95°F db/75°F wb outdoor air	10.0 EER	
SPVHP (cooling mode)	< 65,000 Btu/h	95°F db/75°F wb outdoor air	11.0 EER	
	≥ 65,000 Btu/h and ≤ 135,000 Btu/h	95°F db/75°F wb outdoor air	10.0 EER	
	≥ 135,000 Btu/h and ≤ 240,000 Btu/h	95°F db/75°F wb outdoor air	10.1 EER	
SPVHP (heating mode)	< 65,000 Btu/h	47°F db/43°F wb outdoor air	3.3 COP_H	AHRI 390
	≥ 65,000 Btu/h and ≤ 135,000 Btu/h	47°F db/43°F wb outdoor air	3.0 COP_H	
	≥ 135,000 Btu/h and ≤ 240,000 Btu/h	47°F db/75°F wb outdoor air	3.0 COP_H	
Room air conditioners, without louvered sides	< 6,000 Btu/h	—	10.0 CEER	ANSI/ AHAM RAC-1
	≥ 6,000 Btu/h and < 8,000 Btu/h	—	10.0 CEER	
	≥ 8,000 Btu/h and < 11,000 Btu/h	—	9.6 CEER	
	≥ 11,000 Btu/h and < 14,000 Btu/h	—	9.5 CEER	
	≥ 14,000 Btu/h and < 20,000 Btu/h	—	9.3 CEER	
	≥ 20,000 Btu/h	—	9.4 CEER	

(continued)

TABLE C403.3.2(4)—continued
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS,
PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS,
SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) –– 32]/1.8, wb = wet bulb, db = dry bulb.
"Cap" = The rated cooling capacity of the project in Btu/h. Where the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. Where the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculations.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. Nonstandard size units must be factory labeled as follows: "MANUFACTURED FOR NONSTANDARD SIZE APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW STANDARD PROJECTS." Nonstandard size efficiencies apply only to units being installed in existing sleeves having an external wall opening of less than 16 inches (406 mm) high or less than 42 inches (1067 mm) wide and having a cross-sectional area less than 670 square inches (0.43 m^2).

c. The cooling-mode wet bulb temperature requirements only applies for units that reject condensate to the condenser coil.

d. "Cap" in EER and COPH equations for PTACs and PTHPs means cooling capacity in Btu/h at 95°F outdoor dry-bulb temperature.

e. This table is a replica of ASHRAE 90.1 Table 6.8.1-4 Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air-Conditioner Heat Pumps—Minimum Efficiency Requirements less the values for equipment for applications outside the US.

TABLE C403.3.2(5)
WARM-AIR FURNACES AND COMBINATION WARM-AIR FURNACES/AIR-CONDITIONING UNITS,
WARM-AIR DUCT FURNACES AND UNIT HEATERS, MINIMUM EFFICIENCY REQUIREMENTS[g]

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY[d, e]	TEST PROCEDURE[a]
Warm-air furnaces, gas fired	< 225,000 Btu/h	Maximum capacity[c]	before 1/1/2023 80% E_t[b,d] After 1/1/2023 81%E_t[b, d]	ANSI Z21.47
Warm-air furnaces, oil fired	< 225,000 Btu/h	Maximum capacity[c]	before 1/1/2023 80% E_t After 1/1/2023 82%E_t[d]	Section 42, Combustion, UL 727
Warm-air duct furnaces, gas fired	All capacities	Maximum capacity[c]	80%E_c[e]	Section 2.10, Efficiency ANSI Z83.8
Warm-air unit heaters, gas fired	All capacities	Maximum capacity[c]	80%E_c[e, f]	
Warm-air unit heaters, oil fired	All capacities	Maximum capacity[c]	80%E_c[e, f]	Section 40, Combustion, UL 731

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. Combination units (i.e., furnaces contained within the same cabinet as an air conditioner) not covered by DOE 10 CFR 430 (i.e., three-phase power or with cooling capacity greater than or equal to 65,000 Btu/h) may comply with either rating. All other units greater than 225,000 Btu/h sold in the US must meet the AFUE standards for consumer products and test using USDOE's AFUE test procedure at DOE 10 CFR 430, Subpart B, Appendix N.

c. Compliance of multiple firing rate units shall be at the maximum firing rate.

d. Et = Thermal efficiency. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

e. Ec = Combustion efficiency (100% less flue losses). See test procedure for detailed discussion.

f. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an automatic flue damper.

g. This table is a replica of ASHRAE 90.1 Table 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements less the values for equipment for applications outside the US.

TABLE C403.3.2(6)
MINIMUM EFFICIENCY REQUIREMENTS: GAS- AND OIL-FIRED BOILERS

EQUIPMENT TYPE[b]	SUBCATEGORY OR RATING CONDITION	SIZE CATEGORY (INPUT)	MINIMUM EFFICIENCY	EFFICIENCY AS OF 3/2/2022	TEST PROCEDURE[a]
Boilers, hot water	Gas-fired	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[e]	80% E_t[d]	80% E_t[d]	DOE 10 CFR Part 431.86
		> 2,500,000 Btu/h[b]	82% E_c[c]	82% E_c[c]	
	Oil-fired[f]	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	82% E_t[d]	82% E_t[d]	
		> 2,500,000 Btu/h[a]	84% E_c[c]	84% E_c[c]	
Boilers, steam	Gas-fired- all, except natural draft	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	79% E_t[d]	79% E_t[d]	
		> 2,500,000 Btu/h[a]	79% E_t[d]	79% E_t[d]	
	Gas-fired-natural draft	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	77% E_t[d]	79% E_t[d]	
		> 2,500,000 Btu/h[a]	77% E_t[d]	79% E_t[d]	
	Oil-fired[f]	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h[b]	81% E_t[d]	81% E_t[d]	
		> 2,500,000 Btu/h[a]	81% E_t[d]	81% E_t[d]	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.

b. These requirements apply to boilers with rated input of 8,000,000 Btu/h or less that are not packaged boilers and to all packaged boilers. Minimum efficiency requirements for boilers cover all capacities of packaged boilers.

c. Ec = Combustion efficiency (100 percent less flue losses).

d. Et = Thermal efficiency.

e. Maximum capacity – minimum and maximum ratings as provided for and allowed by the unit's controls.

f. Includes oil-fired (residual).

g. Boilers shall not be equipped with a constant-burning pilot light.

h. A boiler not equipped with a tankless domestic water heating coil shall be equipped with an automatic means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.

i. This table is a replica of ASHRAE 90.1 Table 6.8.1-6 Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements less the values for equipment for applications outside the US.

TABLE C403.3.2(7)
MINIMUM EFFICIENCY REQUIREMENTS:
HEAT REJECTION EQUIPMENT [i]

EQUIPMENT TYPE[a]	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION[h]	PERFORMANCE REQUIRED[b, c, d, f, g]	TEST PROCEDURE[a, e]
Propeller or axial fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 60 gpm/hp	CTI ATC-105 and CTI STD-201 RS
Centrifugal fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 20.0 gpm/hp	CTI ATC-105 and CTI STD-201 RS
Propeller or axial fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ 16.1 gpm/hp	CTI ATC-105S and CTI STD-201 RS
Centrifugal fan closed- circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ 7.0 gpm/hp	CTI ATC-105S and CTI STD-201 RS
Propeller or axial fan dry coolers (air-cooled fluid coolers)	All	115°F entering water 105°F leaving water 95°F entering wb	≥ 4.5 gpm/hp	CTI ATC-105DS
Propeller or axial fan evaporative condensers	All	R-448A test fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 160,000 Btu/h × hp	CTI ATC-106
Propeller or axial fan evaporative condensers	All	R-448A test fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 134,000 Btu/h × hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	R-448A test fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥137,000 Btu/h × hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 110,000 Btu/h × hp	CTI ATC-106
Air-cooled condensers	All	125°F Condensing Temperature 190°F Entering Gas Temperature 15°F subcooling 95°F entering db	≥ 176,000 Btu/h × hp	AHRI 460

For SI: °C = [(°F) - 32]/1.8, L/s • kW = (gpm/hp)/(11.83), COP = (Btu/h • hp)/(2550.7), db = dry bulb temperature, °F, wb = wet bulb temperature, °F.

a. Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. For purposes of this table, open circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in the table, divided by the fan motor nameplate power.

c. For purposes of this table, closed-circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in the table, divided by the sum of the fan motor nameplate power and the spray pump motor nameplate power.

d. For purposes of this table, dry-cooler performance is defined as the process water-flow rating of the unit at the thermal rating condition listed in the table divided by the total fan motor nameplate power of the unit, and air-cooled condenser performance is defined as the heat rejected form the refrigerant divided by the total fan motor nameplate power of the unit.

e. The efficiencies and test procedures for both open- and closed-circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of separate wet and dry heat exchange sections. The certification requirements do not apply to field-erected cooling towers.

f. All cooling towers shall comply with the minimum efficiency listed in the table for that specific type of tower with the capacity effect of any project-specific accessories or options included in the capacity of the cooling tower.

g. For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power.

h. Requirements for evaporative condensers are listed with ammonia (R-717) and R-448A as test fluids in the table. Evaporative condensers intended for use with halocarbon refrigerants other than R-448A shall meet the minimum efficiency requirements listed in this table with R-448A as the test fluid. For Ammonia, the condensing temperature is defined as the saturation temperature corresponding to the refrigerant pressure at the condenser entrance. For R-448A, which is a zeotropic refrigerant, the condensing temperature is defined as the arithmetic average of the dew point and the bubble point temperatures corresponding to the refrigerant pressure at the condenser entrance.

i. This table is a replica of ASHRAE 90.1 Table 6.8.1-7 Performance Requirements for Heat Rejection Equipment—Minimum Efficiency Requirements.

TABLE C403.3.2(8)
ELECTRICALLY OPERATED VARIABLE-REFRIGERANT-FLOW AIR CONDITIONERS—MINIMUM EFFICIENCY REQUIREMENTS[b]

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
VRF air conditioners, air cooled	< 65,000 Btu/h	All	VRF multisplit system	13.0 SEER	AHRI 1230
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric resistance (or none)	VRF multisplit system	11.2 EER 13.1 IEER 15.5 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric resistance (or none)	VRF multisplit system	11.0 EER 12.9 IEER 14.9 IEER	
	≥ 240,000 Btu/h	Electric resistance (or none)	VRF multisplit system	10.0 EER 11.6 IEER 13.9 IEER	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.

b. This table is a replica of ASHRAE 90.1 Table 6.8.1-8 Electrically Operated Variable-Refrigerant-Flow Air Conditioners—Minimum Efficiency Requirements.

TABLE C403.3.2(9)
ELECTRICALLY OPERATED VARIABLE-REFRIGERANT-FLOW AND APPLIED HEAT PUMPS—MINIMUM EFFICIENCY REQUIREMENTS[b]

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
VRF air cooled (cooling mode)	< 65,000 Btu/h	All	VRF multisplit system	13.0 SEER	AHRI 1230
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric resistance (or none)		11.0 EER 12.9 IEER 14.6 IEER	
			VRF multisplit system with heat recovery	10.8 EER 12.7 IEER 14.4 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h		VRF multisplit system	10.6 EER 12.3 IEER 13.9 IEER	
			VRF multisplit system with heat recovery	10.4 EER 12.1 IEER 13.7 IEER	
	≥ 240,000 Btu/h		VRF multisplit system	9.5 EER 11.0 IEER 12.7 IEER	
			VRF multisplit system with heat recovery	9.3 EER 10.8 IEER 12.5 IEER	
VRF water source (cooling mode)	< 65,000 Btu/h	All	VRF multisplit systems 86°F entering water	12.0 EER 16.0 IEER	AHRI 1230
			VRF multisplit systems with heat recovery 86°F entering water	11.8 EER 15.8 IEER	
	≥ 65,000 Btu/h and < 135,000 Btu/h		VRF multisplit systems 86°F entering water	12.0 EER 16.0 IEER	
			VRF multisplit systems with heat recovery 86°F entering water	11.8 EER 15.8 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h		VRF multisplit systems 86°F entering water	10.0 EER 14.0 IEER	
			VRF multisplit systems with heat recovery 86°F entering water	9.8 EER 13.8 IEER	

(continued)

TABLE C403.3.2(9)
ELECTRICALLY OPERATED VARIABLE-REFRIGERANT-FLOW AND APPLIED HEAT PUMPS—MINIMUM EFFICIENCY REQUIREMENTS[b]—continued

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
VRF water source (cooling mode) (cont.)	≥ 240,000 Btu/h	All	VRF multisplit systems 86°F entering water	10.0 EER 12.0 IEER	AHRI 1230
			VRF multisplit systems with heat recovery 86°F entering water	9.8 EER 11.8 IEER	
VRF groundwater source (cooling mode)	< 135,000 Btu/h	All	VRF multisplit systems 59°F entering water	16.2 EER	AHRI 1230
			VRF multisplit systems with heat recovery 59°F entering water	16.0 EER	
	≥ 135,000 Btu/h		VRF multisplit systems 59°F entering water	13.8 EER	
			VRF multisplit systems with heat recovery 59°F entering water	13.6 EER	
VRF ground source (cooling mode)	< 135,000 Btu/h		VRF multisplit systems 77°F entering water	13.4 EER	AHRI 1230
			VRF multisplit systems with heat recovery 77°F entering water	13.2 EER	
	≥ 135,000 Btu/h		VRF multisplit systems 77°F entering water	11.0 EER	
			VRF multisplit systems with heat recovery 77°F entering water	10.8 EER	
VRF air cooled (heating mode)	< 65,000 Btu/h (cooling capacity)		VRF multisplit system	7.7 HSPF	AHRI 1230
	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)		VRF multisplit systems 47°F db/ 43°F wb outdoor air	3.3 COP_H	
			17°F db/ 15°F wb outdoor air	2.25 COP_H	
	≥ 135,000 Btu/h (cooling capacity		VRF multisplit systems 47°F db/ 43°F wb outdoor air	3.2 COP_H	
			17°F db/ 15°F wb outdoor air	2.05 COP_H	
VRF water source (heating mode)	< 65,000 Btu/h (cooling capacity)		VRF multisplit systems 68°F entering water	4.2 COP_H 4.3 COP_H	AHRI 1230
	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)		VRF multisplit systems 68°F entering water	4.2 COP_H 4.3 COP_H	
	≥ 135,000 Btu/h and < 240,000 Btu/h (cooling capacity)		VRF multisplit systems 68°F entering water	3.9 COP_H 4.0 COP_H	
	≥ 240,000 Btu/h		VRF multisplit systems 68°F entering water	3.9 COP_H	

(continued)

TABLE C403.3.2(9)
ELECTRICALLY OPERATED VARIABLE-REFRIGERANT-FLOW AND APPLIED HEAT PUMPS—MINIMUM EFFICIENCY REQUIREMENTS[b]—continued

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
VRF groundwater source (heating mode)	< 135,000 Btu/h (cooling capacity)	All	VRF multisplit systems 50°F entering water	3.6 COP_H	AHRI 1230
	≥ 135,000 Btu/h (cooling capacity)		VRF multisplit systems 50°F entering water	3.3 COP_H	
VRF ground source (heating mode)	< 135,000 Btu/h (cooling capacity)		VRF multisplit systems 32°F entering water	3.1 COP_H	AHRI 1230
	≥ 135,000 Btu/h (cooling capacity)		VRF multisplit systems 32°F entering water	2.8 COP_H	

For SI: °C = [(°F)-32]/1.8, 1 British thermal unit per hour = 0.2931 W, db = dry bulb temperature, wb = wet bulb temperature.

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.

b. This table is a replica of ASHRAE 90.1 Table 6.8.1-9 Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps—Minimum Efficiency Requirements.

TABLE C403.3.2(10)
FLOOR-MOUNTED AIR CONDITIONERS AND CONDENSING UNITS SERVING COMPUTER ROOMS—MINIMUM EFFICIENCY REQUIREMENTS[b]

EQUIPMENT TYPE	STANDARD MODEL	NET SENSIBLE COOLING CAPACITY	MINIMUM NET SENSIBLE COP	RATING CONDITIONS RETURN AIR (dry bulb/dew point)	TEST PROCEDURE[a]
Air cooled	Downflow	< 80,000 Btu/h	2.70	85°F/52°F (Class 2)	AHRI 1360
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.58		
		≥ 295,000 Btu/h	2.36		
	Upflow-ducted	< 80,000 Btu/h	2.67		
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.55		
		≥ 295,000 Btu/h	2.33		
	Upflow-nonducted	< 65,000 Btu/h	2.16	75°F/52°F (Class 1)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.04		
		≥ 240,000 Btu/h	1.89		
	Horizontal	< 65,000 Btu/h	2.65	95°F/52°F (Class 3)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.55		
		≥ 240,000 Btu/h	2.47		
Air cooled with fluid economizer	Downflow	< 80,000 Btu/h	2.70	85°F/52°F (Class 1)	
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.58		
		≥ 295,000 Btu/h	2.36		
	Upflow-ducted	< 80,000 Btu/h	2.67		
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.55		
		≥ 295,000 Btu/h	2.33		
	Upflow-nonducted	< 65,000 Btu/h	2.09	75°F/52°F (Class 1)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	1.99		
		≥ 240,000 Btu/h	1.81		

(continued)

TABLE C403.3.2(10)
FLOOR-MOUNTED AIR CONDITIONERS AND CONDENSING UNITS SERVING COMPUTER ROOMS—MINIMUM EFFICIENCY REQUIREMENTS[b]—continued

EQUIPMENT TYPE	STANDARD MODEL	NET SENSIBLE COOLING CAPACITY	MINIMUM NET SENSIBLE COP	RATING CONDITIONS RETURN AIR (dry bulb/dew point)	TEST PROCEDURE[a]
Air cooled with fluid economizer (cont.)	Horizontal	< 65,000 Btu/h	2.65	95°F/52°F (Class 3)	AHRI 1360
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.55		
		≥ 240,000 Btu/h	2.47		
Water cooled economizer	Downflow	< 80,000 Btu/h	2.82	85°F/52°F (Class 1)	
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.73		
		≥ 295,000 Btu/h	2.67		
	Upflow-ducted	< 80,000 Btu/h	2.79		
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.70		
		≥ 295,000 Btu/h	2.64		
	Upflow-nonducted	< 65,000 Btu/h	2.43	75°F/52°F (Class 1)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.32		
		≥ 240,000 Btu/h	2.20		
	Horizontal	< 65,000 Btu/h	2.79	95°F/52°F (Class 3)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.68		
		≥ 240,000 Btu/h	2.60		
Water cooled with fluid economizer	Downflow	< 80,000 Btu/h	2.77	85°F/52°F (Class 1)	
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.68		
		≥ 295,000 Btu/h	2.61		
	Upflow-ducted	< 80,000 Btu/h	2.74		
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.65		
		≥ 295,000 Btu/h	2.58		
	Upflow-nonducted	< 65,000 Btu/h	2.35	75°F/52°F (Class 1)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.24		
		≥ 240,000 Btu/h	2.12		
	Horizontal	< 65,000 Btu/h	2.71	95°F/52°F (Class 3)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.60		
		≥ 240,000 Btu/h	2.54		
Glycol cooled	Downflow	< 80,000 Btu/h	2.56	85°F/52°F (Class 1)	
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.24		
		≥ 295,000 Btu/h	2.21		
	Upflow-ducted	< 80,000 Btu/h	2.53		
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.21		
		≥ 295,000 Btu/h	2.18		

(continued)

TABLE C403.3.2(10)
FLOOR-MOUNTED AIR CONDITIONERS AND CONDENSING UNITS SERVING COMPUTER ROOMS—MINIMUM EFFICIENCY REQUIREMENTS[b]—continued

EQUIPMENT TYPE	STANDARD MODEL	NET SENSIBLE COOLING CAPACITY	MINIMUM NET SENSIBLE COP	RATING CONDITIONS RETURN AIR (dry bulb/dew point)	TEST PROCEDURE[a]
Glycol cooled (cont.)	Upflow-nonducted	< 65,000 Btu/h	2.08	75°F/52°F (Class 1)	AHRI 1360
		≥ 65,000 Btu/h and < 240,000 Btu/h	1.90		
		≥ 240,000 Btu/h	1.81		
	Horizontal	< 65,000 Btu/h	2.48	95°F/52°F (Class 3)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.18		
		≥ 240,000 Btu/h	2.18		
Glycol cooled with fluid economizer	Downflow	< 80,000 Btu/h	2.51	85°F/52°F (Class 1)	
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.19		
		≥ 295,000 Btu/h	2.15		
	Upflow-ducted	< 80,000 Btu/h	2.48		
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.16		
		≥ 295,000 Btu/h	2.12		
	Upflow-nonducted	< 65,000 Btu/h	2.00	75°F/52°F (Class 1)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	1.82		
		≥ 240,000 Btu/h	1.73		
	Horizontal	< 65,000 Btu/h	2.44	95°F/52°F (Class 3)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.10		
		≥ 240,000 Btu/h	2.10		

For SI: 1 British thermal unit per hour = 0.2931 W, oC = [(oF)-32]/1.8, COP = (Btu/h x hp)/(2,550.7).

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.

b. This table is a replica of ASHRAE 90.1 Table 6.8.1-10 Floor-Mounted Air Conditioners and Condensing Units Serving Computer Rooms—Minimum Efficiency Requirements.

TABLE C403.3.2(11)
VAPOR-COMPRESSION-BASED INDOOR POOL DEHUMIDIFIERS—MINIMUM EFFICIENCY REQUIREMENT[b]

EQUIPMENT TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Single package indoor (with or without economizer)	Rating Conditions: A or C	3.5 MRE	AHRI 910
Single package indoor water cooled (with or without economizer)	Rating Conditions: A, B or C	3.5 MRE	
Single package indoor air cooled (with or without economizer)	Rating Conditions: A, B or C	3.5 MRE	
Split system indoor air cooled (with or without economizer)	Rating Conditions: A, B or C	3.5 MRE	

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.

b. This table is a replica of ASHRAE 90.1 Table 6.8.1-12 Vapor-Compression-Based Indoor Pool Dehumidifiers—Minimum Efficiency Requirements.

TABLE C403.3.2(12)
ELECTRICALLY OPERATED DX-DOAS UNITS, SINGLE-PACKAGE AND REMOTE CONDENSER, WITHOUT ENERGY RECOVERY—MINIMUM EFFICIENCY REQUIREMENT[b]

EQUIPMENT TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Air cooled and Air-source heat pumps (dehumidification mode)	—	4.0 ISMRE	AHRI 920
Water cooled (dehumidification mode)	Cooling tower condenser water	4.9 ISMRE	
	Chilled water	6.0 ISMRE	
Air-source heat pump (heating mode)	—	2.7 ISCOP	
Water-source heat pump (dehumidification mode)	Ground source, closed loop	4.8 ISMRE	
	Ground-water source	5.0 ISMRE	
	Water source	4.0 ISMRE	
Water-source heat pump (heating mode)	Ground source, closed loop	2.0 ISCOP	AHRI 920
	Ground-water source	3.2 ISCOP	
	Water source	3.5 ISCOP	

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.

b. This table is a replica of ASHRAE 90.1 Table 6.8.1-13 Electrically Operated DX-DOAS Units, Single-Package and Remote Condenser, without Energy Recovery—Minimum Efficiency Requirements.

TABLE C403.3.2(13)
ELECTRICALLY OPERATED DX-DOAS UNITS, SINGLE-PACKAGE AND REMOTE CONDENSER, WITH ENERGY RECOVERY—MINIMUM EFFICIENCY REQUIREMENT[b]

EQUIPMENT TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Air cooled and Air-source heat pumps (dehumidification mode)	—	5.2 ISMRE	AHRI 920
			AHRI 920
Water cooled (dehumidification mode)	Cooling tower condenser water	5.3 ISMRE	AHRI 920
	Chilled water	6.6 ISMRE	
Air-source heat pump (heating mode)	—	3.3 ISCOP	AHRI 920
Water-source heat pump (dehumidification mode)	Ground source, closed loop	5.2 ISMRE	AHRI 920
	Ground-water source	5.8 ISMRE	
	Water source	4.8 ISMRE	
Water-source heat pump (heating mode)	Ground source, closed loop	3.8 ISCOP	AHRI 920
	Ground-water source	4.0 ISCOP	
	Water source	4.8 ISCOP	

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.

b. This table is a replica of ASHRAE 90.1 Table 6.8.1-14 Electrically Operated DX-DOAS Units, Single-Package and Remote Condenser, with Energy Recovery—Minimum Efficiency Requirements.

TABLE C403.3.2(14)
ELECTRICALLY OPERATED WATER-SOURCE HEAT PUMPS—MINIMUM EFFICIENCY REQUIREMENTS[c]

EQUIPMENT TYPE	SIZE CATEGORY[b]	HEAT SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE[a]
Water-to-air, water loop (cooling mode)	< 17,000 Btu/h	All	86°F entering water	12.2 EER	ISO 13256-1
	≥ 17,000 Btu/h and < 65,000 Btu/h			13.0 EER	
	≥ 65,000 Btu/h and < 135,000 Btu/h			13.0 EER	
Water-to-air, ground water (cooling mode)	< 135,000 Btu/h	All	59°F entering water	18.0 EER	ISO 13256-1
Brine-to-air, ground loop (cooling mode)			77°F entering water	14.1 EER	
Water-to-water, water loop (cooling mode)			86°F entering water	10.6 EER	ISO 13256-2
Water-to-water, ground water (cooling mode)			59°F entering water	16.3 EER	
Brine-to-water, ground loop (cooling mode)			77°F entering water	12.1 EER	
Water-to-water, water loop (heating mode)	< 135,000 Btu/h (cooling capacity)	—	68°F entering water	4.3 COP_H	ISO 13256-1
Water-to-air, ground water (heating mode)			50°F entering water	3.7 COP_H	
Brine-to-air, ground loop (heating mode)			32°F entering water	3.2 COP_H	
Water-to-water, water loop (heating mode)			68°F entering water	3.7 COP_H	
Water-to-water, ground water (heating mode)			50°F entering water	3.1 COP_H	ISO 13256-2
Brine-to-water, ground loop (heating mode)			32°F entering water	2.5 COP_H	

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F)-32]/1.8.

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.

b. Single-phase, US air-cooled heat pumps less than 19 kW are regulated as consumer products by DOE 10 CFR 430. SCOPC, SCOP2C, SCOPH and SCOP2H values for single-phase products are set by the USDOE.

c. This table is a replica of ASHRAE 90.1 Table 6.8.1-15 Electrically Operated Water-Source Heat Pumps—Minimum Efficiency Requirements.

TABLE C403.3.2(15)
HEAT-PUMP AND HEAT RECOVERY CHILLER PACKAGES- MINIMUM EFFICIENCY REQUIREMENTS[g]

HEATING OPERATION													
EQUIPMENT TYPE	SIZE CATEGORY, ton_R	COOLING-ONLY OPERATION COOLING EFFICIENCY[c] AIR-SOURCE EER (FL/IPLV), Btu/W × h WATER-SOURCE POWER INPUT PER CAPACITY (FL/IPLV), kW/ton_R		HEATING SOURCE CONDITIONS (entering/ leaving water) OR OAT (db/wb), °F	HEAT-PUMP HEATING FULL-LOAD EFFICIENCY (COP_H)[b], W/W				HEAT RECOVERY CHILLER FULL-LOAD EFFICIENCY (COP_{HR})[c, d], W/W SIMULTANEOUS COOLING AND HEATING FULL-LOAD EFFICIENCY (COP_{SHC})[c], W/W				TEST PROCEDURE[a]
					Leaving Heating Water Temperature				Leaving Heating Water Temperature				
					Low	Medium	High	Boost	Low	Medium	High	Boost	
		Path A	Path B		105°F	120°F	140°F	140°F	105°F	120°F	140°F	140°F	
Air source	All sizes	≥ 9.595 FL ≥ 13.02 IPLV.IP	≥ 9.215 FL ≥ 15.01 IPLV.IP	47 db 43 wb[e]	≥ 3.290	≥ 2.770	≥ 2.310	NA	NA	NA	NA	NA	AHRI 550/590
		≥ 9.595 FL ≥ 13.30 IPLV.IP	≥ 9.215 FL ≥ 15.30 IPLV.IP	17 db 15 wb[e]	≥ 2.230	≥ 1.950	≥ 1.630	NA	NA	NA	NA	NA	
Water-source electrically operated positive displace-ment	< 75	≤ 0.7885 FL ≤ 0.6316 IPLV.IP	≤ 0.7875 FL ≤ 0.5145 IPLV.IP	54/44[f]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	
				75/65[f]	NA	NA	NA	≥ 3.550	NA	NA	NA	≥ 6.150	
	≥ 75 and < 150	≤ 0.7579 FL ≤ 0.5895 IPLV.IP	≤ 0.7140 FL ≤ 0.4620 IPLV.IP	54/44[f]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	
				75/65[f]	NA	NA	NA	≥ 3.550	NA	NA	NA	≥ 6.150	
	≥ 150 and < 300	≤ 0.6947 FL ≤ 0.5684 IPLV.IP	≤ 0.7140 FL ≤ 0.4620 IPLV.IP	54/44[f]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	
				75/65[f]	NA	NA	NA	≥ 3.550	NA	NA	NA	≥ 6.150	
	≥ 300 and < 600	≤ 0.6421 FL ≤ 0.5474 IPLV.IP	≤ 0.6563 FL ≤ 0.4305 IPLV.IP	54/44[f]	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	
				75/65[f]	NA	NA	NA	≥ 3.900	NA	NA	NA	≥ 6.850	
	≥ 600	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6143 FL ≤ 0.3990 IPLV.IP	54/44[f]	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	
				75/65[f]	NA	NA	NA	≥ 3.900	NA	NA	NA	≥ 6.850	
Water-source electrically operated centrifugal	< 75	≤ 0.6421 FL ≤ 0.5789 IPLV.IP	≤ 0.7316 FL ≤ 0.4632 IPLV.IP	54/44[f]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	
				75/65[f]	NA	NA	NA	≥ 3.550	NA	NA	NA	≥ 6.150	
	≥ 75 and < 150	≤ 0.5895 FL ≤ 0.5474 IPLV.IP	≤ 0.6684 FL ≤ 0.4211 IPLV.IP	54/44[f]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	
				75/65[f]	NA	NA	NA	≥ 3.550	NA	NA	NA	≥ 6.150	
	≥ 150 and < 300	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6263 FL ≤ 0.4105 IPLV.IP	54/44[f]	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	
				75/65[f]	NA	NA	NA	≥ 3.550	NA	NA	NA	≥ 6.150	
	≥ 300 and < 600	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6158 FL ≤ 0.4000 IPLV.IP	54/44[f]	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	
				75/65[f]	NA	NA	NA	≥ 3.900	NA	NA	NA	≥ 6.850	
	≥ 600	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6158 FL ≤ 0.4000 IPLV.IP	54/44[f]	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	
				75/65[f]	NA	NA	NA	≥ 3.900	NA	NA	NA	≥ 6.850	

(continued)

TABLE C403.3.2(15)—continued
HEAT-PUMP AND HEAT RECOVERY CHILLER PACKAGES- MINIMUM EFFICIENCY REQUIREMENTS[g]

For SI: °C = [(°F)-32]/1.8.

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.
b. Cooling-only rating conditions are standard rating conditions defined in AHRI 550/590, Table 1.
c. Heating full-load rating conditions are at rating conditions defined in AHRI 550/590, Table 1.
d. For water-cooled heat recovery chillers that have capabilities for heat rejection to a heat recovery condenser and a tower condenser, the COPHR applies to operation at full load with 100 percent heat recovery (no tower rejection). Units that only have capabilities for partial heat recovery shall meet the requirements of Table C403.3.2(3).
e. Outdoor air entering dry-bulb (db) temperature and wet-bulb (wb) temperature.
f. Source-water entering and leaving water temperature.
g. This table is a replica of ASHRAE 90.1 Table 6.8.1-16 Heat-Pump and Heat Recovery Chiller Packages —Minimum Efficiency Requirements.

TABLE C403.3.2(16)
CEILING-MOUNTED COMPUTER-ROOM AIR CONDITIONERS—MINIMUM EFFICIENCY REQUIREMENTS[b]

EQUIPMENT TYPE	STANDARD MODEL	NET SENSIBLE COOLING CAPACITY	MINIMUM NET SENSIBLE COP	RATING CONDITIONS RETURN AIR (dry bulb/dew point	TEST PROCEDURE[a]
Air cooled with free air discharge condenser	Ducted	< 29,000 Btu/h	2.05	75°F/52°F (Class 1)	AHRI 1360
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.02		
		≥ 65,000 Btu/h	1.92		
	Nonducted	< 29,000 Btu/h	2.08		
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.05		
		≥ 65,000 Btu/h	1.94		
Air cooled with free air discharge condenser with fluid economizer	Ducted	< 29,000 Btu/h	2.01		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.97		
		≥ 65,000 Btu/h	1.87		
	Nonducted	< 29,000 Btu/h	2.04		
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.00		
		≥ 65,000 Btu/h	1.89		
Air cooled with ducted condenser	Ducted	< 29,000 Btu/h	1.86		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.83		
		≥ 65,000 Btu/h	1.73		
	Nonducted	< 29,000 Btu/h	1.89		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.86		
		≥ 65,000 Btu/h	1.75		
Air cooled with fluid economizer and ducted condenser	Ducted	< 29,000 Btu/h	1.82		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.78		
		≥ 65,000 Btu/h	1.68		
	Nonducted	< 29,000 Btu/h	1.85		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.81		
		≥ 65,000 Btu/h	1.70		
Water cooled	Ducted	< 29,000 Btu/h	2.38		
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.38		
		≥ 65,000 Btu/h	2.18		
	Nonducted	< 29,000 Btu/h	2.41		
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.31		
		≥ 65,000 Btu/h	2.20		

(continued)

TABLE C403.3.2(16)—continued
CEILING-MOUNTED COMPUTER-ROOM AIR CONDITIONERS—MINIMUM EFFICIENCY REQUIREMENTS[b]

EQUIPMENT TYPE	STANDARD MODEL	NET SENSIBLE COOLING CAPACITY	MINIMUM NET SENSIBLE COP	RATING CONDITIONS RETURN AIR (dry bulb/ dew point	TEST PROCEDURE[a]
Water cooled with fluid economizer	Ducted	< 29,000 Btu/h	2.33	75°F/52°F (Class 1)	AHRI 1360
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.23		
		≥ 65,000 Btu/h	2.13		
	Nonducted	< 29,000 Btu/h	2.36		
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.26		
		≥ 65,000 Btu/h	2.16		
Glycol cooled	Ducted	< 29,000 Btu/h	1.97		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.93		
		≥ 65,000 Btu/h	1.78		
	Nonducted	< 29,000 Btu/h	2.00		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.98		
		≥ 65,000 Btu/h	1.81		
Glycol cooled with fluid economizer	Ducted	< 29,000 Btu/h	1.92		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.88		
		≥ 65,000 Btu/h	1.73		
	Nonducted	< 29,000 Btu/h	1.95		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.93		
		≥ 65,000 Btu/h	1.76		

For SI: 1 British thermal unit per hour = 0.2931 W, oC = [(oF)-32]/1.8, COP = (Btu/h x hp)/(2,550.7).

a. Chapter 6 contains a complete specification of the referenced standards, which include test procedures, including the reference year version of the test procedure.

b. This table is a replica of ASHRAE 90.1 Table 6.8.1-17 Ceiling-Mounted Computer-Room Air Conditioners—Minimum Efficiency Requirements.

C403.3.3.2 Positive displacement (air- and water-cooled) chilling packages. Equipment with a leaving fluid temperature higher than 32°F (0°C) and water-cooled positive displacement chilling packages with a condenser leaving fluid temperature below 115°F (46°C) shall meet the requirements of the tables in Section C403.3.2 when tested or certified with water at standard rating conditions, in accordance with the referenced test procedure.

C403.3.3.3 Hot gas bypass limitation. Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated in Table C403.3.3, as limited by Section C403.5.1.

TABLE C403.3.3
MAXIMUM HOT GAS BYPASS CAPACITY

RATED CAPACITY	MAXIMUM HOT GAS BYPASS CAPACITY (% of total capacity)
≤ 240,000 Btu/h	50
> 240,000 Btu/h	25

For SI: 1 British thermal unit per hour = 0.2931 W.

C403.3.4 Boiler turndown. *Boiler systems* with design input of greater than 1,000,000 Btu/h (293 kW) shall comply with the turndown ratio specified in Table C403.3.4.

The system turndown requirement shall be met through the use of multiple single-input boilers, one or more *modulating boilers* or a combination of single-input and *modulating boilers*.

TABLE C403.3.4
BOILER TURNDOWN

BOILER SYSTEM DESIGN INPUT (Btu/h)	MINIMUM TURNDOWN RATIO
≥ 1,000,000 and ≤ 5,000,000	3 to 1
> 5,000,000 and ≤ 10,000,000	4 to 1
> 10,000,000	5 to 1

For SI: 1 British thermal unit per hour = 0.2931 W.

C403.4 Heating and cooling system controls. Each heating and cooling system shall be provided with controls in accordance with Sections C403.4.1 through C403.4.5.

C403.4.1 Thermostatic controls. The supply of heating and cooling energy to each *zone* shall be controlled by individual thermostatic controls capable of responding to temperature within the *zone*. Where humidification or dehumidification or both is provided, not fewer than one humidity control device shall be provided for each humidity control system.

Exception: Independent perimeter systems that are designed to offset only building envelope heat losses, gains or both serving one or more perimeter *zones* also

served by an interior system provided that both of the following conditions are met:

1. The perimeter system includes not fewer than one thermostatic control *zone* for each building exposure having exterior walls facing only one orientation (within ± 45 degrees) (0.8 rad) for more than 50 contiguous feet (15 240 mm).
2. The perimeter system heating and cooling supply is controlled by thermostats located within the *zones* served by the system.

C403.4.1.1 Climate-appropriate equipment. Equipment that provides heating and cooling shall be able to adequately function in Boulder's climate zone, including demonstrated performance of at least 70 percent capacity with outdoor temperatures of 5°F.

C403.4.1.2 Heat pump supplementary heat. Heat pumps having supplementary electric resistance heat shall have controls that limit supplemental heat operation to only those times when one of the following applies:

1. The vapor compression cycle cannot provide the necessary heating energy to satisfy the thermostat setting.
2. The heat pump is operating in defrost mode.
3. The vapor compression cycle malfunctions.

The thermostat malfunctions.

C403.4.1.3 Deadband. Where used to control both heating and cooling, *zone* thermostatic controls shall be configured to provide a temperature range or deadband of not less than 5°F (2.8°C) within which the supply of heating and cooling energy to the *zone* is shut off or reduced to a minimum.

Exceptions:

1. Thermostats requiring manual changeover between heating and cooling modes.
2. Occupancies or applications requiring precision in indoor temperature control as *approved* by the *code official*.

C403.4.1.4 Setpoint overlap restriction. Where a *zone* has a separate heating and a separate cooling thermostatic control located within the *zone*, a limit switch, mechanical stop or direct digital control system with software programming shall be configured to prevent the heating setpoint from exceeding the cooling setpoint and to maintain a deadband in accordance with Section C403.4.1.3.

C403.4.1.5 Heated or cooled vestibules. The heating system for heated vestibules and air curtains with integral heating shall be provided with controls configured to shut off the source of heating when the outdoor air temperature is greater than 45°F (7°C). Vestibule heating and cooling systems shall be controlled by a thermostat located in the vestibule configured to limit heating to a temperature not greater than 60°F (16°C) and cooling to a temperature not less than 85°F (29°C).

Exception: Control of heating or cooling provided by site-recovered energy or transfer air that would otherwise be exhausted.

C403.4.1.6 Hot water boiler outdoor temperature setback control. Hot water boilers that supply heat to the building through one- or two-pipe heating systems shall have an outdoor setback control that lowers the boiler water temperature based on the outdoor temperature.

C403.4.2 Off-hour controls. Each *zone* shall be provided with thermostatic setback controls that are controlled by either an automatic time clock or programmable control system.

Exceptions:

1. *Zones* that will be operated continuously.
2. *Zones* with a full HVAC load demand not exceeding 6,800 Btu/h (2 kW) and having a manual shutoff switch located with *ready access*.

C403.4.2.1 Thermostatic setback. Thermostatic setback controls shall be configured to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85°F (29°C).

C403.4.2.2 Automatic setback and shutdown. Automatic time clock or programmable controls shall be capable of starting and stopping the system for seven different daily schedules per week and retaining their programming and time setting during a loss of power for not fewer than 10 hours. Additionally, the controls shall have a manual override that allows temporary operation of the system for up to 2 hours; a manually operated timer configured to operate the system for up to 2 hours; or an occupancy sensor.

C403.4.2.3 Automatic start and stop. Automatic start controls shall be provided for each HVAC system. The automatic start controls shall be configured to automatically adjust the daily start time of the HVAC system in order to bring each space to the desired occupied temperature immediately prior to scheduled occupancy. Automatic stop controls shall be provided for each HVAC system with direct digital control of individual zones. The automatic stop controls shall be configured to reduce the HVAC system's heating temperature setpoint and increase the cooling temperature setpoint by not less than 2°F (-16.6ºC) before scheduled unoccupied periods based on the thermal lag and acceptable drift in space temperature that is within comfort limits.

C403.4.3 Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated shall be limited in accordance with Sections C403.4.3.1 through C403.4.3.3. Hydronic heating systems comprised of multiple-packaged boilers and

designed to deliver conditioned water or steam into a common distribution system shall include automatic controls configured to sequence operation of the boilers. Hydronic heating systems composed of a single boiler and greater than 500,000 Btu/h (146.5 kW) input design capacity shall include either a multistaged or modulating burner.

C403.4.3.1 Three-pipe system. Hydronic systems that use a common return system for both hot water and chilled water are prohibited.

C403.4.3.2 Two-pipe changeover system. Systems that use a common distribution system to supply both heated and chilled water shall be designed to allow a deadband between changeover from one mode to the other of not less than 15°F (8.3°C) outside air temperatures; be designed to and provided with controls that will allow operation in one mode for not less than 4 hours before changing over to the other mode; and be provided with controls that allow heating and cooling supply temperatures at the changeover point to be not more than 30°F (16.7°C) apart.

C403.4.3.3 Hydronic (water loop) heat pump systems. Hydronic heat pump systems shall comply with Sections C403.4.3.3.1 through C403.4.3.3.3.

C403.4.3.3.1 Temperature deadband. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are configured to provide a heat pump water supply temperature deadband of not less than 20°F (11°C) between initiation of heat rejection and heat addition by the central devices.

Exception: Where a system loop temperature optimization controller is installed and can determine the most efficient operating temperature based on real-time conditions of demand and capacity, deadbands of less than 20°F (11°C) shall be permitted.

C403.4.3.3.2 Heat rejection. The following shall apply to hydronic water loop heat pump systems:

1. Where a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass the flow of water around the closed-circuit cooling tower, except for any flow necessary for freeze protection, or low-leakage positive-closure dampers shall be provided.
2. Where an open-circuit cooling tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the open-circuit cooling tower.
3. Where an open-circuit or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the open-circuit cooling tower from the heat pump loop, heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.

Exception: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

C403.4.3.3.3 Two-position valve. Each hydronic heat pump on the hydronic system having a total pump system power exceeding 10 hp (7.5 kW) shall have a two-position automatic valve interlocked to shut off the water flow when the compressor is off..

C403.4.4 Part-load controls. Hydronic systems greater than or equal to 300,000 Btu/h (87.9 kW) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that are configured to do all of the following:

1. Automatically reset the supply-water temperatures in response to varying building heating and cooling demand using coil valve position, zone-return water temperature, building-return water temperature or outside air temperature. The temperature shall be reset by not less than 25 percent of the design supply-to-return water temperature difference.
2. Automatically vary fluid flow for hydronic systems with a combined pump motor capacity of 2 hp (1.5 kW) or larger with three or more control valves or other devices by reducing the system design flow rate by not less than 50 percent or the maximum reduction allowed by the equipment manufacturer for proper operation of equipment by valves that modulate or step open and close, or pumps that modulate or turn on and off as a function of load.
3. Automatically vary pump flow on heating-water systems, chilled-water systems and heat rejection loops serving water-cooled unitary air conditioners as follows:
   3.1. Where pumps operate continuously or operate based on a time schedule, pumps with nominal output motor power of 2 hp or more shall have a variable speed drive.
   3.2. Where pumps have automatic direct digital control configured to operate pumps only when zone heating or cooling is required, a variable speed drive shall be provided for pumps with motors having the same or greater nominal output power indicated in Table C403.4.4 based on the system served.
4. Where a variable speed drive is required by Item 3 of this Section, pump motor power input shall be not more than 30 percent of design wattage at 50 percent of the design water flow. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.

Exceptions:

1. Supply-water temperature reset is not required for chilled-water systems supplied by off-site dis-

trict chilled water or chilled water from ice storage systems.

2. Variable pump flow is not required on dedicated coil circulation pumps where needed for freeze protection.
3. Variable pump flow is not required on dedicated equipment circulation pumps where configured in primary/secondary design to provide the minimum flow requirements of the equipment manufacturer for proper operation of equipment.
4. Variable speed drives are not required on heating water pumps where more than 50 percent of annual heat is generated by an electric boiler.

TABLE C403.4.4
VARIABLE SPEED DRIVE (VSD) REQUIREMENTS FOR DEMAND-CONTROLLED PUMPS

TYPES OF DEMAND CONTROLLED PUMPS	VSD REQUIRED FOR MOTORS WITH RATED OUTPUT OF:
Chilled water and heat rejection loop pumps	≥ 7.5 hp
Heating water pumps	≥ 10 hp

C403.4.5 Pump isolation. Chilled water plants including more than one chiller shall be capable of and configured to reduce flow automatically through the chiller plant when a chiller is shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller.

Boiler systems including more than one boiler shall be capable of and configured to reduce flow automatically through the boiler system when a boiler is shut down.

C403.5 Economizers. Economizers shall comply with Sections C403.5.1 through C403.5.5. An air or water economizer shall be provided for the following cooling systems:

1. Chilled water systems with a total cooling capacity, less cooling capacity provided with air economizers specified in Table C403.5.
2. Individual fan systems with cooling capacity greater than or equal to 36,000 Btu/h (10.5 kW) in buildings having other than a *Group R* occupancy,

   The total supply capacity of all fan cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan cooling units in the building or 300,000 Btu/h (88 kW), whichever is greater.
3. Individual fan systems with cooling capacity greater than or equal to 270,000 Btu/h (79.1 kW) in buildings having a *Group R* occupancy.

   The total supply capacity of all fan cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan cooling units in the building or 1,500,000 Btu/h (440 kW), whichever is greater.

Exceptions: Economizers are not required for the following systems.

1. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7°C) dewpoint temperature to satisfy process needs.
2. Systems serving supermarket areas with open refrigerated casework.
3. Systems that include a heat recovery system in accordance with Section C403.9.5.
4. VRF systems installed with a dedicated outdoor air system.

C403.5.1 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be configured to provide partial cooling even where additional mechanical cooling is required to provide the remainder of the cooling load. Controls shall not be capable of creating a false load in the mechanical cooling systems by limiting or disabling the economizer or any other means, such as hot gas bypass, except at the lowest stage of mechanical cooling.

Units that include an air economizer shall comply with the following:

1. Unit controls shall have the mechanical cooling capacity control interlocked with the air economizer controls such that the outdoor air damper is at the

TABLE C403.5
MINIMUM CHILLED-WATER SYSTEM COOLING CAPACITY FOR DETERMINING ECONOMIZER COOLING REQUIREMENTS

TOTAL CHILLED-WATER SYSTEM CAPACITY LESS CAPACITY OF COOLING UNITS WITH AIR ECONOMIZERS	
Local Water-cooled Chilled-water Systems	Air-cooled Chilled-water Systems or District Chilled-Water Systems
1,320,000 Btu/h	1,720,000 Btu/h

For SI: 1 British thermal unit per hour = 0.2931 W.

TABLE C403.5.1
DX COOLING STAGE REQUIREMENTS FOR MODULATING AIRFLOW UNITS

RATING CAPACITY	MINIMUM NUMBER OF MECHANICAL COOLING STAGES	MINIMUM COMPRESSOR DISPLACEMENT[a]
≥ 65,000 Btu/h and < 240,000 Btu/h	3 stages	≤ 35% of full load
≥ 240,000 Btu/h	4 stages	≤ 25% of full load

For SI: 1 British thermal unit per hour = 0.2931 W.

a. For mechanical cooling stage control that does not use variable compressor displacement, the percent displacement shall be equivalent to the mechanical cooling capacity reduction evaluated at the full load rating conditions for the compressor.

100-percent open position when mechanical cooling is on and the outdoor air damper does not begin to close to prevent coil freezing due to minimum compressor run time until the leaving air temperature is less than 45°F (7°C).

2. Direct expansion (DX) units that control 75,000 Btu/h (22 kW) or greater of rated capacity of the capacity of the mechanical cooling directly based on occupied space temperature shall have not fewer than two stages of mechanical cooling capacity.
3. Other DX units, including those that control space temperature by modulating the airflow to the space, shall be in accordance with Table C403.5.1.

C403.5.2 Economizer heating system impact. HVAC system design and economizer controls shall be such that economizer operation does not increase building heating energy use during normal operation.

Exception: Economizers on variable air volume (VAV) systems that cause zone level heating to increase because of a reduction in supply air temperature.

C403.5.3 Air economizers. Where economizers are required by Section C403.5, air economizers shall comply with Sections C403.5.3.1 through C403.5.3.5.

C403.5.3.1 Design capacity. Air economizer systems shall be configured to modulate *outdoor air* and return air dampers to provide up to 100 percent of the design supply air quantity as *outdoor air* for cooling.

C403.5.3.2 Control signal. Economizer controls and dampers shall be configured to sequence the dampers with the mechanical cooling equipment and shall not be controlled by only mixed-air temperature.

Exception: The use of mixed-air temperature limit control shall be permitted for systems controlled from space temperature (such as single-*zone* systems).

C403.5.3.3 High-limit shutoff. Air economizers shall be configured to automatically reduce *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will not reduce cooling energy usage. High-limit shutoff control types shall be chosen from Table C403.5.3.3. High-limit shutoff control settings for these control types shall be those specified in Table C403.5.3.3.

C403.5.3.4 Relief of excess outdoor air. Systems shall be capable of relieving excess *outdoor air* during air economizer operation to prevent overpressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

C403.5.3.5 Economizer dampers. Return, exhaust/relief and outdoor air dampers used in economizers shall comply with Section C403.7.7.

C403.5.4 Water-side economizers. Where economizers are required by Section C403.5, water-side economizers shall comply with Sections C403.5.4.1 and C403.5.4.2.

C403.5.4.1 Design capacity. Water economizer systems shall be configured to cool supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of not greater than 50°F (10°C) dry bulb/45°F (7°C) wet bulb.

Exceptions:

1. Systems primarily serving computer rooms in which 100 percent of the expected system cooling load at 40°F (4°C) dry bulb/35°F (1.7°C) wet bulb is met with evaporative water economizers.
2. Systems primarily serving computer rooms with dry cooler water economizers that satisfy 100 percent of the expected system cooling load at 35°F (1.7°C) dry bulb.
3. Systems where dehumidification requirements cannot be met using outdoor air temperatures of 50°F (10°C) dry bulb/45°F (7°C) wet bulb and where 100 percent of the expected system cooling load at 45°F (7°C) dry bulb/40°F (4°C) wet bulb is met with evaporative water economizers.

C403.5.4.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (45 kPa) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.

TABLE C403.5.3.3
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS[b]

DEVICE TYPE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN):	
	Equation	Description
Fixed dry bulb	$T_{OA} > 75°F$	Outdoor air temperature exceeds 75°F
Differential dry bulb	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature
Differential enthalpy with fixed dry-bulb temperature	$h_{OA} > h_{RA}$ or $T_{OA} > 75°F$	Outdoor air enthalpy exceeds return air enthalpy OR Outdoor air temperature exceeds 75°F

For SI: 1 foot = 305 mm, °C = (°F - 32)/1.8, 1 Btu/lb = 2.33 kJ/kg.

a. At altitudes substantially different than sea level, the fixed enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6,000 feet elevation, the fixed enthalpy limit is approximately 30.7 Btu/lb.

C403.5.5 Economizer fault detection and diagnostics (Mandatory). Air-cooled unitary direct-expansion units listed in the tables in Section C403.3.2 and variable refrigerant flow (VRF) units that are equipped with an economizer in accordance with Sections C403.5 through C403.5.4 shall include a fault detection and diagnostics system complying with the following:

1. The following temperature sensors shall be permanently installed to monitor system operation:
    1.1. Outside air.
    1.2. Supply air.
    1.3. Return air.
2. Temperature sensors shall have an accuracy of ±2°F (1.1°C) over the range of 40°F to 80°F (4°C to 26.7°C).
3. Refrigerant pressure sensors, where used, shall have an accuracy of ±3 percent of full scale.
4. The unit controller shall be configured to provide system status by indicating the following:
    4.1. Free cooling available.
    4.2. Economizer enabled.
    4.3. Compressor enabled.
    4.4. Heating enabled.
    4.5. Mixed air low limit cycle active.
    4.6. The current value of each sensor.
5. The unit controller shall be capable of manually initiating each operating mode so that the operation of compressors, economizers, fans and the heating system can be independently tested and verified.
6. The unit shall be configured to report faults to a fault management application available for *access* by day-to-day operating or service personnel, or annunciated locally on zone thermostats.
7. The fault detection and diagnostics system shall be configured to detect the following faults:
    7.1. Air temperature sensor failure/fault.
    7.2. Not economizing when the unit should be economizing.
    7.3. Economizing when the unit should not be economizing.
    7.4. Damper not modulating.
    7.5. Excess outdoor air.

C403.6 Requirements for mechanical systems serving multiple zones. Sections C403.6.1 through C403.6.9 shall apply to mechanical systems serving multiple zones.

C403.6.1 Variable air volume and multiple-zone systems. Supply air systems serving multiple zones shall be variable air volume (VAV) systems that have zone controls configured to reduce the volume of air that is reheated, recooled or mixed in each zone to one of the following:

1. Twenty percent of the zone design peak supply for systems with direct digital control (DDC) and 30 percent for other systems.
2. Systems with DDC where all of the following apply:
    2.1. The airflow rate in the deadband between heating and cooling does not exceed 20 percent of the zone design peak supply rate or higher allowed rates under Items 3, 4 and 5 of this section.
    2.2. The first stage of heating modulates the zone supply air temperature setpoint up to a maximum setpoint while the airflow is maintained at the deadband flow rate.
    2.3. The second stage of heating modulates the airflow rate from the deadband flow rate up to the heating maximum flow rate that is less than 50 percent of the zone design peak supply rate.
3. The outdoor airflow rate required to meet the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
4. Any higher rate that can be demonstrated to reduce overall system annual energy use by offsetting reheat/recool energy losses through a reduction in outdoor air intake for the system as approved by the *code official*.
5. The airflow rate required to comply with applicable codes or accreditation standards such as pressure relationships or minimum air change rates.

Exception: The following individual zones or entire air distribution systems are exempted from the requirement for VAV control:

1. *Zones* or supply air systems where not less than 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered, including condenser heat, or site-solar energy source.
2. Systems that prevent reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.

C403.6.2 Single-duct VAV systems, terminal devices. Single-duct VAV systems shall use terminal devices capable of and configured to reduce the supply of primary supply air before reheating or recooling takes place.

C403.6.3 Dual-duct and mixing VAV systems, terminal devices. Systems that have one warm air duct and one cool air duct shall use terminal devices that are configured to reduce the flow from one duct to a minimum before mixing of air from the other duct takes place.

C403.6.4 Single-fan dual-duct and mixing VAV systems, economizers. Individual dual-duct or mixing heating and cooling systems with a single fan and with total capacities greater than 90,000 Btu/h [(26.4 kW) 7.5 tons] shall not be equipped with air economizers.

C403.6.5 Supply-air temperature reset controls. Multiple-*zone* HVAC systems shall include controls that are capable of and configured to automatically reset the sup-

ply-air temperature in response to representative building loads, or to outdoor air temperature. The controls shall be configured to reset the supply air temperature not less than 25 percent of the difference between the design supply-air temperature and the design room air temperature. Controls that adjust the reset based on zone humidity are allowed. HVAC zones that are expected to experience relatively constant loads, shall have maximum airflow designed to accommodate the fully reset supply-air temperature.

Exceptions:

1. Systems that prevent reheating, recooling or mixing of heated and cooled supply air.
2. Seventy-five percent of the energy for reheating is from site-recovered or site-solar energy sources.
3. *Zones* with peak supply air quantities of 300 cfm (142 L/s) or less.

C403.6.6 Multiple-zone VAV system ventilation optimization control. Multiple-zone VAV systems with direct digital control of individual zone boxes reporting to a central control panel shall have automatic controls configured to reduce outdoor air intake flow below design rates in response to changes in system *ventilation* efficiency (E_v) as defined by the *International Mechanical Code*.

Exceptions:

1. VAV systems with zonal transfer fans that recirculate air from other zones without directly mixing it with outdoor air, dual-duct dual-fan VAV systems, and VAV systems with fan-powered terminal units.
2. Systems where total design exhaust airflow is more than 70 percent of total design outdoor air intake flow requirements.

C403.6.7 Parallel-flow fan-powered VAV air terminal control. Parallel-flow fan-powered VAV air terminals shall have automatic controls configured to:

1. Turn off the terminal fan except when space heating is required or where required for ventilation.
2. Turn on the terminal fan as the first stage of heating before the heating coil is activated.
3. During heating for warmup or setback temperature control, either:
    3.1. Operate the terminal fan and heating coil without primary air.
    3.2. Reverse the terminal damper logic and provide heating from the central air handler by primary air.

C403.6.8 Setpoints for direct digital control. For systems with direct digital control of individual zones reporting to the central control panel, the static pressure setpoint shall be reset based on the *zone* requiring the most pressure. In such case, the setpoint is reset lower until one *zone* damper is nearly wide open. The direct digital controls shall be capable of monitoring zone damper positions or shall have an alternative method of indicating the need for static pressure that is configured to provide all of the following:

1. Automatic detection of any *zone* that excessively drives the reset logic.
2. Generation of an alarm to the system operational location.
3. Allowance for an operator to readily remove one or more *zones* from the reset algorithm.

C403.6.9 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be located such that the controller setpoint is not greater than 1.2 inches w.c. (299 Pa). Where this results in one or more sensors being located downstream of major duct splits, not less than one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

C403.7 Ventilation and exhaust systems. In addition to other requirements of Section C403 applicable to the provision of ventilation air or the exhaust of air, ventilation and exhaust systems shall be in accordance with Sections C403.7.1 through C403.7.7.

C403.7.1 Demand control ventilation. Demand control ventilation (DCV) shall be provided for all single-zone systems required to comply with Sections C403.5 through C403.5.3 and spaces larger than 500 square feet (46.5 m^2) and with an average occupant load of 15 people or greater per 1,000 square feet (93 m^2) of floor area, as established in Table 403.3.1.1 of the *International Mechanical Code*, and served by systems with one or more of the following:

1. An air-side economizer.
2. Automatic modulating control of the outdoor air damper.
3. A design outdoor airflow greater than 3,000 cfm (1416 L/s).

Exceptions:

1. Systems with energy recovery complying with Section C403.7.5.2.
2. Multiple-zone systems without direct digital control of individual zones communicating with a central control panel.
3. Multiple-zone systems with a design outdoor airflow less than 750 cfm (354 L/s).
4. Spaces where more than 75 percent of the space design outdoor airflow is required for makeup air that is exhausted from the space or transfer air that is required for makeup air that is exhausted from other spaces.
5. Spaces with one of the following occupancy classifications as defined in Table 403.3.1.1 of the International Mechanical Code: correctional cells, education laboratories, barber, beauty and nail salons, and bowling alley seating areas.

C403.7.2 Dwelling unit mechanical ventilation. Dwelling units shall be provided with mechanical ventilation that complies with the requirements of the *International Mechanical Code*, as applicable, or with other *approved*

means of ventilation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

C403.7.2.1 Whole-dwelling mechanical ventilation system fan efficacy. Fans used to provide whole-dwelling mechanical ventilation shall meet the efficacy requirements of Table C403.7.2.1 at one or more rating points. Fans shall be tested in accordance with HVI 916 and listed. The airflow shall be reported in the product listing or on the label. Fan efficacy shall be reported in the product listing or shall be derived from the input power and airflow values reported in the product listing or on the label. Fan efficacy for fully ducted HRV, ERC, balanced, and in-line fans shall be determined at a static pressure of not less than 0.2-inch w.c. (49.85 Pa). Fan efficacy for ducted range hoods, bathroom and utility room fans shall be determined at a static pressure of not less than 0.1-inch w.c. (24.91 Pa).

TABLE C403.7.2.1
WHOLE-DWELLING MECHANICAL VENTILATION SYSTEM FAN EFFICACY[a]

FAN LOCATION	AIRFLOW RATE MINMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)
HRV, ERV	Any	1.2 cfm/watt
In-line supply or exhuast fan	Any	3.8 cfm/watt
Other exhaust fan	< 90	2.8 cfm/watt
Other exhaust fan	≥ 90	3.5 cfm/watt
Air-handler integrated to tested and listed HVAC equipment	Any	1.2 cfm/watt

For SI: 1 cubic foot per minute = 28.3 L/min.

C403.7.2.2 Testing. Mechanical ventilation systems shall be tested and verified to provide the minimum ventilation flow rates required by Section C403.7.2 and shall meet the efficacy requirements as per Table C403.7.2.1. Testing shall be performed according to the ventilation equipment manufacturer's instructions, or by using a flow hood or box, flow grid, or other airflow measuring device at the mechanical ventilation fan's inlet terminals or grilles, outlet terminals or grilles, or in the connected ventilation ducts. Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Units shall be tested as follows:

1. Where the buildings have fewer than eight testing units, each unit shall be tested.
2. For buildings with eight or more units, the greater of seven or 20 percent of the units in the building shall be tested evenly across all floors and shall encompass each unique unit type in the building. For each unit that does not meet the required ventilation/exhaust rate, an additional two units shall be tested.

Exception: Kitchen range hoods that are ducted to the outside with 6-inch (152 mm) or larger duct and not more than one 90-degree (1.57 rad) elbow or equivalent in the duct run.

C403.7.3 Enclosed parking garage ventilation controls. Enclosed parking garages used for storing or handling automobiles operating under their own power shall employ carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors and automatic controls configured to stage fans or modulate fan average airflow rates to 50 percent or less of design capacity, or intermittently operate fans less than 20 percent of the occupied time or as required to maintain acceptable contaminant levels in accordance with *International Mechanical Code* provisions. Failure of contamination-sensing devices shall cause the exhaust fans to operate continuously at design airflow.

Exceptions:

1. Garages with a total exhaust capacity of less than 8,000 cfm (3,755 L/s) with ventilation systems that do not utilize heating or mechanical cooling.
2. Garages that have a garage area to ventilation system motor nameplate power ratio that exceeds 1125 cfm/hp (710 L/s/kW) and do not utilize heating or mechanical cooling.

C403.7.4 Ventilation air heating control. Units that provide ventilation air to multiple zones and operate in conjunction with zone heating and cooling systems shall not use heating or heat recovery to warm supply air to a temperature greater than 60°F (16°C) when representative building loads or outdoor air temperatures indicate that the majority of zones require cooling.

C403.7.5 Energy recovery systems. Energy recovery ventilation systems shall be provided as specified in either Section C403.7.5.1 or C403.7.5.2, as applicable.

C403.7.5.1 Nontransient dwelling units. Nontransient dwelling units shall be provided with outdoor air energy recovery ventilation systems with an enthalpy recovery ratio of not less than 60 percent at heating design condition.

C403.7.5.2 Spaces other than nontransient dwelling units. Where the supply airflow rate of a fan system serving a space other than a nontransient dwelling unit exceeds the values specified in Table C403.7.4.2, the system shall include an energy recovery system. The energy recovery system shall provide an enthalpy recovery ratio of not less than 50 percent at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls that permit operation of the economizer as required by Section C403.5.

Exception: An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.
2. Laboratory fume hood systems that include not fewer than one of the following features:

2.1. Variable-air-volume hood exhaust and room supply systems configured to reduce exhaust and mt warmer than 2°F (1.1°C) above room setpoint, cooled to not cooler than 3°F (1.7°C) belakeup air volume to 50 percent or less of design values.

2.2. Direct makeup (auxiliary) air supply equal to or greater than 75 percent of the exhaust rate, heated noow room setpoint, with no humidification added, and no simultaneous heating and cooling used for dehumidification control.

3. Systems serving spaces that are heated to less than 60°F (15.5°C) and that are not cooled.
4. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site-solar energy.
5. Enthalpy recovery ratio requirements are at the cooling design condition.
6. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
7. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor air* flow rate.
8. Systems exhausting toxic, flammable, paint or corrosive fumes or dust.
9. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

C403.7.6 Kitchen exhaust systems. Replacement air introduced directly into the exhaust hood cavity shall not be greater than 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space shall not exceed the greater of the following:

1. The ventilation rate required to meet the space heating or cooling load.
2. The hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered to be that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.

Where total kitchen hood exhaust airflow rate is greater than 5,000 cfm (2360 L/s), each hood shall be a factory-built commercial exhaust hood listed by a nationally recognized testing laboratory in compliance with UL 710. Each hood shall have a maximum exhaust rate as specified in Table C403.7.5 and shall comply with one of the following:

1. Not less than 50 percent of all replacement air shall be transfer air that would otherwise be exhausted.
2. Demand ventilation systems on not less than 75 percent of the exhaust air that are configured to provide not less than a 50-percent reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.
3. Listed energy recovery devices with a sensible heat recovery effectiveness of not less than 40 percent on not less than 50 percent of the total exhaust airflow.

TABLE C403.7.4.2
ENERGY RECOVERY REQUIREMENT
(Ventilation systems operating not less than 8,000 hours per year)

PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
≥ 10% and < 20%	≥ 20% and < 30%	≥ 30% and < 40%	≥ 40% and < 50%	≥ 50% and < 60%	≥ 60% and < 70%	≥ 70% and < 80%	≥ 80%
Design Supply Fan Airflow Rate (cfm)							
≥ 2,500	≥ 2,000	≥ 1,000	≥ 500	≥ 140	≥ 120	≥ 100	≥ 80

For SI: 1 cfm = 0.4719 L/s.

TABLE C403.7.5
MAXIMUM NET EXHAUST FLOW RATE,
CFM PER LINEAR FOOT OF HOOD LENGTH

TYPE OF HOOD	LIGHT-DUTY EQUIPMENT	MEDIUM-DUTY EQUIPMENT	HEAVY-DUTY EQUIPMENT	EXTRA-HEAVY-DUTY EQUIPMENT
Wall-mounted canopy	140	210	280	385
Single island	280	350	420	490
Double island (per side)	175	210	280	385
Eyebrow	175	175	NA	NA
Backshelf/Pass-over	210	210	280	NA

For SI:1 cfm = 0.4719 L/s; 1 foot = 305 mm.
NA = Not Allowed.

Where a single hood, or hood section, is installed over appliances with different duty ratings, the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the highest appliance duty rating under the hood or hood section.

Exception: Where not less than 75 percent of all the replacement air is transfer air that would otherwise be exhausted.

C403.7.7 Automatic control of HVAC systems serving guestrooms. In *Group R*-1 buildings containing more than 50 guestrooms, each guestroom shall be provided with controls complying with the provisions of Sections C403.7.6.1 and C403.7.6.2. Card key controls comply with these requirements.

C403.7.7.1 Temperature setpoint controls. Controls shall be provided on each HVAC system that are capable of and configured with three modes of temperature control.

1. When the guestroom is rented but unoccupied, the controls shall automatically raise the cooling setpoint and lower the heating setpoint by not less than 4°F (2°C) from the occupant setpoint within 30 minutes after the occupants have left the guestroom.
2. When the guestroom is unrented and unoccupied, the controls shall automatically raise the cooling setpoint to not lower than 80°F (27°C) and lower the heating setpoint to not higher than 60°F (16°C). Unrented and unoccupied guestroom mode shall be initiated within 16 hours of the guestroom being continuously occupied or where a networked guestroom control system indicates that the guestroom is unrented and the guestroom is unoccupied for more than 20 minutes. A networked guestroom control system that is capable of returning the thermostat setpoints to default occupied setpoints 60 minutes prior to the time a guestroom is scheduled to be occupied is not precluded by this section. Cooling that is capable of limiting relative humidity with a setpoint not lower than 65-percent relative humidity during unoccupied periods is not precluded by this section.
3. When the guestroom is occupied, HVAC setpoints shall return to their occupied setpoints once occupancy is sensed.

C403.7.7.2 Ventilation controls. Controls shall be provided on each HVAC system that are capable of and configured to automatically turn off the ventilation and exhaust fans within 20 minutes of the occupants leaving the guestroom, or *isolation devices* shall be provided to each guestroom that are capable of automatically shutting off the supply of outdoor air to and exhaust air from the guestroom.

Exception: Guestroom ventilation systems are not precluded from having an automatic daily pre-occupancy purge cycle that provides daily outdoor air ventilation during unrented periods at the design ventilation rate for 60 minutes, or at a rate and duration equivalent to one air change.

C403.7.8 Shutoff dampers. Outdoor air intake and exhaust openings and stairway and shaft vents shall be provided with Class I motorized dampers. The dampers shall have an air leakage rate not greater than 4 cfm/ft^2 (20.3 L/s • m^2) of damper surface area at 1.0 inch water gauge (249 Pa) and shall be labeled by an approved agency when tested in accordance with AMCA 500D for such purpose.

Outdoor air intake and exhaust dampers shall be installed with automatic controls configured to close when the systems or spaces served are not in use or during unoccupied period warm-up and setback operation, unless the systems served require outdoor or exhaust air in accordance with the *International Mechanical Code* or the dampers are opened to provide intentional economizer cooling.

Stairway and shaft vent dampers shall be installed with automatic controls configured to open upon the activation of any fire alarm initiating device of the building's fire alarm system or the interruption of power to the damper.

Exception: Nonmotorized gravity dampers shall be an alternative to motorized dampers for exhaust and relief openings as follows:

1. In buildings less than three stories in height above grade plane.
2. Where the design exhaust capacity is not greater than 300 cfm (142 L/s).

Nonmotorized gravity dampers shall have an air leakage rate not greater than 20 cfm/ft^2 (101.6 L/s • m^2) where not less than 24 inches (610 mm) in either dimension or 40 cfm/ft^2 (203.2 L/s • m^2) where less than 24 inches (610 mm) in either dimension. The rate of air leakage shall be determined at 1.0 inch water gauge (249 Pa) when tested in accordance with AMCA 500D for such purpose. The dampers shall be labeled by an approved agency.

C403.7.9 Occupied standby controls. Occupied standby controls are required for *zones* and systems serving *zones* where all spaces served by the *zone* are required to have occupancy sensor lighting controls by Section C405.2.1 and are an ASHRAE Standards 62.1 occupancy category where the ASHRAE Standard 62.1 Ventilation Rate Procedure allows the ventilation to be reduced to zero when the space is in occupied standby mode. Spaces meeting these criteria include:

1. Post-secondary classrooms/lecture/training rooms
2. Conference/meeting/multipurpose rooms
3. Lounges/breakrooms
4. Enclosed offices
5. Open plan office areas
6. Corridors

C403.7.9.1 Occupied standby zone controls. For *zones* meeting the occupied-standby control criteria, within five (5) minutes of all rooms in that *zone* entering occupied-standby model, the zone control shall operate as follows:

1. Active heating setpoint shall be setback at least 1 ºF.
2. Active cooling setpoint shall be setup at least 1ºF.
3. All airflow supplied to the zone shall be shut off whenever the space temperature is between the active heating and cooling setpoints.

C403.7.9.2 Occupied standby system controls. Multiple zone systems that can automatically reset the effective minimum outdoor setpoint and that serve zones with occupied-standby zone controls shall reset the effective minimum outdoor air setpoint based on a *zone* outdoor air requirements of zero for all *zones* in occupied standby mode. Sequences of operation for system outside air reset shall comply with an approved method.

C403.8 Fans and fan controls. Fans in HVAC systems shall comply with Sections C403.8.1 through C403.8.6.1.

C403.8.1 Allowable fan horsepower. Each HVAC system having a total fan system motor nameplate horsepower exceeding 5 hp (3.7 kW) at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan system bhp* (Option 2) shown in Table C403.8.1(1). This includes supply fans, exhaust fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single-zone variable air volume systems shall comply with the constant volume fan power limitation.

Exceptions:

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp (0.746 kW) or less are exempt from the allowable fan horsepower requirement.

C403.8.2 Motor nameplate horsepower. For each fan, the fan brake horsepower shall be indicated on the construction documents and the selected motor shall be not larger than the first available motor size greater than the following:

1. For fans less than 6 bhp (4476 W), 1.5 times the fan brake horsepower.
2. For fans 6 bhp (4476 W) and larger, 1.3 times the fan brake horsepower.

Exceptions:

1. Fans equipped with electronic speed control devices to vary the fan airflow as a function of load.
2. Fans with a fan nameplate electrical input power of less than 0.89 kW.
3. Systems complying with Section C403.8.1 *fan system motor nameplate hp* (Option 1).
4. Fans with motor nameplate horsepower less than 1 hp (746 W).

C403.8.3 Fan efficiency. Each fan and fan array shall have a fan energy index (FEI) of not less than 1.00 at the design point of operation, as determined in accordance with AMCA 208 by an *approved*, independent testing laboratory and labeled by the manufacturer. Each fan and fan array used for a variable-air-volume system shall have an FEI of not less than 0.95 at the design point of operation as determined in accordance with AMCA 208 by an approved independent testing laboratory and labeled by the manufacturer. The FEI for fan arrays shall be calculated in accordance with AMCA 208 Annex C.

Exceptions: The following fans are not required to have a fan energy index:

1. Fans that are not embedded fans with motor nameplate horsepower of less than 1.0 hp (0.75 kW) or with a nameplate electrical input power of less than 0.89 kW.
2. Embedded fans that have a motor nameplate horsepower of 5 hp (3.7 kW) or less, or with a fan system electrical input power of 4.1 kW or less.
3. Multiple fans operated in series or parallel as the functional equivalent of a single fan that have a combined motor nameplate horsepower of 5 hp

TABLE C403.8.1(1)
FAN POWER LIMITATION

	LIMIT	CONSTANT VOLUME	VARIABLE VOLUME
Option 1: Fan system motor nameplate hp	Allowable nameplate motor hp	$hp \le CFM_S \times 0.0011$	$hp \le CFM_S \times 0.0015$
Option 2: Fan system bhp	Allowable fan system bhp	$bhp \le CFM_S \times 0.00094 + A$	$bhp \le CFM_S \times 0.0013 + A$

For SI: 1 bhp = 735.5 W, 1 hp = 745.5 W, 1 cfm = 0.4719 L/s.

where:

CFM_S = The maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute.
hp = The maximum combined motor nameplate horsepower.
bhp = The maximum combined fan brake horsepower.
A = Sum of $[PD \times CFM_D / 4131]$.

where:

PD = Each applicable pressure drop adjustment from Table C403.8.1(2) in. w.c.
CFM_D = The design airflow through each applicable device from Table C403.8.1(2) in cubic feet per minute.

TABLE C403.8.1(2)
FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT

DEVICE	ADJUSTMENT
CREDITS	
Return air or exhaust systems required by code or accreditation standards to be fully ducted, or systems required to maintain air pressure differentials between adjacent rooms	0.5 inch w.c. (2.15 inches w.c. for laboratory and vivarium systems)
Return and exhaust airflow control devices	0.5 inch w.c.
Exhaust filters, scrubbers or other exhaust treatment	The pressure drop of device calculated at fan system design condition
Particulate filtration credit: MERV 9 thru 12	0.5 inch w.c.
Particulate filtration credit: MERV 13 thru 15	0.9 inch w.c.
Particulate filtration credit: MERV 16 and greater and electronically enhanced filters	Pressure drop calculated at 2x clean filter pressure drop at fan system design condition.
Carbon and other gas-phase air cleaners	Clean filter pressure drop at fan system design condition.
Biosafety cabinet	Pressure drop of device at fan system design condition.
Energy recovery device, other than coil runaround loop	For each airstream, (2.2 × energy recovery effectiveness – 0.5) inch w.c.
Coil runaround loop	0.6 inch w.c. for each airstream.
Evaporative humidifier/cooler in series with another cooling coil	Pressure drop of device at fan system design conditions.
Sound attenuation section (fans serving spaces with design background noise goals below NC35)	0.15 inch w.c.
Exhaust system serving fume hoods	0.35 inch w.c.
Laboratory and vivarium exhaust systems in high-rise buildings	0.25 inch w.c./100 feet of vertical duct exceeding 75 feet.
DEDUCTIONS	
Systems without central cooling device	- 0.6 inch w.c.
Systems without central heating device	- 0.3 inch w.c.
Systems with central electric resistance heat	- 0.2 inch w.c.

For SI: 1 inch w.c. = 249 Pa, 1 inch = 25.4 mm.
w.c. = water column, NC = Noise criterion.

(3.7 kW) or less or with a fan system electrical input power of 4.1 kW or less.

1. Fans that are part of equipment covered in Section C403.3.3.
2. Fans included in an equipment package certified by an *approved agency* for air or energy performance.
3. Ceiling fans, which are defined as non-portable devices suspended from a ceiling or overhead structure for circulating air via the rotation of the blades.
4. Fans used for moving gases at temperatures above 425°F (250°C).
5. Fans used for operation in explosive atmospheres.
6. Reversible fans used for tunnel ventilation
7. Fans that are intended to operate only during emergency conditions.
8. Fans outside the scope of AMCA 208.

C403.8.4 Fractional hp fan motors. Motors for fans that are not less than $^{1}/_{12}$ hp (0.062 kW) and less than 1 hp (0.746 kW) shall be electronically commutated motors or shall have a minimum motor efficiency of 70 percent, rated in accordance with DOE 10 CFR 431. These motors shall have the means to adjust motor speed for either balancing or remote control. The use of belt-driven fans to sheave adjustments for airflow balancing instead of a varying motor speed shall be permitted.

Exceptions: The following motors are not required to comply with this section:

1. Motors in the airstream within fan coils and terminal units that only provide heating to the space served.
2. Motors in space-conditioning equipment that comply with Section C403.3.3 or Sections C403.8.1. through C403.8.3.
3. Motors that comply with Section C405.8.

C403.8.5 Low-capacity ventilation fans. Mechanical ventilation system fans less than $^{1}/_{12}$ horsepower (0.062 kW) in capacity shall meet the efficacy requirements of Table C403.8.5 at one or more rating points.

Exceptions:

1. Where ventilation fans are a component of a listed heating or cooling appliance.

2. Dryer exhaust duct power ventilators, domestic range hoods and domestic range booster fans that operate intermittently.

TABLE C403.8.5
LOW-CAPACITY VENTILATION FAN EFFICACY[a]

FAN LOCATION	AIR FLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)	AIR FLOW RATE MAXIMUM (CFM)
HRV or ERV	Any	1.2 cfm/watt	Any
In-line fan	Any	3.8 cfm/watt	Any
Bathroom, utility room	10	2.8 cfm/watt	< 90
Bathroom, utility room	90	3.5 cfm/watt	Any

For SI: 1cfm/ft = 47.82 W

a. Airflow shall be tested in accordance with HVI 916 and listed. Efficacy shall be listed or shall be derived from listed power and airflow. Fan efficacy for fully ducted HRV, ERV, balanced and in-line fans shall be determined at a static pressure not less than 0.2-inch w.c. Fan efficacy for ducted range hoods, bathroom and utility room fans shall be determined at a static pressure not less than 0.1-inch w.c.

C403.8.6 Fan control. Controls shall be provided for fans in accordance with Section C403.8.6.1 and as required for specific systems provided in Section C403.

C403.8.6.1 Fan airflow control. Each cooling system listed in Table C403.8.6.1 shall be designed to vary the indoor fan airflow as a function of load and shall comply with the following requirements:

1. Direct expansion (DX) and chilled water cooling units that control the capacity of the mechanical cooling directly based on space temperature shall have not fewer than two stages of fan control.
2. Low or minimum speed shall not be greater than 66 percent of full speed. At low or minimum speed, the fan system shall draw not more than 40 percent of the fan power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.
3. Other units including DX cooling units and chilled water units that control the space temperature by modulating the airflow to the space shall have modulating fan control. Minimum speed shall be not greater than 50 percent of full speed. At minimum speed the fan system shall draw not more than 30 percent of the power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation-only operation.
4. Units that include an air-side economizer in accordance with Section C403.5 shall have not fewer than two speeds of fan control during economizer operation.

Exceptions:

1. Modulating fan control is not required for chilled water and evaporative cooling units with fan motors of less than 1 hp (0.746 kW) where the units are not used to provide *ventilation air* and the indoor fan cycles with the load.
2. Where the volume of outdoor air required to comply with the ventilation requirements of the *International Mechanical Code* at low speed exceeds the air that would be delivered at the speed defined in Section C403.8.6, the minimum speed shall be selected to provide the required *ventilation air*.

TABLE C403.8.6.1
COOLING SYSTEMS

COOLING SYSTEM TYPE	FAN MOTOR SIZE	MECHANICAL COOLING CAPACITY
DX cooling	Any	≥ 65,000 Btu/h
Chilled water and evaporative cooling	≥ 1/4 hp	Any

For SI: 1 British thermal unit per hour = 0.2931 W; 1 hp = 0.746 kW.

C403.9 Large-diameter ceiling fans. Where provided, large-diameter ceiling fans shall be tested and labeled in accordance with AMCA 230.

C403.10 Heat rejection equipment. Heat rejection equipment, including air-cooled condensers, dry coolers, open-circuit cooling towers, closed-circuit cooling towers and evaporative condensers, shall comply with this section.

Exception: Heat rejection devices where energy usage is included in the equipment efficiency ratings listed in Tables C403.3.2(1) and C403.3.2(3).

C403.10.1 Fan speed control. Each fan system powered by an individual motor or array of motors with connected power, including the motor service factor, totaling 5 hp (3.7 kW) or more shall have controls and devices configured to automatically modulate the fan speed to control the leaving fluid temperature or condensing temperature and pressure of the heat rejection device. Fan motor power input shall be not more than 30 percent of design wattage at 50 percent of the design airflow.

Exceptions:

1. Fans serving multiple refrigerant or fluid cooling circuits.
2. Condenser fans serving flooded condensers.

C403.10.2 Multiple-cell heat rejection equipment. Multiple-cell heat rejection equipment with variable speed fan drives shall be controlled to operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components and so that all fans operate at the same fan speed required for the instantaneous cooling duty, as opposed to staged on and off operation. The minimum fan speed shall be the minimum allowable speed of the fan drive system in accordance with the manufacturer's recommendations.

C403.10.3 Limitation on centrifugal fan open-circuit cooling towers. Centrifugal fan open-circuit cooling towers with a combined rated capacity of 1,100 gpm (4164 L/m) or greater at 95°F (35°C) condenser water return, 85°F (29°C) condenser water supply, and 75°F (24°C) outdoor air wet-bulb temperature shall meet the energy efficiency

requirement for axial fan open-circuit cooling towers listed in Table C403.3.2(8).

Exception: Centrifugal open-circuit cooling towers that are designed with inlet or discharge ducts or require external sound attenuation.

C403.10.4 Tower flow turndown. Open-circuit cooling towers used on water-cooled chiller systems that are configured with multiple- or variable-speed condenser water pumps shall be designed so that all open- circuit cooling tower cells can be run in parallel with the larger of the flow that is produced by the smallest pump at its minimum expected flow rate or at 50 percent of the design flow for the cell.

C403.10.5 Heat recovery for service water heating. Condenser heat recovery shall be installed for heating or reheating of service hot water provided that the facility operates 24 hours a day, the total installed heat capacity of water-cooled systems exceeds 6,000,000 Btu/hr (1758 kW) of heat rejection, and the design service water heating load exceeds 1,000,000 Btu/h (293 kW).

The required heat recovery system shall have the capacity to provide the smaller of the following:

1. Sixty percent of the peak heat rejection load at design conditions.
2. The preheating required to raise the peak service hot water draw to 85°F (29°C).

Exceptions:

1. Facilities that employ condenser heat recovery for space heating or reheat purposes with a heat recovery design exceeding 30 percent of the peak water-cooled condenser load at design conditions.
2. Facilities that provide 60 percent of their service water heating from site solar or site recovered energy or from other sources.

C403.11 Refrigeration equipment performance. Refrigeration equipment performance shall be determined in accordance with Sections C403.11.1 and C403.11.2 for commercial refrigerators, freezers, refrigerator-freezers, walk-in coolers, walk-in freezers, and refrigeration equipment. The energy use shall be verified through certification under an approved certification program or, where a certification program does not exist, the energy use shall be supported by data furnished by the equipment manufacturer.

Exception: Walk-in coolers and walk-in freezers regulated under federal law in accordance with Subpart R of DOE 10 CFR 431.

C403.11.1 Commercial refrigerators, refrigerator-freezers, and refrigeration. Refrigeration equipment, defined in DOE 10 CFR Part 431.62, shall have an energy use in kWh/day not greater than the values of Table C403.11.1 when tested and rated in accordance with AHRI Standard 1200.

C403.11.2 Walk-in coolers and walk-in freezers. Walk-in cooler and walk-in freezer refrigeration systems, except for walk-in process cooling refrigeration systems as defined in DOE 10 CFR 431.302, shall meet the requirements of Tables C403.11.2.1(1), C403.11.2.1(2) and C403.11.2.1(3).

TABLE C403.11.1
MINIMUM EFFICIENCY REQUIREMENTS:
COMMERCIAL REFRIGERATORS AND FREEZERS AND REFRIGERATION

EQUIPMENT CATEGORY	CONDENSING UNIT CONFIGURATION	EQUIPMENT FAMILY	RATING TEMP. °F	OPERTING TEMP. °F	EQUIPMENT CLASSIFICATION[a, c]	MAXIMUM DAILY ENERGY CONSUMPTION kWh/day[d, e]	TEST STANDARD
Remote condensing commercial refrigerators and commercial freezers	Remote (RC)	Vertical Open (VOP)	38 (M)	> 32	VOP.RC.M	0.64 × TDA + 4.07	AHRI 1200
			0 (L)	< 32	VOP.RC.L	2.20 × TDA + 6.85	
		Semivertical open (SVO)	38 (M)	> 32	SVO.RC.M	0.66 × TDA + 3.18	
			0 (L)	< 32	SVO.RC.L	2.20 × TDA +6.85	
		Horizontal open (HZO)	38 (M)	> 32	HZO.RC.M	0.35 × TDA + 2.88	
			0 (L)	< 32	HZO.RC.L	0.55 × TDA + 6.88	
		Vertical closed transparent (VCT)	38 (M)	> 32	VCT.RC.M	0.15 × TDA + 1.95	
			0 (L)	< 32	VCT.RC.L	0.49 × TDA + 2.61	
		Horizontal closed transparent (HCT)	38 (M)	> 32	HCT.RC.M	0.16 × TDA + 0.13	
			0 (L)	< 32	HCT.RC.L	0.34 × TDA + 0.26	
		Vertical closed solid (VCS)	38 (M)	> 32	VCS.RC.M	0.10 × V + 0.26	
			0 (L)	< 32	VCS.RC.L	0.21 × V + 0.54	
		Horizontal closed solid (HCS)	38 (M)	> 32	HCS.RC.M	0.10 × V + 0.26	
			0 (L)	< 32	HCS.RC.L	0.21 × V + 0.54	
		Service over counter (SOC)	38 (M)	> 32	SOC.RC.M	0.44 × TDA + 0.11	
			0 (L)	< 32	SOC.RC.L	0.93 × TDA + 0.22	

(continued)

TABLE C403.11.1—continued
MINIMUM EFFICIENCY REQUIREMENTS:
COMMERCIAL REFRIGERATORS AND FREEZERS AND REFRIGERATION

EQUIPMENT CATEGORY	CONDENSING UNIT CONFIGURATION	EQUIPMENT FAMILY	RATING TEMP. °F	OPERTING TEMP. °F	EQUIPMENT CLASSIFICATION[a, c]	MAXIMUM DAILY ENERGY CONSUMPTION kWh/day[d, e]	TEST STANDARD
Self-contained commercial refrigerators and commercial freezers with and without doors	Self-contained (SC)	Vertical open (VOP)	38 (M)	> 32	VOP.SC.M	1.69 × TDA + 4.71	AHRI 1200
			0 (L)	< 32	VOP.SC.L	4.25 × TDA + 11.82	
		Semivertical open (SVO)	38 (M)	> 32	SVO.SC.M	1.70 × TDA + 4.59	
			0 (L)	< 32	SVO.SC.L	4.26 × TDA + 11.51	
		Horizontal open (HZO)	38 (M)	> 32	HZO.SC.M	0.72 × TDA + 5.55	
			0 (L)	< 32	HZO.SC.L	1.90 × TDA + 7.08	
		Vertical closed transparent (VCT)	38 (M)	> 32	VCT.SC.M	0.10 × V + 0.86	
			0 (L)	< 32	VCT.SC.L	0.29 × V +2.95	
		Vertical closed solid (VCS)	38 (M)	> 32	VCS.SC.M	0.05 × V + 1.36	
			0 (L)	< 32	VCS.SC.L	0.22 × V + 1.38	
		Horizontal closed transparent (HCT)	38 (M)	> 32	HCT.SC.M	0.06 × V + 0.37	
			0 (L)	< 32	HCT.SC.L	0.08 × V + 1.23	
		Horizontal closed solid (HCS)	38 (M)	> 32	HCS.SC.M	0.05 × V + 0.91	
			0 (L)	< 32	HCS.SC.L	0.06 × V + 1.12	
		Service over counter (SOC)	38 (M)	> 32	SOC.SC.M	0.52 × TDA + 1.00	
			0 (L)	< 32	SOC.SC.L	1.10 × TDA + 2.10	
Self-contained commercial refrigerators with transparent doors for pull-down temperature applications	Self-contained (SC)	Pull-down (PD)	38 (M)	> 32	PD.SC.M	0.11 x V + 0.81	AHRI 1200
Commercial ice cream freezers	Remote (RC)	Vertical open (VOP)	15 (I)	< -5b	VOP.RC.I	2.79 × TDA + 8.70	AHRI 1200
		Semivertical open (SVO)			SVO.RC.I	2.79 × TDA + 8.70	
		Horizontal open (HZO)			HZO.RC.I	0.70 × TDA + 8.74	
		Vertical closed transparent (VCT)			VCT.RC.I	0.58 × TDA + 3.05	
		Horizontal closed transparent (HCT)			HCT.RC.I	0.40 × TDA + 0.31	
		Vertical closed solid (VCS)			VCS.RC.I	0.25 × V + 0.63	
		Horizontal closed solid (HCS)			HCS.RC.I	0.25 × V + 0.63	
		Service over counter (SOC)			SOC.RC.I	1.09 × TDA + 0.26	

(continued)

TABLE C403.11.1—continued
MINIMUM EFFICIENCY REQUIREMENTS:
COMMERCIAL REFRIGERATORS AND FREEZERS AND REFRIGERATION

EQUIPMENT CATEGORY	CONDENSING UNIT CONFIGURATION	EQUIPMENT FAMILY	RATING TEMP. °F	OPERTING TEMP. °F	EQUIPMENT CLASSIFICATION[a, c]	MAXIMUM DAILY ENERGY CONSUMPTION kWh/day[d, e]	TEST STANDARD
Commercial ice cream freezers (cont.)	Self-contained (SC)	Vertical open (VOP)	- 15 (I)	< -5b	VOP.SC.I	5.40 × TDA + 15.02	AHRI 1200
		Semivertical open (SVO)			SVO.SC.I	5.41 × TDA + 14.63	
		Horizontal open (HZO)			HZO.SC.I	2.42 × TDA + 9.00	
		Vertical closed transparent (VCT)			VCT.SC.I	0.62 × TDA + 3.29	
		Horizontal closed transparent (HCT)			HCT.SC.I	0.56 × TDA + 0.43	
		Vertical closed solid (VCS)			VCS.SC.I	0.34 × V + 0.88	
		Horizontal closed solid (HCS)			HCS.SC.I	0.34 × V + 0.88	
		Service over counter (SOC)			SOC.SC.I	1.53 × TDA + 0.36	

For SI: 1 square foot = 0.0929 m2, 1 cubic foot = 0.02832 m3, °C = (°F – 32)/1.8.

a. The meaning of the letters in this column is indicated in the columns to the left.

b. Ice cream freezer is defined in DOE 10 CFR 431.62 as a commercial freezer that is designed to operate at or below -5 °F and that the manufacturer designs, markets or intends for the storing, displaying, or dispensing of ice cream.

c. Equipment class designations consist of a combination [in sequential order separated by periods (AAA).(BB).(C)] of the following:
- (AAA)—An equipment family code (VOP = vertical open, SVO = semivertical open, HZO = horizontal open, VCT = vertical closed transparent doors, VCS = vertical closed solid doors, HCT = horizontal closed transparent doors, HCS = horizontal closed solid doors, and SOC = service over counter);
- (BB)—An operating mode code (RC = remote condensing and SC = self-contained); and
- (C)—A rating temperature code [M = medium temperature (38°F), L = low temperature (0°F), or I = ice cream temperature (-15°F)].
- For example, "VOP.RC.M" refers to the "vertical open, remote condensing, medium temperature" equipment class.

d. V is the volume of the case (ft3) as measured in AHRI 1200, Appendix C.

e. TDA is the total display area of the case (ft2) as measured in AHRI 1200, Appendix D.

TABLE C403.11.2.1(1)
WALK-IN COOLER AND FREEZER DISPLAY DOOR EFFICIENCY REQUIREMENTS[a]

CLASS DESCRIPTOR	CLASS	MAXIMUM ENERGY CONSUMPTION (kWh/day)[a]
Display door, medium temperature	DD, M	$0.04 \times A_{dd} + 0.41$
Display door, low temperature	DD, L	$0.15 \times A_{dd} + 0.29$

a. A_{dd} is the surface area of the display door.

TABLE C403.11.2.1(2)
WALK-IN COOLER AND FREEZER NONDISPLAY DOOR EFFICIENCY REQUIREMENTS[a]

CLASS DESCRIPTOR	CLASS	MAXIMUM ENERGY CONSUMPTION (kWh/day)[a]
Passage door, medium temperature	PD, M	$0.05 \times A_{nd} + 1.7$
Passage door, low temperature	PD, L	$0.14 \times A_{nd} + 4.8$
Freight door, medium temperature	FD, M	$0.04 \times A_{nd} + 1.9$
Freight door, low temperature	FD, L	$0.12 \times A_{nd} + 5.6$

a. A_{nd} is the surface area of the nondisplay door.

TABLE C403.11.2.1(3)
WALK-IN COOLER AND FREEZER REFRIGERATION SYSTEM EFFICIENCY REQUIREMENTS

CLASS DESCRIPTOR	CLASS	MINIMUM ANNUAL WALK-IN ENERGY FACTOR AWEF (Btu/W-h)[a]	TEST PROCEDURE
Dedicated condensing, medium temperature, indoor system	DC.M.I	5.61	AHRI 1250
Dedicated condensing, medium temperature, outdoor system	DC.M.O	7.60	
Dedicated condensing, medium temperature, indoor system, net capacity (q_{net})	DC.L.I, < 6,500 Btu/h	9.091 × 10-5 × q_{net} + 1.81	
Dedicated condensing, low temperature, indoor system, net capacity (q_{net})	DC.L.I, ≥ 6,500 Btu/h	2.40	
Dedicated condensing, low temperature, outdoor system, net capacity (q_{net})	DC.L.O, < 6,500 Btu/h	6.522 × 10-5 × q_{net} + 2.73	
Dedicated condensing, medium temperature, outdoor system, net capacity (q_{net})	DC.L.O, ≥ 6,500 Btu/h	3.15	
Unit cooler, medium	UC.M	9.00	
Unit cooler, low temperature, net capacity (q_{net})	UC.L, < 15,500 Btu/h	1.575 × 10-5 × q_{net} + 3.91	
Unit cooler, low temperature, net capacity (q_{net})	UC.L, ≥ 15,500 Btu/h	4.15	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. q_{net} is net capacity (Btu/h) as determined in accordance with AHRI 1250.

C403.11.2.1 Performance standards. *Walk-in coolers* and *walk-in freezers* shall meet the requirements of Tables C403.11.2.1(1), C403.11.2.1(2) and C403.11.2.1(3).

C403.11.3 Refrigeration systems. Refrigerated display cases, *walk-in coolers* or *walk-in freezers* that are served by remote compressors and remote condensers not located in a condensing unit, shall comply with Sections C403.11.3.1 and C403.11.3.2.

Exception: Systems where the working fluid in the refrigeration cycle goes through both subcritical and super-critical states (transcritical) or that use ammonia refrigerant are exempt.

C403.11.3.1 Condensers serving refrigeration systems. Fan-powered condensers shall comply with the following:

1. The design *saturated condensing temperatures* for air-cooled condensers shall not exceed the design dry-bulb temperature plus 10°F (5.6°C) for low-*temperature refrigeration systems*, and the design dry- bulb temperature plus 15°F (8°C) for *medium temperature refrigeration systems* where the *saturated condensing temperature* for blend refrigerants shall be determined using the average of liquid and vapor temperatures as converted from the condenser drain pressure.
2. Condenser fan motors that are less than 1 hp (0.75 kW) shall use electronically commutated motors, permanent split-capacitor-type motors, or 3-phase motors.
3. Condenser fans for air-cooled condensers, evaporatively cooled condensers, air- or water-cooled fluid coolers or cooling towers shall reduce fan motor demand to not more than 30 percent of design wattage at 50 percent of design air volume, and incorporate one of the following continuous variable speed fan control approaches:
   3.1. Refrigeration system condenser control for air-cooled condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient dry-bulb temperature.
   3.2. Refrigeration system condenser control for evaporatively cooled condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient wet-bulb temperature.
4. Multiple fan condensers shall be controlled in unison.
5. The minimum condensing temperature setpoint shall be not greater than 70°F (21°C).

C403.11.3.2 Compressor systems. Refrigeration compressor systems shall comply with the following:

1. Compressors and multiple-compressor system suction groups shall include control systems that use floating suction pressure control logic to reset the target suction pressure temperature based on the temperature requirements of the attached refrigeration display cases or walk-ins.

   Exception: Controls are not required for the following:

   1. Single-compressor systems that do not have variable capacity capability.
   2. Suction groups that have a design saturated suction temperature of 30°F (-1.1°C) or higher, suction groups that comprise the high stage of a two-stage or cascade system, or suction groups

that primarily serve chillers for secondary cooling fluids.

Liquid subcooling shall be provided for all low-temperature compressor systems with a design cooling capacity equal to or greater than 100,000 Btu/h (29.3 kW) with a design-saturated suction temperature of -10°F (-23°C) or lower. The sub-cooled liquid temperature shall be controlled at a maximum temperature setpoint of 50°F (10°C) at the exit of the subcooler using either compressor economizer (interstage) ports or a separate compressor suction group operating at a saturated suction temperature of 18°F (-7.8°C) or higher.

2.1. Insulation for liquid lines with a fluid operating temperature less than 60°F (15.6°C) shall comply with Table C403.11.3.

3. Compressors that incorporate internal or external crankcase heaters shall provide a means to cycle the heaters off during compressor operation.

C403.12 Construction of HVAC system elements. Ducts, plenums, piping and other elements that are part of an HVAC system shall be constructed and insulated in accordance with Sections C403.12.1 through C403.12.4.1.

C403.12.1 Duct and plenum insulation and sealing. Supply and return air ducts and plenums shall be insulated with not less than R-6 insulation where located in unconditioned spaces and where located outside the building with not less than R-12 insulation. Ducts located underground beneath buildings shall be insulated as required in this section or have an equivalent thermal distribution efficiency. Underground ducts utilizing the thermal distribution efficiency method shall be listed and labeled to indicate the R-value equivalency. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by not less than R-12 insulation.

Exceptions:

1. Where located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct or plenum is not greater than 15°F (8°C).

Ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

C403.12.2 Duct construction. Ductwork shall be constructed and erected in accordance with the *International Mechanical Code*.

C403.12.2.1 Low-pressure duct systems. Longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge (w.g.) (498 Pa) shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes installed in accordance with the manufacturer's instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

Exception: Locking-type longitudinal joints and seams, other than the snap-lock and button-lock types, need not be sealed as specified in this section.

C403.12.2.2 Medium-pressure duct systems (Mandatory). Ducts and plenums designed to operate at a static pressure greater than 2 inches water gauge (w.g.) (498 Pa) but less than 3 inches w.g. (747 Pa) shall be insulated and sealed in accordance with Section C403.12.1. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

C403.12.2.3 High-pressure duct systems. Ducts and plenums designed to operate at static pressures equal to or greater than 3 inches of water gauge (747 Pa) shall be insulated and sealed in accordance with Section C403.12.1. In addition, ducts and plenums shall be leak tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual and shown to have a rate of air leakage (CL) less than or equal to 4.0 as determined in accordance with Equation 4-7.

$$CL = F/P^{0.65} \qquad \textbf{(Equation 4-7)}$$

where:

F = The measured leakage rate in cfm per 100 square feet of duct surface.

P = The static pressure of the test.

Documentation shall be furnished demonstrating that representative sections totaling not less than 25 percent of the duct area have been tested and that all tested sections comply with the requirements of this section.

C403.12.3 Dwelling and sleeping unit duct systems. The dwelling or sleeping unit duct system shall be tested in accordance with ANSI/RESNET/ICC 380 or an equivalent method approved by the code official. Buildings with fewer than eight dwelling or sleeping units, each unit shall be tested. Buildings with eight or more dwelling or sleeping units, the greater of seven or 20 percent of the units shall be tested. Ducts shall be pressure tested to determine the air leakage by one of the following methods.:

1. Rough-in: Total leakage shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29m^2) of conditioned floor area when measured with a pressure differential of 0.1-inch w.g. (25 Pa) across the system. Where the air handlers is NOT installed at the time of the test, the total leakage shall be less than or equal to 3 cubic feet per minute (85L/min) per 100 square feet (9.29m^2) of conditioned floor area. Registers shall be taped or otherwise sealed during the test.

2. Postconstruction test: Total leakage shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29m^2) of conditioned floor area when measured with a pressure differential of 0.1-inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All portions of the duct system, including air handler, filter box, supply and return boots shall be tested. Registers shall be taped or otherwise sealed during the test.
3. Test for ducts within unit envelope: Where all ducts and air handlers are located entirely within the building thermal envelope, total leakage shall be less than or equal to 8.0 cubic feet per minute (226.6 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.

Exception: A duct-leakage test shall not be required for ducts serving a ventilation system that is not integrated with the heating or cooling system(s).

A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*.

C403.12.4 Piping insulation. Piping serving as part of a heating or cooling system shall be thermally insulated in accordance with Table C403.11.3.

Exceptions:

1. Factory-installed piping within HVAC equipment tested and rated in accordance with a test procedure referenced by this code.
2. Factory-installed piping within room fan-coils and unit ventilators tested and rated according to AHRI 440 (except that the sampling and variation provisions of Section 6.5 shall not apply) and AHRI 840, respectively.
3. Piping that conveys fluids that have a design operating temperature range between 60°F (15°C) and 105°F (41°C).
4. Piping that conveys fluids that have not been heated or cooled through the use of fossil fuels or electric power.
5. Strainers, control valves, and balancing valves associated with piping 1 inch (25 mm) or less in diameter.
6. Direct buried piping that conveys fluids at or below 60°F (15°C).
7. In radiant heating systems, sections of piping intended by design to radiate heat.

C403.12.4.1 Protection of piping insulation. Piping insulation exposed to the weather shall be protected from damage, including that caused by sunlight, moisture, equipment maintenance and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted.

C403.13 Mechanical systems located outside of the building thermal envelope. Mechanical systems providing heat outside of the thermal envelope of a building shall comply with Sections C403.13.1 through C403.13.3.

C403.13.1 Heating outside a building. Systems installed to provide heat outside a building shall be radiant systems.

Such heating systems shall be controlled by an occupancy sensing device or a timer switch, so that the system is automatically de-energized when occupants are

TABLE C403.12.4
MINIMUM PIPE INSULATION THICKNESS (in inches)[a, c]

FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (inches)				
	Conductivity Btu • in./(h • ft^2 • °F)[b]	Mean Rating Temperature, °F	< 1	1 to < 1 1/2	1 1/2 to < 4	4 to < 8	≥ 8
> 350	0.32 – 0.34	250	4.5	5.0	5.0	5.0	5.0
251 – 350	0.29 – 0.32	200	3.0	4.0	4.5	4.5	4.5
201 – 250	0.27 – 0.30	150	2.5	2.5	2.5	3.0	3.0
141 – 200	0.25 – 0.29	125	1.5	1.5	2.0	2.0	2.0
105 – 140	0.21 – 0.28	100	1.0	1.0	1.5	1.5	1.5
40 – 60	0.21 – 0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20 – 0.26	50	0.5	1.0	1.0	1.0	1.5

For SI: 1 inch = 25.4 mm, °C = [(°F) - 32]/1.8.

a. For piping smaller than 1 1/2 inches and located in partitions within conditioned spaces, reduction of these thicknesses by 1 inch shall be permitted (before thickness adjustment required in footnote b) but not to a thickness less than 1 inch.

b. For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows:

$T = r\,[(1 + t/r)^{K/k} - 1]$

where:

T = minimum insulation thickness,
r = actual outside radius of pipe,
t = insulation thickness listed in the table for applicable fluid temperature and pipe size,
K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu • in/h • ft^2 • °F) and
k = the upper value of the conductivity range listed in the table for the applicable fluid temperature.

c. For direct-buried heating and hot water system piping, reduction of these thicknesses by 1 1/2 inches (38 mm) shall be permitted (before thickness adjustment required in footnote b but not to thicknesses less than 1 inch.

not present. Energy use by an exterior radiant system shall be offset by on-site renewable energy generation equivalent to the energy use by the system. Plans shall be submitted that detail the type, size, and location of the on-site renewable energy generation equipment.

C403.13.2 Snow- and ice-melt system controls. Snow- and ice-melting systems shall include automatic controls configured to shut off the system when the pavement temperature is above 50°F (10°C) and precipitation is not falling, and an automatic or manual control that is configured to shut off when the outdoor temperature is above 40°F (4°C).

C403.13.3 Freeze protection system controls. Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, shall include automatic controls configured to shut off the systems when outdoor air temperatures are above 40°F (4°C) or when the conditions of the protected fluid will prevent freezing.

C403.14 Operable opening interlocking controls. The heating and cooling systems shall have controls that will interlock these mechanical systems to the set temperatures of 90ºF (32ºC) for cooling and 55ºF (12.7ºC) for heating when the conditions of Section C402.5.8 exist. The controls shall configure to shut off the systems entirely when the outdoor temperatures are below 90ºF (32ºC) or above 55ºF (12.7ºC).

C403.14.1 Overhead door HVAC shutoff devices. Overhead doors, cargo doors, sliding doors, folding and accordion-style wall systems, and other loading dock-style doors that open to the outdoors shall be equipped with interlock controls that disable the heating, cooling and humidity control equipment that serves the area or zone adjacent to the door. The shutoff shall activate prior to the door being 25 percent open. A shutoff override, designed to be used when vehicles are parked in the doorway, may be included on doors equipped with weather seals. The override must automatically deactivate when the vehicle is removed.

Exceptions:

1. Areas where HVAC equipment must remain on for safety, sanitation or other health-related reasons.
2. Areas heated by radiant heating systems.
3. The shutoff override shall activate within 5 minutes in groups U, SI, and B motor vehicle showroom occupancies.

SECTION C404
SERVICE WATER HEATING (MANDATORY)

C404.1 General. This section covers the minimum efficiency of, and controls for, service water-heating equipment and insulation of service hot water piping.

C404.2 Service water-heating energy source. All service water-heating systems shall be all-electric or fueled by other non-fossil fuel derived energy source.

Exceptions:

1. Systems serving laboratories
2. Systems serving hospitals
3. Systems serving large industrial S-1 occupancies, with constant vehicle traffic.

For the exceptions where an energy source is not electric, fossil fuel energy usage shall be 100 percent offset by onsite renewable energy. The power generated to offset the fossil fuel energy source shall not offset greater than 10 percent of the building's total energy use for the purposes of complying with Section C407.

C404.2.1 Service water-heating equipment performance efficiency. Water-heating equipment and hot water storage tanks shall meet the requirements of Table C404.2. The efficiency shall be verified through data furnished by the manufacturer of the equipment or through certification under an *approved* certification program. Water-heating equipment intended to be used to provide space heating shall meet the applicable provisions of Table C404.2.

C404.2.2 High input service water-heating systems. Gas-fired water-heating equipment installed in new buildings shall be in compliance with this section. Where a singular piece of water-heating equipment serves the entire building and the input rating of the equipment is 1,000,000 Btu/h (293 kW) or greater, such equipment shall have a thermal efficiency, E_t, of not less than 92 percent. Where multiple pieces of water-heating equipment serve the building and the combined input rating of the water-heating equipment is 1,000,000 Btu/h (293 kW) or greater, the combined input-capacity-weighted-average thermal efficiency, E_t, shall be not less than 90 percent.

Exceptions:

1. Where not less than 25 percent of the annual *service water-heating* requirement is provided by *on-site renewable energy* or site-recovered energy, the minimum thermal efficiency requirements of this section shall not apply.
2. The input rating of water heaters installed in individual dwelling units shall not be required to be included in the total input rating of *service water-heating* equipment for a building.
3. The input rating of water heaters with an input rating of not greater than 100,000 Btu/h (29.3 kW) shall not be required to be included in the total input rating of *service water-heating* equipment for a building.

TABLE C404.2
MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED[a]	TEST PROCEDURE[b, c]
Water heaters, electric	≤ 12 kW[d]	Tabletop[f] ≥ 20 gallons and ≤ 120 gallons Resistance ≥ 20 gallons and ≤ 55 gallons Grid-enabled > 75 gallons and ≤ 120 gallons	This category is regulated as a consumer product by the U.S. DOE as defined in 10 CFR 430	DOE 10 CFR Part 430
	> 12 kW	Resistance	$(0.3 + 27/V_m)$, %/h	ANSI Z21.10.3
	≤ 24 amps and ≤ 250 volts	Heat pump > 55 gallons and ≤ 120 gallons	$2.057 - 0.00113V$, EF	DOE 10 CFR Part 430
Storage water heaters, gas	≤ 75,000 Btu/h	≥ 20 gallons and ≤ 55 gallons	$0.675 - 0.0015V$, EF	DOE 10 CFR Part 430
		> 55 gallons and ≤ 100 gallons	$0.8012 - 0.00078V$, EF	
	> 75,000 Btu/h and ≤ 105,000 Btu/h	< 4,000 Btu/h/gal	80% E_t $(Q/800 + 110\sqrt{V})SL$, Btu/h	ANSI Z21.10.3
	> 105,000 Btu/h	< 4,000 Btu/h/gal	80% E_t $(Q/800 + 110\sqrt{V})SL$, Btu/h	
Instantaneous water heaters, gas	> 50,000 Btu/h and < 200,000 Btu/h[c]	≥ 4,000 Btu/h/gal and < 2 gal	$0.82 - 0.0019V$, EF	DOE 10 CFR Part 430
	≥ 200,000 Btu/h	≥ 4,000 Btu/h/gal and < 10 gal	80% E_t	ANSI Z21.10.3
	≥ 200,000 Btu/h	≥ 4,000 Btu/h/gal and < 10 gal	80% E_t $(Q/800 + 110\sqrt{V})SL$, Btu/h	
Storage water heaters, oil	≤ 105,000 Btu/h	≥ 20 gal and ≤ 50 gallons	$0.68 - 0.0019V$, EF	DOE 10 CFR Part 430
	≥ 105,000 Btu/h	< 4,000 Btu/h/gal	80% E_t $(Q/800 + 110\sqrt{V})SL$, Btu/h	ANSI Z21.10.3
Instantaneous water heaters, oil	≤ 210,000 Btu/h	≥ 4,000 Btu/h/gal and < 2 gal	$0.59 - 0.0019V$, EF	DOE 10 CFR Part 430
	> 210,000 Btu/h	≥ 4,000 Btu/h/gal and < 10 gal	80% E_t	ANSI Z21.10.3
	> 210,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	78% E_t $(Q/800 + 110\sqrt{V})SL$, Btu/h	
Hot water supply boilers, gas, and oil[e]	≥ 300,000 Btu/h and < 12,500,000 Btu/h	≥ 4,000 Btu/h/gal and < 10 gal	80% E_t	ANSI Z21.10.3
Hot water supply boilers, gas[e]	≥ 300,000 Btu/h and < 12,500,000 Btu/h	≥ 4,000 Btu/h/gal and ≥ 10 gal	80% E_t $(Q/800 + 110\sqrt{V})SL$, Btu/h	
Hot water supply boilers, oil	> 300,000 Btu/h and < 12,500,000 Btu/h	> 4,000 Btu/h/gal and > 10 gal	78% E_t $(Q/800 + 110\sqrt{V})SL$, Btu/h	
Pool heaters, gas, and oil	All	—	This category is regulated as a consumer product by the U.S. DOE as defined in 10 CFR 430	ASHRAE 146
Heat pump pool heaters	All	—	4.0 COP	AHRI 1160

(continued)

TABLE C404.2—continued
MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED[a]	TEST PROCEDURE[b, c]
Unfired storage tanks	All	—	Minimum insulation requirement R-12.5 (h • ft^2 • °F)/Btu	(none)

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2,°C = [(°F) - 32]/1.8, 1 British thermal unit per hour = 0.2931 W, 1 gallon = 3.785 L, 1 British thermal unit per hour per gallon = 0.078 W/L.

a. Thermal *efficiency* (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the EF standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_b is the measured volume in the tank in gallons, Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL." Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF and energy factor (EF) are minimum requirements. In UEF standard equations, V_r refers to the rated volume in gallons.

b. ASHRAE 90.1, section 13 contains a complete specification, including the year version, of the referenced test procedure.

c. Instantaneous water heaters with input rates below 200,000 Btu/h shall comply with these requirements where the water heater is designed to heat water to temperatures 180°F or higher.

d. Electric water heaters with an input rating of 12 kW (40,950 Btu/h) or less that are designed to heat water to temperatures of 180°F or greater shall comply with the requirements for electric water heaters that have an input rating greater than 12 kW (40,950 Btu/h).

e. Refer to section C402.2.2 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.

f. A tabletop water heater is a water heater that is enclosed in a rectangular cabinet with a flat top surface not more than 3 feet in height. A grid-enabled water heater is an electric resistance water heater that meets all of the following:
   1. Has a rated storage tank volume of more than 75 gallons.
   2. Was manufactured on or after April 16, 2015.
   3. Is equipped at the point of manufacture with an activation lock.
   4. Bears a permanent label applied by the manufacturer that complies with all of the following:
      4.1. Is made of material not adversely affected by water.
      4.2. Is attached by means of nonwater-soluble adhesive.
      4.3. Advises purchasers and end users of the intended and appropriate use of the product with the following notice printed in 16.5-point Arial Narrow Bold font: "IMPORTANT INFORMATION: This water heater is intended only for use as part of an electric thermal storage or demand response program. It will not provide adequate hot water unless enrolled in such a program and activated by your utility company or another program operator. Confirm the availability of a program in your local area before purchasing or installing this product."

C404.3 Heat traps for hot water storage tanks. Storage tank-type water heaters and hot water storage tanks that have vertical water pipes connecting to the inlet and outlet of the tank shall be provided with integral heat traps at those inlets and outlets or shall have pipe-configured heat traps in the piping connected to those inlets and outlets. Tank inlets and outlets associated with solar water-heating system circulation loops shall not be required to have heat traps.

C404.4 Insulation of piping. Piping from a water heater to the termination of the heated water fixture supply pipe shall be insulated in accordance with Table C403.12.3. On both the inlet and outlet piping of a storage water heater or heated water storage tank, the piping to a heat trap or the first 8 feet (2438 mm) of piping, whichever is less, shall be insulated. Piping that is heat traced shall be insulated in accordance with Table C403.12.3 or the heat trace manufacturer's instructions. Tubular pipe insulation shall be installed in accordance with the insulation manufacturer's instructions. Pipe insulation shall be continuous except where the piping passes through a framing member. The minimum insulation thickness requirements of this section shall not supersede any greater insulation thickness requirements necessary for the protection of piping from freezing temperatures or the protection of personnel against external surface temperatures on the insulation.

Exception: Tubular pipe insulation shall not be required on the following:

1. The tubing from the connection at the termination of the fixture supply piping to a plumbing fixture or plumbing appliance.
2. Valves, pumps, strainers and threaded unions in piping that is 1 inch (25 mm) or less in nominal diameter.
3. Piping from user-controlled shower and bath mixing valves to the water outlets.
4. Cold-water piping of a demand recirculation water system.
5. Tubing from a hot drinking-water heating unit to the water outlet.
6. Piping at locations where a vertical support of the piping is installed.
7. Piping surrounded by building insulation with a thermal resistance (*R*-value) of not less than R-3.

C404.5 Heated water supply piping. Heated water supply piping shall be in accordance with Section C404.5.1 or C404.5.2. The flow rate through $^1/_4$-inch (6.4 mm) piping shall be not greater than 0.5 gpm (1.9 L/m). The flow rate through $^5/_{16}$-inch (7.9 mm) piping shall be not greater than 1 gpm (3.8 L/m). The flow rate through $^3/_8$-inch (9.5 mm) piping shall be not greater than 1.5 gpm (5.7 L/m).

C404.5.1 Maximum allowable pipe length method. The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe shall be in accordance with the following. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.

1. For a public lavatory faucet, use the "Public lavatory faucets" column in Table C404.5.1.

2. For all other plumbing fixtures and plumbing appliances, use the "Other fixtures and appliances" column in Table C404.5.1.

C404.5.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section C404.5.2.1. Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered to be sources of heated water.

The volume from the nearest source of heated water to the termination of the fixture supply pipe shall be as follows:

1. For a public lavatory faucet: not more than 2 ounces (0.06 L).
2. For other plumbing fixtures or plumbing appliances; not more than 0.5 gallon (1.89 L).

C404.5.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the "Volume" column in Table C404.5.1 or from Table C404.5.2.1. The volume contained within fixture shut-off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

C404.6 Heated-water circulating and temperature maintenance systems. Heated-water circulation systems shall be in accordance with Section C404.6.1. Heat trace temperature maintenance systems shall be in accordance with Section C404.6.2. Controls for hot water storage shall be in accordance with Section C404.6.3. Automatic controls, temperature sensors and pumps shall be in a location with *access*. Manual controls shall be in a location with *ready access*.

C404.6.1 Circulation systems. Heated-water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Controls for circulating hot water system pumps shall automatically turn off the pump when the water in the circulation loop is at the

TABLE C404.5.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inches)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)	
		Public lavatory faucets	Other fixtures and appliances
1/4	0.33	6	50
5/16	0.5	4	50
3/8	0.75	3	50
1/2	1.5	2	43
5/8	2	1	32
3/4	3	0.5	21
7/8	4	0.5	16
1	5	0.5	13
1 1/4	8	0.5	8
1 1/2	11	0.5	6
2 or larger	18	0.5	4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L, 1 gallon = 128 ounces.

TABLE C404.5.2.1
INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION TUBING

OUNCES OF WATER PER FOOT OF TUBE									
Nominal Size (inches)	Copper Type M	Copper Type L	Copper Type K	CPVC CTS SDR 11	CPVC SCH 40	CPVC SCH 80	PERT SDR	Composite ASTM F1281	PEX CTS SDR 9
3/8	1.06	0.97	0.84	N/A	1.17	N/A	0.64	0.63	0.64
1/2	1.69	1.55	1.45	1.25	1.89	1.46	1.18	1.31	1.18
3/4	3.43	3.22	2.90	2.67	3.38	2.74	2.35	3.39	2.35
1	5.81	5.49	5.17	4.43	5.53	4.57	3.91	5.56	3.91
1 1/4	8.70	8.36	8.09	6.61	9.66	8.24	5.81	8.49	5.81
1 1/2	12.18	11.83	11.45	9.22	13.20	11.38	8.09	13.88	8.09
2	21.08	20.58	20.04	15.79	21.88	19.11	13.86	21.48	13.86

For SI: 1 foot = 304.8 mm, 1 inch = 25.4 mm, 1 liquid ounce = 0.030 L, 1 oz/ft = 305.15 g/m^2.
N/A = Not Available.

hot water. The controls shall limit the temperature of the water entering the cold-water piping to not greater than 104°F (40°C).

C404.6.1.1 Demand recirculation controls. Demand recirculation water systems shall have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture, or sensing the flow of hot or tempered water to a fixture fitting or appliance.

C404.6.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy. Heat trace shall be arranged to be turned off automatically when there is not a demand for hot water.

C404.6.3 Controls for hot water storage. The controls on pumps that circulate water between a water heater and a heated-water storage tank shall limit operation of the pump from heating cycle startup to not greater than 5 minutes after the end of the cycle.

C404.7 Demand responsive water heating. Electric storage water heaters with a rated water storage volume of 40 gallons (150 L) to 120 gallons (450 L) and a nameplate input rating equal to or less than 12kW shall be provided with demand responsive controls in accordance with Table C404.10 or another equivalent approved standard.

Exceptions:

1. Water heaters that provide a hot water delivery temperature of 180F (82C) or greater.
2. Water heaters that comply with Section IV, Part HLW or Section X of the ASME Boiler and Pressure Vessel Code.
3. Water heaters that use 3-phase electric power.

C404.8 Water heating equipment location. Water heaters with combustion equipment shall be located in a space meeting the following requirements:

1. Minimum dimensions of 3 feet by 3 feet by 7 feet high.
2. Minimum volume of 760 cubic feet, or the equivalent of one 16-inch by 24-inch grill to a heated space and one 8-inch duct of no more than 10 feet in length for cool exhaust air.
3. Contains a condensate drain that is no more than 2 inches higher than the base of the installed water heater and allows natural draining without pump assistance, installed within 3 feet of the water heater.

Exceptions:

1. Instantaneous water heaters located within 10 feet of the point of use.
2. Water heats with an input capacity of more than 300,000 Btu/h.

C404.9 Drain water heat recovery units. Drain water heat recovery units shall comply with CSA B55.2. Potable water-side pressure loss shall be less than 10 psi (69 kPa) at maximum design flow. For *Group R* occupancies, the efficiency of drain water heat recovery unit efficiency shall be in accordance with CSA B55.1.

C404.10 Energy consumption of pools and permanent spas. The energy consumption of pools and permanent spas shall be controlled by the requirements in Sections C404.10.1 through C404.10.3.

TABLE 404.10
DEMAND RESPONSIVE CONTROLS FOR WATER HEATING

EQUIPMENT TYPE	CONTROLS	
	BEFORE 7/1/2025[a]	AFTER 7/1/2025[a]
Electric storage water heaters	ANSI/CTA and also capable of initiating water heating to meet the temperature set point in response to a demand response signal.	ANSI/CTA-2045, except "Price Stream Communication" functionality as defined in the standard.

a. Manufacture date.

C404.10.1 Heaters. The electric power to all heaters shall be controlled by an on-off switch that is an integral part of the heater, mounted on the exterior of the heater, or external to and within 3 feet (914 mm) of the heater in a location with *ready access*. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Only equipment that utilizes a non-fossil fuel derived energy source are permitted. Any heat pump shall be able to adequately function in Boulder's climate zone, 5b.

C404.10.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in time switches shall be in compliance with this section.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- and waste-heat-recovery pool heating systems.

C404.10.3 Covers. Outdoor heated pools and outdoor permanent spas shall be provided with a vapor-retardant cover or other *approved* vapor-retardant means.

Exception: Where more than 75 percent of the energy for heating, computed over an operating season of not fewer than 3 calendar months, is from a heat pump or an on-site renewable energy system, covers or other vapor-retardant means shall not be required.

C404.11 Energy consumption of portable spas. The energy consumption of electric-powered portable spas shall be controlled by the requirements of APSP 14.

SECTION C405
ELECTRICAL POWER AND LIGHTING SYSTEMS

C405.1 General. Lighting system controls, the maximum lighting power for interior and exterior applications and electrical energy consumption shall comply with this section. *Sleeping units* shall comply with Section C405.2.4 and with either Section C405.1.1 or C405.3. *General lighting* shall consist of all lighting included when calculating the total connected interior lighting power in accordance with Section C405.3.1 and which does not require specific application controls in accordance with Section C405.2.5. Transformers, uninterruptable power supplies, motors and electrical power processing equipment in data center systems shall comply with Section 8 of ASHRAE 90.4 in addition to this code.

C405.1.1 Lighting for dwelling units. Dwelling units shall comply with Section R404.1.

C405.2 Lighting controls. Lighting systems shall be provided with controls that comply with one of the following.

1. Lighting controls as specified in Sections C405.2.1 through C405.2.8.
2. Luminaire level lighting controls (LLLC) and lighting controls as specified in Sections C405.2.1, C405.2.5 and C405.2.6. The LLLC luminaire shall be independently capable of:
    2.1. Monitoring occupant activity to brighten or dim lighting when occupied or unoccupied, respectively.
    2.2. Monitoring ambient light, both electric light and daylight, and brighten or dim artificial light to maintain desired light level.
    2.3. For each control strategy, configuration and reconfiguration of performance parameters including; bright and dim setpoints, timeouts, dimming fade rates, sensor sensitivity adjustments, and wireless zoning configurations.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted.
2. Interior exit stairways, interior exit ramps and exit passageways.
3. Emergency egress lighting that is normally off.
4. Emergency lighting required by the International Building Code in exit access components which are not provided with fire alarm systems.
5. Up to 0.02 Watts per square foot (0.06 W/m2) of lighting in exit access components which are provided with fire alarm systems.

C405.2.1 Occupant sensor controls. Occupant *sensor controls* shall be installed to control lights in the following space types:

1. Classrooms/lecture/training rooms.
2. Conference/meeting/multipurpose rooms.
3. Copy/print rooms.
4. Lounges/breakrooms.
5. Enclosed offices.
6. Open plan office areas.
7. Restrooms.
8. Storage rooms.
9. Locker rooms.
10. Corridors.
11. Warehouse storage areas.
12. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions.

Exception: Luminaires that are required to have specific application controls in accordance with Section C405.2.5.

C405.2.1.1 Occupant sensor control function. Occupant sensor controls in warehouses shall comply with Section C405.2.1.2. Occupant sensor controls in open plan office areas shall comply with Section C405.2.1.3. Occupant sensor controls in corridors shall comply with Section C405.2.1.4. Occupant sensor controls for all other spaces specified in Section C405.2.1 shall comply with the following:

1. They shall automatically turn off lights within 20 minutes after all occupants have left the space.
2. They shall be manual on or controlled to automatically turn on the lighting to not more than 50-percent power.
3. They shall incorporate a manual control to allow occupants to turn off lights.

    Exception: Full automatic-on controls with no manual control shall be permitted in corridors, interior parking areas, stairways, restrooms, locker rooms, lobbies, library stacks and areas where manual operation would endanger occupant safety or security.

C405.2.1.2 Occupant sensor control function in warehouse storage areas. Lighting in warehouse storage areas shall be controlled as follows:

1. Lighting in each aisleway shall be controlled independently of lighting in all other aisleways and open areas.
2. Occupant sensors shall automatically reduce lighting power within each controlled area to an occupied setpoint of not more than 50 percent within 20 minutes after all occupants have left the controlled area.
3. Lights that are not turned off by occupant sensors shall be turned off by time-switch control complying with Section C405.2.2.1.
4. A manual control shall be provided to allow occupants to turn off lights in the space.

C405.2.1.3 Occupant sensor control function in open plan office areas. Occupant sensor controls in open plan office spaces less than 300 square feet (28 m^2) in area shall comply with Section C405.2.1.1.

Occupant sensor controls in all other open plan office spaces shall comply with all of the following:

1. The controls shall be configured so that general lighting can be controlled separately in control zones with floor areas not greater than 600 square feet (55 m^2) within the open plan office space.
2. General lighting in each control zone shall be permitted to automatically turn on upon occupancy within the control zone. General lighting in other unoccupied zones within the open plan office space shall be permitted to turn on to not more than 20 percent of full power or remain unaffected.
3. The controls shall automatically turn off general lighting in all control zones within 20 minutes after all occupants have left the open plan office space.

   Exception: Where general lighting is turned off by time-switch control complying with Section C405.2.2.1.
4. General lighting in each control zone shall turn off or uniformly reduce lighting power to an unoccupied setpoint of not more than 20 percent of full power within 20 minutes after all occupants have left the control zone.

C405.2.1.4 Occupant sensor control function in corridors. Occupant sensor controls in corridors shall uniformly reduce lighting power to not more than 50 percent of full power within 20 minutes after all occupants have left the space.

Exception: Corridors provided with less than two footcandles of illumination on the floor at the darkest point with all lights on.

C405.2.2 Time-switch controls. Each area of the building that is not provided with *occupant sensor controls* complying with Section C405.2.1.1 shall be provided with *time-switch controls* complying with Section C405.2.2.1.

Exceptions:

1. Luminaires that are required to have specific application controls in accordance with Section C405.2.4.
2. Spaces where patient care is directly provided.
3. Spaces where an automatic shutoff would endanger occupant safety or security.
4. Lighting intended for continuous operation.
5. Shop and laboratory classrooms.

C405.2.2.1 Time-switch control function. Time-switch *controls* shall comply with all of the following:

1. Automatically turn off lights when the space is scheduled to be unoccupied.
2. Have a minimum 7-day clock.
3. Be capable of being set for seven different day types per week.
4. Incorporate an automatic holiday "shutoff" feature, which turns off all controlled lighting loads for not fewer than 24 hours and then resumes normally scheduled operations.
5. Have program backup capabilities, which prevent the loss of program and time settings for not fewer than 10 hours, if power is interrupted.
6. Include an override switch that complies with the following:

   6.1. The override switch shall be a manual control.

   6.2. The override switch, when initiated, shall permit the controlled lighting to remain on for not more than 2 hours.

   6.3. Any individual override switch shall control the lighting for an area not larger than 5,000 square feet (465 m^2).

Exceptions: Within mall concourses, auditoriums, sales areas, manufacturing facilities and sports arenas:

1. The time limit shall be permitted to be greater than 2 hours, provided that the switch is a captive key device.
2. The area controlled by the override switch shall not be limited to 5,000 square feet (465 m^2) provided that such area is less than 20,000 square feet (1860 m^2).

C405.2.3 Light-reduction controls. Where not provided with occupant sensor controls complying with Section C405.2.1.1, general lighting shall be provided with light-reduction controls complying with Section C405.2.3.1.

Exceptions:

1. Luminaires controlled by daylight responsive controls complying with Section C405.2.4.
2. Luminaires controlled by special application controls complying with Section C405.2.5.
3. Where provided with manual control, the following areas are not requirefd to have light-reduction control:

   3.1. Spaces that have only one luminaire with a rated power of less than 60 watts.

   3.2. Spaces that use less than 0.45 watts per square foot (4.9 W/m^2).

   3.3. Corridors, lobbies, electrical rooms and or mechanical rooms.

C405.2.3.1 Light-reduction control function. Spaces required to have light-reduction controls shall have a *manual control* that allows the occupant to reduce the connected lighting load by not less than 50 percent in a reasonably uniform illumination pattern with an intermediate step in addition to full on or off, or with contin-

uous dimming control, using one of the following or another *approved* method:

1. Continuous dimming of all luminaires from full output to less than 20 percent of full power.
2. Switching all luminaires to a reduced output of not less than 30 percent and not more than 70 percent of full power.
3. Switching alternate luminaires or alternate rows of luminaires to achieve a reduced output of not less than 30 percent and not more than 70 percent full power.

C405.2.4 Daylight responsive controls. *Daylight-responsive controls* complying with Section C405.2.4.1 shall be provided to control the general lighting within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of gen*eral lighting* within primary sidelit zones complying with Section C405.2.4.2.
2. Spaces with a total of more than 300 watts of general lighting within sidelit daylight zones complying with Section C405.2.4.2.
3. Spaces with a total of more than 150 watts of *general lighting* within toplit daylight zones complying with Section C405.2.4.3.

Exceptions: Daylight responsive controls are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Sidelit daylight zones on the first floor above grade in Group A-2 and Group M occupancies.
3. New buildings where the total connected lighting power calculated in accordance with Section C405.3.1 is not greater than the adjusted interior lighting power allowance (LPA_{adj}) calculated in accordance with Equation 4-8:

$$LPA_{adj} = [LPA_{norm} \times (1.0 - 0.4 \times UDZFA / TBFA)]$$

(Equation 4-8)

where:

LPA_{adj} = Adjusted building interior lighting power allowance in watts.

LPA_{norm} = Normal building lighting power allowance in watts calculated in accordance with section C405.3.2 and reduced in accordance with section C406.2.5.6 where used to comply with the requirements of section C406.

$UDZFA$ = Uncontrolled daylight zone floor area is the sum of all sidelit and toplit zones, calculated in accordance with sections C405.2.4.2 and C405.2.4.3, that do not have daylight responsive controls.

$TBFA$ = Total building floor area is the sum of all floor areas included in the lighting power allowance calculation in section C405.3.2.

C405.2.4.1 Daylight-responsive control function. Where required, *daylight-responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

1. Lights in *toplit daylight* zones in accordance with Section C405.2.4.3 shall be controlled independently of lights in sidelit daylight zones in accordance with Section C405.2.4.2.
2. Lights in the primary sidelit daylight zone shall be controlled independently of lights in the secondary sidelit daylight zone.
3. *Daylight responsive controls* within each space shall be configured so that they can be calibrated from within that space by authorized personnel.
4. Calibration mechanisms shall be in a location with *ready access.*
5. Daylight responsive controls shall dim lights continuously from full light output to 15 percent of full light output or lower.
6. Daylight responsive controls shall be configured to completely shut off all controlled lights.
7. When occupant sensor controls have reduced the lighting power to an unoccupied setpoint in accordance with Sections C405.2.1.2 through C405.2.1.4, daylight responsive controls shall continue to adjust electric light levels in response to available daylight, but shall be configured to not increase the lighting power above the specified unoccupied setpoint.
8. Lights in sidelit zones in accordance with Section C405.2.4.2 facing different cardinal orientations [within 45 degrees (0.79 rad) of due north, east, south, west] shall be controlled independently of each other.

Exceptions:

1. Within each space, up to 150 watts of lighting within the primary sidelit daylight zone is permitted to be controlled together with lighting in a primary sidelit daylight zone facing a different cardinal orientation.
2. Within each space, up to 150 watts of lighting within the secondary sidelit daylight zone is permitted to be controlled together with lighting in a secondary sidelit daylight zone facing a different cardinal orientation.

C405.2.4.2 Sidelit daylight zone. The sidelit daylight zone is the floor area adjacent to vertical *fenestration* that complies with all of the following:

1. Where the fenestration is located in a wall, the sidelit daylight zone shall extend laterally to the nearest full-height wall, or up to 1.0 times the height from the floor to the top of the fenestration, and longitudinally from the edge of the fenestration to the nearest full-height wall, or up to 0.5 times the height from the floor to the top of the fenestration, whichever is less, as indicated in Figure C405.2.4.2(1).
2. Where the fenestration is located in a rooftop monitor, the sidelit daylight zone shall extend laterally to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 1.0 times the height from the floor to the bottom of the fenestration, whichever is less, and longitudinally from the edge of the fenestration to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.25 times the height from the floor to the bottom of the fenestration, whichever is less, as indicated in Figures C405.2.4.2(2) and C405.2.4.2(3).
3. The secondary sidelit daylight zone is directly adjacent to the primary sidelit daylight zone and shall extend laterally to 2.0 times the height from the floor to the top of the fenestration or to the nearest full height wall, whichever is less, and longitudinally from the edge of the fenestration to the nearest full height wall, or up to 0.5 times the height from the floor to the top of the fenestration, whichever is less, as indicated in Figure C405.2.4.2(1). The area of secondary sidelit zones shall not be considered in the calculation of the daylight zones in Section C402.4.1.1.
4. The area of the fenestration is not less than 24 square feet (2.23 m^2).
5. The distance from the fenestration to any building or geological formation that would block access to daylight is greater than one-half of the height from the bottom of the fenestration to the top of the building or geologic formation.

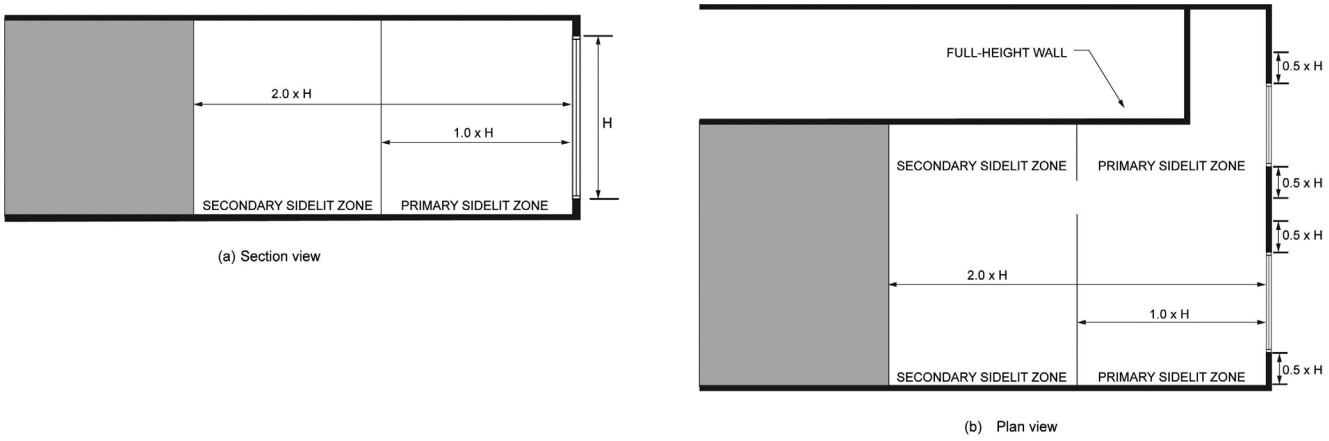
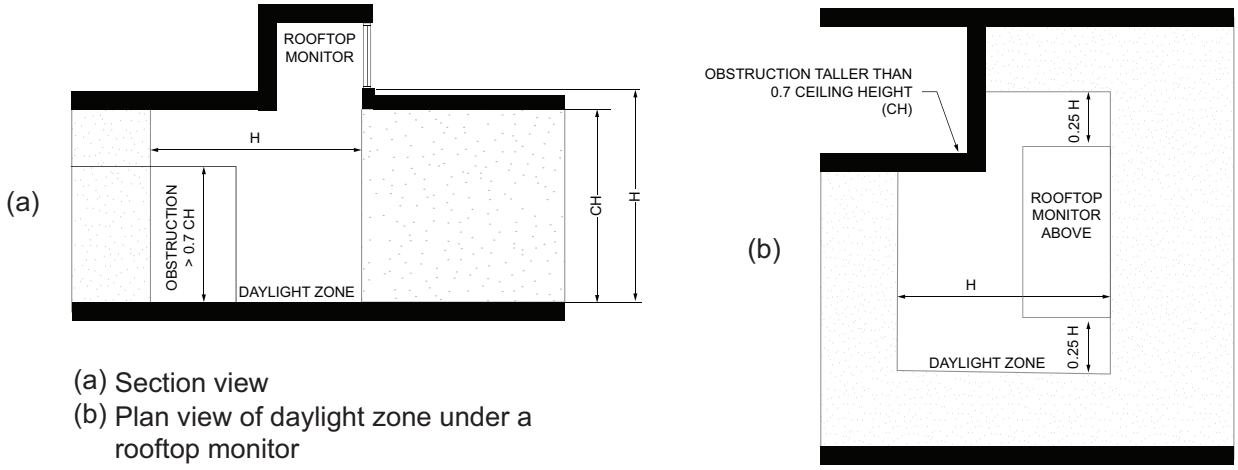
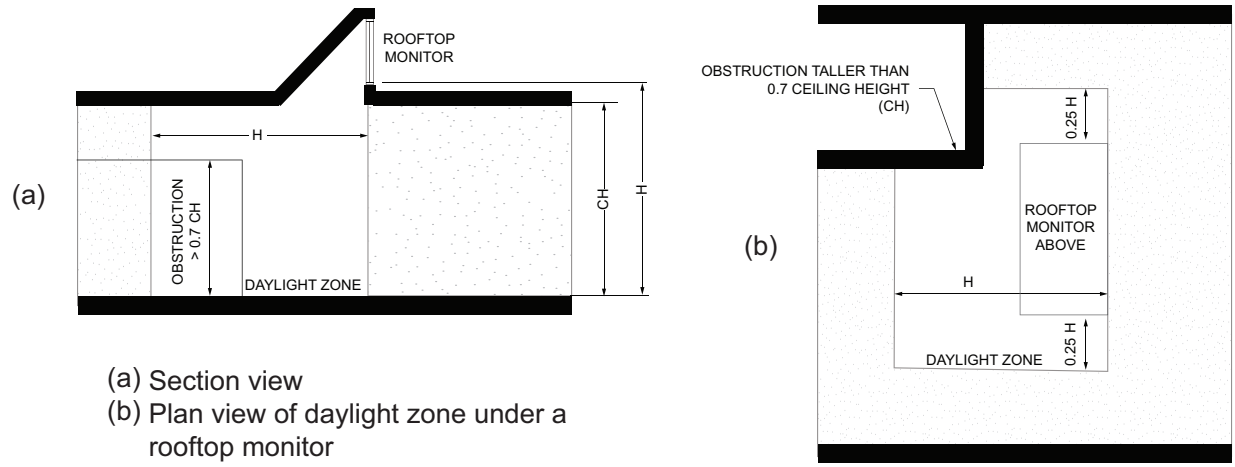


FIGURE C405.2.4.2(1)
PRIMARY AND SECONDARY SIDELIT DAYLIGHT ZONES



(a) Section view
(b) Plan view of daylight zone under a rooftop monitor

FIGURE C405.2.4.2(2)
DAYLIGHT ZONE UNDER A ROOFTOP MONITOR



(a) Section view
(b) Plan view of daylight zone under a rooftop monitor

FIGURE C405.2.4.2(3)
DAYLIGHT ZONE UNDER A SLOPED ROOFTOP MONITOR

6. The visible transmittance of the fenestration is not less than 0.20.
7. The projection factor (determined in accordance with Equation 4-5) for any overhanging projection that is shading the fenestration is not greater than 1.0 for fenestration oriented 45 degrees or less from true north and not greater than 1.5 for all other orientations.

C405.2.4.3 Toplit daylight zone. The *toplit daylight* zone is the floor area underneath a roof fenestration assembly that complies with all of the following:

1. The *toplit daylight* zone shall extend laterally and longitudinally beyond the edge of the roof fenestration assembly to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.7 times the ceiling height, whichever is less, as indicated in Figure C405.2.4.3.
2. Direct sunlight is not blocked from hitting the roof fenestration assembly at the peak solar angle on the summer solstice by buildings or geological formations.
3. The product of the visible transmittance of the roof fenestration assembly and the area of the rough opening of the roof fenestration assembly divided by the area of the *toplit* zone is not less than 0.008.

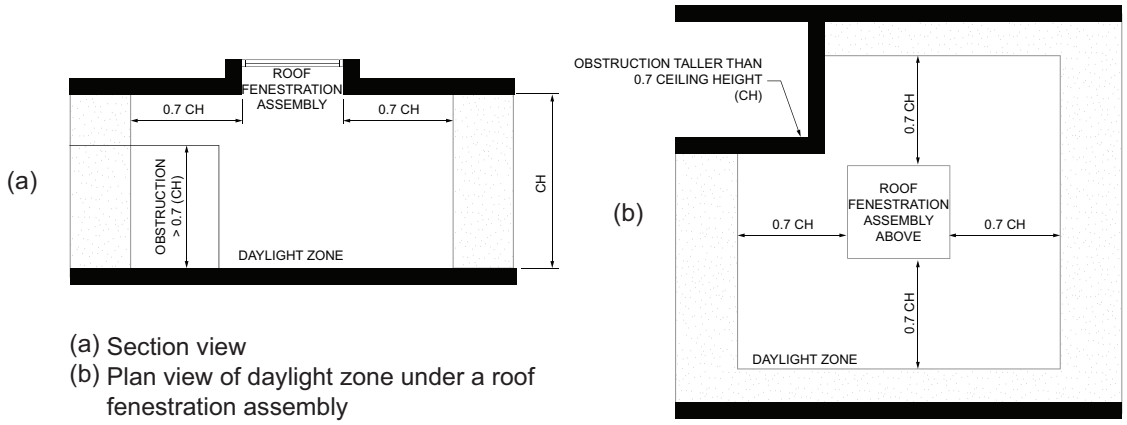
C405.2.4.4 Atriums. Daylight zones at atrium spaces shall be established at the top floor surrounding the atrium and at the floor of the atrium space, and not on intermediate floors, as indicated in Figure C405.2.4.4.

C405.2.5 Specific application controls. Specific application controls shall be provided for the following:

1. The following lighting shall be controlled by an occupant sensor complying with Section C405.2.1.1 or a time-switch control complying with Section C405.2.2.1. In addition, a manual control shall be provided to control such lighting separately from the general lighting in the space:
   1.1. Luminaires for which additional lighting power is claimed in accordance with Section C405.3.2.2.1.
   1.2. Display and accent.
   1.3. Lighting in display cases.
   1.4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting.
   1.5. Lighting equipment that is for sale or demonstration in lighting education.
   1.6. Display lighting for exhibits in galleries, museums and monuments that is in addition to general lighting.
2. *Sleeping units* shall have control devices or systems that are configured to automatically switch off all permanently installed luminaires and switched receptacles within 20 minutes after all occupants have left the unit.

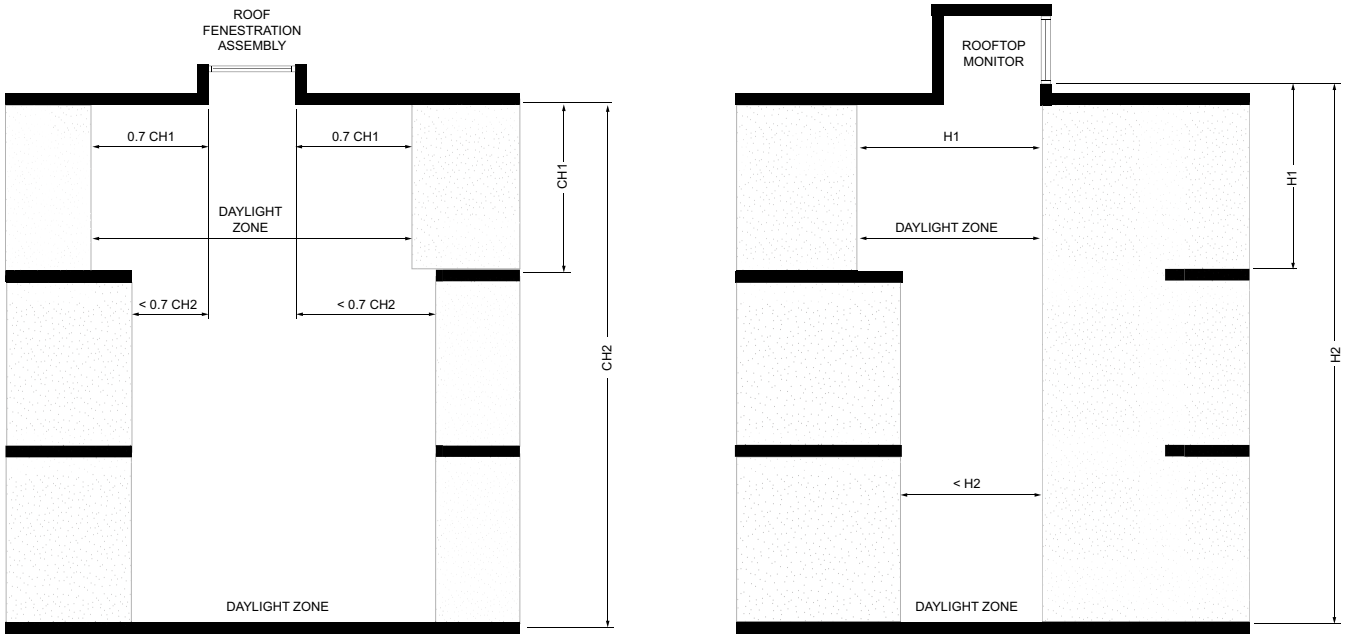
   Exceptions:

   1. Lighting and switched receptacles controlled by card key controls.
   2. Spaces where patient care is directly provided.
   3. Permanently installed luminaires within *dwelling units* shall be provided with controls complying with Section C405.2.1.1 or C405.2.3.1.
3. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a time switch control complying with Section C405.2.2.1 that is independent of the controls for other lighting within the room or space.
4. Task lighting for medical and dental purposes that is in addition to *general lighting* shall be provided with a *manual control*.



(a) Section view
(b) Plan view of daylight zone under a roof fenestration assembly

FIGURE C405.2.4.3
TOPLIT DAYLIGHT ZONE



(a) Section view of roof fenestration assembly at atrium

(b) Section view of roof monitor at atrium

C405.2.4.4
DAYLIGHT ZONES AT A MULTISTORY ATRIUM

C405.2.6 Manual controls. Where required by this code, manual controls for lights shall comply with the following:

1. They shall be in a location with *ready access* to occupants.
2. They shall be located where the controlled lights are visible, or shall identify the area served by the lights and indicate their status.

C405.2.7 Exterior lighting controls. Exterior lighting systems shall be provided with controls that comply with Sections C405.2.7.1 through C405.2.7.4.

Exceptions:

1. Lighting for covered vehicle entrances and exits from buildings and parking structures where required for eye adaptation.
2. Lighting controlled from within dwelling units.

C405.2.7.1 Daylight shutoff. Lights shall be automatically turned off when daylight is present and satisfies the lighting needs.

C405.2.7.2 Building facade and landscape lighting. Building façade and landscape lighting shall automatically shut off from not later than 1 hour after business closing to not earlier than 1 hour before business opening.

C405.2.7.3 Lighting setback. Lighting that is not controlled in accordance with Section C405.2.7.2 shall comply with the following:

1. Be controlled so that the total wattage of such lighting is automatically reduced by not less than

50 percent by selectively switching off or dimming luminaires at one of the following times:

1.1. From not later than midnight to not earlier than 6 a.m.

1.2. From not later than one hour after business closing to not earlier than one hour before business opening.

1.3. During any time where activity has not been detected for 15 minutes or more.

2. Luminaires serving outdoor parking areas and having a rated input wattage of greater than 78 watts and a mounting height of 24 feet (7315 mm) or less above the ground shall be controlled so that the total wattage of such lighting is automatically reduced by not less than 50 percent during any time where activity has not been detected for 15 minutes or more. Not more than 1,500 watts of lighting power shall be controlled together.

C405.2.7.4 Exterior time-switch control function. Time-switch controls for exterior lighting shall comply with the following:

1. They shall have a clock capable of being programmed for not fewer than 7 days.
2. They shall be capable of being set for seven different day types per week.
3. They shall incorporate an automatic holiday setback feature.
4. They shall have program backup capabilities that prevent the loss of program and time settings for a period of not less than 10 hours in the event that power is interrupted.

C405.2.8 Parking garage lighting control. Parking garage lighting shall be controlled by an *occupant sensor* complying with Section C405.2.1.1 or a *time-switch control* complying with Section C405.2.2.1. Additional lighting controls shall be provided as follows:

1. Lighting power of each luminaire shall be automatically reduced by not less than 50 percent when there is no activity detected within a lighting zone for 20 minutes. Lighting zones for this requirement shall be not greater than 3,600 square feet.

   Exception: Lighting zones provided with less than 1.5 footcandles of illumination on the floor at the darkest point with all lights on are not required to have automatic light-reduction controls.

2. Where lighting for eye adaptation is provided at covered vehicle entrances and exits from buildings and parking structures, such lighting shall be separately controlled by a device that automatically reduces lighting power by at least 50 percent from sunset to sunrise.
3. The power to luminaires within 20 feet (6096 mm) of perimeter wall openings or fenestration shall automatically reduce in response to daylight by at least 50 percent.

   Exceptions:

   1. Where the opening-to-wall-ratio is less than 40 percent as viewed from the interior and encompasses the vertical distance from the driving surface to the lowest structural element.
   2. Where the distance from the opening to any exterior daylight blocking obstruction is less than one-half the height from the bottom of the opening or fenestration to the top of the obstruction.
   3. Where openings are obstructed by permanent screens or architectural elements restricting daylight entering the interior space.

C405.3 Interior lighting power requirements. A building complies with this section where its total connected interior lighting power calculated under Section C405.3.1 is not greater than the interior lighting power allowance calculated under Section C405.3.2.

C405.3.1 Total connected interior lighting power. The total connected interior lighting power shall be determined in accordance with Equation 4-9.

$$TCLP = [LVL + BLL + LED + TRK + \text{Other}] \quad \textbf{(Equation 4-9)}$$

where:

TCLP = Total connected lighting power (watts).

LVL = For luminaires with lamps connected directly to building power, such as line voltage lamps, the rated wattage of the lamp.

BLL = For luminaires incorporating a ballast or transformer, the rated input wattage of the ballast or transformer when operating that lamp.

LED = For light-emitting diode luminaires with either integral or remote drivers, the rated wattage of the luminaire.

TRK = For lighting track, cable conductor, rail conductor, and plug-in busway systems that allow the addition and relocation of luminaires without rewiring, the wattage shall be one of the following:

1. The specified wattage of the luminaires, but not less than 8 W per linear foot (25 W/lin m).
2. The wattage limit of the permanent current-limiting devices protecting the system.
3. The wattage limit of the transformer supplying the system.

Other = The wattage of all other luminaires and lighting sources not covered previously and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

The connected power associated with the following lighting equipment and applications is not included in calculating total connected lighting power.

1. Television broadcast lighting for playing areas in sports arenas.
2. Emergency lighting automatically off during normal building operation.
3. Lighting in spaces specifically designed for use by occupants with special lighting needs, including those with visual impairment and other medical and age-related issues.
4. Casino gaming areas.
5. Mirror lighting in dressing rooms.
6. Task lighting for medical and dental purposes that is in addition to general lighting.
7. Display lighting for exhibits in galleries, museums and monuments that is in addition to general lighting.
8. Lighting for theatrical purposes, including performance, stage, film production and video production.
9. Lighting for photographic processes.
10. Lighting integral to equipment or instrumentation and installed by the manufacturer.
11. Task lighting for plant growth or maintenance.
12. Advertising signage or directional signage.
13. Lighting for food warming.
14. Lighting equipment that is for sale.
15. Lighting demonstration equipment in lighting education facilities.
16. Lighting approved because of safety considerations.
17. Lighting in retail display windows, provided that the display area is enclosed by ceiling-height partitions.
18. Furniture-mounted supplemental task lighting that is controlled by automatic shutoff.
19. Exit signs.
20. Antimicrobial lighting used for the sole purpose of disinfecting a space.

C405.3.2 Interior lighting power allowance. The total interior lighting power allowance (watts) for an entire building shall be determined according to Table C405.3.2(1) using the Building Area Method, or Table C405.3.2(2) using the Space-by-Space Method. The interior lighting power allowance for projects that involve only portions of a building shall be determined according to Table C405.3.2(2) using the Space-by-Space Method. Buildings with unfinished spaces shall use the Space-by-Space Method.

TABLE C405.3.2(1)
INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD

BUILDING AREA TYPE	LPD (w/ft^2)
Automotive facility	0.64
Convention center	0.64
Courthouse	0.74
Dining: bar lounge/leisure	0.69
Dining: cafeteria/fast food	0.66
Dining: family	0.61
Dormitory[a, b]	0.52
Exercise center	0.65
Fire station[a]	0.50
Gymnasium	0.65
Health care clinic	0.68
Hospital[a]	0.86
Hotel/Motel[a, b]	0.53
Library	0.70
Manufacturing facility	0.60
Motion picture theater	0.44
Multifamily[c]	0.45
Museum	0.55
Office	0.62
Parking garage	0.12
Penitentiary	0.65
Performing arts theater	0.82
Police station	0.64
Post office	0.62
Religious building	0.66
Retail	0.78
School/university	0.65
Sports arena	0.73
Town hall	0.67
Transportation	0.50
Warehouse	0.41
Workshop	0.83

For SI: 1 watt per square foot = 10.76 W/m^2.

a. Where sleeping units are excluded from lighting power calculations by application of Section C405.1.1, neither the area of the sleeping units nor the wattage of lighting in the sleeping units is counted.

b. Where dwelling units are excluded from lighting power calculations by application of Section C405.1.1, neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted.

c. Where dwelling units are excluded from lighting power calculations by application of Section C405.1.1, neither the area of the dwelling units nor the wattage of lighting in the dwelling units shall be counted. Where dwelling units are included in the lighting power calculations, only the area served by hardwired lighting shall be included.

TABLE C405.3.2(2)
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

COMMON SPACE TYPES[a]	LPD (watts/sq ft)
Atrium	
Less than 40 feet in height	0.41
Greater than 40 feet in height	0.51
Audience seating area	
In an auditorium	0.57
In a convention center	0.65
In a gymnasium	0.23
In a motion picture theater	0.27
In a penitentiary	0.56
In a performing arts theater	1.10
In a religious building	0.72
In a sports arena	0.27
Otherwise	0.23
Banking activity area	0.56
Breakroom (See Lounge/breakroom)	
Classroom/lecture hall/training room	
In a penitentiary	0.74
Otherwise	0.71
Computer room	0.75
Conference/meeting/multipurpose room	0.88
Confinement cells	0.51
Copy/print room	0.31
Corridor	
In a facility for the visually impaired (and not used primarily by the staff)[b]	0.71
In a hospital	0.61
In a manufacturing facility	0.28
In a primary or secondary school (and not used primarily by the staff)	0.71
Otherwise	0.41
Courtroom	1.06
Dining area	
In bar/lounge or leisure dining	0.62
In cafeteria or fast food dining	0.36
In a facility for the visually impaired (and not used primarily by the staff)[b]	1.22
In family dining	0.52
In a penitentiary	0.35
Otherwise	0.42
Dwelling unit	0.43
Electrical/mechanical room	0.39
Emergency vehicle garage	0.41

(continued)

TABLE C405.3.2(2)—continued
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

COMMON SPACE TYPES[a]	LPD (watts/sq ft)
Food preparation area	0.92
Guestroom[c, d]	0.41
Laboratory	
In or as a classroom	1.04
Otherwise	1.21
Laundry/washing area	0.43
Loading dock, interior	0.51
Lobby	
For an elevator	0.52
In a facility for the visually impaired (and not used primarily by the staff)[b]	1.44
In a hotel	0.48
In a motion picture theater	0.20
In a performing arts theater	0.82
Otherwise	0.80
Locker room	0.43
Lounge/breakroom	
In a healthcare facility	0.42
Otherwise	0.44
Office	
Enclosed	0.73
Open plan	0.56
Parking area, interior	0.11
Pharmacy area	1.23
Restroom	
In a facility for the visually impaired (and not used primarily by the staff[b]	0.96
Otherwise	0.63
Sales area	0.85
Seating area, general	0.21
Stairway (see Space containing stairway)	
Stairwell	0.47
Storage room	0.38
Vehicular maintenance area	0.53
Workshop	1.09
BUILDING TYPE SPECIFIC SPACE TYPES[a]	**LPD (watts/sq ft)**
Automotive (see Vehicular maintenance area)	
Convention Center—exhibit space	0.50
Dormitory—living quarters[c, d]	0.43
Facility for the visually impaired[b]	
In a chapel (and not used primarily by the staff)	0.58
In a recreation room (and not used primarily by the staff)	1.20
Fire Station—sleeping quarters[c]	0.19
Gymnasium/fitness center	
In an exercise area	0.50
In a playing area	0.75

TABLE C405.3.2(2)—continued
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

BUILDING TYPE SPECIFIC SPACE TYPES[a]	LPD (watts/sq ft)
Healthcare facility	
In control room (MRI/CT/radiology/PET)	0.78
In an exam/treatment room	1.16
In an imaging room	0.94
In a medical supply room	0.54
In a nursery	0.87
In a nurse's station	0.75
In an operating room	1.87
In a patient room[c]	0.45
In a physical therapy room	0.82
In a recovery room	0.89
Library	
In a reading area	0.77
In the stacks	1.18
Manufacturing facility	
In a detailed manufacturing area	0.75
In an equipment room	0.61
In an extra-high-bay area (greater than 50′ floor-to-ceiling height)	0.73
In a high-bay area (25-50′ floor-to-ceiling height)	0.58
In a low-bay area (less than 25′ floor-to-ceiling height)	0.61
Museum	
In a general exhibition area	0.31
In a restoration room	0.77
Performing arts theater—dressing room	0.35
Post office—sorting area	0.66
Religious buildings	
In a fellowship hall	0.50
In a worship/pulpit/choir area	0.75
Retail facilities	
In a dressing/fitting room	0.45
In hair care salon	0.65
In nail care salon	0.75
In massage clinic	0.81
In a mall concourse	0.57
Sports arena—playing area	
For a Class I facility[e]	2.26
For a Class II facility[f]	1.45
For a Class III facility[g]	1.08
For a Class IV facility[h]	0.72

(continued)

TABLE C405.3.2(2)—continued
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

BUILDING TYPE SPECIFIC SPACE TYPES[a]	LPD (watts/sq ft)
Transportation facility	
In a baggage/carousel area	0.28
In an airport concourse	0.25
At a terminal ticket counter	0.40
Warehouse—storage area	
For medium to bulky, palletized items	0.33
For smaller, hand-carried items	0.69

For SI: 1 foot = 304.8 mm, 1 watt per square foot = 10.76 W/m^2.

a. In cases where both a common space type and a building area specific space type are listed, the building area specific space type shall apply
b. A 'Facility for the Visually Impaired' is a facility that is licensed or will be licensed by local or state authorities for senior long-term care, adult daycare, senior support, or people with special visual needs.
c. Where sleeping units are excluded from lighting power calculations by application of Section C405.1.1, neither the area of the sleeping units nor the wattage of lighting in the sleeping units is counted.
d. Where dwelling units are excluded from lighting power calculations by application of Section C405.1.1, neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted.
e. Class I facilities consist of professional facilities; and semiprofessional, collegiate, or club facilities with seating for 5,000 or more spectators.
f. Class II facilities consist of collegiate and semiprofessional facilities with seating for fewer than 5,000 spectators; club facilities with seating for between 2,000 and 5,000 spectators; and amateur league and high-school facilities with seating for more than 2,000 spectators.
g. Class III facilities consist of club, amateur league, and high-school facilities with seating for 2,000 or fewer spectators.
h. Class IV facilities consist of elementary school and recreational facilities; and amateur league and high-school facilities without provision for spectators.

C405.3.2.1 Building Area Method. For the Building Area Method, the interior lighting power allowance is calculated as follows:

1. For each building area type inside the building, determine the applicable building area type and the allowed lighting power density for that type from Table C405.3.2(1). For building area types not listed, select the building area type that most closely represents the use of that area. For the purposes of this method, an "area" shall be defined as all contiguous spaces that accommodate or are associated with a single building area type.
2. Determine the floor area for each building area type listed in Table C405.3.2(1) and multiply this area by the applicable value from Table C405.3.2(1) to determine the lighting power (watts) for each building area type.
3. The total interior lighting power allowance (watts) for the entire building is the sum of the lighting power from each building area type.

C405.3.2.2 Space-by-Space Method. Where a building has unfinished spaces, the lighting power allowance for the unfinished spaces shall be the total connected lighting power for those spaces, or 0.2 watts per square

Space Method, the interior lighting power allowance is calculated as follows:

1. For each space enclosed by partitions that are not less than 80 percent of the ceiling height, determine the applicable space type from Table C405.3.2(2). For space types not listed, select the space type that most closely represents the proposed use of the space. Where a space has multiple functions, that space may be divided into separate spaces.
2. Determine the total floor area of all the spaces of each space type and multiply by the value for the space type in Table C405.3.2(2) to determine the lighting power (watts) for each space type.
3. The total interior lighting power allowance (watts) shall be the sum of the lighting power allowances for all space types.

C405.3.2.2.1 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and controlled in accordance with Section C405.2.5. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following cases:

1. For lighting equipment to be installed in sales areas specifically to highlight merchandise, the additional lighting power shall be determined in accordance with Equation 4-10.

   Additional interior lighting power allowance = 1000 W + (Retail Area 1 × 0.45 W/ft^2) + (Retail Area 2 × 0.45W/ft^2) + (Retail Area 3 × 1.05 W/ft^2) + (Retail Area 4 × 1.87 W/ft^2)

   For SI units:

   Additional interior lighting power allowance = 1000 W + (Retail Area 1 × 4.8 W/m^2) + (Retail Area 2 × 4.84 W/m^2) + (Retail Area 3 × 11 W/m^2) + (Retail Area 4 × 20 W/m^2)

   (Equation 4-10)

   where:

   Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.

   Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.

   Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.

   Retail Area 4 = The floor area used for the sale of jewelry, crystal and china.

   Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is approved by the *code official.*

2. For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional lighting power shall be not more than 0.9 W/ft^2 (9.7 W/m^2) in lobbies and not more than 0.75 W/ft^2 (8.1 W/m^2) in other spaces.

C405.4 Horticultural lighting. Not less than 95 percent of the permanently installed luminaires for *horticultural lighting* shall have a *photosynthetic photon* of not less than 1.7 µmol/J in *greenhouses* and not less than 1.9 umol/J for all other horticultural lighting. Luminaires for horticultural lighting shall be controlled by a device that that can be programmed to turn on at specific times and that can automatically turn off the luminaire when sufficient daylight is available.

C405.5 Exterior lighting power requirements. The total connected exterior lighting power calculated in accordance with Section C405.5.1 shall not be greater than the exterior lighting power allowance calculated in accordance with Section C405.5.2.

C405.5.1 Total connected exterior building exterior lighting power. The total exterior connected lighting power shall be the total maximum rated wattage of all lighting that is powered through the energy service for the building.

Exception: Lighting used for the following applications shall not be included.

1. Lighting *approved* because of safety considerations.
2. Emergency lighting automatically off during normal business operation.
3. Exit signs.
4. Specialized signal, directional and marker lighting associated with transportation.
5. Advertising signage or directional signage.
6. Integral to equipment or instrumentation and installed by its manufacturer.
7. Theatrical purposes, including performance, stage, film production and video production.
8. Athletic playing areas.
9. Temporary lighting.
10. Industrial production, material handling, transportation sites and associated storage areas.
11. Theme elements in theme/amusement parks.
12. Used to highlight features of art, public monuments, and the national flag.

13. Lighting for water features and swimming pools.
14. Lighting controlled from within dwelling units, where the lighting complies with Section C405.1.1.

C405.5.2 Exterior lighting power allowance. The exterior lighting power allowance (watts) is calculated as follows:

1. Determine the Lighting Zone (LZ) for the building according to Table C405.5.2(1), unless otherwise specified by the code official.
2. For each exterior area that is to be illuminated by lighting that is powered through the energy service for the building, determine the applicable area type from Table C405.5.2(2). For area types not listed, select the area type that most closely represents the proposed use of the area.
3. Determine the total area or length of each area type and multiply by the value for the area type in Table C405.5.2(2) to determine the lighting power (watts) allowed for each area type.
4. The total exterior lighting power allowance (watts) is the sum of the base site allowance determined according to Table C405.5.2(2), plus the watts from each area type.

TABLE C405.5.2(1)
EXTERIOR LIGHTING ZONES

LIGHTING ZONE	DESCRIPTION
1	Developed areas of national parks, state parks, forest land, and rural areas
2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed-use areas
3	All other areas not classified as lighting zone 1, 2 or 4
4	High-activity commercial districts in major metropolitan areas as designated by the local land use planning authority

C405.5.2.1 Additional exterior lighting power. Additional exterior lighting power allowances are available for the specific lighting applications listed in Table C405.5.2(3). These additional power allowances shall be used only for the luminaires serving these specific applications and shall not be used to increase any other lighting power allowance.

C405.5.3 Gas lighting. Gas-fired lighting is prohibited.

C405.6 Dwelling electrical meter. Each dwelling unit located in a *Group R*-2 building shall have a separate electrical meter.

C405.7 Electrical transformers. Low-voltage dry-type distribution electric transformers shall meet the minimum efficiency requirements of Table C405.7 as tested and rated in accordance with the test procedure listed in DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the transformer manufacturer.

Exceptions: The following transformers are exempt:

1. Transformers that meet the *Energy Policy Act of 2005* exclusions based on the DOE 10 CFR 431 definition of special purpose applications.
2. Transformers that meet the *Energy Policy Act of 2005* exclusions that are not to be used in general purpose applications based on information provided in DOE 10 CFR 431.
3. Transformers that meet the *Energy Policy Act of 2005* exclusions with multiple voltage taps where the highest tap is not less than 20 percent more than the lowest tap.
4. Drive transformers.
5. Rectifier transformers.
6. Auto-transformers.
7. Uninterruptible power system transformers.
8. Impedance transformers.
9. Regulating transformers.
10. Sealed and nonventilating transformers.
11. Machine tool transformers.
12. Welding transformers.
13. Grounding transformers.
14. Testing transformers.

C405.8 Electric motors. Electric motors shall meet the minimum efficiency requirements of Tables C405.8(1) through C405.8(4) when tested and rated in accordance with the DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the motor manufacturer.

Exception: The standards in this section shall not apply to the following exempt electric motors:

1. Air-over electric motors.
2. Component sets of an electric motor.
3. Liquid-cooled electric motors.
4. Submersible electric motors.
5. Inverter-only electric motors.

C405.9 Vertical and horizontal transportation systems and equipment. Vertical and horizontal transportation systems and equipment shall comply with this section.

C405.9.1 Elevator cabs. For the luminaires in each elevator cab, not including signals and displays, the sum of the lumens divided by the sum of the watts shall be not less than 35 lumens per watt. Ventilation fans in elevators that do not have their own air-conditioning system shall not consume more than 0.33 watts/cfm at the maximum rated speed of the fan. Controls shall be provided that will de-energize ventilation fans and lighting systems when the elevator is stopped, unoccupied and with its doors closed for over 15 minutes.

TABLE C405.5.2(2)
LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

	LIGHTING ZONES			
	Zone 1	Zone 2	Zone 3	Zone 4
Base Site Allowance	160 W	280 W	400 W	560 W
Uncovered Parking Areas				
Parking areas and drives	0.015 W/ft^2	0.026 W/ft^2	0.037 W/ft^2	0.052 W/ft^2
Building Grounds				
Walkways and ramps less than 10 feet wide	0.50 W/linear foot	0.50 W/linear foot	0.55 W/linear foot	0.60 W/linear foot
Walkways and ramps 10 feet wide or greater, plaza areas, special feature areas	0.10 W/ft^2	0.10 W/ft^2	0.11 W/ft^2	0.14 W/ft^2
Plaza areas	0.028 W/ft^2	0.049 W/ft^2	0.070 W/ft^2	0.098 W/ft^2
Roof terraces and special features	0.04 W/ft^2	0.07 W/ft^2	0.10 W/ft^2	0.140 W/ft^2
Dinning areas	0.156 W/ft^2	0.273 W/ft^2	0.39 W/ft^2	0.546 W/ft^2
Stairways	0.60 W/ft^2	0.70 W/ft^2	0.70 W/ft^2	0.70 W/ft^2
Pedestrian tunnels	0.063 W/ft^2	0.11 W/ft^2	0.14 W/ft^2	0.21 W/ft^2
Landscaping	0.014 W/ft^2	0.025 W/ft^2	0.036 W/ft^2	0.04 W/ft^2
Building Entrances and Exits				
Pedestrian and vehicular entrances and exits	5.6 W/linear foot of opening	9.8 W/linear foot of opening	14 W/linear foot of opening	19.6 W/linear foot of opening
Entry canopies	0.072 W/ft^2	0.126 W/ft^2	0.18 W/ft^2	0.252 W/ft^2
Loading docks	0.104 W/ft^2	0.182 W/ft^2	0.260 W/ft^2	0.35 W/ft^2
Sales Canopies				
Free-standing and attached	0.20 W/ft^2	0.35 W/ft^2	0.50 W/ft^2	0.70 W/ft^2
Outdoor Sales				
Open areas (including vehicle sales lots)	0.072 W/ft^2	0.126 W/ft^2	0.180 W/ft^2	0.252 W/ft^2
Street frontage for vehicle sales lots in addition to “open area” allowance	No allowance	7 W/linear foot	7 W/linear foot	14.4 W/linear foot

For SI: 1 foot = 304.8 mm, 1 watt per square foot = W/0.0929 m^2.
W = watts.

TABLE C405.5.2(3)
INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

LIGHTING ZONES				
	Zone 1	Zone 2	Zone 3	Zone 4
Building façades	No allowance	0.075 W/ft^2 of gross above-grade wall area or 1.8 W/linear ft of façades length	0.113 W/ft^2 of gross above-grade wall area or 2.7 W/linear ft of façades length	0.15 W/ft^2 of gross above-grade wall area or 3.6 W/linear ft of façades length
Automated teller machines (ATM) and night depositories	90 W per location plus 35 W per additional ATM per location			
Uncovered entrances and gatehouse inspection stations at guarded facilities	0.144 W/ft^2	0.252 W/ft^2	0.36 W/ft^2	0.504 W/ft^2
Uncovered loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.104 W/ft^2	0.182 W/ft^2	0.260 W/ft^2	0.364 W/ft^2
Drive-through windows and doors	53 W per drive-through	92 W per drive-through	132 W per drive-through	185 W per drive-through
Parking near 24-hour retail entrances	80 W per main entry	140 W per main entry	200 W per main entry	280 W per main entry
For areas that are not listed in the table or are not comparable to areas listed in the table, use the comparable interior space type from Table C405.3.2(2) as modified by the factor in this row.	22% of the interior lighting power allowance value	39% of the interior lighting power allowance value	55% of the interior lighting power allowance value	77% of the interior lighting power allowance value
Uncovered entrances and gatehouse inspection stations at guarded facilities	0.50 W/ft^2 of area			
Uncovered loading areas for law enforcement, fire, ambulance, and other emergency service vehicles	0.35 W/ft^2 of area			
Drive-up windows and doors	200 W per drive through			
Parking near 24-hour retail entrances.	400 W per main entry			

For SI: 1 watt per square foot = W/0.0929 m^2.
W = watts.

TABLE C405.7
MINIMUM NOMINAL EFFICIENCY LEVELS FOR 10 CFR 431 LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS

SINGLE-PHASE TRANSFORMERS		THREE-PHASE TRANSFORMERS	
kVA[a]	Efficiency (%)[b]	kVA[a]	Efficiency (%)[b]
15	97.70	15	97.89
25	98.00	30	98.23
37.5	98.20	45	98.40
50	98.30	75	98.60
75	98.50	112.5	98.74
100	98.60	150	98.83
167	98.70	225	98.94
250	98.80	300	99.02
333	98.90	500	99.14
—	—	750	99.23
—	—	1000	99.28

a. kiloVolt-Amp rating.
b. Nominal efficiencies shall be established in accordance with the DOE 10 CFR 431 test procedure for low-voltage dry-type transformers.

TABLE C405.8(1)
MINIMUM NOMINAL FULL-LOAD EFFICIENCY FOR NEMA DESIGN A, NEMA DESIGN B, AND *IEC DESIGN N MOTORS* (EXCLUDING FIRE PUMP) ELECTRIC MOTORS AT 60 HZ[a, b]

MOTOR HORSEPOWER (STANDARD KILOWATT EQUIVALENT)	NOMINAL FULL-LOAD EFFICIENCY (%) AS OF JUNE 1, 2016							
	2 Pole		4 Pole		6 Pole		8 Pole	
	Enclosed	Open	Enclosed	Open	Enclosed	Open	Enclosed	Open
1 (0.75)	77.0	77.0	85.5	85.5	82.5	82.5	75.5	75.5
1.5 (1.1)	84.0	84.0	86.5	86.5	87.5	86.5	78.5	77.0
2 (1.5)	85.5	85.5	86.5	86.5	88.5	87.5	84.0	86.5
3 (2.2)	86.5	85.5	89.5	89.5	89.5	88.5	85.5	87.5
5 (3.7)	88.5	86.5	89.5	89.5	89.5	89.5	86.5	88.5
7.5 (5.5)	89.5	88.5	91.7	91.0	91.0	90.2	86.5	89.5
10 (7.5)	90.2	89.5	91.7	91.7	91.0	91.7	89.5	90.2
15 (11)	91.0	90.2	92.4	93.0	91.7	91.7	89.5	90.2
20 (15)	91.0	91.0	93.0	93.0	91.7	92.4	90.2	91.0
25 (18.5)	91.7	91.7	93.6	93.6	93.0	93.0	90.2	91.0
30 (22)	91.7	91.7	93.6	94.1	93.0	93.6	91.7	91.7
40 (30)	92.4	92.4	94.1	94.1	94.1	94.1	91.7	91.7
50 (37)	93.0	93.0	94.5	94.5	94.1	94.1	92.4	92.4
60 (45)	93.6	93.6	95.0	95.0	94.5	94.5	92.4	93.0
75 (55)	93.6	93.6	95.4	95.0	94.5	94.5	93.6	94.1
100 (75)	94.1	93.6	95.4	95.4	95.0	95.0	93.6	94.1
125 (90)	95.0	94.1	95.4	95.4	95.0	95.0	94.1	94.1
150 (110)	95.0	94.1	95.8	95.8	95.8	95.4	94.1	94.1
200 (150)	95.4	95.0	96.2	95.8	95.8	95.4	94.5	94.1
250 (186)	95.8	95.0	96.2	95.8	95.8	95.8	95.0	95.0
300 (224)	95.8	95.4	96.2	95.8	95.8	95.8	—	—
350 (261)	95.8	95.4	96.2	95.8	95.8	95.8	—	—
400 (298)	95.8	95.8	96.2	95.8	—	—	—	—
450 (336)	95.8	96.2	96.2	96.2	—	—	—	—
500 (373)	95.8	96.2	96.2	96.2	—	—	—	—

a. Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

b. For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a horsepower or kilowatt rating between two horsepower or two kilowatt ratings listed in this table, each such motor shall be deemed to have a listed horsepower or kilowatt rating, determined as follows:

1. A horsepower at or above the midpoint between the two consecutive horsepowers shall be rounded up to the higher of the two horsepowers.
2. A horsepower below the midpoint between the two consecutive horsepowers shall be rounded down to the lower of the two horsepowers.
3. A kilowatt rating shall be directly converted from kilowatts to horsepower using the formula: 1 kilowatt = (1/0.746) horsepower. The conversion should be calculated to three significant decimal places, and the resulting horsepower shall be rounded in accordance with No. 1 or No. 2 above, as applicable.

TABLE C405.8(2)
MINIMUM NOMINAL FULL-LOAD EFFICIENCY FOR NEMA DESIGN C AND *IEC DESIGN H MOTORS* AT 60 HZ[a, b]

MOTOR HORSEPOWER (STANDARD KILOWATT EQUIVALENT)	NOMINAL FULL-LOAD EFFICIENCY (%) AS OF JUNE 1, 2016					
	4 Pole		6 Pole		8 Pole	
	Enclosed	Open	Enclosed	Open	Enclosed	Open
1 (0.75)	85.5	85.5	82.5	82.5	75.5	75.5
1.5 (1.1)	86.5	86.5	87.5	86.5	78.5	77.0
2 (1.5)	86.5	86.5	88.5	87.5	84.0	86.5
3 (2.2)	89.5	89.5	89.5	88.5	85.5	87.5
5 (3.7)	89.5	89.5	89.5	89.5	86.5	88.5
7.5 (5.5)	91.7	91.0	91.0	90.2	86.5	89.5
10 (7.5)	91.7	91.7	91.0	91.7	89.5	90.2
15 (11)	92.4	93.0	91.7	91.7	89.5	90.2
20 (15)	93.0	93.0	91.7	92.4	90.2	91.0
25 (18.5)	93.6	93.6	93.0	93.0	90.2	91.0
30 (22)	93.6	94.1	93.0	93.6	91.7	91.7
40 (30)	94.1	94.1	94.1	94.1	91.7	91.7
50 (37)	94.5	94.5	94.1	94.1	92.4	92.4
60 (45)	95.0	95.0	94.5	94.5	92.4	93.0
75 (55)	95.4	95.0	94.5	94.5	93.6	94.1
100 (75)	95.4	95.4	95.0	95.0	93.6	94.1
125 (90)	95.4	95.4	95.0	95.0	94.1	94.1
150 (110)	95.8	95.8	95.8	95.4	94.1	94.1
200 (150)	96.2	95.8	95.8	95.4	94.5	94.1

a. Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

b. For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a horsepower or kilowatt rating between two horsepower or two kilowatt ratings listed in this table, each such motor shall be deemed to have a listed horsepower or kilowatt rating, determined as follows:

1. A horsepower at or above the midpoint between the two consecutive horsepowers shall be rounded up to the higher of the two horsepowers.
2. A horsepower below the midpoint between the two consecutive horsepowers shall be rounded down to the lower of the two horsepowers.
3. A kilowatt rating shall be directly converted from kilowatts to horsepower using the formula: 1 kilowatt = (1/0.746) horsepower. The conversion should be calculated to three significant decimal places, and the resulting horsepower shall be rounded in accordance with No. 1 or No. 2 above, as applicable.

TABLE C405.8(3)
MINIMUM AVERAGE FULL-LOAD EFFICIENCY POLYPHASE SMALL ELECTRIC MOTORS[a]

MOTOR HORSEPOWER	OPEN MOTORS			
	Number of Poles	2	4	6
	Synchronous Speed (RPM)	3600	1800	1200
0.25	—	65.6	69.5	67.5
0.33	—	69.5	73.4	71.4
0.50	—	73.4	78.2	75.3
0.75	—	76.8	81.1	81.7
1	—	77.0	83.5	82.5
1.5	—	84.0	86.5	83.8
2	—	85.5	86.5	N/A
3	—	85.5	86.9	N/A

a. Average full-load efficiencies shall be established in accordance with DOE 10 CFR 431.

TABLE C405.8(4)
MINIMUM AVERAGE FULL-LOAD EFFICIENCY FOR
CAPACITOR-START CAPACITOR-RUN AND CAPACITOR-START INDUCTION-RUN SMALL ELECTRIC MOTORS[a]

MOTOR HORSEPOWER	OPEN MOTORS			
	Number of Poles	2	4	6
	Synchronous Speed (RPM)	3600	1800	1200
0.25	—	66.6	68.5	62.2
0.33	—	70.5	72.4	66.6
0.50	—	72.4	76.2	76.2
0.75	—	76.2	81.8	80.2
1	—	80.4	82.6	81.1
1.5	—	81.5	83.8	N/A
2	—	82.9	84.5	N/A
3	—	84.1	N/A	N/A

a. Average full-load efficiencies shall be established in accordance with DOE 10 CFR 431.

C405.9.2 Escalators and moving walks. Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have automatic controls that reduce speed as permitted in accordance with ASME A17.1/CSA B44 and applicable local code.

Exception: A variable voltage drive system that reduces operating voltage in response to light loading conditions is an alternative to the reduced speed function.

C405.9.2.1 Energy recovery. Escalators shall be designed to recover electrical energy when resisting overspeed in the down direction. The escalator shall be designed to recover, on average, more power than is consumed by the power recovery feature of its motor controller system.

C405.10 Voltage drop. The total *voltage drop* across the combination of customer-owned service conductors, feeder conductors and branch circuit conductors shall not exceed 5 percent.

C405.11 Automatic receptacle control. The following shall have automatic receptacle control complying with Section C405.11.1:

1. At least 50 percent of all 125V, 15- and 20-amp receptacles installed in enclosed offices, conference rooms, rooms used primarily for copy or print functions, breakrooms, classrooms, and individual workstations, including those installed in modular partitions and module office workstation systems.
2. At least 25 percent of branch circuit feeders installed for modular furniture not shown on the construction documents.

C405.11.1 Automatic receptacle control function. Automatic receptacle controls shall comply with the following:

1. Either split controlled receptacles shall be provided with the top receptacle controlled, or a controlled receptacle shall be located within 12 inches (304.8 mm) of each uncontrolled receptacle.
2. One of One of the following methods shall be used to provide control:
   2.1. A scheduled basis using a time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be configured to provide an independent schedule for each portion of the building of not more than 5,000 square feet (464.5 m2) and not more than one floor. The occupant shall be able to manually override an area for not more than 2 hours. Any individual override switch shall control the receptacles of not more than 5,000 feet (1524 m).
   2.2. An occupant sensor control that shall turn off receptacles within 20 minutes of all occupants leaving a space.
   2.3. An automated signal from another control or alarm system that shall turn off receptacles within 20 minutes after determining that the area is unoccupied.
3. All controlled receptacles shall be permanently marked in accordance with NFPA 70 and be uniformly distributed throughout the space.
4. Plug-in devices shall not comply.

Exceptions: Automatic receptacle controls are not required for the following:

1. Receptacles specifically designated for equipment requiring continuous operation (24 hours per day, 365 days per year).
2. Spaces where an automatic control would endanger the safety or security of the room or building occupants.
3. Within a single modular office workstation, noncontrolled receptacles are permitted to be located more than 12 inches (304.8 mm), but not more than 72 inches (1828 mm) from the controlled receptacles serving that workstation.

C405.12 Energy Monitoring. New buildings with a gross *conditioned floor area* of 25,000 square feet (2322 m2) or larger shall be equipped to measure, monitor, record, and report energy consumption data in compliance with Sections C405.12.1 through C405.12.5.

Exception: R-2 occupancies and individual tenant spaces are not required to comply with this section provided that the space has its own utility services and meters and has less than 5,000 square feet (464.5 m2) of *conditioned floor area*.

C405.12.1 Electrical energy metering. For all electrical energy supplied to the building and its associated site, including but not limited to site lighting, parking, recreational facilities, and other areas that serve the building and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C405.12.2.

C405.12.2 End-use metering categories. Meters or other approved measurement devices shall be provided to collect energy use data for each end-use category indicated in Table C405.12.2. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the measured load for each of the end-use categories indicated in Table C405.12.2 shall be permitted to be from a load that is not within that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit shall not require end-use metering.
2. End-use metering shall not be required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.
3. End-use metering shall not be required for an individual tenant space having a floor area not greater than 2,500 square feet (232 m^2) where a dedicated source meter complying with Section C405.12.3 is provided.

C405.12.3 Meters. Meters or other measurement devices required by this section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C405.12.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC, or other building systems that can monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of ±2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections C405.12.4 and C405.12.5.

C405.12.4 Data acquisition system. A data acquisition system shall have the capability to store the data from the required meters and other sensing devices for a minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each end-use category required by Section C405.12.2.

TABLE C405.12.2
ENERGY USE CATEGORIES

LOAD CATGEROGY	DESCRIPTION OF ENERGY USE
Total HVAC system	Heating, cooling, and ventilation, including but not limited to fans, pumps, boilers, chillers, and water heating. Energy used by 120-volt equipment, or by 208/120-volt equipment that is located in a building where the main service is 480/277-volt power, is permitted to be excluded from total HVAC system energy use.
Interior lighting	Lighting systems located within the building.
Exterior lighting	Lighting systems located on the building site but not within the building.
Plug loads	Devices, appliances, and equipment connected to convenience receptacle outlets.
Process load	Any single load that is not included in an HVAC, lighting or plug load category and that exceeds 5 percent of the peak connected load of the whole building, including, but not limited to data centers, manufacturing equipment and commercial kitchens.
Building operations and other miscellaneous loads	The remaining loads not included elsewhere in this table, including but not limited to vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas, and snow-melt systems.
Electric Vehicle Charging	Loads associated with charging an electric vehicle.
Solar Production	Energy produced from on-site renewable energy system

C405.12.5 Graphical energy report. A permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall have the capability to graphically provide the energy consumption for each end-use category required by Section C405.12.2 at least every hour, day, month, and year for the previous 36 months.

C405.13 Electric vehicle (EV) charging for new construction. The building shall be provided with electric vehicle (EV) charging in accordance with this section and the *National Electrical Code* (NFPA 70). Where parking spaces are added or modified without an increase in building size, only the new parking spaces are subject to this requirement. The number of required *EVSE installed spaces*, *EV ready spaces*, *EV capable spaces*, and *EV capable light spaces* shall be determined based on the total number of provided vehicle parking spaces or the number of vehicle parking spaces required under Section 9-9-6, "Parking Standards," B.R.C. 1981 prior to any approved parking reductions.

C405.13.1 Group R occupancies. Group R occupancies with three or more *dwelling units* and/or *sleeping units*

shall be provided with EV charging in accordance with Table C405.13.1. Calculations for the number of spaces shall be rounded up to the nearest whole number. The following substitutions shall be applicable:

1. R-2 Occupancies shall be permitted to substitute a *DCFC EVSE* for up to 5 spaces.
2. All attached garages with direct connection to a dwelling unit shall have one *EV ready* space.
3. When spaces exceed the minimum required for a specified space in Table C405.12.1, additional:
    a. *EVSE* installed spaces are permitted to be used to meet the minimum requirements for *EV ready spaces*, *EV capable spaces*, and *EV capable light spaces*.
    b. *EV ready* spaces are permitted to be used to meet the minimum requirements for *EV capable spaces* and *EV capable light spaces*.
    c. *EV-capable* spaces are permitted to be used to meet the minimum requirements for *EV-capable light spaces*.

TABLE C405.13.1
GROUP R OCCUPANCIES

# OF SPACES	NUMBER OF EVSE INSTALLED SPACES	NUMBER OF EV READY SPACES	NUMBER OF EV CAPABLE SPACES	NUMBER OF EV CAPABLE LIGHT SPACES
1–10	0	100%	0	0
> 10	5% of spaces (min. 1 dual port charging station)	15% of spaces	40% of spaces	40% of spaces

C405.13.2 Group A, B, E, I, M and S-2 occupancies. Group A, B, E, I, M and open or enclosed parking garages under an S-2 occupancy shall be provided with electric vehicle charging in accordance with Table C405.13.2. Calculations for the number of spaces shall be rounded up to the nearest whole number. The following substitutions shall be applicable:

1. Commercial buildings other than R-2 Occupancies shall be permitted to substitute a *DCFC EVSE* for up to 10 spaces.
2. When spaces exceed the minimum required for a specified space in Table C405.12.1, additional:
    a. *EVSE* installed spaces are permitted to be used to meet the minimum requirements for *EV ready spaces*, *EV capable spaces*, and *EV capable light spaces*.
    b. *EV ready* spaces are permitted to be used to meet the minimum requirements for *EV capable spaces* and *EV capable light spaces*.
    c. *EV-capable* spaces are permitted to be used to meet the minimum requirements for *EV-capable light spaces*.

TABLE C405.13.2
GROUP A, B, E, I, M AND S-2 OCCUPANCIES

# OF SPACES	NUMBER OF EVSE INSTALLED SPACES	NUMBER OF EV READY SPACES	NUMBER OF EV CAPABLE SPACES	NUMBER OF EV CAPABLE LIGHT SPACES
1–10	2 spaces	2 spaces	0	remaining spaces
> 10 including parking garages	5% of spaces (min. 1 dual port charging station)	10% of spaces	10% of spaces	20% of spaces*

*For parking garage, once spaces have been allocated, any remaining spaces in a parking garage shall, at a minimum, be *EV capable light spaces.*

C405.13.3 Identification. Construction documents shall designate all *EV capable light*, *EV capable spaces*, *EV ready spaces* and *EVSE installed spaces* and indicate the locations of conduit and termination points serving them. The circuits or spaces reserved for the circuits for *EV capable spaces*, *EV ready spaces*, and *EVSE installed spaces* shall be clearly identified in the panel or subpanel directory. The raceway and/or conduit for *EV capable light*, *EV capable* and *EV ready spaces* shall be clearly identified at both the panel or subpanel and the termination point at the parking space.

C405.13.4 EVSE installation. EVSE shall be installed in accordance with NFPA 70 and shall be listed and labeled in accordance with UL 2202 or UL 2594. When serving an accessible parking space, EVSE shall be accessible in accordance with City of Boulder Building Code, Chapter 11, Accessibility, and Section C405.13.5. EVSE shall meet all of the following requirements:

1. A power capacity of at least 8.3 kVa (or 40A at 208/240V) and has the ability to connect to the internet OR an inductive charging system for battery-powered electric vehicles that is ENERGY STAR certified and has the ability to connect to the internet.
2. An electric vehicle charging system shall be wall-mounted or pedestal style and may provide multiple cords to connect with *electric vehicles*.
3. An electric vehicle charging system shall be listed and labeled for EV charging and must comply with the current version of Article 625 of the National Electrical Code.

C405.13.4.1 EVSE minimum charging rate. Each installed EVSE shall comply with one of the following:

1. Be capable of charging at a minimum rate of 6.2 kVA (or 30A at 208/240V).
2. When serving multiple EVSE installed spaces and controlled by an energy management system providing load management, be capable of simultaneously sharing each EVSE installed space at a minimum charging rate of no less than 3.3 kVA.

C405.13.5 EV parking space requirements. Spaces designated for EVSE installed, EV ready, EV capable and EV

capable light shall meet the applicable requirements of Sections C405.13.5.1 through C405.13.5.4

C405.13.5.1 EVSE installed spaces. An installed EVSE with multiple output connections shall be permitted to serve multiple EVSE installed spaces. Each EVSE installed serving either a single EVSE installed space or multiple EVSE installed spaces, shall comply with all of the following:

1. Be installed in accordance with Section C405.13.4.
2. Be located within 3 feet of each EVSE installed space it serves.
3. Have a minimum circuit capacity of 8.3 kVA (40A 2 208/240V).

C405.13.5.2 EV Ready Spaces. Each EV ready space shall have a branch circuit that complies with all of the following:

1. Terminates at a receptacle or junction box located within 3 feet of each EV ready space it serves. EV ready includes two adjacent parking spaces if the receptacle is installed adjacent to and between both parking spaces.
2. Has a minimum circuit capacity of 8.3 kVA (40A 208/240V).
3. The electrical panel, electrical distribution equipment directory, and all outlets or enclosures shall be marked "For future electric vehicle supply equipment (EVSE)."

C405.13.5.3 EV Capable Spaces. Each EV capable space shall comply with all of the following:

1. A continuous raceway and/or conduit shall be installed between a suitable electrical panel or other electrical distribution equipment and terminate within 3 feet of the EV capable space and shall be capped. EV capable includes two adjacent parking spaces if the raceway and/or conduit terminates adjacent to and between both parking spaces.
2. The installed raceway and/or conduit shall be sized and rated to supply a minimum of 208 volts and a minimum of 40-ampere rated circuits.
3. The electrical panel or other electrical distribution equipment to which the raceway and/or conduit connects shall have sufficient dedicated space and spare electrical capacity to supply a minimum of 208 volts and a minimum of 40-ampere rated circuits.
4. The termination point of the conduit and/or raceway and the electrical distribution equipment directory shall be marked: "For future electric vehicle supply equipment (EVSE)."
5. Reserved capacity shall be no less than 8.3 kVA (40A 208/240V) for each EV capable space.

C405.13.5.4 EV Capable Light Spaces. Each EV capable light space shall comply with all of the following:

1. A continuous raceway and/or conduit shall be installed between a suitable electrical panel or other electrical distribution equipment and terminate within 3 feet of the EV capable light space and shall be capped. EV capable light includes two adjacent parking spaces if the raceway and/or conduit terminates adjacent to and between both parking spaces.
2. Installed raceway and/or conduit shall be sized and rated to supply a minimum of 208 volts and a minimum of 40-ampere rated circuits.
3. Dedicated physical space to accommodate all equipment necessary for electrical service to future EVSE.
4. The routing of the raceway and/or conduit must be noted on the construction documents and the raceway shall be permanently and visibly marked "EV CAPABLE" at the load center and termination point locations.

C405.13.6 Accessible parking. Where new *EVSE installed spaces* and/or new *EV ready spaces* and new accessible parking, as defined by the *City of Boulder Building Code*, Chapter 11, "Accessibility," are both provided, parking facilities shall be designed so that at least one accessible parking space shall be an *EV ready space* or *EVSE installed space*.

C405.13.7 Number and features of *universal vehicle charging spaces*. Where electric vehicle charging stations are provided for public use, the number of universal vehicle charging stations shall be provided in accordance with Table C405.13.5. Vehicle space size shall be 132 inches (3350 mm) minimum in width with an adjoining access aisle that is 60 inches (1525 mm) minimum in width. Additionally, the features of universal vehicle spaces and equipment shall comply with ICC A117.1 Sections 502.3 through 502.5, and Section 502.11, except that an *EVSE installed space* is permitted to be located at the end of the access aisle opposite the drive aisle.

Exception: For parking facilities of more than 100 total parking spaces, or 200 total parking spaces for Group I occupancies, the number of required universal vehicle charging stations may be reduced to 10 plus 5% of all required *EVSE installed spaces*. The total number of universal vehicle charging stations need not exceed 40.

TABLE C405.13.5
ELECTRIC VEHICLE CHARGING STATION FOR PUBLIC USE

NUMBER OF ELECTRIC VEHICLE CHARGING STATIONS REQUIRED	MINIMUM NUMBER OF UNIVERSAL VEHICLE CHARGING STATIONS
1	1
2 to 25	2
26 to 50	4
51 to 100	6
Over 100	8, plus 4 for each additional 200

C405.14 Solar Readiness. All newly constructed commercial buildings shall comply with the requirements of Sections C405.15 through C405.18.

C405.15 *Solar-ready zone*. Solar zones shall be clearly indicated on the construction documents.

C405.15.1 Location and size of solar zone. The *solar-ready zone* shall have a minimum total area described as follows. The *solar-ready zone* shall comply with access, pathway, smoke ventilation, and spacing requirements as specified in the Boulder Revised Code. The *solar-ready zone* total area shall be comprised of one or more rectangular areas. For sloped roofs each area must be not less than 200 square feet and no side of any rectangular area shall be less than 11 feet in length. For low-sloped or flat roofs, each area must be not less than 330 square feet, with a minimum length running generally north to south of 15' and a minimum length running generally east to west of 22' and no side of any rectangular area shall be less than 11 feet in length. The *solar-ready zone* shall be located on one or more of the following areas:

1. The roof or overhang of the building.
2. The roof or overhang of another structure located within 250 feet of the building on the same parcel or lot.
3. Covered parking installed with the building project.
4. A façade of the building that is within 15 degrees of true south.

The total *solar-ready zone* area shall not be less in size than an area that equals 40 percent of the total roof area, calculated as the horizontally projected gross roof area less the area covered by skylights, occupied roof decks, vegetative roof areas, and mandatory access or set back areas as required by the Boulder Revised Code. The following roof areas will be excluded when calculating the total roof area of the building:

1. Areas with a permanently installed on-site renewable energy systems that meets the following criteria:
    a. The system produces the energy output equivalent to covering 40 percent of the net roof area with solar photovoltaic calculated as the horizontally projected gross roof area less the area covered by skylights, occupied roof decks, vegetative roof areas, and mandatory access or set back areas as required by the Boulder Revised Code.
    b. The system is located on the roof or overhang of the building or on the roof or overhang of another structure located within 250 feet of the building, on the building premises, on covered parking, or another approved location installed with the building project and under the same property ownership
2. Roof areas where the annual solar access is less than 70 percent. For the purposes of this code, solar access means the ratio of solar insolation including shade to the solar insolation without shade. Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access.

    Exception: Solar zones are not required in buildings where the roof is designed and approved to be used for vehicular traffic or parking or for a heliport.

C405.15.2 Orientation. All sections of the solar zone located on steep sloped roofs shall be oriented between 110 degrees and 270 degrees of true north.

C405.15.3 Obstructions. No obstructions, including, but not limited to, vents, chimneys, architectural features, and roof-mounted equipment, shall be located in the solar zone. Any obstruction located on the roof or any other part of the building that projects above a solar zone shall be located at least twice the distance, measured in the horizontal plane, of the height difference between the highest point of the obstruction and the horizontal projection of the nearest point of the solar zone, measured in the vertical plane.

Exception: Any roof obstruction, located on the roof or any other part of the building, that is oriented north of all points on the solar zone.

C405.15.4 Roof loads and documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

C405.16 Interconnection pathways. The construction documents shall indicate at least one potential pathway for routing of conduit and/or raceway from the solar-ready zone to the point of interconnection with the electrical service panel and electrical storage system area.

C405.17 Documentation. A copy of the construction documents or a comparable document indicating the information from Sections C405.15 and C405.16 shall be provided to and maintained by the building owner. The building owner shall provide a copy of the construction documents or a comparable document indicating the information from Sections C405.15 and C405.16 to any purchasers and subsequent owners of the building or any part thereof.

C405.18 Electrical services reserved space. The main electrical service panel shall have a minimum bus bar rating of not less than 200 amps. The main electrical service panel shall have reserved spaces to allow for the installation of double pole circuit breakers for a future solar electric installation and a double pole circuit breaker for future electrical storage system installation. The reserved spaces shall be positioned at the opposite (load) end from the input feeder location or main circuit location. The reserved spaces shall be permanently marked as “For Future Solar Electric and Storage.”. The minimum reserved amperage shall be determined from Table C405.18.

TABLE C405.18
MINIMUM RESERVED AMPERAGE
PER SQUARE FOOT OF PLANNED SOLAR AREA

INVERTER SYSTEM VOLTAGE	AMPERAGE PER SQUARE FOOT
120	0.125
240	0.063
208	0.042
277	0.054
480	0.018

C405.19 Electrical energy storage system-ready area. The building shall have an area allocated of not less than 2 feet (610 mm) in one dimension and 4 feet (1219 mm) in another dimension and located in accordance with Section 1207 of the *International Fire Code* for future installation of an energy storage system. The location and layout diagram of the electrical energy storage system-ready area shall be indicated on the construction documents.

C405.20 Electric ready. These provisions shall be applicable for all new buildings, additions and *first tenant finish* permits that utilize combustion equipment. In the event of a *first tenant finish* to a commercial *core* and *shell* building or unfinished space is credited towards meeting the requirements of this chapter, the *code official* shall not issue a certificate of occupancy to the tenant until the requirements of Section C405.20.1 or C405.20.2 have met as applicable.

C405.20.1 Commercial building less than 10,000 sq.ft. and all R-occupancies. Commercial buildings that have a gross floor area of less than 10,000 sq.ft., and all R-occupancies of any size, shall comply with Sections C405.20.1.1 through C405.20.1.5.

C405.20.1.1 Combustion equipment. Combustion equipment shall be provided with all of the following:

1. A dedicated, appropriately phased branch circuit sized to accommodate future electric equipment or appliances to serve a comparable capacity to meet the heating load.
2. An electric receptacle or junction box that meets the requirements of Section C405.20.1.1.5, and is connected to the electrical panel through the branch circuit. Each electrical receptacle or junction box shall have reasonable access to the combustion equipment or dedicated physical space for future electric equipment with no obstructions other than the current combustion equipment.
3. Where combustion equipment is used for space or water heating, dedicated space shall be provided for all future electric equipment including an electric resistance backup coil for ducted systems if applicable.

Exception: Buildings with installed air conditioning systems are not required to provide additional dedicated physical space for an outdoor heat pump.

C405.20.1.2 Electrical panel space. The electrical panel shall have reserved physical space for a minimum two-pole or three-pole circuit breaker for each branch circuit provided for future electric equipment or appliances. The physical space in the electrical panel for each circuit breaker shall be sized with sufficient breaker capacity to meet the electrical demand of the future electric equipment or appliance that is sized to serve a comparable capacity to meet the heating load.

C405.20.1.3 Labeling. The junction box or receptacle and the dedicated circuit breaker space serving future electric equipment or appliances in the electrical panel shall be labeled for their intended use.

C405.20.1.4 Adjacency. The electrical receptacle or junction box must be provided within 3 feet of the combustion equipment or appliances or within 3 feet of the dedicated physical space for future electric equipment or appliances.

Exception: For combustion equipment dedicated to space or water heating, the electrical receptacle or junction box shall be located not more than 6 feet from the combustion equipment or the dedicated physical space for future electric equipment.

C405.20.1.5 Condensate drain. Where combustion equipment dedicated to space heating and water heating is installed, a location shall be provided for condensate drainage.

C405.20.2 Commercial building 10,000 sq.ft. and greater excluding R-occupancies. Commercial buildings excluding R-occupancies that have a gross floor area greater than or equal to 10,000 sq.ft., shall comply with Sections C405.20.2.1 through C405.20.2.4.

C405.20.2.1 Combustion equipment and appliances. Combustion equipment shall be provided with all of the following:

1. A junction box that is located in the same physical space as the combustion equipment and is reasonably accessible, and that is connected to the electrical panel by continuous conduit and/or raceways.
2. Dedicated electrical panel space for an appropriately phased branch circuit sized to accommodate future electric equipment or appliances to serve a comparable capacity to meet the heating load.
3. Where *combustion equipment* is used for space and water heating, dedicated physical space shall be provided for all future electric equipment.

C405.20.2.2 Electrical panel space. The electrical panel shall have reserved physical space for a minimum two-pole or three-pole circuit breaker for each branch circuit provided for future electric equipment or appliances. The physical space in the electrical panel for each circuit breaker shall be sized with sufficient breaker capacity to meet the electrical demand of the future electric equipment or appliance that is sized to serve a comparable capacity to meet the heating load.

C405.20.2.3 Labeling. The dedicated circuit breaker space serving future electric equipment or appliances in

the electrical panel shall be labeled "For future electric equipment".

C405.20.2.4 Physical space. Dedicated physical space shall be provided for additional electric equipment, including but not limited to transformers and cabinets, necessary for electrical service to future electric equipment or appliances.

SECTION C406
ADDITIONAL CONSERVATION REQUIREMENTS

C406.1 Compliance. Section C406 establishes additional conservation requirements for buildings. Buildings shall comply as follows with the conservation requirements of this Section C406:

1. Buildings with greater than 2,000 square feet (186 m^2) shall comply with Section C406.1.1. Buildings over 25,000 square feet is required to choose a minimum of one measure from C406.3.
2. Build-out construction with greater than 1,000 square feet (93 m^2) conditioned floor area that does not have final lighting or final HVAC systems installed under a prior building permit shall comply with Section C406.1.1.1

Exceptions: Core and shell buildings where no less than 20 percent of the net floor area is without final lighting or final HVAC and that comply with all of the following:

1. Buildings with greater than 5,000 square feet (465 m^2) of conditioned floor area that comply with Section C406.1.1.
2. Portions of the building where the net floor area is without final lighting or final HVAC that comply with Section C406.1.1.1.
3. Portions of the building where the net floor area has final lighting and final HVAC systems that comply with Section C406.1.1.

C406.1.1 Additional conservation credit requirements. Buildings shall achieve the minimum building conservation credit requirements established in Table C406.1.1 for their occupancy type with measures from Section C406.2 or C406.3 or both sections. Where a building contains multiple occupancies, credits under Table C406.1.1 from each building occupancy type shall be weighted by the gross floor area of each type to determine the weighted average project energy credits required. Associated supporting occupancies shall be included with the primary occupancy group for purposes of Section C406.

Exceptions:

1. Unconditioned parking garages that achieve 50% of the credits required for occupancy types S-1 and S-2 in Table C406.1.1.
2. Portions of buildings devoted to manufacturing or industrial uses.

TABLE C406.1.1
BUILDING CONSERVATION CREDIT REQUIREMENTS BY OCCUPANCY TYPE

OCCUPANCY TYPE	MIXED FUEL BUILDING	ALL-ELECTRIC BUILDING*
R-2	105	65
I-2	58	18
B	98	58
A-2	87	47
M	87	62
E	92	42
S-1, S-2	97	57
All other	40	n/a

C406.1.1.1 New construction less than 5,000 square feet & building core/shell and initial build-out construction. Where separate permits are issued for new construction, core and shell buildings and build-out construction, compliance shall be in accordance with the following requirements:

1. New construction less than 5,000 square feet, core and shell buildings or portions of buildings initially built-out shall comply with one of the following:
   1.1. Where the scope of work includes a new or previously installed central HVAC system or service water heating system with chillers, heat pumps, boilers, or loop pumping systems with heat rejection, the project shall achieve at least 50 percent of the energy credits required in Table C406.1.1.
   1.2. Where the scope of work does not include those systems listed in 1.1 above, the project shall achieve at least 33 percent of the energy credits required in Table C406.1.1.
2. 5,0000 square feet, core and shell buildings or portions of buildings initially built-out, the energy credits achieved shall be subject to the following:
   2.1. Lighting measure credits shall be determined only for areas with final lighting installed.
   2.2. Where HVAC or service water heating systems are designed to serve the entire building, full HVAC or service water heating measure credits shall be achieved.
   2.3. Where HVAC or service water heating systems are designed to service individual areas, HVAC or service water heating measure credits achieved shall be reduced in proportion to the floor area

with final HVAC systems or final service water heating systems installed.

Exception: Buildings less than 2,000 square feet are exempt from these requirements.

C406.1.2 Conservation credits determination. Overall conservation credits achieved for the project shall be the sum of the conservation credits for individual measures included in the building. Credits are available for the measures listed in Section C406.2 and C406.3. Base energy credits are shown in Tables C406.2 and C406.3 based on building occupancy type. Conservation credits achieved shall be determined in one of three ways, depending on the measure:

1. The conservation credit shall be the base energy credit for the measure where no adjustment factor or formula is shown in the measure description in Section C406.2.
2. The conservation credit shall be the base energy credit for the measure adjusted by a factor or formula where an adjustment factor or formula is stated in the measure description in Section C406.2. Where adjustments are applied, each conservation credit shall be rounded to the nearest whole number.
3. The conservation credit shall be determined by direct formula as stated in the measure description in Section C406.2. Where the direct formula is applied, each individual measure credit shall be rounded to the nearest whole number.

C406.2 Additional conservation credit measures. Credits are available for the measures listed in this Section C406.2. Each conservation measure used to meet credit requirements for the project shall meet or exceed the requirements in Sections C402 through C405. Credit for measures installed in the project shall be determined by one of three approaches defined in C406.1.2.

Conservation credits required for the project shall be the sum of the individual conservation credit measures. Credits are available for the measures listed in section C406.2. Where a project contains multiple building occupancy types:

1. Credits achieved for each occupancy type shall be summed and then weighted by the floor area of each occupancy type to determine the weighted average project conservation credits achieved.
2. Credits for improved envelope efficiency and lighting reduction (L06) shall be determined for the building or permitted floor area as a whole. Credits for other measures shall be taken from applicable tables or calculations weighted by the building occupancy type floor area.

C406.2.1 More efficient building envelope. A project will achieve credits for improved envelope performance by complying with one or several of following measures:

1. Section C406.2.1.2, E02
2. Section C406.2.1.3, E03
3. Section C406.2.1.6, E06

C406.2.1.1 E01 Reserved.

C406.2.1.2 E02 Total UA envelope reduction. Credit will be achieved if the total UA of the building thermal envelope as designed is at least15 percent below the total UA of the building thermal envelope in accordance with Section C402.1.5.

C406.2.1.3 E03 Reduced air leakage. Credit will be achieved if the tested building air leakage is at least 15 percent lower than the maximum leakage permitted by Section C402.5 provided the building is tested in accordance with the applicable methods in Section C402.5.

C406.2.1.4 E04 Reserved.

C406.2.1.5 E05 Reserved.

C406.2.1.6 E06 Improved fenestration. Credit will be achieved if the energy performance characteristics of all vertical fenestration in the project meet the requirements in Table C406.2.1.6 and Section C406.2.1.3.

TABLE C406.2.1.6
IMPROVED FENESTRATION EFFICIENCY REQUIREMENTS

FENESTRATION METRIC	WINDOWS		ENTRANCE DOORS
	Fixed	Operable	
Maximum U-factor	0.31	0.38	0.54
Maximum SHGC[a]	0.34	0.28	0.33
Minimum VT[b]	0.41	0.41	0.41

a. *Solar Heat Gain Coefficient.*
b. *Visible Transmittance*.

C406.2.2 More efficient HVAC performance. To achieve credits for more efficient HVAC performance, all heating and cooling systems shall meet the minimum requirements of Section C403 and efficiency improvements shall be referenced to minimum efficiencies listed in tables referenced by Section C403.3.3. Where multiple efficiency requirements are listed, equipment shall meet the seasonal or part-load efficiencies, including SEER/SEER2, EER/integrated energy efficiency ratio (IEER), integrated part load value (IPLV), or AFUE. Equipment that is larger than the maximum capacity range indicated in tables referenced by Section C403.3.3shall meet the efficiencies listed for the largest capacity for the associated equipment type shown in the table. Where multiple individual heating or cooling systems serve a project, the HVAC performance improvement of the project shall be the weighted average improvement based on individual system capacity. Projects will achieve HVAC efficiency credits for one or several of the following measures:

1. C406.2.2.2 H02
2. C406.2.2.3 H03
3. C406.2.2.4 H04
4. C406.2.2.5 H05

C406.2.2.1 H01. Reserved.

C406.2.2.2 H02 More efficient HVAC equipment heating performance. Credit for more efficient HVAC equipment heating performance will be achieved if at least 90 percent of the total HVAC capacity serving the total conditioned floor area of the entire building, or

TABLE C406.2
BASE CREDIT FOR ADDITIONAL CONSERVATION MEASURES

ID	ENERGY CREDIT MEASURE	SECTION	OCCUPANCY TYPE							
			R-2, R-4, and I-1	I-2	B	A-2	M	E	S-1, S-2	Other
E01	Reserved	—								
E02	UA reduction (15%)	C406.2.1.2	15	3	6	7	11	6	21	10
E03	Envelope Leak reduction	C406.2.1.3	16	3	4	9	13	1	25	9
E04	Reserved	—								
E05	Reserved	—								
E06	Improved Fenestration	C406.2.1.6	18	1	5	2	5	18	1	7
H01	Reserved	—								
H02	Heating efficiency	C406.2.2.2	5	8	4	11	17	11	31	11
H03	Cooling efficiency	C406.2.2.3	2	1	1	1	1	1	1	X
H04	Residential HVAC Control	C406.2.2.4	27	X	X	X	X	X	X	X
H05	DOAS Fan Control	C406.2.2.5	36	56	38	53	91	65	132	61
H06	Reserved	—								
H07	Central space heating heat pump	C406.2.2.7	30	30	30	30	30	30	30	30
W01	SHW preheat recovery	C406.2.3.1	111	6	13	40	19	14	6	8
W02	Heat pump water heater	C406.2.3	96	3	5	28	5	10	2	20
W03	Reserved	—								
W04	SHW pipe insulation	C406.2.3.4	8	1	4	3	4	5	2	23
W05	Point of use water heaters	C406.2.3.5	X	X	20	X	X	5	X	
W06	Thermostatic balancing valves	C406.2.3.6	3	1	1	1	1	2	1	4
W07	SHW heat trace system	C406.2.3.7	14	2	5	4	5	6	2	13
W08	SHW submeters	C406.2.3.8	20	X	X	X	X	X	X	1
W09	Reserved	—								
W10	Shower heat recovery	C406.2.3.1	29	1	3	X	X	3	X	20
P01	Energy monitoring	C406.2.4.1	2	3	X	2	5	3	5	54
L01	Reserved	—								
L02	Lighting dimming & tuning	C406.2.5.2	1	5	6	2	7	5	6	3
L03	Increase occ sensor	C406.2.5.3	2	5	6	1	7	4	7	X
L04	Increase daylight area	C406.2.5.4	3	6	7	2	9	5	8	4
L05	Res light control	C406.2.5.5	7	X	X	X	X	X	X	5
L06	Light Power reduction	C406.2.5.6	1	6	8	2	6	7	8	6
Q01	Reserved	—								
Q02	Commercial kitchen equipment	C406.2.6.2	X	15	X	40	X	X	X	5
Q03	Reserved	—								

tenant space in accordance with Section C406.1.1, complies with the following requirements:

1. Equipment installed shall be types that are listed in tables referenced by Section C 403.3.3. Electric resistance heating capacity shall be limited to 20% of system capacity with the exception of heat pump supplemental heating.
2. Equipment shall exceed the minimum heating efficiency requirements listed in tables referenced by section C403.3.3 by at least 5 percent. Where equipment exceeds the minimum annual heating efficiency requirements by 5 percent or more, credit for heating performance shall be determined using Equation 4-11 rounded to the nearest whole number.

$ACC_{HE} = ACC_{H5} \times (HEI / 0.05)$ **(Equation 4-11)**

Where:

ACC_{HE} = additional conservation credit for heating efficiency improvement

ACC_{H5} = base credits from Table C406.2 for applicable occupancy type

HEI = the efficiency improvement (percent) of the system as designed

C406.2.2.3 H03 More efficient HVAC equipment cooling and fan performance. Credit for more efficient HVAC equipment cooling and fan performance will be achieved if at least 90 percent of the total HVAC capacity serving the total conditioned floor area of the entire building, or tenant space in accordance with Section C406.1.1, complies with the following requirements:

1. Equipment installed shall be types that are listed in tables referenced by Section C 403.3.3.
2. Equipment shall exceed the minimum cooling efficiency requirements listed in tables referenced by Section C403.3.3 by 5 percent or more. For water-cooled chiller plants, heat rejection equipment efficacy shall also be increased by at least the chiller efficiency improvement. Where equipment exceeds the minimum annual cooling efficiency requirements by more than 5 percent, energy efficiency credits for cooling shall be determined using Equation 4-12 rounded to the nearest whole number.

   Where fan energy is not included in packaged equipment rating or it is and the fan size has been increased from the as-rated equipment condition, fan power or horsepower shall be no more than 5 percent of the allowed fan power in Section C403.8.1.

$ACC_{CE} = ACC_{C5} \times (CEI / 0.05)$ **(Equation 4-12)**

Where:

ACC_{CE} = additional conservation credits for cooling efficiency improvement

ACC_{C5} = base cooling efficiency credits from Table C406.2 for applicable occupancy type. Where multiple types of HVAC equipment is installed with different cooling efficiencies, the capacity-weighted average efficiency improvement shall be used. Where multiple equipment performance requirements apply, the equipment shall exceed the annualized energy or part-load requirement. Meeting both part-load and full-load efficiency percentage improvements is not required.

CEI = cooling efficiency improvement, the incremental improvement in efficiency over the minimum efficiency for the class of equipment, expressed as a fraction. For HVAC equipment classes with both full-load and part-load (seasonal) metrics, the part-load metric should be used.

(Equation 4-13)

For metrics that increase as efficiency increases, CEI shall be calculated as follows:

CEI = (CMdes/CMmin) – 1

For metrics that decrease as efficiency increases, CEI shall be calculated as follows:

CEI = (CMmin/CMdes) - 1

Where:

CMdes = design cooling efficiency, part-load, or annualized metric where available

CMmin = minimum required cooling efficiency, part-load, or annualized rating where available from Section C403.3.3

For Data Centers using ASHRAE Standard 90.4, CEI shall be calculated as follows:

CEI = (AMLCmax/AMLCdes) – 1

Where:

AMLCdes = as-designed Annualized Mechanical Load Component calculated in accordance with ASHRAE Standard 90.4, Section 6.5

AMLCmax = maximum annualized mechanical load component from ASHRAE Standard 90.4, Table 6.5

C406.2.2.4 H04 Residential HVAC Control. Credit for residential HVAC controls will be achieved if HVAC systems serving dwelling units or sleeping units are controlled to automatically activate a setback of at least 5°F (3°C) for both heating and cooling modes during occupied sleep periods and during unoccupied periods. The temperature controller shall be configured to provide setback during occupied sleep periods. The unoccupied setback mode shall be configured to operate in conjunction with one of the following:

1. Occupancy sensors in each room of the dwelling unit contained with a door switch to initiate setback and non-ventilation mode for all HVAC units in the dwelling within 20 minutes of all spaces being vacant immediately after a door switch operation. Where separate room HVAC units are used, an individual occupancy sensor on each HVAC unit that is configured to provide setback shall meet this requirement.
2. An advanced learning thermostat or controller that recognizes occupant presence and automatically creates a schedule for occupancy and provides a dynamic setback schedule based on when the spaces are generally unoccupied.
3. An automated control and sensing system that uses geo fencing connected to the dwelling unit occupants' cell phones and initiates the setback condition when all occupants are away from the building.

C406.2.2.5 H05 Dedicated outdoor Air System. Credit for dedicated outdoor air systems (DOAS) can be achieved only for single zone HVAC units that are not required to have multi-speed or variable speed fan control in accordance with Section C403.8.6.1. To achieve this credit, HVAC controls and ventilation systems shall include all the following:

1. Zone controls that cycle the heating/cooling unit fans off when not providing required heating/ cooling or limit fan power to 0.12 Watts per cfm of zone outdoor air.
2. Outdoor air supplied by an independent ventilation system designed to provide no more than 110 percent of the minimum outdoor air to each individual occupied zone, as specified by the *International Mechanical Code*.
3. Ventilation systems have energy recovery with an enthalpy recovery ratio of 65 percent or more at heating design conditions.
4. For ventilation system serving multiple zones and the system is not in a latent recovery outside air dehumidification mode, partial economizer cooling through an outdoor air bypass or wheel speed control automatically does one of the following:
    a. Sets the energy recovery leaving air temperature 55°F or 100% outdoor air bypass when the majority of zones require cooling and outdoor air temperature is below 70°F.
    b. The HVAC ventilation system includes supply air temperature controls that automatically reset the supply air temperature in response to outdoor air temperatures.
5. Ventilation systems providing mechanical dehumidification use recovered energy for reheat within the limits of item 4, above. This shall not limit the use of latent energy recovery for dehumidification.

The energy credit achieved for this measure is determined by multiplying the base energy credit from Table C406.2 by the fraction of system cooling capacity (nominal tons) that includes variable speed fan control.

C402.2.2.6. H06 Reserved.

C402.2.2.7. H07 Central space heating heat pump. Credit for this measure may be achieved only when the building uses all-electric systems for central space heating. Credits for this measure will be achieved if systems serve multiple spaces and use only electricity for space heating and reheat. Supplemental electric resistance heating capacity shall be limited to a maximum of 50% of rated capacity. Systems that qualify for this requirement include, but are not limited to, variable refrigerant flow (VRF) systems, air-to-water heat pumps, water-to-water heat pumps, and ground-source heat pump systems.

C406.2.3 Reduced Energy Use for Service Water Heating. Projects with service water-heating equipment that serves the whole building, a building addition or a tenant space shall achieve credits for reduced energy use for service water heating through compliance with the requirements of this section. Systems achieve credit by meeting one of the following requirements, combinations of measures achieve credit only if expressly listed:

1. By selecting one of the following measures: C406.2.3.1 W01, C406.2.3.2 W02 or C406.2.3.4 W04
2. By selecting one following measures: C406.2.3.5 W05, C406.2.3.6 W06, or C406.2.3.7 W07,
3. C406.2.3.8 W08,
4. C406.2.3.9 W09,
5. C406.2.3.10 W10,
6. Any combination of measures in C406.2.3.1 through C406.2.3.10 as long no more than one measure from Section C406.2.3.1 through C406.2.3.4 and no more than one measure from C406.2.3.5 through C406.2.3.7 are selected.

C406.2.3.1 W01 Recovered or renewable water-heating. Credits for recovered or renewable water heating will be achieved if the building complies with the requirements of this section. The building service water-heating system shall have one or more of the following that are sized to provide not less than 30 percent of the building's annual hot water requirements, or sized to provide 70 percent of the building's annual hot water requirements if the building is required to comply with Section C403.10.5:

1.1. Waste heat recovery from service hot water, recovery chillers, building equipment, or process equipment.

1.2. A water-to-water heat pump that precools chilled water return for building cooling.

1.3. On-site renewable energy water-heating systems.

C406.2.3.2. W02 Heat pump water heater. Credits for heat pump water heaters will be achieved if air-source heat pump water heaters do not draw conditioned air from within the building, except exhaust air that would otherwise be exhausted to the exterior. Any recirculating system and final heating shall be met with a separate non-heat pump heating source. The design shall also comply with the following as applicable:

2.1. For multi-family, dormitories, and healthcare occupancies with a recirculating system, at least 30% of design end use service water heating requirements shall be met using heat pump preheat with a COP of not less than 4.0 tested at 50°F (10°C) entering air and 70°F (21°C) entering water in accordance with AHRI standard 1300. A preheat storage tank equal to 25% of peak demand shall be included in the design.

2.2. For office, restaurant, and school occupancies with piping temperature maintenance, at least 30% of design end use service water heating requirements shall be met using heat pump preheat with a combined input-capacity-weighted-average UEF of 3.0 with a medium draw pattern for unitary equipment with either a heat trace system or a separate water heater in series for recirculating system and final heating.

2.3. For retail, small office, and warehouse occupancies with no recirculating system, at least 30% of design end use service water heating requirements shall be met using the heat pump portion of a hybrid water heater with a combined input-capacity-weighted-average UEF of 3.0 with a medium draw pattern for unitary equipment, including electric resistance heating to meet peak loading.

Where the heat pump capacity at 50°F (10°C) entering air and 70°F (21°C) entering water exceeds 50% of the design end use load excluding recirculating system losses, the base credits from Table C406.2 shall be prorated based on Equation 4-16.

W02 credit = base W02 table credit × HP*LLLL* 50% **(Equation 4-16)**

Where:

HPLF = Heat pump capacity as a fraction of the design end use service hot water requirements excluding recirculating system losses, not to exceed 80%.

C406.2.3.3. W03 Reserved.

C406.2.3.4 W04 Water-heating pipe insulation. Credits for water-heating pipe insulation will be achieved if service hot water is provided by a central water-heating system and the hot water pipe insulation thickness is at least 1.5 times the thickness required in Table C403.12.3. All service hot water piping shall be insulated from the hot water source to the fixture shutoff. For Group S (warehouse and storage) and Group M (retail) buildings, this measure is only available where a recirculation or heat trace system is used and piping length exceeds 80 lineal feet.

C406.2.3.5 W05 Point of use water heaters. Credits for point of use water heaters are available only for office or school buildings larger than 10,000 ft2 (930 m2). Credits are achieved if fixtures requiring hot water are supplied from a localized source of hot water with no recirculating system or heat trace piping. Supply piping from the water heater to the termination of the fixture supply pipe shall be insulated to the levels shown in Table C403.12.3 without exception. The volume from the water heater to the termination of the fixture supply pipe shall be limited as follows:

5.1. Nonresidential lavatories: not more than 2 oz (60 mL)

5.2. All other plumbing fixtures or appliances: not more than 0.25 gallons (0.95 L)

Exception: Where all remotely located hot water uses meet the requirements for measure W05, separate water heaters serving commercial kitchens or showers in locker rooms shall be permitted to have a local recirculating system or heat trace piping.

C406.2.3.6 W06 Thermostatic balancing valves. Credits for thermostatic balancing valves are available only where service water heating is provided centrally and distributed throughout the building. Credits will be achieved if each recirculating system branch return connection to the main service hot water supply piping has an automatic thermostatic balancing valve set to a minimal return water flow when the branch return temperature is greater than 115°F (46°C).

C406.2.3.7 W07 Heat trace system. Credits for heat trace systems are only available for projects with gross floor area greater than 10,000 square feet and a central water heating system. Credits will be achieved if the system includes self-regulating electric heat cables, connection kits, and electronic controls. The cable shall be installed directly on the hot water supply pipes underneath the insulation to replace standby losses.

C406.2.3.8 W08 Water heating system submeters. Credits for water heating system submeters are available only to Group R-2 occupancies where each individual dwelling unit is served by a central service water heating system has a service hot water meter connected to a reporting system that reports actual domestic hot water use of the individual dwelling unit. Preheated water serving the cold-water inlet to showers need not be metered. Credits cannot be achieved for this measure where other codes or regulations require individual dwelling unit hot water metering use of the individual dwelling unit. Preheated water serving the cold-water inlet to showers need not be metered. Credits cannot be achieved for this measure where other codes or regulations require individual dwelling unit hot water metering.

C406.2.3.9 W09 Reserved.

C406.2.3.10 W10 Shower drain heat recovery. Credits for shower drain heat recovery will be achieved if cold water serving building showers are be preheated by shower drain heat recovery units that comply with Section C404.7. The efficiency of drain water heat recovery units shall be 54 percent or greater, measured in accordance with CSA B55.1. Full credits are available only for the following occupancy types: I-2, I-4, R-1, R-2, and group E. Credits are only available only where there are more than eight showers. Credit is achieved only for buildings that utilize drain water heat recovery on at least 75% of shower drains in the building.

C406.2.4 P01 Energy monitoring. Credit may be achieved for this measure only if the project is not required to comply with Section C405.12. If eligible, credits will be achieved for installation of an energy

monitoring system that complies with all the requirements of Sections C405.12.1 through C405.12.5.

C406.2.5 Energy savings in lighting systems. Credits will be achieved for increased lighting system performance if the building complies with one or several of the following measures:

1. C406.2.5.2 L02
2. C406.2.5.3 L03
3. C406.2.5.4 L04
4. C406.2.5.5 L05
5. C406.2.5.6 L06

C406.2.5.1 L01 Reserved.

C406.2.5.2 L02 Enhanced digital lighting controls. Credit will be achieved if at least 50 percent of the gross floor area within the project complies with the following requirements:

1. Interior general lighting shall be located, scheduled, and operated in accordance with the lighting control standards in Section C405.2 and shall be configured with the following enhanced control functions:
    1.1. Luminaires shall be configured for continuous dimming.
    1.2. Each luminaire shall have luminaire level lighting controls.
    1.3. No more than eight luminaires within a *daylight zone* shall be controlled by a single *daylighting responsive control*.
2. Luminaires shall be controlled by a digital control system configured with the following capabilities:
    2.1. Reconfiguration of scheduling and illumination levels of individual and groups of luminaires.
    2.2. Load shedding.
    2.3. Occupancy sensors and daylight responsive controls are capable of being reconfigured through the system.
3. Construction documents shall include submittal of a sequence of operations, including a specification outlining each of the functions required by this section.
4. Luminaires shall be initially configured consistent with the following:
    4.1. *High-end trim*, setting the maximum light output of individual luminaires or groups of luminaires to support visual needs of a space or area, shall be implemented such that maximum light output or power of controlled lighting is initially reduced by rate of at least 15 percent from full output. The average maximum light output or power of the controlled lighting shall be documented without high end trim and with high end trim to verify reduction of light output or power by at least 15 percent when tuned.
    4.2. Where lumen maintenance control is used, controls shall be configured to limit the initial maximum lumen output or maximum lighting power to 85 percent or less of full light output or full power draw aluminum maintenance controls shall be limited to increasing lighting power by 1% per year.
    4.3. High-end trim and lumen maintenance controls shall be accessible only to authorized personnel.

C406.2.5.3 L03 Increase occupancy sensor. Credit will be achieved for this measure if the project complies with the lighting control requirements of Sections C406.2.5.3.1, C406.2.5.3.2, and C406.2.5.3.3.

C406.2.5.3.1 Occupant sensor controls. Occupant sensor controls shall be installed to control lights in the following space types:

1. Courtroom
2. Electrical/mechanical room
3. Food preparation area
4. Laboratory
5. Elevator lobby
6. Pharmacy area
7. Vehicular maintenance area
8. Workshop
9. Chapel in a facility for the visually impaired
10. Recreation room in a facility for the visually impaired
11. Exercise area in a fitness center
12. Playing area in a fitness center
13. Exam/treatment room in a health care facility
14. Imaging room in a health care facility
15. Physical therapy room in a healthcare facility
16. Library reading area
17. Library stacks
18. Detailed manufacturing area
19. Equipment room in a manufacturing facility
20. Low-bay Area in a manufacturing facility
21. Post office sorting area
22. Religious fellowship hall
23. Religious worship area
24. Hair salon
25. Nail salon
26. Banking activity area

27. Computer room, data center
28. Laundry washing area
29. Medical supply room in a healthcare facility
30. Telemedicine room in a healthcare facility
31. Museum restoration room

C406.2.5.3.2 Occupant sensor control function. Occupant sensor controls shall automatically turn lights off within 10 minutes after all occupants have left the space. If a manual control complying with Section C405.2.6 allows occupants to turn off lights, time-switch controls are not required.

Exception: In spaces where an automatic shutoff could endanger occupant safety or security, occupant sensor controls shall uniformly reduce lighting power to not more than 20 percent of full power within 10 minutes after all occupants have left the space. Time-switch controls complying with Section C405.2.2.1 shall only automatically turn lights off.

C406.2.5.3.3 Occupant sensor time function. Occupant sensor controls installed in accordance with Sections C405.2.1.1, C405.2.1.2 C405.2.1.3, and C405.2.1.4 shall automatically turn lights off or reduce lighting power within 10 minutes after all occupants have left the space. When the space is unoccupied, the lighting power shall be reduced by a minimum of 20 percent below the full lighting power. In egress areas the lighting power shall be reduced to the power level required to meet egress light levels.

C406.2.5.4 L04 Increase daylight area. Credit will be achieved for this measure if the total daylit area of the project (DLAbldg) has continuous daylight dimming meeting the requirements of Section C405.2.4 and is at least 5 percent greater than the typical daylit area (DLAtyp). Credit for measure L04 shall be determined based Equation 4-14:

$$ACCDL = ACC_{L04} \times 20 \times [(DLAbldg/GLFA) - DLAtyp] \quad \textbf{(Equation 4-14)}$$

Where:

ACCDL = additional conservation credit daylighting

ACC_{L04} = Section C406.2.5.4 base credits from Table C406.2

GLFA = project gross lighted floor area, ft^2 or m^2

DLAtyp = typical % of building area with daylight control (as a fraction) from Table C406.2.5.4

DLAbldg = the % building area with daylight control, but limited to no greater than DLAmax in Table C406.2.5.4

TABLE C406.2.5.4
DLAtyp AND DLAmax VALUES BY BUILDING USE TYPE

BUILDING USE TYPE	DLAtyp	DLAmax
Group B: Office ≤ 5000 ft^2	10%	20%
Group B: Office > 5000 ft^2	21%	31%
Group M: Retail, ≤ 1,000 ft^2 of roof area	0%	20%
Group M: Retail, >1,000 ft^2 of roof area	60%	80%
Group E: Education	42%	52%
Groups S-1 and S-2: Warehouse	50%	70%
Group I-2, R, and other	NA	NA

C406.2.5.5 L05 Residential light control. Credit for this measure is only available in buildings containing group R-2 occupancy spaces. Credit will be achieved for this measure if interior lighting systems comply with the following:

1. Common area restrooms, laundry rooms, storage rooms, and utility rooms shall have automatic hold off occupancy sensor controls that comply with the requirements for Section C405.2.1.1. Each additional device shall control no more than 5,000 square feet of floor area.
2. Each dwelling unit shall have a main control by the main entrance that turns off all the lights and all switched receptacles in the dwelling unit. Two switched receptacles shall be provided in living and keeping rooms or areas and shall be clearly identified. All switched receptacles shall be located within 12 inches of an unswitched receptacle. The main controls may have two controls, one for permanently wired lighting and one for receptacles. The main controls shall be identified as “lights master off” and “switched outlets master off.

C406.2.5.6 L06 Reserved.

C406.2.6 Efficient Equipment Credits.

C406.2.6.1 Q01 Reserved.

C406.2.6.2 Q02 Efficient commercial kitchen equipment. Credit for this measure is only available for buildings and spaces designated as occupancy type A-2, or facilities whose primary business type involves the use of a commercial kitchen. Credits will be achieved for this measure if at least one electric fryer is installed before the issuance of the certificate of occupancy and all fryers, dishwashers, steam cookers, and ovens installed before the issuance of the certificate of occupancy shall comply with all of the following:

1. Achieve performance levels in accordance with the equipment specifications listed in Tables C406.2.6.2(1) through C406.2.6.2(3) when rated in accordance with the applicable test procedure.
2. Have associated performance levels listed on the construction documents submitted for permitting.

TABLE C406.2.6.2(1)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL FRYERS

TYPE	HEAVY-LOAD COOKING ENERGY EFFICIENCY	IDLE ENERGY RATE (watts)	TEST PROCEDURE
Standard Open Deep-Fat Electric Fryers	> 83%	≤ 800	ASTM F1361
Large Vat Open Deep-Fat Electric Fryers	> 80%	≤ 1,100	ASTM F2144

TABLE C406.2.6.2(2)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL STEAM COOKERS

TYPE	PAN CAPACITY	COOKING ENERGY EFF	IDLE ENERGY RATE	TEST PROCEDURE
Electric	3 pan	50%	400 W	ASTM F1484
	4 pan	50%	530 W	
	5 pan	50%	670 W	
	6 pan +	50%	800 W	

TABLE C406.2.6.2(3)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL DISHWAHERS (HIGH TEMPERATURE)[1]

MACHINE TYPE	IDLE ENERGY RATE	WASHING ENERGY	WATER CONSUMPTION
Under Counter	< 0.30 kW	< 0.35 kWh/rack	< 0.86 GPR
Stationary Single Tank Door	< 0.55 kW	< 0.35 kWh/rack	< 0.89 GPR
Pot, Pan, and Utensil	< 0.90 kW	< 0.55 + 0.05 × SFrack	< 0.58 GPSF
Single Tank Conveyor	< 1.20 kW	< 0.36 kWh/rack	< 0.70 GPR
Multiple Tank Conveyor	< 1.85 kW	< 0.36 kWh/rack	< 0.54 GPR
Single Tank Flight Type	Reported	Reported	GPH < 2.975c + 55.0
Multiple Tank Flight Type	Reported	Reported	GPH < 4.96c + 17.0

1 Ratings shall follow test procedures ASTM F1696 and ASTM F1920 as applicable.

C406.3 Additional load management and carbon credit requirements. Credits achieved through the measures in Sections C406.3.1 through C406.3.9.12 count towards the total credit requirements for the specified occupancy in Table C406.1.1. Credits amounts for measures in Sections C406.3.1 through C406.3.9.12 shall be determined by Table C406.3.

C406.3.1 G01 Lighting load management. Credits for lighting load management will be achieved if luminaires have dimming control capability and automatic motion controllers that gradually reduce generating power during peak periods. The load management controls shall reduce lighting power in 75% of the building area with at least 20% of the luminaires being capable of continuous dimming over a period longer than 15 minutes.

C406.3.2 G02 HVAC load management. Credit for this measure will be achieved if automatic load management controls are configured as follows:

1. Where electric cooling is used to gradually increase the cooling setpoint by at least three degrees Fahrenheit over a minimum of three hours or reduce effective cooling capacity to 60% of installed capacity during the peak period.
2. Where electric heating is used to gradually decrease the heating setpoint by at least three degrees Fahrenheit over a minimum or reduce effective heating capacity to 60% of its installed capacity during the peak period.
3. Where HVAC systems are serving multiple zones and have less than 70 percent outdoor air required, include controls that provide excess outdoor air preceding the peak period and reduce outdoor air by at least 30% during the peak period in accordance with ASHRAE Standard 62.1, section 6.2.5.2 short term conditions, or provisions for approved engineering analysis per the International Mechanical Code Section C403.3.1.1, Outdoor Air Flowrates.

C406.3.3 G03 Automated shading load management. Credit for this measure will be achieved where fenestration on east, south, and west exposures exceeds 20% of the wall area and meets all of the following:

1. Automatic exterior shading devices or dynamic glazing that are capable of reducing solar gain (SHGC) through sunlit fenestration by at least 50 percent when fully closed shall receive the full credits in Table C406.3. The exterior shades shall have

TABLE TABLE C406.3
LOAD MANAGEMENT AND CARBON CREDITS

ID	Energy Credit Measure	Section	R-2, R-4, and I-1	I-2	B	A-2	M	E	S-1, S-2
G01	Lighting Load Management	C406.3.1	11	14	18	4	21	14	23
G02	HVAC Load Management	C406.3.2	22	14	11	14	19	31	13
G03	Automated Shading	C406.3.3	13	2	10	n/a	10	15	n/a
G04	Electric Energy Storage	C406.3.4	13	15	30	15	40	15	24
G05	Cooling Energy Storage	C406.3.5	17	18	15	10	19	28	1
G06	Reserved								
G07	Building Thermal Mass	C403.3.7	58	53	9	18	24	60	20
G08	Embodied Carbon Credits	C403.3.8	30	30	30	30	30	30	30

fully open and fully closed SHGC determined in accordance with AERC1.

2. Automatic interior shading devices with a minimum solar reflectance of 0.50 for the surface facing the fenestration shall receive 40 percent of the credits in Table C406.3.
3. All shading devices, dynamic glazing, or shading attachments shall:
    3.1. Provide at least 90 percent coverage of the total fenestration on east, south, and west exposures in the building.
    3.2. Be automatically controlled and shall modulate in multiple steps or continuously the amount of solar gain and light transmitted into the space in response to peak period and either daylight levels or solar intensity.

C406.3.3 G03 Automated shading load management. Credits for automated shading load management are available only where fenestration on the east, west and south elevations exceeds 20% of the wall area. Credits will be achieved for this measure as follows:

1. Automatic exterior shading devices or dynamic glazing capable of reducing solar gain (SHGC) through sunlit fenestration by at least 50 percent when fully closed will receive the full credits shown for this measure in Table C406.3. The exterior shades shall have fully open and fully closed SHGC determined in accordance with AERC1.
2. Automatic interior shading devices with a minimum solar reflectance of 0.50 for the surface facing the fenestration receive 40 percent of the credits shown for this measure in Table C406.3.
3. All shading devices, dynamic glazing, or shading attachments shall:
    3.1 Provide at least 90 percent coverage of the total fenestration on east, south, and west exposures in the building.
    3.2 Be automatically controlled and modulate in multiple steps or continuously the amount of solar gain and light transmitted into the space in response to peak period and either daylight levels or solar intensity.
    3.3 Include a manual override located in the same enclosed space as the shaded vertical fenestration. The manual override shall be configured so that override operation of automatics controls last no longer than an hour. The manual override shall be locked out during peak periods.

C406.3.4 G04 Electric energy storage. Credit for electric energy storage will be achieved if the electric storage devices meet the requirements of this section. Electric energy storage devices shall be charged and discharged by automatic load management controls to store energy during non-peak periods and use stored energy during peak periods to reduce building demand. To achieve credits for this measure, electric storage devices shall have a minimum capacity of 1.5 Wh/ft^2 of gross building area. The credits shown in Table C406.3 for this measure are achieved for installed electric storage of 5 Wh/ft^2. Credits achieved for this measure is determined by prorating the credits shown in Table C406.3 for actual installed storage capacity. Prorated credits are limited to a storage capacity of 15 Wh/ft^2, although larger capacity systems may be installed.

C406.3.5 G05 Cooling energy storage. Credits for cooling energy storage will be achieved if automatic load management controls are capable of activating ice or chilled water storage equipment to reduce demand during summer peak periods. Storage tank standby loss shall be demonstrated through analysis to be no more than two percent of storage capacity over a 24-hour period for the cooling design day. The base credits shown in Table C406.3 are achieved for storage capacity of the design peak hour cooling mode with a 1.15 sizing factor. Credits achieved for this measure are determined by prorating the credits shown in Table C406.3 for installed storage system sizes between 0.5 and 4.0 times the design day peak hour cooling load, rounded to the nearest whole credit. Prorated credits are limited to this range, although larger storage systems may be installed. Credit shall be determined from Equation 4-15.

$$ACC_{cs} = EC1.0 \times (1.44 \times SR + 0.71) / 2.15$$

(Equation 4-15)

Where:

ACC_{cs} = cooling storage credits achieved for the project

EC1.0 = G05 base energy credit, based on 1.0 ton-hours storage per design-day ton of cooling load

SR = storage ratio in ton-hours storage per design day ton (kWh/kW) of cooling load, limited to $0.5 \leq SR \leq 4.0$

C406.3.6 G06 Reserved.

C406.3.7 G07 Building thermal mass. Credit for building thermal mass is available only to projects where at least 80 percent of the gross floor area is unoccupied between midnight and 6:00 a.m.. Credit for building thermal mass is achieved if the project has additional passive interior mass and a night flush control of the HVAC system. To achieve this credit the project shall meet the following requirements:

1. Interior to the building envelope insulation, provide 10 lb per square foot of passive thermal mass. Thermal mass construction shall have mass surfaces directly contacting the air in the conditioned spaces; directly attached gypsum panels area allowed. Mass with carpet or furred gypsum panels for exterior wall mass that is on the exterior of the insulation layer may not be counted toward the required building mass.
2. HVAC units for 80 percent of the supply air flow in the project shall (a) be equipped with outdoor air

economizers and fans that have variable or are capable of operating at 66% or lower air flow and (b) be included in the night flush control sequence

3. Night flush controls shall be configured with the following sequence flush strategy:
    3.1. Summer mode shall be activated when outdoor air temperature exceeds 70°F and shall continue uninterrupted until deactivated when outdoor air temperature falls below 45°F. During summer mode, the occupied cooling setpoint shall be set at least 2°F higher than normal and the occupied heating set point shall be reset at least 2°F lower than normal.
    3.2. When all the following conditions exist, night flush shall be activated:
        3.2.1. Summer mode is active in accordance with item 3.1.
        3.2.2. Outdoor air temperature is 5°F or more below indoor average zone temperature.
        3.2.3. Indoor average zone temperature is greater than morning occupied heating setpoint.
        3.2.4. Local time is between 10:00 pm and 6:00 am.

C406.3.8 G08 Embodied carbon (CO2e) credits. To achieve credits for reduction of embodied carbon, all materials or products of the type chosen to meet this credit option used in the construction of the building shall meet the requirements of this section. The construction documents shall identify the products proposed for the construction of the building and demonstrate compliance of the proposed products with the requirements of this section. A minimum of three materials or products selected from the options in Sections C406.3.8.1 through C406.2.8.11 must be chosen to achieve the credit set forth in Table C406.3; alternatively, one selection from the options in Sections C406.3.8.1 through C406.3.8.11 and compliance with Section C406.3.9.12 will also achieve the credit.

C406.3.8.1 Embodied CO2e of insulation products. 75 percent of mineral wool (heavy density, light, and loose-fill), and cellulose insulation products used in the building, based on product cost or area, do not exceed 125 percent of *IW-EPD's* kgCO2e/m2-RSI. Products shall have a *product-specific Type III EPD*. Documentation of the product's kgCO2e/m2-RSI and *product specific Type III EPDs* shall be verified by a *registered design professional* on the project, and a summary shall be submitted upon application for building permit and shall include a list of each product and its associated kgCO2e/m2-RSI, per the *product-specific Type III EPD*.

C406.3.8.2 Embodied CO2e of interior finishes. CO_2e of interior finishes shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product's kgCO2e/unit and *product-specific Type III EPDs* shall be verified by a *registered design professional* on the project, and a summary shall be submitted upon application for building permit and shall include a list of each product and associated kgCO2e/unit, per the *product-specific Type III EPD*.

C406.3.8.2.1 Embodied CO2e of interior floor covering products. 80 percent of solid and engineered flooring, ceramic tile, natural stone floor, and resilient flooring (homogeneous and heterogeneous vinyl, and rigid core) used in the building, based on cost or area, shall not exceed 125% of *IW-EPD's* kgCO2e/m2.

C406.3.8.2.2 Embodied CO2e of acoustical ceiling systems. 80 percent of all acoustical ceiling products used in the building, based on cost or weight, shall not exceed 125 percent of *IW-EPD's* kgCO2e/kg.

C406.3.8.3 Embodied CO2e of insulated metal panels products. 80 percent of all insulated metal panel siding used in the building, based on cost or area, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m2, and products shall have a *product-specific Type III EPD*. Documentation of the product's kgCO2e/unit and *product-specific Type III EPDs* shall be verified by a *registered design professional* on the project, and a summary shall be submitted upon application for building permit and shall include a list of each product and associated kgCO2e/m2, per the *product-specific Type III EPD*.

C406.3.8.4 Embodied CO2e of roof assemblies and rooftop structures products. CO2e of roofing assemblies and rooftop structures products shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product's kgCO2e/m2 and *product-specific Type III EPDs* shall be verified by a *registered design professional* on the project, and a summary shall be submitted upon application for building permit and shall include a list of each product and associated kgCO2e/m2, per the *product-specific Type III EPD*.

C406.3.8.4.1 Embodied CO2e of roofing products. 80 percent of all built-up, PVC, and asphalt roofing products used in the building, based on product cost or area, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m2.

C406.3.8.4.2 Embodied CO2e of insulated metal panels products. 80 percent of insulated metal panel products used in the building, based on product cost or area, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m2.

C406.3.8.5 Embodied CO2e in concrete products. CO2e of ready-mix and precast concrete shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product's kgCO2e/unit and *prod-*

uct-specific Type III EPDs shall be verified by a registered design professional on the project, and a summary shall be submitted upon application for building permit and shall include a list of each product and associated kgCO2e/unit, per the *product-specific Type III EPD*.

C406.3.8.5.1 Embodied CO2e in ready-mix concrete products. 90 percent of all ready-mix concrete mixes used in the building's primary structural frame, secondary members, seismic force-resisting system, and foundations shall not exceed the project limit (CO2emax, see Equation 4-16) determined by 125 percent of *IW-EPD's* kgCO2e/y3.

Exceptions: Precast, shotcrete, or auger cast concrete.

CO2eproj < CO2emax **(Equation 4-16)**

where:

CO2eproj = Σ(CO2en) (vn)|CO2emax = Σ(CO2elim) (vn)

n = the total number of concrete mixtures for the project

CO2en = the global warming potential for mixture n per mixture *product-specific Type III EPD*, kgCO2e/y3

CO2elim = the global warming potential limit for mixture n per 125% of *IW-EPD's* kgCO2e/y3

vn = the volume of mixture n concrete to be placed in the project, in cubic yards (y3)

C406.3.8.5.2 Embodied CO2e in precast concrete products. 75 percent of all precast concrete products used as ordinary precast structural walls and foundations, based on cost or weight, shall not exceed 125 percent of *IW-EPD's* kg-CO2e/metric ton.

C406.3.8.6 Embodied CO2e in masonry construction products. CO_2e of clay bricks and cement products shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product's kgCO2e/unit and *product-specific Type III EPDs* shall be verified by a *registered design professional* on the project, and a summary shall be submitted upon application for building permit and shall include a list of each product and associated kgCO2e/unit, per the *product-specific Type III EPD*.

C406.3.8.6.1 Embodied CO2e of clay bricks. 50 percent of all clay brick products used in the building, based on cost or volume, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m3.

C406.3.8.6.2 Embodied CO2e of masonry cement. 50 percent of all masonry cement used in the building, based on cost or weight, shall not exceed 125 percent of *IW-EPD's* kgCO2e/metric ton.

C406.3.8.7 Embodied CO2e in steel products. CO2e of primary and secondary steel products shall meet the requirements in this section, and products shall have a *product-specific Type III EPD*. Documentation of the product's kgCO2e/metric ton and *product-specific Type III EPDs* shall be verified by a *registered design professional* on the project, and a summary thereof by the registered design professional shall be submitted with the building permit application and shall include a list of each product and associated kgCO2e/metric ton, per the *product-specific Type III EPD*.

Exceptions: When a minimum of 90 percent of steel products listed in this section, based on cost or weight, are produced in a facility or facilities that complies with one of the following and independent, third-party documentation is submitted with the building permit application demonstrating such compliances:

1. On the date of procurement, the facility is independently, or as part of an aggregation of facilities, a Green Power Partner in the United States Environmental Protection Agency (U.S. EPA) Green Power Partnership program or listed in an equivalent renewable power procurement registry, as approved by the *chief building official*.
2. Not less than 50 percent of the energy sourced for production at the facility is a renewable energy resource provided through one or more of the following:
    2.1. On-site renewable energy system
    2.2. Off-site renewable energy system owned by the production facility owner
    2.3. Community renewable energy facility
    2.4. Power Purchase Agreement (PPA)

C406.3.8.7.1 Embodied CO2e of structural steel products. 90 percent of all hollow structural steel sections, hot rolled structural steel sections and steel plate products used in the building's primary structural frame, secondary members, seismic force-resisting system, and foundations, steel decking, and roll-formed cladding shall not exceed 125 percent of *IW-EPD's* kgCO2e/metric ton.

C406.3.8.7.2 Embodied CO2e of steel reinforcing bar Products. 90 percent of all concrete reinforcing bars used in the building shall not exceed 125 percent of *IW-EPD's* kgCO2e/metric ton.

C406.3.8.7.3 Embodied CO2e of steel joist products. 50 percent of all open web steel joists and joist girder products used in the building shall not exceed 125 percent of *IW-EPD's* kgCO2e/metric ton.

C406.3.8.7.4 Embodied CO2e of cold formed steel products. 50 percent of all cold formed steel construction decking, secondary structural steel frame components, and nonstructural framing components for walls, floors, ceilings, and roofs used in

the building shall not exceed 125 percent of *IW-EPD's* kgCO2e/metric ton.

C406.3.8.8 Embodied CO2e of wood products. CO_2e of wood products shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product's kgCO2e/unit and *product-specific Type III EPDs* shall be verified by a registered design professional on the project, and a shall be submitted upon application for building permit and shall include a list of each product and associated kgCO2e/unit, per the *product-specific Type III EPD*.

Exceptions:

1. Fire-retardant-treated wood
2. Preservative-treated wood
3. Furniture and cabinetry

C406.3.8.8.1 Embodied CO2e of grade lumber products. 10 percent of all softwood and redwood lumber products used in the building, based on cost or volume, shall not exceed 125 percent of *IW-EPD's* kg-CO2e/m3.

C406.3.8.8.2 Embodied CO2e of prefabricated joist products. 50 percent of all prefabricated wood I-joist products used in the building, based on cost or length, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m.

C406.3.8.8.3 Embodied CO2e of glued cross-laminated timber products. 90 percent of all glued laminated timber products used in the building, based on cost or volume, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m3.

C406.3.8.8.4 Embodied CO2e of wood structural panel products. 50 percent of all soft plywood, oriented strand board products used in the building, based on cost or volume, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m3.

C406.3.8.8.5 Embodied CO2e of structural composite lumber products. 50 percent of all laminated veneer lumber and laminated strand lumber products used in the building, based on cost or volume, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m3.

C406.3.8.8.6 Embodied CO2e of particleboard and fiberboard products. 50 percent of all medium density fiberboard, cellulosic fiberboard, and particleboard products used in the building, based on cost or volume, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m3.

C406.3.8.9 Embodied CO2e of glazing products. 50 percent of all flat glass used in window products installed in the building, based on cost or weight, shall not exceed 125 percent of *IW-EPD's* kgCO2e/metric ton. Products shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product's kgCO2e/metric ton and *product-specific Type III EPDs* shall be verified by a *registered design professional* on the project, and a summary shall be submitted upon application for building permit and shall include a list of each product and associated kgCO2e/metric ton, per the *product-specific Type III EPD*.

Exceptions:

1. Plastic glazing
2. Fire-rated glazing
3. Interior partition walls
4. Skylights
5. Guards and railings
6. Glazing in athletic facilities
7. Floor/ceiling walking surfaces
8. Elevator hoist way glazing

C406.3.8.10 Embodied CO2e of gypsum products. 80 percent of all gypsum board, gypsum sheathing, and glass-mat gypsum board products used in the building, based on cost or area, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m2. Products shall have a product-specific Type III EPD. Confirmation of the product's kgCO2e/m2 and EPDs shall be verified by a *registered design professional* on the project, and a summary shall be submitted upon application for building permit and shall include a list of each product and associated kgCO2e/m2, per the *product-specific Type III EPD*.

C406.3.8.11 Embodied CO2e of foam plastic insulation products. 50 percent of all insulation products, including expanded polystyrene (EPS) and polyurethane foam insulation (HFC or HFO) used in the building, based on cost and area, shall not exceed 125 percent of *IW-EPD's* kgCO2e/m2-RSI. Products shall have a *product-specific Type III EPD*. Documentation of the product's kgCO2e/m2-RSI and *product-specific Type III EPDs* shall be verified by a registered design professional on the project, and a summary shall be submitted upon application for building permit and shall include a list of each product and associated kgCO2e/m2-RSI., per the *product-specific Type III EPD*.

C406.3.8.12 Whole building lifecycle analysis (WB LCA). Conduct a whole building life-cycle assessment, including operating energy, against a baseline building that demonstrates a minimum of 10% reduction for at least three of the six impact categories listed below, one of which must be global warming potential. The building envelope, structural elements including footings and foundations, interior ceilings, walls, and floors; and exterior finishes shall be studied for the assessment. The baseline and proposed buildings must be of comparable size, function, complexity, orientation, and operating energy performance. The service life of the baseline and proposed buildings must be the same and at least 60 years. The same life-cycle assessment software tools and data sets shall be used to evaluate both the baseline building and the proposed building. The construction documents shall report all listed impact

categories. Data sets must comply with the standards of ISO 14044.

Impact Categories:

1. Global warming potential (greenhouse gases), in kg CO2e.
2. Depletion of the stratospheric ozone layer, in kg CFC-11e.
3. Acidification of land and water sources, in moles H+ or kg SO2e.
4. Eutrophication, in kg nitrogen eq or kg phosphate eq.
5. Formation of tropospheric ozone, in kg NOx, kg O3 eq, or kg ethene; and
6. Depletion of nonrenewable energy resources, in MJ using CML/depletion of fossil fuels in TRACI.

SECTION C407
TOTAL BUILDING PERFORMANCE

C407.1 Scope. This section establishes criteria for compliance using total building performance. Compliance with this section requires the use of ASHRAE Standard 90.1-2022 Appendix G, as modified by this code. Required modifications to this standard are included in this section and in Appendix CA, "Boulder Modified Appendix G Protocol" to this code. All end use load components within and associated with the building shall be modeled.

Exception: Energy used to recharge or refuel vehicles that are used for on-road and off-site transportation purposes shall be excluded from end use load compliance modeling. Energy supplied to vehicle charging equipment shall be submetered per section C407.6.

C407.2 Mandatory requirements. Compliance under the total building performance path of Section C407 requires compliance with the section of this code identified in Table C407.2.

C407.3 Performance-based compliance. Compliance based on building performance shall be determined in accordance with Section C407.3.1, C407.3.2 or C407.3.3. Energy use for the *proposed design* shall be reported to the *code official* as energy use intensity (EUI) in kBtu/sf/yr.

C407.3.1 Modeled baseline. Projects shall comply with Section 4.2.1.1 of ASHRAE Standard 90.1-2022, as modified in Section C407.4. Projects complying using this Section C407.3.1 to demonstrate compliance shall use a site energy index as defined in Appendix I of ASHRAE 90.1-2022 and as defined in Section C407.4.

C407.3.2 Fixed performance target. Only project types listed in Table C407.3.2 may use this section for compliance with Section C407.3. Eligible projects may demonstrate compliance by meeting the EUI targets identified in the Table C407.3.2. The *proposed building model* predicted performance shall be demonstrated using the energy modeling procedures for the proposed building performance in Appendix G of ASHRAE 90.1-2022, as modified in Section C407.4. Buildings with multiple occupancy types listed in Table C407.3.2 shall develop a performance target based on area weighted-average EUI calculated by floor area of each occupancy type.

TABLE C407.2
MANDATORY REQUIREMENTS

SECTION	TITLE
C401	General
C402.5	Air leakage—thermal envelope
C403.1	General
C403.2	System design
C403.3	Mechanical system energy source
C403.4	Heating and cooling system controls
C403.5.5	Economizer fault detection and diagnostics
C403.7 (except C403.7.5.1)	Ventilation and exhaust systems
C403.8 (except C403.8.6)	Fans and fan controls
C403.9	Large-diameter ceiling fans
C403.11 (except C403.11.3)	Refrigeration equipment performance
C403.12	Construction of HVAC system elements
C403.13	Mechanical systems located outside of the building thermal envelope
C404	Service Water Heating
C405 (except C405.3)	Electrical Power and Lighting Systems
Reserved	
C408	Maintenance information and system commissioning

a. Reference to a code section includes all the relative subsections except as indicated in the table.

C407.3.3 Measured performance outcome. With approval of the *chief building official*, projects may demonstrate compliance with this code by documenting that the building has achieved the EUI target calculated per C407.3.1 or C407.3.2 within 10 percent based on metered energy use after occupancy.

C407.3.3.1 Excluded energy use. Energy used for data centers and EV charging equipment may be excluded from the total EUI of the building, provided that this energy use is separately metered per the requirements of Section C407.6.

C407.3.3.2 Demonstration of operating energy use. Metered energy data shall be reported to the *code official* using Energy Star Portfolio Manager and adjusted for the percentage of occupied floor area. The applicant shall demonstrate that, while at least 75 percent occupied, the building operates at or below its assigned EUI target established in Section C407.3.2 for any recording period of 12 consecutive months that is completed within three years of the date of the Certificate of Occupancy. The owner shall notify the *code official* when this 12-month period has been successfully completed.

TABLE C407.3.2
FIXED EUI TARGETS

BUILDING TYPE	PERFORMANCE TARGETS (kBtu/ft²)
Medium office (5,000–50,000 sf)	23
Mid-rise apartment (Type R2)	32
Primary school	34
Large Office (> 50,000 sf)	40
Small office (< 5000 sf)	19
Secondary school	31
Warehouse	11
Retail Store	40
Small Hotel	35
Hospital	76
Restaurant	200
Strip Mall	40

C407.3.3.3 Adjustments to EUI targets. The *chief building official* may approve an adjustment to a building's EUI target based on unanticipated changes to building operation and conditions as set forth in Items 1 through 3 below. The applicant shall demonstrate the need for adjustment based on the standards set forth Items 1 through 3 with specific documentation of the need:

1. **Adjustment for change in occupancy.** When the occupancy of the building or a portion of the building changes from that assumed in the permit submittal, the *code official* will adjust the assigned EUI target to reflect the new occupancy. If the new occupancy is not listed in Section C407.3.2, either the *code official* shall assign it an EUI target based on the best-performing local examples of that occupancy type, or a metering system shall be provided that excludes the energy loads for the additional occupancy.
2. **Adjustment for unusually cold years.** If the heating degree days (HDD) recorded by the National Weather Service for the Denver International Airport exceeds the average HDD value identified in local TMY3 data for the 12-month demonstration period, the *code official* will adjust the assigned EUI target by 1 percent for each 4-percent increase of HDD from average HDD for that period.
3. **Adjustment for other factors.** The *chief building official* may approve adjustments to the assigned EUI target for conditions other than those identified in this section if the *chief building official* finds that the conditions represent reasonable changes impacting the building use characteristics that were not anticipated when the EUI target was assigned.

C407.3.3.4 Financial security. The applicant shall provide a financial security to be used if the building fails to achieve an operating EUI at or lower than the building's EUI target according to Section C407.3.2. The financial security shall be submitted to and approved by the *chief code official* prior to issuance of the building permit. The financial security requirement shall be fulfilled by an escrow of funds with the city for an amount equal to $2.00 per square foot of gross floor area. If the owner provides evidence that the building has operated at or below its target energy performance level, as provided in Section C407.3.3.2, the financial security provided by the applicant shall be returned to the applicant and the applicant will have no further obligations under this section.

C407.3.3.5 Procedure for noncompliance. If the owner fails to provide evidence that the building has operated as required under Section C407.3.3.2, the *chief building official* shall require the applicant to draw down on the financial security of Section C407.3.3.4 to lower the operating energy use of the building, including recommissioning, repairs, and improvements to the existing energy-consuming systems, or provision of additional energy efficiency measures to reduce the building's energy use. Such expenditures shall be approved in advance by the *chief building official*, and the work shall be fully completed within one year of the date when a financial security has been drawn down.

C407.4 Modifications to Appendix G. Compliance with this section requires the use of ASHRAE Standard 90.1-2022 Appendix G, as modified by Appendix I to that standard, where references to "energy cost" are replaced with "site energy", and as modified here-in Section C407.4 and by Appendix CA "Boulder Modified Appendix G Protocol" of this code. Modifications to the Appendix G protocol include the following:

C407.4.1 Building performance requirement. The Site Energy Index target shall be calculated in accordance with Appendix I and Section 4.2.1.1(c) of ASHRAE 90.1-2022 with the following modifications:

1. The required Performance Index (Site Energy) shall be reduced by 15 percent for mixed-fuel buildings and 10 percent for all-electric buildings.
2. The building performance factors in Table 4.2.1.1 of Standard 90.1 shall be replaced by those listed in Table C407.4.1.

C407.4.2 Performance backstop. All elements of the building envelope and HVAC system must meet the mandatory requirements of ASHRAE Standard 90.1-2016, Sections 5.5 and 6.8. No individual component tradeoffs below these prescriptive requirements will be allowed in the proposed building performance model. Exceptions to the 40 percent window-to-wall area may be approved by the *code official* provided that the project can still meet the required building energy performance requirements of Section C401.

C407.4.3 Fixed schedules. All projects using the performance pathway must use the mandatory building schedules and equipment power density schedules

TABLE C407.4.1
BUILDING PERFORMANCE FACTORS (BPF) SITE ENERGY

BUILDING AREA TYPE	BUI8LDING PERFORMANCE FACTOR (BPF)
Office	0.52
Retail	0.47
School	0.50
Healthcare	0.63
Restaurant	0.69
Hotel	0.66
Warehouse	0.45
Apartment	0.67
All others	0.50

provided in Appendix CA, "Boulder Modified Appendix G Protocol" of this code for both the baseline and proposed building model.

Exceptions:

1. The *code official* may approve alternate schedules prior to submittal to account for special use conditions.
2. The *code official* may approve alternate schedules for unregulated loads in the proposed building design that reflect plug and process load management strategies.

C407.4.4 Appendix G mandatory requirements. The mandatory sections of ASHRAE Standard 90.1-2022 are superseded by the mandatory requirements listed in Section C407.2: Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4.

C407.5 Solar requirements. The project must meet the following solar requirements:

C407.5.1 Minimum installed solar capacity. The project must install an on-site renewable energy system sized to meet at least 5 percent of annual proposed design energy consumption. Projects pursuing C407.3.2 for compliance are exempt from this requirement.

C407.5.2 Solar readiness. The project must also meet the requirements of Section C405.14, Solar Readiness.

C407.6 Performance feedback. Applicants using the performance path to show compliance are required to submit an analysis comparing the modeled design to actual energy use of the building for a consecutive 12-month period within two years of project occupancy. This analysis shall use billing data and submetered data from the building meters to identify the accuracy of the energy model and any areas of performance divergence from predicted energy use. The applicant shall provide a narrative summary describing areas of alignment and misalignment of predictive modeling and compliance modeling following ASHRAE 90.1 with actual energy use patterns, including modeled EUI and actual EUI from metered use. This analysis shall be designed to support the ongoing commissioning or retro-commissioning process required in Section C408.

SECTION C408
MAINTENANCE INFORMATION AND SYSTEM COMMISSIONING

C408.1 General. This section covers the provision of maintenance information and the commissioning of, and the functional testing requirements for, building systems.

C408.1.1 Building operations and maintenance information. The building operations and maintenance documents shall be provided to the owner and shall consist of manufacturers' information, specifications and recommendations; programming procedures and data points; narratives; and other means of illustrating to the owner how the building, equipment and systems are intended to be installed, maintained and operated. Required regular maintenance actions for equipment and systems shall be clearly stated on a readily visible label on the equipment or appliance. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.

C408.1.2 Energy use monitoring plan. As part of the operations manual, the project must provide a written description of what metered data is collected, how metering data is collected and stored, and how the data can be accessed for project analysis by the building operator.

C408.2 Mechanical systems and service water-heating systems commissioning and completion requirements. Prior to the final mechanical and plumbing inspections, the *registered design professional or approved agency* shall provide evidence of mechanical systems *commissioning* and completion in accordance with the provisions of this section.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner or owner's authorized agent and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exceptions: The following systems are exempt:

1. Mechanical systems and service water heater systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140.7 kW) cooling capacity and 600,000 Btu/h (175.8 kW) combined service water-heating and space-heating capacity.
2. Systems included in Section C403.3.1 that serve individual *dwelling units* and *sleeping units*.

C408.2.1 *Commissioning* plan. A *commissioning plan* shall be developed by a *registered design professiona*l or *approved agency* and shall include the following items:

1. A narrative description of the activities that will be accomplished during each phase of *commissioning,* including the personnel intended to accomplish each of the activities.
2. A listing of the specific equipment, appliances, or systems to be tested and a description of the tests to be performed.

3. Functions to be tested including, but not limited to, calibrations and economizer controls.
4. Conditions under which the test will be performed. Testing shall affirm winter and summer design conditions and full outside air conditions.
5. Measurable criteria for performance.

C408.2.2 Systems adjusting and balancing. HVAC systems shall be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the product specifications. Test and balance activities shall include air system and hydronic system balancing.

C408.2.2.1 Air systems balancing. Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the *International Mechanical Code*. Discharge dampers used for air-system balancing are prohibited on constant-volume fans and variable- volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.746 kW), fan speed shall be adjusted to meet design flow conditions.

Exception: Fans with fan motors of 1 hp (0.74 kW) or less are not required to be provided with a means for air balancing.

C408.2.2.2 Hydronic systems balancing. Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the capability to measure pressure across the pump, or test ports at each side of each pump.

Exception: The following equipment is not required to be equipped with a means for balancing or measuring flow:

1. Pumps with pump motors of 5 hp (3.7 kW) or less.
2. Where throttling results in not greater than 5 percent of the nameplate horsepower draw above that required if the impeller were trimmed.

C408.2.3 Functional performance testing. Functional performance testing specified in Sections C408.2.3.1 through C408.2.3.3 shall be conducted.

C408.2.3.1 Equipment. Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specification such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and *sequence of operation*, including under full-load, part-load, and the following emergency conditions.

1. All modes as described in the *sequence* of *operation*.
2. All modes as described in the *sequence* of *operation*.
3. Redundant or *automatic* back-up mode.
4. Performance of alarms.
5. Mode of operation upon a loss of power and restoration of power.

Exception: Unitary or packaged HVAC equipment listed in the tables in Section C403.3.3 that do not require supply air economizers.

C408.2.3.2 Controls. HVAC and service water-heating control systems shall be tested to document that control devices, components, equipment and systems are calibrated and adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with *approved* plans and specifications.

C408.2.3.3 Economizers. Air economizers shall undergo a functional test to determine that they operate in accordance with the manufacturer's specifications.

C408.2.4 Preliminary commissioning report. A preliminary report of *commissioning* test procedures and results shall be completed and certified by the r*egistered design professional* or *approved agency* and provided to the building owner or owner's authorized agent. The report shall be organized with mechanical and service hot water findings in separate sections to allow independent review. The report shall be identified as "Preliminary Commissioning Report," shall include the completed Commissioning Compliance Checklist, Figure C408.2.4, and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.
4. Results of functional performance tests.
5. Functional performance test procedures used during the commissioning process, including measurable criteria for test acceptance.

C408.2.4.1 Acceptance of report. Buildings, or portions thereof, shall not be considered as acceptable for a final inspection pursuant to Section C105.2.6 until the *code official* has received the Preliminary Commissioning Report from the building owner or owner's authorized agent.

C408.2.4.2 Copy of report. The *code official* shall be permitted to require that a copy of the Preliminary

Commissioning Report be made available for review by the *code official*.

C408.2.5 Documentation requirements. The construction *documents* shall specify that the documents described in this section be provided to the building owner or owner's authorized agent within 90 days of the date of receipt of the *certificate of occupancy*.

C408.2.5.1 System balancing report. A written report describing the activities and measurements completed in accordance with Section C408.2.2.

C408.2.5.2 Final commissioning report. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner or owner's authorized agent. The report shall be organized with mechanical system and service hot water system findings in separate sections to allow independent review. The report shall include the following:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.

Exception: Deferred tests that cannot be performed at the time of report preparation due to climatic conditions.

C408.3 Functional testing of lighting controls. Automatic lighting controls required by this code shall comply with this section.

C408.3.1 Functional testing. Prior to passing final inspection, the *registered design professional* or *approved agency* shall provide evidence that the lighting control systems have been tested to ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the *construction documents* and manufacturer's instructions. Functional testing shall be in accordance with Sections C408.3.1.1 through C408.3.1.3 for the applicable control type.

C408.3.1.1 Occupant sensor controls. Where *occupant sensor controls* are provided, the following procedures shall be performed:

1. Certify that the *occupant sensor* has been located and aimed in accordance with manufacturer recommendations.
2. For projects with seven or fewer *occupant sensors*, each sensor shall be tested. For projects with more than seven *occupant sensors,* testing shall be done for each unique combination of sensor type and space geometry. Where multiples of each unique combination of sensor type and space geometry are provided, not less than 10 percent and in no case fewer than one, of each combination shall be tested unless the *code official* or design professional requires a higher percentage to be tested. Where 30 percent or more of the tested controls fail, all remaining identical combinations shall be tested.
3. For *occupant sensor controls* to be tested, verify the following:
   3.1. Where *occupant sensor controls* include status indicators, verify correct operation.
   3.2. The controlled lights turn off or down to the permitted level within the required time.
   3.3. For auto-on *occupant sensor controls*, the lights turn on to the permitted level when an occupant enters the space.
   3.4. For manual-on *occupant sensor controls*, the lights turn on only when manually activated.
   3.5. The lights are not incorrectly turned on by movement in adjacent areas or by HVAC operation.

C408.3.1.2 Time-switch controls. Where *time-switch controls* are provided, the following procedures shall be performed:

1. Confirm that the *time-switch control* is programmed with accurate weekday, weekend and holiday schedules.
2. Provide documentation to the owner of *time-switch controls* programming including weekday, weekend, holiday schedules, and set-up and preference program settings.
3. Verify the correct time and date in the time switch.
4. Verify that any battery back-up is installed and energized.
5. Verify that the override time limit is set to not more than 2 hours.
6. Simulate occupied condition. Verify and document the following:
   6.1. All lights can be turned on and off by their respective area control switch.
   6.2. The switch only operates lighting in the enclosed space in which the switch is located.
7. Simulate unoccupied condition. Verify and document the following:
   7.1. Nonexempt lighting turns off.
   7.2. Manual override switch allows only the lights in the enclosed space where the override switch is located to turn on or remain on until the next scheduled shutoff occurs.
8. Additional testing as specified by the *registered design professional.*

C408.3.1.3 Daylight responsive controls. Where *daylight responsive controls* are provided, the following shall be verified:

1. Control devices have been properly located, field calibrated and set for accurate setpoints and threshold light levels.
2. Daylight controlled lighting loads adjust to light level setpoints in response to available daylight.
3. The calibration adjustment equipment is located for *ready access* only by authorized personnel.

C408.3.2 Documentation requirements. The construction documents shall specify that the documents described in this section be provided to the building owner or owner's authorized agent within 90 days of the date of receipt of the *certificate of occupancy*.

C408.3.2.1 Drawings. Construction documents shall include the location and catalogue number of each piece of equipment.

C408.3.2.2 Manuals. An operating and maintenance manual shall be provided and include the following:

1. Name and address of not less than one service agency for installed equipment.
2. A narrative of how each system is intended to operate, including recommended setpoints.
3. Submittal data indicating all selected options for each piece of lighting equipment and lighting controls.
4. Operation and maintenance manuals for each piece of lighting equipment. Required routine maintenance actions, cleaning and recommended relamping shall be clearly identified.
5. A schedule for inspecting and recalibrating all lighting controls.

C408.3.2.3 Report. A report of test results shall be provided and include the following:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.

Project Information: _____ Project Name:_____

Project Address:_____

Commissioning Authority:_____

Commissioning Plan (Section C408.2.1)

☐ Commissioning Plan was used during construction and includes all items required by Section C408.2.1

☐ Systems Adjusting and Balancing has been completed.

☐ HVAC Equipment Functional Testing has been executed. If applicable, deferred and follow-up testing is scheduled to be provided on:_____

☐ HVAC Controls Functional Testing has been executed. If applicable, deferred and follow-up testing is scheduled to be provided on:_____

☐ Economizer Functional Testing has been executed. If applicable, deferred and follow-up testing is scheduled to be provided on:_____

☐ Lighting Controls Functional Testing has been executed. If applicable, deferred and follow-up testing is scheduled to be provided on:_____

☐ Service Water-Heating System Functional Testing has been executed. If applicable, deferred and follow-up testing is scheduled to be provided on:_____

☐ Manual, record documents and training have been completed or scheduled

☐ Preliminary Commissioning Report submitted to owner and included all items required by Section C408.2.4

I hereby certify that the commissioning provider has provided me with evidence of mechanical, service water heating and lighting systems commissioning in accordance with the 2018 IECC.

Signature of Building Owner or Owner's Representative _____ Date_____

FIGURE C408.2.4
COMMISSIONING COMPLIANCE CHECKLIST

CHAPTER 5 [CE]
EXISTING BUILDINGS

User note:

About this chapter: *Many buildings are renovated or altered in numerous ways that could affect the energy use of the building as a whole. Chapter 5 requires the application of certain parts of Chapter 4 in order to maintain, if not improve, the conservation of energy by the renovated or altered building.*

SECTION C501
GENERAL

C501.1 Scope. The provisions of this chapter shall control the *alteration*, *repair*, *addition* and *change of occupancy* of existing buildings and structures.

C501.1.1 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing *building* or *building* system lawfully in existence at the time of adoption of this code.

C501.2 Compliance. *Additions*, *alterations*, *repairs*, and changes of occupancy to, or relocation of, existing *buildings* and structures shall comply with Sections C502, C503, C504 and C505 of this code, as applicable, and with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in the *International Building Code*, *International Existing Building Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code*, *International Property Maintenance Code*, *International Private Sewage Disposal Code* and NFPA 70. Changes where unconditioned space is changed to conditioned space shall comply with Section C502. Where both additions and alterations are included in the scope of work, the larger portion of work shall govern the compliance method.

Exception: *Additions*, *alterations*, *repairs*, or changes of occupancy complying with ANSI/ASHRAE/IESNA 90.1.

C501.3 Maintenance. *Buildings* and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and systems required by this code shall be maintained in conformance to the code edition under which they were installed. The owner or the owner's authorized agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

C501.4 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for *repairs*, provided that hazards to life, health or property are not created. Hazardous materials shall not be used where the code for new construction would not allow use of these materials in buildings of similar occupancy, purpose and location.

C501.5 *Designated Historic buildings*. The provisions of this code relating to the construction, *repair, alteration*, restoration and movement of structures, and *change of occupancy* shall apply to *designated historic buildings*. The *code official* shall have the authority to waive certain requirements for a *designated historic building* if the *code official* finds that compliance with a requirement would have an adverse impact upon the historic character of the individual landmark or, if the building is contributing to a historic district, upon the historic character of the contributing building or historic district.

SECTION C502
ADDITIONS

C502.1 General. *Additions* to an existing *building*, *building* system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction subject to the following:

1. *Additions* with a construction valuation of $500,000 or more shall comply with Section C407.
2. *Additions* with a construction valuation less than $500,00 shall comply with Section C502.2 or C407.

Additions shall not create unsafe or hazardous conditions or overload existing *building* systems. An *addition* shall be deemed to comply with this code if the *addition* alone complies or if the existing building and *addition* comply with this code as a single building.

C502.2 Prescriptive compliance. *Additions* with a construction valuation less than $500,000 shall comply with Sections C502.2.1 through C502.2.6.3. *Additions* complying with Section C407 are exempt from the requirements of Section C502.2.

C502.2.1 Vertical fenestration area. Additions shall comply with the following:

1. Where an addition has a new *vertical fenestration* area that results in a total building *fenestration* area less than or equal to that permitted by Section C402.4.1, the addition shall comply with Section C402.1.5, C402.4.3 or C407.
2. Where an addition with new *vertical fenestration* that results in a total building *fenestration* area greater than permitted by Section C402.4.1 or an *addition* that, itself, exceeds the fenestration area permitted by Section C402.4.1, the fenestration shall

comply with Section C402.4.1.1 for the *addition* only.

3. Where an addition has new *vertical fenestration* that results in a total building vertical fenestration area exceeding that permitted by Section C402.4.1.1, the addition shall comply with Section C402.1.5 or C407.

C502.2.2 Skylight area. Skylights shall comply with the following:

1. Where an addition has new *skylight* area that results in a total building *fenestration* area less than or equal to that permitted by Section C402.4.1, the addition shall comply with Section C402.1.5 or C407.
2. Where an addition has new *skylight* area that results in a total building *skylight* area greater than permitted by C402.4.1 or where additions have skylight area greater than that permitted by Section C402.4.1, the *skylight* area shall comply with Section C402.4.1.2 for the *addition* only.
3. Where an addition has new skylight area that results in a total building *skylight* area exceeding that permitted by Section C402.4.1.2, the addition shall comply with Section C402.1.5 or C407.

C502.2.3 Building mechanical systems. New mechanical systems and equipment that are part of the *addition* and serve the building heating, cooling and ventilation needs shall comply with Section C403.

C502.2.3.1 Mechanical systems acceptance testing. New mechanical systems that serve *additions* shall comply with Sections C408.2.2, C408.2.3 and C408.2.5.

Exceptions:

1. Mechanical systems and service water-heating systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140.7 kW) cooling capacity and 600,000 Btu/h (175.8 kW) combined service water-heating and space-heating capacity.
2. Systems included in Section C403.3.1 that serve individual *dwelling units* and *sleeping units*.

C502.2.4 Service water-heating systems. New service water-heating equipment, controls and service water heating piping shall comply with Section C404.

C502.2.4.1 Service hot water systems acceptance testing. New service hot water systems that serve *additions* shall comply with Sections C408.2.3 and C408.2.5.

Exceptions:

1. Service water-heating systems in buildings where the total mechanical equipment capacity is less than 600,000 Btu/h (175.8 kW) combined service water-heating and space-heating capacity.
2. Systems included in Section C403.3.1 that serve individual *dwelling units* and *sleeping units*.

C502.2.5 Pools and inground permanently installed spas. New pools and inground permanently installed spas shall comply with Section C404.10.

C502.2.6 Lighting power and systems. New lighting systems that are installed as part of the addition shall comply with Section C405.

C502.2.6.1 Interior lighting power. The total interior lighting power for the *addition* shall comply with Section C405.3.2 for the *addition* alone, or the existing building and the *addition* shall comply as a single building.

C502.2.6.2 Exterior lighting power. The total exterior lighting power for the *addition* shall comply with Section C405.5.2 for the *addition* alone, or the existing building and the *addition* shall comply as a single building.

C502.2.6.3 Lighting acceptance testing. New lighting systems that serve *additions* shall comply with Section C408.3.

SECTION C503
ALTERATIONS

C503.1 General. *Alterations* to any *building* or structure shall comply with the requirements of Section C503. *Alterations* shall be such that the existing *building* or structure is not less conforming to the provisions of this code than the existing *building* or structure was prior to the *alteration*. *Alterations* to an existing *building*, *building* system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction. When calculating alteration level, only previously conditioned floor area shall count as existing building floor area. *Alterations* shall not create an unsafe or hazardous condition or overload existing *building* systems. *Level 3 alterations* shall also comply with Section C503.8.

Exception: The following *alterations* need not comply with the requirements for new construction, provided that the energy use of the building is not increased:

1. Storm windows installed over existing *fenestration*.
2. Surface-applied window film installed on existing single-pane *fenestration* assemblies reducing solar heat gain, provided that the code does not require the glazing or *fenestration* to be replaced.
3. Existing ceiling, wall or floor cavities exposed during construction, provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. *Roof recover*.

   5.1. *Air barriers* shall not be required for *roof recover* and roof replacement where the *alterations* or renovations to the building do

not include *alterations*, renovations or *repairs* to the remainder of the building envelope.

C503.2 Change in space conditioning. Any nonconditioned or low-energy space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code as if new construction.

Exceptions:

1. Where the component performance alternative in Section C402.1.5 is used to comply with this section, the proposed total UA of the existing building, the addition, and any alterations shall be less than or equal to the total UA of the existing building.
2. Where the total building performance option in Section C407 is used to show compliance with this section, the annual energy cost of the proposed design shall be not greater than 110 percent of the annual energy cost otherwise permitted by Section C407.3.

C503.3 Building envelope. New building envelope assemblies that are part of the *alteration* shall comply with Sections C402.1 through C402.5. Level 1 and 2 *alterations* are exempt from the requirement of Sections C402.5.1.2, C402.5.1.3 and C402.5.1.4.

Exception: Where the existing building exceeds the fenestration area limitations of Section C402.4.1 prior to alteration, the building is exempt from Section C402.4.1 provided that there is not an increase in fenestration area.

C503.3.1 Roof replacement. *Roof replacements* shall comply with Section C402.1.3, C402.1.4, C402.1.5 or C407 where the existing roof assembly is part of the *building thermal envelope* and contains insulation entirely above the roof deck. In no case shall the R-value of the roof insulation be reduced or the U-factor of the roof assembly be increased as part of the *roof replacement*.

C503.3.2 Vertical fenestration. The addition of *vertical fenestration* that results in a total building *fenestration* area less than or equal to that specified in Section C402.4.1 shall comply with Section C402.1.5, C402.4.3 or C407. The addition of *vertical fenestration* that results in a total building *fenestration* area greater than Section C402.4.1 shall comply with Section C402.4.1.1 for the space adjacent to the new fenestration only. *Alterations* that result in a total building *vertical fenestration* area exceeding that specified in Section C402.4.1.1 shall comply with Section C402.1.5 or C407. Provided that the vertical fenestration area is not changed, using the same vertical fenestration area in the *standard reference design* as the building prior to alteration shall be an alternative to using the vertical fenestration area specified in Table G3.1 of Appendix G of ASHRAE 90.1-2022.

C503.3.3 Skylight area. New *skylight* area that results in a total building *skylight* area less than or equal to that specified in Section C402.4.1 shall comply with Section C402.1.5, C402.4 or C407. The addition of *skylight* area that results in a total building skylight area greater than Section C402.4.1 shall comply with Section C402.4.1.2 for the space adjacent to the new skylights. *Alterations* that result in a total building skylight area exceeding that specified in Section C402.4.1.2 shall comply with Section C402.1.5 or C407. Provided that the skylight area is not changed, using the same skylight area in the *standard reference design* as the building prior to alteration shall be an alternative to using the skylight area specified in Table G3.1 of Appendix G of ASHRAE 90.1-2022.

C503.4 Heating and cooling systems. New heating, cooling and duct systems that are part of the *alteration* shall comply with Sections C403. *Level 1*, *2* and *3 alterations* are exempt from the requirements of Section C403.3. New combustion equipment shall not be installed where there was not one previously installed.

C503.4.1 Economizers. New cooling systems that are part of *alteration* shall comply with Section C403.5.

C503.4.2 Mechanical system acceptance testing. New mechanical systems that serve *alterations* shall comply with Sections C408.2.2, C408.2.3 and C408.2.5.

Exceptions:

1. Mechanical systems and service water-heating systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140.7 kW) cooling capacity and 600,000 Btu/h (175.8 kW) combined service water-heating and space-heating capacity.
2. Systems included in Section C403.3.1 that serve individual *dwelling units* and *sleeping units*.

C503.5 Service hot water systems. New service hot water systems that are part of the *alteration* shall comply with Section C404. *Level 1*, *2* and *3 alterations* are exempt from the requirements of Section C404.2.

C503.5.1 Service hot water system acceptance testing. New service hot water systems that serve *alterations* shall comply with Sections C408.2.3 and C408.2.5.

Exceptions:

1. Service water-heating systems in buildings where the total mechanical equipment capacity is less than 600,000 Btu/h (175.8 kW) combined service water-heating and space-heating capacity.
2. Systems included in Section C403.3.1 that serve individual *dwelling units* and *sleeping units*.

C503.6 Lighting systems. New lighting systems that are part of the *alteration* shall comply with Section C405.

Exception. *Alterations* that replace less than 10 percent of the luminaires in a space, provided that such *alterations* do not increase the installed interior lighting power.

C503.6.1 Lighting acceptance testing. New lighting systems that serve *alterations* shall comply with Section C408.3.

C503.7 Electric Ready (Level 3 alterations only). In the case of a *level 3 alteration* that is a first tenant finish, the requirements of Section C405.20 shall also be met.

C503.8 Level 3 alterations. In addition to the other requirements of this section, *Level 3 alterations* shall also comply with Section C407.3 except that EUI target shall be not greater than 125 percent of the EUI otherwise permitted by Section C407.3. For *Level 3 alterations* that also include both *substantial mechanical alteration* and *substantial thermal envelope alteration*, the principle/primary space conditioning equipment shall be all-electric or fueled by an energy source other than fossil fuels.

SECTION C504
REPAIRS

C504.1 General. *Buildings*, and structures, and parts thereof shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered to be part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary *repairs* exempt from *permit* and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1, repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.

C504.2 Application. For the purposes of this code, the following shall be considered to be repairs:

1. Glass-only replacements in an existing sash and frame.
2. *Roof repairs*.
    2.1. Air barriers shall not be required for *roof repair* where the repairs to the building do not include *alterations*, renovations or *repairs* to the remainder of the building envelope.
3. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided that an existing vestibule that separates a conditioned space from the exterior shall not be removed.
4. *Repairs* where only the bulb, the ballast or both within the existing luminaires in a space are replaced, provided that the replacement does not increase the installed interior lighting power.

SECTION C505
CHANGE OF OCCUPANCY OR USE

C505.1 General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.3.2(1) or C405.3.2(2) to another use in Table C405.3.2(1) or C405.3.2(2), the installed lighting wattage shall comply with Section C405.3. Where the space undergoing a change in occupancy or use is in a building with a fenestration area that exceeds the limitations of Section C402.4.1, the space is exempt from Section C402.4.1 provided that there is not an increase in fenestration area.

Exceptions:

1. Where the component performance alternative in Section C402.1.5 is used to comply with this section, the proposed UA shall be not greater than 110 percent of the target UA.
2. Where performance-based compliance in Section C407 is required to comply with this section, the proposed design EUI or Performance Index (Site Energy) shall be not greater than 110 percent of the EUI or PI (Site Energy) otherwise permitted by Section C407.3.

CHAPTER 6 [CE]
REFERENCED STANDARDS

User note:

About this chapter: *Chapter 6 lists the full title, edition year and address of the promulgator for all standards that are referenced in the code. The section numbers in which the standards are referenced are also listed.*

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section 107.

AAMA

American Architectural Manufacturers Association
1827 Walden Office Square
Suite 550
Schaumburg, IL 60173-4268

AAMA/WDMA/CSA 101/I.S.2/A C440—17: North American Fenestration Standard/Specifications for Windows, Doors and Unit Skylights
Table C402.5.2

AHAM

Association of Home Appliance Manufacturers
1111 19th Street NW, Suite 402
Washington, DC 20036

ANSI/AHAM RAC-1—2015: Room Air Conditioners
Table C403.3.2(4)

AHAM HRF-1—2016: Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers
Table C403.11.1

AHRI

Air-Conditioning, Heating, & Refrigeration Institute
2111 Wilson Blvd, Suite 500
Arlington, VA 22201

ISO/AHRI/ASHRAE 13256-1 (1998 RA2014): Water-to-Air and Brine-to-Air Heat Pumps—Testing and Rating for Performance
Table C403.3.2(2)

ISO/AHRI/ASHRAE 13256-2 (1998 RA2014): Water-to-Water and Brine-to-Water Heat Pumps —Testing and Rating for Performance
Table C403.3.2(2)

210/240—2017 and 2023: Performance Rating of Unitary Air-conditioning and Air-source Heat Pump Equipment
Table C403.3.2(1), Table C403.3.2(2)

310/380—2017 (CSA-C744-17): Standard for Packaged Terminal Air Conditioners and Heat Pumps
Table C403.3.2(4)

340/360—2019: Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment
Table C403.3.2(1), Table C403.3.2(2)

365(I-P)—2009: Commercial and Industrial Unitary Air-conditioning Condensing Units
Table C403.3.2(1)

390 (I-P)—2003: Performance Rating of Single Package Vertical Air-conditioners and Heat Pumps
Table C403.3.2(4)

400 (I-P)—2015: Performance Rating of Liquid-to-Liquid Heat Exchangers

440—2008: Performance Rating of Room Fan Coils—with Addendum 1
C403.12.3

460—2005: Performance Rating of Remote Mechanical-draft Air-cooled Refrigerant Condensers
Table C403.3.2(7)

AHRI—continued

550/590 (I-P)—2018: Performance Rating of Water-chilling and Heat Pump Water-heating Packages Using the Vapor Compression Cycle
C403.3.2.1, Table C403.3.2(3)

560—2018: Absorption Water Chilling and Water Heating Packages
Table C403.3.2(3)

910—2014: Performance Rating of Indoor Pool Dehumidifiers
Table C403.3.2(11)

920—2015: Performance Rating of DX-Dedicated Outdoor Air System Units
Table C403.3.2(12), Table C403.3.2(13)

1160 (I-P) —2014: Performance Rating of Heat Pump Pool Heaters (with Addendum 1)
Table C404.2

1200 (I-P)—2013: Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets
C403.11, Table C403.11.1(1), Table C403.11.1(2)

1230—2014: Performance Rating of Variable Refrigerant Flow (VRF) Multi-split Air-Conditioning and Heat Pump Equipment (with Addendum 1)
Table C403.3.2(9)

1250 (I-P)—2014: Standard for Performance Rating in Walk-in Coolers and Freezers
Table C403.11.2.1(3)

1360—2017: Performance Rating of Computer and Data Processing Room Air Conditioners
Table C403.3.2(10), Table C403.3.2(16)

AMCA

Air Movement and Control Association International
30 West University Drive
Arlington Heights, IL 60004-1806

208—18: Calculation of the Fan Energy Index
C403.8.3

220—19 (R2012): Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating
C402.5.6

230—15: Laboratory Methods of Testing Air Circulating Fans for Rating and Certification
C403.9

500D—18: Laboratory Methods for Testing Dampers for Rating
C403.7.7

ANSI

American National Standards Institute
25 West 43rd Street, 4th Floor
New York, NY 10036

Z21.10.3/CSA 4.3—17: Gas Water Heaters, Volume III—Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating Tank and Instantaneous
Table C404.2

Z21.47/CSA 2.3—16: Gas-fired Central Furnaces
Table C403.3.2(5)

Z83.8/CSA 2.6—16: Gas Unit Heaters, Gas Packaged Heaters, Gas Utility Heaters and Gas-fired Duct Furnaces
Table C403.3.2(5)

APSP

The Association of Pool & Spa Professionals
2111 Eisenhower Avenue, Suite 580
Alexandria, VA 22314

14—2019: American National Standard for Portable Electric Spa Energy Efficiency
C404.9

ASABE

American Society of Agricultural and Biological Engineers
2950 Niles Road
St. Joseph, MI 49085

S640—2017: Quantities and Units of Electromagnetic Radiation for Plants (Photosynthetic Organisms)
C405.4

ASHRAE

ASHRAE
1791 Tullie Circle NE
Atlanta, GA 30329

ANSI/ASHRAE/ACCA Standard 183—(RA2017): Peak Cooling and Heating Load Calculations in Buildings, Except Low-rise Residential Buildings
C403.1.1

ASHRAE—2020: ASHRAE HVAC Systems and Equipment Handbook—2020
C403.1.1

ISO/AHRI/ASHRAE 13256-1 (1998 RA2014): Water-to-Air and Brine-to-Air Heat Pumps—Testing and Rating for Performance
Table C403.3.2(2)

ISO/AHRI/ASHRAE 13256-2 (1998 RA2014): Water-to-Water and Brine-to-Water Heat Pumps—Testing and Rating for Performance
Table C403.3.2(2)

55—2017: Thermal Environmental Conditions for Human Occupancy
Table C407.5.1

90.1—2022: Energy Standard for Buildings Except Low-rise Residential Buildings
C401.2, Table C402.1.3, Table C402.1.4, Table C407.6.1, C502.1, C503.1, C504.1

90.4—2016: Energy Standard for Data Centers
C403.1.2, C405.2.4

140—2014: Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs
C407.6.1

146—2011: Testing and Rating Pool Heaters
Table C404.2

ASME

American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990

ASME A17.1—2019/CSA B44—19: Safety Code for Elevators and Escalators
C405.8.2

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959

C90—2016A: Specification for Load-bearing Concrete Masonry Units
Table C401.3

C1363—11: Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
C303.1.4.1, Table C402.1.4, 402.2.7

C1371—15: Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
Table C402.3

C1549—2016: Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
Table C402.3

D1003—13: Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics
C402.4.2.2

ASTM—continued

D8052/D8052M—2017: Standard Test Method for Quantification of Air Leakage in Low-Sloped Membrane Roof Assemblies
C402.5.1.4

E283—2004(2012): Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
Table C402.5.2, C402.5.7

E408—13: Test Methods for Total Normal Emittance of Surfaces Using Inspection-meter Techniques
Table C402.3

E779—10(2018): Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
C402.5

E903—2012: Standard Test Method Solar Absorptance, Reflectance and Transmittance of Materials Using Integrating Spheres (Withdrawn 2005)
Table C402.3

E1827—2011(2017): Standard Test Methods for Determining Airtightness of Building Using an Orifice Blower Door
C402.5, C606.4

E1918—06(2016): Standard Test Method for Measuring Solar Reflectance of Horizontal or Low-sloped Surfaces in the Field
Table C402.3

E1980—11: Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-sloped Opaque Surfaces
Table C402.3, C402.3.2

E2357—2018: Standard Test Method for Determining Air Leakage of Air Barriers Assemblies
C402.5.1.4

E3158—2018: Test Method for Measuring the Air Leakage Rate of a Large or Multizone Building
C402.5.3

F1281—2017: Specification for Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene (PEX-AL-PEX) Pressure Pipe
Table C404.5.2.1

F1361—2017: Standard Test Method for Performance of Open Deep Fat Fryers
Table C406.12(1)

F1484—2018: Standard Test Method for Performance of Steam Cookers
Table C406.12(2)

F1495—2014a: Standard Specification for Combination Oven Electric or Gas Fired
Table C406.12(4)

F1496—2013: Standard Test Method for Performance of Convection Ovens
Table C406.12(4)

F1696—2018: Standard Test Method for Energy Performance of Stationary-Rack, Door-Type Commercial Dishwashing Machines
Table C406.12(3)

F1920—2015: Standard Test Method for Performance of Rack Conveyor Commercial Dishwashing Machines
Table C406.12(3)

F2093—2018: Standard Test Method for Performance of Rack Ovens
Table C406.12(4)

F2144—2017: Standard Test Method for Performance of Large Open Vat Fryers
Table C406.12(1)

F2861—2017: Standard Test Method for Enhanced Performance of Combination Oven in Various Modes
Table C406.12(4)

CRRC

Cool Roof Rating Council
2435 North Lombard Street
Portland, OR 97217

ANSI/CRRC-S100—2020: Standard Test Methods for Determining Radiative Properties of Materials
Table C402.3, C402.3.1

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland, OH 44131-5516

AAMA/WDMA/CSA 101/I.S.2/A440—17: North American Fenestration Standard/Specification for Windows, Doors, and Unit Skylights
Table C402.5.2

CSA B55.1—2015: Test Method for Measuring Efficiency and Pressure Loss of Drain Water Heat Recovery Units
C404.7

CSA B55.2—2015: Drain Water Heat Recovery Units
C404.7

CTI

Cooling Technology Institute
P. O. Box 681807
Houston, TX 77268

ATC 105—2019: Acceptance Test Code for Water Cooling Tower
Table C403.3.2(7)

ATC 105DS—2018: Acceptance Test Code for Dry Fluid Coolers
Table C403.3.2(7)

ATC 105S—11: Acceptance Test Code for Closed Circuit Cooling Towers
Table C403.3.2(7)

ATC 106—11: Acceptance Test for Mechanical Draft Evaporative Vapor Condensers
Table C403.3.2(7)

STD 201—11: Standard for Certification of Water Cooling Towers Thermal Performances
Table C403.3.2(7)

CTI STD 201 RS(17): Performance Rating of Evaporative Heat Rejection Equipment
Table C403.3.2(7)

DASMA

Door & Access Systems Manufacturers Association, International
1300 Sumner Avenue
Cleveland, OH 44115-2851

105—2017: Test Method for Thermal Transmittance and Air Infiltration of Garage Doors and Rolling Doors
C303.1.3, Table C402.5.2

DOE

U.S. Department of Energy
c/o Superintendent of Documents
1000 Independence Avenue SW
Washington, DC 20585

10 CFR, Part 430—2015: Energy Conservation Program for Consumer Products: Test Procedures and Certification and Enforcement Requirement for Plumbing Products; and Certification and Enforcement Requirements for Residential Appliances; Final Rule
Table C403.3.2(5), Table C403.3.2(6), Table C404.2

10 CFR, Part 430, Subpart B, Appendix N—(2015): Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers
C202

10 CFR, Part 431—2015: Energy Efficiency Program for Certain Commercial and Industrial Equipment: Test Procedures and Efficiency Standards; Final Rules
Table C403.3.2(6), C405.6, Table C405.6, C405.7

10 CFR 431 Subpart B App B: Uniform Test Method for Measuring Nominal Full Load Efficiency of Electric Motors
C403.8.4, Table C405.7(1), Table C405.7(2), Table C405.7(3), C405.7(4)

NAECA 87—(88): National Appliance Energy Conservation Act 1987 [Public Law 100-12 (with Amendments of 1988-P.L. 100-357)]
Table C403.3.2(1), Table C403.3.2(2), Table C403.3.2(5)

HVI

Home Ventilating Institute
1740 Dell Range Blvd. Ste H PMB 45
Cheyenne, WY 82009

916—18: Airflow Test Procedure
C403.8.5

ICC

International Code Council, Inc.
500 New Jersey Avenue NW
6th Floor
Washington, DC 20001

ANSI/RESNET/ICC 380—19: Standard for Testing Airtightness of Buildings, Dwelling Unit and Sleeping Unit Enclosures; Airtightness of Heating and Cooling Air Distribution Systems, and Airflow of Mechanical Ventilation Systems
C402.5.2, C402.5.3

IBC—21: International Building Code®
C201.3, C303.2, C402.5.3, C501.2

ICC 500—2020: Standard for the Design and Construction of Storm Shelters
C402.4.2

IFC—21: International Fire Code®
C201.3, C501.2

IFGC—21: International Fuel Gas Code®
C201.3, C501.2

IMC—21: International Mechanical Code®
C201.3, C402.5.3, C403.2.2, C403.7.1, C403.7.2, C403.7.4, C403.7.5, C403.7.7, C403.12.1, C403.12.2.1, C403.12.2.2, C403.6, C403.6.6, C501.2

IPC—21: International Plumbing Code®
C201.3, C501.2

IPMC—21: International Property Maintenance Code®
C501.2

IPSDC—21: International Private Sewage Disposal Code®
C501.2

IEEE

Institute of Electrical and Electronic Engineers
3 Park Avenue, 17th Floor
New York, NY 10016

IEEE 515.1—2012: IEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications
C404.6.2

IES

Illuminating Engineering Society
120 Wall Street, 17th Floor
New York, NY 10005-4001

ANSI/ASHRAE/IESNA 90.1—2022: Energy Standard for Buildings, Except Low-rise Residential Buildings
C401.2, Table C402.1.3, Table C402.1.4, C502.1, C503.1, C504.1

ISO

International Organization for Standardization
Chemin de Blandonnet 8, CP 401, 1214 Vernier
Geneva, Switzerland

ISO/AHRI/ASHRAE 13256-1(2017): Water-to-Air and Brine-to-Air Heat Pumps -Testing and Rating for Performance
Table C403.3.2(2)

ISO/AHRI/ASHRAE 13256-2(2017): Water-to-Water and Brine-to-Water Heat Pumps -Testing and Rating for Performance
C403.3.2(2)

NBI

New Buildings Institute
151 SW 1st Ave, Suite 300
Portland, OR 97204

Embodied Carbon Building Code (2023): An overlay o model code language for limiting the climate impact of building products
C406.3.8

NEMA

National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, VA 22209

MG1—2016: Motors and Generators
C202

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

70—20: National Electrical Code
C501.2

NFRC

National Fenestration Rating Council, Inc.
6305 Ivy Lane, Suite 140
Greenbelt, MD 20770

100—2020: Procedure for Determining Fenestration Products *U-factors*
C303.1.3, C402.2.1.1

200—2020: Procedure for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittance at Normal Incidence
C303.1.3, C402.4.1.1

203—2017: Procedure for Determining Translucent Fenestration Product Visible Transmittance at Normal Incidence
C303.1.3

400—2020: Procedure for Determining Fenestration Product Air Leakage
Table C402.5.2

SMACNA

Sheet Metal and Air Conditioning Contractors' National Association, Inc.
4021 Lafayette Center Drive
Chantilly, VA 20151-1219

SMACNA—2012: HVAC Air Duct Leakage Test Manual Second Edition
C403.2.11.2.3

UL

UL LLC
333 Pfingsten Road
Northbrook, IL 60062-2096

710—12: Exhaust Hoods for Commercial Cooking Equipment—with Revisions through November 2013
C403.7.5

727—06: Oil-fired Central Furnaces—with Revisions through October
Table C403.3.2(5)

731—95: Oil-fired Unit Heaters
Table C403.3.2(5)

1784—151: Air Leakage Tests of Door Assemblies—with Revisions through February 2015
C402.5.3

US-FTC

United States-Federal Trade Commission
600 Pennsylvania Avenue NW
Washington, DC 20580

CFR Title 16 (2015): *R*-value Rule
C303.1.4

WDMA

Window and Door Manufacturers Association
2025 M Street NW, Suite 800
Washington, DC 20036-3309

AAMA/WDMA/CSA 101/I.S.2/A440—17: North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights
Table C402.5.2

APPENDIX CA
BOULDER MODIFIED APPENDIX G PROTOCOL

User note:

About this appendix: *This appendix contains sections of ASHRAE 90.1-2022 Normative Appendix G that have been modified to reflect specific requirements of the 2024 City of Boulder Energy Conservation Code (CoBECC). Only sections of Appendix G that have been modified from the original language are included in this document.*

Section G1
GENERAL

Section G1.2. Performance Rating

G1.2.1 Mandatory Provisions

This *performance rating method* requires conformance with the following provisions:

a. All mandatory requirements of Chapter 4 of the *2024 City of Boulder Energy Conservation Code* (*COBECC*) must be met. These supersede the mandatory requirements in Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 of ASHRAE Standard 90.1-2022.

b. The interior lighting power shall not exceed the *interior lighting power allowance* determined using either:

   1. Tables G3.7-1 and G3.7-2 and the methodology described in Section 9.5.2, or

   2. Table G3.8 and the methodology described in Section 9.5.1.

c. Energy *efficiency* levels of installed components and *systems* shall meet or exceed the efficiency levels used to calculate the *proposed building performance*.

d. The proposed envelope U factors shall not exceed the performance requirements of ASHRAE 90.1-2016 listed in Table 5.5-5. No tradeoffs of envelope performance below these levels are allowed.

e. Verification, testing and *commissioning* requirements of Section C408 of the 2024 City of Boulder Energy Conservation Code shall supersede the requirements of Section 4.2.5.

f. The proposed HVAC equipment efficiencies at a minimum shall meet the performance requirements determined in Tables 6.8.1-1 through Table 6.8.1-21.

G1.2.2 Performance Rating Calculation

All new construction in Boulder with a construction value of $500,000 or more must comply with Section G1.2.2.1, G1.2.2.2 or G1.2.2.3, below.

G1.2.2.1 Modeled Baseline

Compliance with Section C407.3.1 of the 2024 CoBECC, Modeled Baseline path requires that the Performance Index target (PI_t) (site energy) for the *proposed design* be reduced by 15 percent for mixed-fuel buildings and 10 percent for all-electric buildings from a PI_t (site energy) target that complies with the ASHRAE 90.1-2022 as modified by Appendix I for "site energy".

The performance of the *proposed design* is calculated in accordance with the provisions of this protocol using the equation G1.2.2.1.1 or G1.2.2.1.2 below as applicable. Both the proposed building performance and baseline building performance shall include all end-use load components within and associated with the building when calculation the Performance EUI for Site Energy.

Mixed Fuel Buildings:

$$PIt_{site} = 0.85 \times (BBUE + (BPF_{site} \times BBRE) \quad BBP$$

(Eq. G1.2.2.1.1)

All Electric Buildings:

$$PIt_{site} = 0.90 \times (BBUE + (BPF_{site} \times BBRE) \quad BBP$$

(Eq. G1.2.2.1.2)

where:

PIt_{site} = The maximum Performance Index (Site Energy) for the *proposed design* to comply with the Boulder Energy Code

BBUE = Baseline Building Unregulated *Site Energy*, the portion of the annual site energy of a *baseline building design* that is due to *unregulated energy use*.

BBRE = Baseline *Building* Regulated *Site Energy*. The portion of the annual *site energy* of a *baseline building design* that is due to *regulated energy use*.

BPF_{site} = *Building* Performance Factor (BPF) from Table G1.2 below. For *building* area types not listed in the table, use "All Others." Where a *building* includes multiple *building* area types, the required BPF shall be equal to the area-weighted average of the *building* area types. (Table G1.1 replaces Table 4.2.1.1 in 90.1- 2022)

BBP = *Baseline Building Performance*. The annual *site energy* of the *baseline building design*

including both *regulated* and *unregulated energy use*.

TABLE G1.1
BUILDING PERFORMANCE FACTORS FOR SITE ENERGY USE (BPF_{SITE})

USE TYPE	BPF
Office	0.52
Retail	0.47
School	0.50
Healthcare	0.63
Restaurant	0.69
Hotel	0.66
Warehouse	0.45
Apartment	0.67
All Others	0.50

G1.2.2.2 Fixed Performance Target

Projects of the types listed in Table G1.2 may use the site EUI targets identified in the Table G1.2 in lieu of baseline modeling of performance index (PI) (site energy). The *proposed building model* predicted performance will be demonstrated not to exceed the values in this table, using the energy modeling procedures described in this appendix. *Buildings* with multiple occupancy types listed in Table G1.2 (only) may develop a performance target based on an area weighted average EUI calculated by floor area of each occupancy type.

TABLE G1.2
FIXED PERFORMANCE TARGETS FOR PERFORMANCE PATHWAY

TABLE G1.2
SITE EUI TARGETS

BUILDING TYPE	PERFORMANCE TARGETS ($kBtu/ft^2/year$)
Medium Office (5,000-50,000 sf)	23
Mid-rise Apartment	32
Primary School	34
Large Office (> 50,000 sf)	40
Small Office (< 5,000 sf)	19
Secondary School	31
Warehouse	11
Retail Store	40
Small Hotel	35
Hospital	76
Restaurant	200
Strip Mall	40

G1.2.2.3 Measured Performance Outcome

With approval of the *chief building official*, projects may demonstrate compliance with the 2024 CoBECC by proving that the building has achieved the modeled performance calculated in accordance with Section G1.2.2.1 or G1.2.2.2, based on metered energy use after occupancy. Section C407.3.3 of the 2024 CoBECC outlines how projects comply with this path.

Section G1.3 Documentation Submittal Requirements

The building permit application for performance rating shall include all *building* and mechanical drawings and information necessary to verify that the building envelope and mechanical design for the project corresponds with the annual energy analysis. This includes, but is not limited to, equipment and material cut sheets, specifications, and sequences of operations. If credit for lighting energy savings is proposed to be taken, then electrical drawings and proposed lighting power density calculation shall be submitted. If credit is proposed to be taken for energy savings from plug-in equipment or control measures, then such measures should be pre-approved by the *code official*. Measures of the project that are not approved as part of the building permit application shall be modeled the same way in both the *proposed building* and *baseline design* and shall comply with the requirements of the 2024 CoBECC.

Simulated performance shall be documented, and documentation shall be submitted to the building official. The information shall be submitted in a report and shall include the following:

a. The performance path chosen per Section C407.3 of the 2024 CoBECC, the *simulation program* used, the version of the *simulation program*, and the results of the *energy* analysis, including the calculated values for the baseline *building* unregulated site energy (BBUE), baseline building regulated site *energy* (BBRE), *building* performance factor (BPF_{site}), *baseline building performance*, the *proposed building* performance, proposed Performance Index for site *energy* (PI_{site}), and target Performance Index for site *energy* (PIt_{site}) and the percentage improvement. A brief description of the project, the key *energy efficiency* improvements compared with the requirements in Sections 5 through 10, the *simulation program* used, the version of the *simulation program*, the performance pathway used (per 2024 CoBECC, Section C407.3), and the results of the *energy* analysis. This summary shall contain the calculated values for the *baseline building performance (or EUI target)*, the *proposed building performance*, and the percentage improvement.

b. An overview of the project that includes the number of stories (above and below *grade*), the typical *floor* size, the uses in the *building* (e.g., office, cafeteria, retail, parking, etc.), the gross area of each use, and whether each use is *conditioned space*.

c. A list of the *energy*-related features that are included in the design and on which the performance rating is based. This list shall document all *energy* features that differ between the models used in the *baseline building performance* and *proposed building performance* calculations.

d. A list showing compliance for the *proposed design* with all the mandatory provisions in Table C407.2 of the 2024 CoBECC.

e. Documentation of compliance with the backstop values found in of Table 5.5-5 and Tables 6.8.1 to 6.8.1.7 of the ASHRAE 90.1-2016 (Identified in Section C407.4.2 of the 2024 CoBECC)

f. A table with a summary by end use of the *proposed building performance energy use intensity* (EUI) and the baseline building performance EUI, with each end-use separated into regulated and unregulated components.

A site plan showing all adjacent *buildings* and topography that may shade the proposed *building* (with estimated height or number of *stories*).

g. *Building* elevations and *floor* plans (schematic is acceptable).

h. A diagram showing the *thermal blocks* used in the computer simulation.

i. An explanation of any significant modeling assumptions.

j. Backup calculations and material to support data inputs (e.g., *U-factors* for *building envelope* assemblies, NFRC ratings for *fenestration*, end-uses identified in Table G3.1(1)(a) of ASHRAE 90.1-2022.

k. *Building* elevations and *floor* plans (schematic is acceptable).

l. A diagram showing the *thermal blocks* used in the computer simulation.

m. An explanation of any significant modeling assumptions.

n. Backup calculations and material to support data inputs (e.g., *U-factors* for *building envelope* assemblies, NFRC ratings for *fenestration*, end-uses identified in Table G3.1(1)(a) of ASHRAE 90.1-2022.

o. Input and output reports from the *simulation program* or compliance software, including a breakdown of *energy* use by at least the following components: lights, internal *equipment* loads, *service water- heating equipment*, *space*-heating *equipment*, *space*-cooling and heat rejection *equipment*, fans, and other HVAC *equipment* (such as pumps). The output reports shall also show the amount of *unmet load hours* for both the *proposed design* and *baseline building design*.

p. *Purchased energy rates* used in the simulations.

q. An explanation of any error messages noted in the *simulation program* output.

r. For any exceptional calculation methods employed, document the predicted *energy* savings by *energy* type, the *energy* use intensity savings, a narrative explaining the exceptional calculation method performed, and theoretical or empirical information supporting the accuracy of the method.

s. The reduction in *proposed building performance* associated with *on-site renewable energy*.

t. The version of the software and the link to the website that contains the ASHRAE Standard 140 results for the version used in accordance with Section G2.2.4 of ASHRAE 90.1-2022.

The Commercial Energy Modeling Summary Report template can be found at www.BoulderEnergyCode.com.

Section G2
SIMULATION GENERAL REQUIREMENTS

Section G2.1 Performance Calculations

The *proposed building* performance and *baseline building* performance shall be calculated using the following:

a. The same *simulation program*.

b. The same weather data.

c. The same *energy* rates.

d. The same required *building* schedules (unless changes are pre-approved by the building official).

e. The same required *equipment* power densities (unless changes are pre-approved by the building official).

Section G2.4
Renewable, Recovered, and Purchased Energy

G2.4.1 On-site Renewable Energy and Site-Recovered Energy

Site-recovered energy shall not be considered *purchased energy* and shall be subtracted from the *proposed design energy* consumption prior to calculating the *proposed building performance*. *On-site renewable energy* generated by *systems* included on the *building* permit that is used by the *building* shall be subtracted from the *proposed design energy* consumption prior to calculating the *proposed building performance*. The reduction in *proposed building site energy performance (EUI)* associated with *on-site renewable energy* systems shall be at least 5 percent of the calculated *proposed building performance* when following Section C407.3.1 of the 2024 CoBECC and Section G1.2.2.1 of this protocol. Where the proposed design includes electricity generated from sources other than *on-site renewable energy*, the baseline design shall include the same generation system.

Section G3
CALCULATION OF THE PROPOSED DESIGN AND BASELINE BUILDING PERFORMANCE

TABLE G3.1
MODELING REQUIREMENTS FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*

NO. 4 SCHEDULES		
No.	**Proposed Building Performance**	**Baseline Building Performance**
4. Schedule		
	Schedules capable of modeling hourly variations in occupancy, lighting power, miscellaneous *equipment* power, *thermostat set points*, infiltration, service hot water usage and *HVAC system* operation shall be used. Projects are required to use the schedules provided in Table G.4. **Exception:** For buildings where non-standard operations are anticipated, projects may propose specific schedule modifications for pre-approval by the *chief building official.* ~~The schedules shall be typical of the proposed building type as determined by the designer and approved by the *rating authority.*~~ **Temperature and Humidity Schedules.** Temperature and humidity *control set points* and schedules as well as *temperature control throttling range* shall be the same for *proposed design* and *baseline building design*. **HVAC Fan Schedules.** Schedules for HVAC fans that provide *outdoor air* for *ventilation* shall run continuously whenever *spaces* are occupied and shall be cycled ON and OFF to meet heating and cooling loads during unoccupied hours. **Exceptions:** 1. Where no heating and/or cooling *system* is to be installed, and a heating or cooling *system* is being simulated only to meet the requirements described in this table, heating and/or cooling *system* fans shall not be simulated as running continuously during occupied hours but shall be cycled ON and OFF to meet heating and cooling loads during all hours. 2. HVAC fans shall remain on during occupied and unoccupied hours in *spaces* that have health- and safety-mandated minimum *ventilation* requirements during unoccupied hours. 3. HVAC fans shall remain on during occupied and unoccupied hours in *systems* primarily serving *computer rooms*. 4. Dedicated *outdoor air* supply fans shall stay off during unoccupied hours.	Same as *proposed design*. **Exceptions:** 1. *Set points* and schedules for *HVAC systems* that automatically provide occupant thermal comfort via means other than directly controlling the air dry-bulb and wet-bulb temperature may be allowed to differ, provided that equivalent levels of occupant thermal comfort are demonstrated via the methodology in ASHRAE Standard 55, Section 5.3.3, "Elevated Air Speed," or Standard 55, Appendix B, "Computer Program for Calculation of PMV-PPD." 2. Schedules may be allowed to differ between *proposed design* and *baseline building design* when necessary to model nonstandard *efficiency* measures, provided that the revised schedules have been approved by the *chief building official* ~~rating authority~~. Measures that may warrant use of different schedules include but are not limited to *automatic* lighting *controls*, *automatic* natural *ventilation controls*, *automatic demand control ventilation controls*, and *automatic controls* that reduce *service water-heating* loads or process loads. In no case shall schedules differ where the *controls* are *manual* (e.g., *manual* operation of light switches or *manual* operation of windows). 3. *HVAC* system fan schedules may be allowed to differ when Section G3.2.1.2(a) of ASHARE 90.1-2022 applies. 4. For *systems* 6 and 8, only *terminal*-unit fan and *reheat* coil shall be energized to meet heating *set point* during unoccupied hours.

(continued)

TABLE G3.1
MODELING REQUIREMENTS FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

NO. 12 RECEPTACLE AND OTHER LOADS		
No.	**Proposed Building Performance**	**Baseline Building Performance**
12. Receptacle and Other Loads		
	Receptacle and *process loads*, such as those for office and other *equipment*, ~~shall be estimated based on the *building area type* or *space* type category and~~ shall be assumed to be identical in the *proposed design* and *baseline building design*, except as specifically approved by the *building official*. ~~only when quantifying performance that exceeds the requirements of Standard 90.1 but not when the *Performance Rating Method* is used as an alternative path for minimum standard compliance in accordance with Section 4.2.1.1. These loads~~ Receptacle and process loads shall always be included in simulations of the *building*. These loads shall be included when calculating the *proposed building performance* and the *baseline building performance* as required by Section G1.2.1. **Exception:** When receptacle controls installed in *spaces* where not required by Section C405.11 of the 2024 CoBECC, are included in the *proposed building design*, the hourly receptacle shall be reduced as follows: RPC = RC x 10% Where: RPC = receptacle power credit $EPS_{pro} = EPS_{bas}$ x (1 - RPC) RC = percentage of all controlled receptacles EPS_{bas} = *baseline equipment* power hourly schedule (fraction) EPS_{pro} = Proposed equipment power hourly schedule (fraction) a. Where power and other *systems* covered by Sections 8 and 10 of ASHRAE 90.1-2022 have been designed and submitted with design documents, those *systems* shall be determined in accordance with Sections 8 and 10. b. Where power and other *systems* covered by Sections 8 and 10 of ASHRAE 90.1-2022 have not been submitted with design documents, those *systems* shall comply with but not exceed the requirements of those sections. *c.* *Equipment controls (e.g. Computer Power Management, Advanced Power Strips etc.)* designed to improve energy performance shall be modeled in the *proposed design* using equipment schedule adjustments approved by the *rating authority.*	Equipment power density in the baseline building design shall be determined using the whole building or space-by-space values in Table G.5.1 and Table G.5.2 of this protocol. The default values cover energy used for equipment that is normally plugged into convenience outlets and does not include process equipment such as commercial refrigeration cases, walk-in freezers and refrigerators, cooking equipment, elevators, and other devices. Standardized receptacle hourly schedules shall be used with the specified power densities. Motors shall have minimum *efficiency* ratings found in Table G3.9.1. Other *systems* covered by Section 10 of ASHRAE 90.1-2022 and miscellaneous loads shall be modeled as identical to those in the *proposed design* ~~including schedules of operation and *control* of the *equipment*. *Energy* used for cooking *equipment*, receptacle loads, computers, medical or laboratory *equipment*, and manufacturing and industrial process *equipment* not specifically identified in the standard power and *energy* rating or capacity of the *equipment* shall be identical between the *proposed building performance* and the *baseline building performance*.~~ **Exceptions:** When quantifying performance that exceeds the requirements of Standard 90.1, variations of the power requirements, schedules, or *control* sequences of the *equipment* modeled in the *baseline building design* from those in the *proposed design* shall be approved by the *building official* based on documentation that the *equipment* installed in the proposed design represents a significant verifiable departure from documented current conventional practice. The burden of this documentation is to demonstrate that accepted conventional practice would result in baseline building equipment different from that installed in the proposed design. Occupancy and occupancy schedules shall not be changed.

Section G4
REQUIRED SCHEDULES (New Section)

All projects using the performance pathway shall use the mandatory *building* schedules and *equipment* power density schedules provided Table G4 below.

Exceptions:

1) The *chief building official* may approve alternate schedules prior to submittal to account for special use conditions. The same values must be used in the *baseline* and *proposed building* model.

2) The code official may approve alternate schedules for unregulated loads in the *proposed building design* that reflect plug and process load management strategies.

ADDITION TO APPENDIX G: TABLE G.5.1
PLUG LOAD MODELING REQUIREMENTS
WHOLE BUILDING

WHOLE BUILDING CATEGORIES	DEFAULT EQUIPMENT POWER DENSITY (W/ft²)
Automotive Facility	0.5
Convention Center	0.75
Courthouse	1.67
Dining: Bar Lounge/Leisure	1.32
Dining: Cafeteria/Fast Food	1.37
Dining: Family	1.26
Dormitory	1.96
Exercise Center	0.67
Fire Station	1.54
Gymnasium	0.67
Healthcare Clinic	1.22
Hospital	1.25
Hotel	1.56
Library	0.94
Manufacturing Facility	0.34
Motel	1.56
Motion Picture Theater	0.74
Multifamily	1.42
Museum	0.74
Office	0.75
Parking Garage	n.a.
Penitentiary	1.49
Performing Arts Theater	0.74
Police Station	1.54
Post Office	0.91
Religious Building	0.3
Retail	0.7
School/University	0.69
Sports Arena	0.75

(continued)

ADDITION TO APPENDIX G: TABLE G.5.1
PLUG LOAD MODELING REQUIREMENTS
WHOLE BUILDING—continued

WHOLE BUILDING CATEGORIES	DEFAULT EQUIPMENT POWER DENSITY (W/ft²)
Town Hall	0.75
Transportation	0.52
Warehouse	0.3
Workshop	0.43

ADDITION TO APPENDIX G: TABLE G.5.2
PLUG LOAD MODELING REQUIREMENTS
SPACE-BY-SPACE

SPACE-BY-SPACE CLASSIFICATIONS	DEFAULT EQUIPMENT POWER DENSITY (W/ft²)
Audience Seating Area, Auditorium	0.75
Audience Seating Area, Religious Building	0.73
Audience Seating Area, Sports Arena	0.74
Audience Seating Area, Transportation Facility	0.75
Audience Seating Area, Other	0.75
Atrium, Less than or equal to 40 ft	n.a.
Atrium, More than 40 ft	n.a.
Banking Activity Area	1.72
Classroom/Lecture/Training, Penitentiary	0.59
Classroom/Lecture/Training, K-12, laboratory, and shops	0.59
Classroom/Lecture/Training, Other	0.59
Conference/Meeting/Multipurpose	0.73
Confinement Cells	1.49
Copy/Print Room,*	UWBD[a]
Corridor, Assisted Living	1.4
Corridor, Hospital	1.25
Corridor, Manufacturing	0.34
Corridor, Other*	UWBD[a]
Courtroom	1.49
Computer Room	n.a.
Dining Area, Penitentiary	1.26
Dining Area, Assisted Living	1.32
Dining Area, Bar Lounge/Leisure	1.26
Dining Area, Cafeteria or Fast Food	1.37
Dining Area, Family Dining	1.32
Dining Area, Other	1.32
Electrical/Mechanical, *	UWBD[a]
Emergency Vehicle Garage	0.58
Food Preparation	1.32
Guest Room	1.56
Judge's Chambers	1.49
Laboratory, Classrooms	3.34

(continued)

**ADDITION TO APPENDIX G: TABLE G.5.2
PLUG LOAD MODELING REQUIREMENTS
SPACE-BY-SPACE—continued**

SPACE-BY-SPACE CLASSIFICATIONS	DEFAULT EQUIPMENT POWER DENSITY (W/ft^2)
Laboratory, Other	3.34
Laundry/Washing Area	0.52
Loading Dock, Interior	n.a.
Lobby, Assisted Living	1.4
Lobby, Elevator*	UWBD[a]
Lobby, Hotel	1.56
Lobby, Motion Picture Theater	0.74
Lobby, Performing Arts Theater	0.74
Lobby, Other*	UWBD[a]
Locker Room	n.a.
Lounge/Break, Healthcare	1.25
Lounge/Break, Other*	UWBD[a]
Office, Enclosed	0.75
Office, Open Plan	0.75
Parking Area, Interior	n.a.
Pharmacy Area	0.55
Restrooms, Assisted Living	1.4
Restrooms, Other*	UWBD[a]
Sales Area	0.55
Seating Area General, *	UWBD[a]
Stairway, *	UWBD[a]
Storage, Hospital	1.25
Storage, >= 50 ft^2	0.31
Storage, < 50 ft^2	0.31
Vehicular Maintenance	0.5
Workshop	0.43
Assisted Living, Chapel	1.4
Assisted Living, Recreation Room	1.4
Convention Center, Exhibit Space	0.75
Dormitory, Living Quarters	1.96
Fire Station, Sleeping Quarters	1.54
Gymnasium/Fitness Center, Exercise Area	0.67
Gymnasium/Fitness Center, Playing Area	0.67
Healthcare, Emergency Room	1.25
Healthcare, Exam/Treatment	1.25
Healthcare, Supply Room	1.25
Healthcare, Nursery	1.25
Healthcare, Nurses' Station	1.25
Healthcare, Operating Room	1.25
Healthcare, Patient Room	1.25
Healthcare, Physical Therapy	1.25

(continued)

**ADDITION TO APPENDIX G: TABLE G.5.2
PLUG LOAD MODELING REQUIREMENTS
SPACE-BY-SPACE—continued**

SPACE-BY-SPACE CLASSIFICATIONS	DEFAULT EQUIPMENT POWER DENSITY (W/ft^2)
Healthcare, Recovery Room	1.25
Library, Reading Area	0.94
Library, Stacks	0.94
Manufacturing Facility, Detailed Manufacturing	0.34
Manufacturing Facility, Equipment Room	0.34
Manufacturing Facility, Extra High Bay (>50 ft Floor to Ceiling Height)	0.34
Manufacturing Facility, High Bay (25–50 ft Floor to Ceiling Height)	0.34
Manufacturing Facility, Low Bay (<25 ft Floor to Ceiling Height)	0.34
Museum, General Exhibition	0.74
Museum, Restoration	0.43
Post Office, Sorting Area	1.67
Religious Building, Fellowship Hall	0.3
Religious Building, Worship/Pulpit/Choir	0.3
Retail, Dressing/Fitting Room	0.82
Retail, Mall Concourse	0
Sports Arena Playing Area, Class I	0.67
Sports Arena Playing Area, Class II	0.67
Sports Arena Playing Area, Class III	0.67
Sports Arena Playing Area, Class IV	0.67
Transportation, Baggage/Carousel Area	0.76
Transportation, Concourse	0.76
Transportation, Ticket Counter	0.76
Warehouse, Medium/Bulky Items on Pallets	0.31
Warehouse, Smaller Hand Carried Items	0.31

a. UWBD = Use whole building data.

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*

C-1 ASSEMBLY SCHEDULES			HOUR ENDING																							
Description	Type	Day	1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 pm
Occupancy	Fraction	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.20	0.20	0.20	0.20	0.10	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.80	0.10	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10	0.10	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.20	0.00
Lights	Fraction	WD	0.05	0.05	0.05	0.05	0.05	0.05	0.35	0.35	0.35	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.25	0.05
		Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.05
		Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.30	0.30	0.30	0.30	0.30	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.05	0.05
Receptacle	Fraction	WD	0.05	0.05	0.05	0.05	0.05	0.05	0.40	0.40	0.40	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.25	0.05
		Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.30	0.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.05
		Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.30	0.30	0.30	0.30	0.30	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.05	0.05
Infiltration	Fraction	WD	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00
ClgSetPt	Temperature	WD	80	80	80	80	80	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	80
		Sat	80	80	80	80	80	80	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	80
		Sun	80	80	80	80	80	80	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	80
HtgSetPt	Temperature	WD	60	60	60	60	60	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60
		Sat	60	60	60	60	60	60	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60
		Sun	60	60	60	60	60	60	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60
Service Hot Water	Fraction	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.35	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.30	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.30	0.00	0.00	0.00
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-2 HEALTH			HOUR ENDING																							
Description	**Type**	**Day**	**1 am**	**2 am**	**3 am**	**4 am**	**5 am**	**6 am**	**7 am**	**8 am**	**9 am**	**10 am**	**11 am**	**12 am**	**1 pm**	**2 pm**	**3 pm**	**4 pm**	**5 pm**	**6 pm**	**7 pm**	**8 pm**	**9 pm**	**10 pm**	**11 pm**	**12 pm**
Occupancy	Fraction	WD	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.50	0.60	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.60	0.50	0.50	0.40	0.40	0.40	0.40
		Sat	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.50	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.50	0.50	0.40	0.40	0.40	0.40	0.40
		Sun	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Lights	Fraction	WD	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
		Sat	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.50	0.50	0.50	0.50	0.50	0.50
		Sun	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Receptacle	Fraction	WD	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.70	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.40
		Sat	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.50	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.40	0.40	0.40	0.40	0.40	0.40
		Sun	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Infiltration	Fraction	WD	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sat	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sun	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
ClgSetPt	Temperature	WD	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
		Sat	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
		Sun	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
HtgSetPt	Temperature	WD	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
		Sat	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
		Sun	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Service Hot Water	Fraction	WD	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.58	0.66	0.78	0.82	0.71	0.82	0.78	0.74	0.63	0.41	0.18	0.18	0.18	0.15	0.15	0.15
		Sat	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.20	0.28	0.30	0.30	0.24	0.24	0.23	0.23	0.23	0.15	0.15	0.15	0.15	0.15	0.15	0.15
		Sun	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-4 MANUFACTURING			HOUR ENDING																							
Description	Type	Day	1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 pm
Occupancy	Fraction	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.20	0.95	0.95	0.95	0.95	0.50	0.95	0.95	0.95	0.95	0.30	0.10	0.10	0.10	0.10	0.05	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.30	0.30	0.30	0.30	0.10	0.10	0.10	0.10	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lights	Fraction	WD	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.85	0.85	0.85	0.85	0.75	0.85	0.85	0.85	0.85	0.65	0.65	0.65	0.65	0.65	0.25	0.05
		Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.15	0.15	0.15	0.15	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Receptacle	Fraction	WD	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.90	0.90	0.90	0.90	0.80	0.90	0.90	0.90	0.90	0.65	0.65	0.65	0.65	0.65	0.25	0.05
		Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.15	0.15	0.15	0.15	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Infiltration	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ClgSetPt	Temperature	WD	80	80	80	80	80	80	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	80	80
		Sat	80	80	80	80	80	80	75	75	75	75	75	75	75	75	75	75	75	75	80	80	80	80	80	80
		Sun	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
HtgSetPt	Temperature	WD	60	60	60	60	60	60	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60	60
		Sat	60	60	60	60	60	60	70	70	70	70	70	70	70	70	70	70	70	70	70	60	60	60	60	60
		Sun	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Service Hot Water	Fraction	WD	0.05	0.05	0.05	0.05	0.05	0.08	0.07	0.19	0.35	0.38	0.39	0.47	0.57	0.54	0.34	0.33	0.44	0.26	0.21	0.15	0.17	0.08	0.05	0.05
		Sat	0.05	0.05	0.05	0.05	0.05	0.08	0.07	0.11	0.15	0.21	0.19	0.23	0.20	0.19	0.15	0.12	0.14	0.07	0.07	0.07	0.07	0.09	0.05	0.05
		Sun	0.04	0.04	0.04	0.04	0.04	0.07	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.09	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.07	0.04	0.04
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-3 HOTEL/MOTEL			HOUR ENDING																							
Description	Type	Day	1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 pm
Occupancy	Fraction	WD	0.90	0.90	0.90	0.90	0.90	0.90	0.70	0.40	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.30	0.50	0.50	0.50	0.70	0.70	0.80	0.90	0.90
		Sat	0.90	0.90	0.90	0.90	0.90	0.90	0.70	0.40	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.30	0.50	0.50	0.50	0.70	0.70	0.80	0.90	0.90
		Sun	0.90	0.90	0.90	0.90	0.90	0.90	0.70	0.40	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.30	0.50	0.50	0.50	0.70	0.70	0.80	0.90	0.90
Lights	Fraction	WD	0.10	0.10	0.10	0.10	0.10	0.30	0.45	0.45	0.45	0.45	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.80	0.90	0.80	0.60	0.30
		Sat	0.10	0.10	0.10	0.10	0.10	0.30	0.45	0.45	0.45	0.45	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.80	0.90	0.80	0.60	0.30
		Sun	0.10	0.10	0.10	0.10	0.10	0.30	0.45	0.45	0.45	0.45	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.80	0.90	0.80	0.60	0.30
Receptacle	Fraction	WD	0.10	0.10	0.10	0.10	0.10	0.30	0.45	0.45	0.45	0.45	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.80	0.90	0.80	0.60	0.30
		Sat	0.10	0.10	0.10	0.10	0.10	0.30	0.45	0.45	0.45	0.45	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.80	0.90	0.80	0.60	0.30
		Sun	0.10	0.10	0.10	0.10	0.10	0.30	0.45	0.45	0.45	0.45	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.80	0.90	0.80	0.60	0.30
Infiltration	Fraction	WD	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sat	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sun	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
ClgSetPt	Temperature	WD	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
		Sat	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
		Sun	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
HtgSetPt	Temperature	WD	60	60	60	60	60	60	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	60	60
		Sat	60	60	60	60	60	60	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	60	60
		Sun	60	60	60	60	60	60	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	60	60
Service Hot Water	Fraction	WD	0.00	0.00	0.00	0.05	0.05	0.05	0.80	0.70	0.50	0.40	0.25	0.25	0.25	0.25	0.50	0.60	0.70	0.70	0.40	0.25	0.20	0.20	0.05	0.05
		Sat	0.00	0.00	0.00	0.05	0.05	0.05	0.80	0.70	0.50	0.40	0.25	0.25	0.25	0.25	0.50	0.60	0.70	0.70	0.40	0.25	0.20	0.20	0.05	0.05
		Sun	0.00	0.00	0.00	0.05	0.05	0.05	0.80	0.70	0.50	0.40	0.25	0.25	0.25	0.25	0.50	0.60	0.70	0.70	0.40	0.25	0.20	0.20	0.05	0.05
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-5 OFFICE			HOUR ENDING																							
Description	Type	Day	1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 pm
Occupancy	Fraction	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.20	0.95	0.95	0.95	0.95	0.50	0.95	0.95	0.95	0.95	0.30	0.10	0.10	0.10	0.10	0.05	0.05
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.30	0.30	0.30	0.30	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.00	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Lights	Fraction	WD	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.50	0.30	0.30	0.20	0.20	0.10	0.05
		Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.15	0.15	0.15	0.15	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Receptacle	Fraction	WD	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.90	0.90	0.90	0.90	0.80	0.90	0.90	0.90	0.90	0.50	0.40	0.40	0.40	0.40	0.40	0.40
		Sat	0.30	0.30	0.30	0.30	0.30	0.30	0.40	0.40	0.50	0.50	0.50	0.50	0.35	0.35	0.35	0.35	0.35	0.30	0.30	0.30	0.30	0.30	0.30	0.30
		Sun	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Infiltration	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ClgSetPt	Temperature	WD	80	80	80	80	80	78	77	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	80	80
		Sat	80	80	80	80	80	78	77	75	75	75	75	75	75	75	75	75	75	80	80	80	80	80	80	80
		Sun	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
HtgSetPt	Temperature	WD	60	60	60	60	60	64	67	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60	60
		Sat	60	60	60	60	60	64	67	70	70	70	70	70	70	70	70	70	70	60	60	60	60	60	60	60
		Sun	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Service Hot Water	Fraction	WD	0.05	0.05	0.05	0.05	0.05	0.08	0.07	0.19	0.35	0.38	0.39	0.47	0.57	0.54	0.34	0.33	0.44	0.26	0.21	0.15	0.17	0.08	0.05	0.05
		Sat	0.05	0.05	0.05	0.05	0.05	0.08	0.07	0.11	0.15	0.21	0.19	0.23	0.20	0.19	0.15	0.12	0.14	0.07	0.07	0.07	0.07	0.09	0.05	0.05
		Sun	0.04	0.04	0.04	0.04	0.04	0.07	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.09	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.07	0.04	0.04
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-6 PARKING GARAGE			HOUR ENDING																							
Description	**Type**	**Day**	**1 am**	**2 am**	**3 am**	**4 am**	**5 am**	**6 am**	**7 am**	**8 am**	**9 am**	**10 am**	**11 am**	**12 am**	**1 pm**	**2 pm**	**3 pm**	**4 pm**	**5 pm**	**6 pm**	**7 pm**	**8 pm**	**9 pm**	**10 pm**	**11 pm**	**12 pm**
Occupancy	Fraction	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lights	Fraction	WD	0.50	0.50	0.50	0.50	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50
		Sat	0.50	0.50	0.50	0.50	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50
		Sun	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Receptacle	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Infiltration	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ClgSetPt	Temperature	WD	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
		Sat	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
		Sun	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HtgSetPt	Temperature	WD	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
		Sat	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
		Sun	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Service Hot Water	Fraction	WD	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
		Sat	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
		Sun	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-7 RESTAURANT			HOUR ENDING																							
Description	Type	Day	1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 pm
Occupancy	Fraction	WD	0.05	0.00	0.00	0.00	0.00	0.05	0.10	0.40	0.40	0.40	0.20	0.50	0.80	0.70	0.40	0.20	0.25	0.50	0.80	0.80	0.80	0.50	0.35	0.20
		Sat	0.05	0.00	0.00	0.00	0.00	0.00	0.05	0.50	0.50	0.40	0.20	0.45	0.50	0.50	0.35	0.30	0.30	0.30	0.70	0.90	0.70	0.65	0.55	0.35
		Sun	0.05	0.00	0.00	0.00	0.00	0.00	0.05	0.50	0.50	0.20	0.20	0.30	0.50	0.50	0.30	0.20	0.25	0.35	0.55	0.65	0.70	0.35	0.20	0.20
Lights	Fraction	WD	0.15	0.15	0.15	0.15	0.15	0.20	0.40	0.40	0.60	0.60	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.50	0.30
		Sat	0.20	0.15	0.15	0.15	0.15	0.15	0.30	0.30	0.60	0.60	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.90	0.90	0.50	0.30
		Sun	0.20	0.15	0.15	0.15	0.15	0.15	0.30	0.30	0.50	0.50	0.70	0.70	0.70	0.70	0.70	0.70	0.60	0.60	0.60	0.60	0.60	0.60	0.50	0.30
Receptacle	Fraction	WD	0.03	0.02	0.03	0.02	0.05	0.12	0.13	0.15	0.18	0.21	0.26	0.29	0.27	0.25	0.23	0.23	0.26	0.26	0.24	0.22	0.20	0.18	0.09	0.03
		Sat	0.03	0.02	0.03	0.02	0.05	0.12	0.13	0.15	0.18	0.21	0.26	0.29	0.27	0.25	0.23	0.23	0.26	0.26	0.24	0.22	0.20	0.18	0.09	0.03
		Sun	0.03	0.02	0.03	0.02	0.05	0.12	0.13	0.15	0.18	0.21	0.26	0.29	0.27	0.25	0.23	0.23	0.26	0.26	0.24	0.22	0.20	0.18	0.09	0.03
Infiltration	Fraction	WD	0.25	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sat	0.25	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sun	0.25	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
ClgSetPt	Temperature	WD	86	86	86	86	86	80	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
		Sat	86	86	86	86	86	80	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
		Sun	86	86	86	86	86	80	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
HtgSetPt	Temperature	WD	60	60	60	60	60	65	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
		Sat	60	60	60	60	60	65	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
		Sun	60	60	60	60	60	65	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Service Hot Water	Fraction	WD	0.20	0.15	0.15	0.00	0.00	0.00	0.00	0.60	0.55	0.45	0.40	0.45	0.40	0.35	0.30	0.30	0.30	0.40	0.55	0.60	0.50	0.55	0.45	0.25
		Sat	0.20	0.15	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.45	0.50	0.50	0.45	0.40	0.40	0.35	0.40	0.55	0.55	0.50	0.55	0.40	0.30
		Sun	0.25	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.40	0.40	0.30	0.30	0.30	0.40	0.50	0.50	0.40	0.50	0.40	0.20
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-8 RETAIL			HOUR ENDING																					
Description	**Type**	**Day**	**1 am**	**2 am**	**3 am**	**4 am**	**5 am**	**6 am**	**7 am**	**8 am**	**9 am**	**10 am**	**11 am**	**12 am**	**1 pm**	**2 pm**	**3 pm**	**4 pm**	**5 pm**	**6 pm**	**7 pm**	**8 pm**	**9 pm**	**10 pm**	**11 pm**	**12 pm**
Occupancy	Fraction	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.20	0.50	0.50	0.70	0.70	0.70	0.70	0.80	0.70	0.50	0.50	0.30	0.30	0.00	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.20	0.50	0.60	0.80	0.80	0.80	0.80	0.80	0.80	0.60	0.20	0.20	0.20	0.10	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.20	0.20	0.40	0.40	0.40	0.40	0.40	0.20	0.10	0.00	0.00	0.00	0.00
Lights	Fraction	WD	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.20	0.40	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.50	0.50	0.50	0.20	0.05
		Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.30	0.60	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.50	0.30	0.30	0.10	0.05
		Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.40	0.40	0.60	0.60	0.60	0.60	0.60	0.40	0.20	0.05	0.05	0.05	0.05
Receptacle	Fraction	WD	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.40	0.60	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.70	0.70	0.20	0.20
		Sat	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.30	0.50	0.80	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.70	0.50	0.50	0.30	0.15
		Sun	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.30	0.60	0.60	0.80	0.80	0.80	0.80	0.80	0.60	0.40	0.15	0.15	0.15	0.15
Infiltration	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00	1.00	1.00
ClgSetPt	Temperature	WD	85	85	85	85	85	85	85	80	75	75	75	75	75	75	75	75	75	75	75	75	75	75	85	85
		Sat	85	85	85	85	85	85	85	80	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	85
		Sun	85	85	85	85	85	85	85	85	85	80	75	75	75	75	75	75	75	75	75	75	85	85	85	85
HtgSetPt	Temperature	WD	60	60	60	60	60	60	60	65	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60	60
		Sat	60	60	60	60	60	60	60	65	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60
		Sun	60	60	60	60	60	60	60	60	60	65	70	70	70	70	70	70	70	70	70	70	60	60	60	60
Service Hot Water	Fraction	WD	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.15	0.23	0.32	0.41	0.57	0.62	0.61	0.50	0.45	0.46	0.47	0.42	0.34	0.33	0.23	0.13	0.08
		Sat	0.11	0.10	0.08	0.06	0.06	0.06	0.07	0.20	0.24	0.27	0.42	0.54	0.59	0.60	0.49	0.48	0.47	0.46	0.44	0.36	0.29	0.22	0.16	0.13
		Sun	0.07	0.07	0.07	0.06	0.06	0.06	0.07	0.10	0.12	0.14	0.29	0.31	0.36	0.36	0.34	0.35	0.37	0.34	0.25	0.27	0.21	0.16	0.10	0.06
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-9 SCHOOL			HOUR ENDING																							
Description	Type	Day	1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 pm
Occupancy	Fraction	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.15	0.15	0.15	0.15	0.15	0.00	0.00	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lights	Fraction	WD	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.18	0.18	0.18
		Sat	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
		Sun	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Receptacle	Fraction	WD	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.35	0.35	0.35	0.35	0.35	0.35	0.35
		Sat	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
		Sun	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Infiltration	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ClgSetPt	Temperature	WD	80	80	80	80	80	80	80	75	75	75	75	75	75	75	75	75	75	75	75	75	75	80	80	80
		Sat	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
		Sun	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
HtgSetPt	Temperature	WD	60	60	60	60	60	60	60	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60	60	60
		Sat	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
		Sun	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Service Hot Water	Fraction	WD	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.34	0.60	0.63	0.72	0.79	0.83	0.61	0.65	0.10	0.10	0.19	0.25	0.22	0.22	0.12	0.09
		Sat	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		Sun	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-10 WAREHOUSES			HOUR ENDING																							
Description	Type	Day	1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 pm
Occupancy	Fraction	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.70	0.90	0.90	0.90	0.50	0.85	0.85	0.85	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.10	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lights	Fraction	WD	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.60	0.75	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.75	0.60	0.10	0.10	0.10	0.10	0.10	0.10
		Sat	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
		Sun	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Receptacle	Fraction	WD	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00	1.00	1.00	0.25	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Infiltration	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.25	1.25	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.25	1.25	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ClgSetPt	Temperature	WD	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
		Sat	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
		Sun	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
HtgSetPt	Temperature	WD	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
		Sat	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
		Sun	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Service Hot Water	Fraction	WD	0.02	0.02	0.02	0.02	0.05	0.07	0.07	0.10	0.30	0.36	0.36	0.46	0.57	0.43	0.38	0.40	0.30	0.18	0.03	0.03	0.03	0.03	0.03	0.03
		Sat	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.06	0.12	0.12	0.17	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
		Sun	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-11 LABORATORY			HOUR ENDING																							
Description	Type	Day	1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 pm
Occupancy	Fraction	WD	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.20	0.90	0.90	0.45	0.45	0.90	0.90	0.90	0.90	0.90	0.30	0.10	0.10	0.10	0.05	0.05
		Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.05	0.05	0.05	0.05
		Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.05	0.05	0.05	0.05
Lights	Fraction	WD	0.20	0.20	0.20	0.20	0.20	0.20	0.30	0.50	0.90	0.90	0.90	0.90	0.80	0.90	0.90	0.90	0.90	0.90	0.50	0.50	0.30	0.30	0.20	0.20
		Sat	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.40	0.40	0.40	0.40	0.20	0.20	0.20	0.20	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.10
		Sun	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.40	0.40	0.40	0.40	0.20	0.20	0.20	0.20	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Receptacle	Fraction	WD	0.20	0.20	0.20	0.20	0.20	0.20	0.30	0.40	0.50	0.70	0.80	0.50	0.60	0.70	0.90	0.80	0.50	0.40	0.30	0.20	0.20	0.20	0.20	0.20
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Infiltration	Fraction	WD	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sat	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sun	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
ClgSetPt	Temperature	WD	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
		Sat	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
		Sun	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
HtgSetPt	Temperature	WD	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
		Sat	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
		Sun	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Service Hot Water	Fraction	WD	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
		Sat	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
		Sun	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-12 RESIDENTIAL			HOUR ENDING																							
Description	Type	Day	1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 pm
Occupancy	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.40	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.30	0.50	0.90	0.90	0.90	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.40	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.30	0.50	0.90	0.90	0.90	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.40	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.30	0.50	0.90	0.90	0.90	1.00	1.00	1.00
Lights	Fraction	WD	0.10	0.10	0.10	0.10	0.20	0.40	0.40	0.40	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.40	0.60	0.80	1.00	1.00	0.70	0.40	0.20
		Sat	0.10	0.10	0.10	0.10	0.20	0.40	0.40	0.40	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.40	0.60	0.80	1.00	1.00	0.70	0.40	0.20
		Sun	0.10	0.10	0.10	0.10	0.20	0.40	0.40	0.40	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.40	0.60	0.80	1.00	1.00	0.70	0.40	0.20
Receptacle	Fraction	WD	0.50	0.40	0.40	0.40	0.40	0.40	0.50	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.80	1.00	1.00	0.90	0.90	0.80	0.70	0.60
		Sat	0.50	0.40	0.40	0.40	0.40	0.40	0.50	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.80	1.00	1.00	0.90	0.90	0.80	0.70	0.60
		Sun	0.50	0.40	0.40	0.40	0.40	0.40	0.50	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.80	1.00	1.00	0.90	0.90	0.80	0.70	0.60
Infiltration	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ClgSetPt	Temperature	WD	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
		Sat	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
		Sun	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
HtgSetPt	Temperature	WD	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
		Sat	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
		Sun	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Service Hot Water	Fraction	WD	0.00	0.00	0.00	0.05	0.05	0.05	0.80	0.70	0.50	0.40	0.25	0.25	0.25	0.25	0.50	0.60	0.70	0.70	0.40	0.25	0.20	0.20	0.05	0.05
		Sat	0.00	0.00	0.00	0.05	0.05	0.05	0.80	0.70	0.50	0.40	0.25	0.25	0.25	0.25	0.50	0.60	0.70	0.70	0.40	0.25	0.20	0.20	0.05	0.05
		Sun	0.00	0.00	0.00	0.05	0.05	0.05	0.80	0.70	0.50	0.40	0.25	0.25	0.25	0.25	0.50	0.60	0.70	0.70	0.40	0.25	0.20	0.20	0.05	0.05
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-13 DATA CENTER			HOUR ENDING																							
Description	Type	Day	1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 pm
Occupancy	Fraction	WD	0.00	0.00	0.00	0.00	0.05	0.10	0.25	0.65	0.65	0.65	0.65	0.60	0.60	0.65	0.65	0.65	0.65	0.40	0.25	0.10	0.05	0.05	0.05	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.05	0.05	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00
Lights	Fraction	WD	0.05	0.05	0.05	0.05	0.10	0.20	0.40	0.70	0.80	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.80	0.35	0.10	0.10	0.10	0.10	0.10
		Sat	0.05	0.05	0.05	0.05	0.05	0.10	0.15	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.20	0.20	0.20	0.15	0.10	0.10	0.10	0.10	0.10	0.10
		Sun	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.10	0.10	0.10	0.05	0.05	0.05	0.05
Receptacle	Fraction	Jan May Sep	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Feb Jun Oct	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
		Mar Jul Nov	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
		Apr Aug Dec	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Infiltration	Fraction	WD	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sat	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sun	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
ClgSetPt	Temperature	WD	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
		Sat	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
		Sun	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
HtgSetPt	Temperature	WD	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
		Sat	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
		Sun	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Service Hot Water	Fraction	WD	0.00	0.00	0.00	0.00	0.10	0.10	0.50	0.50	0.50	0.50	0.70	0.90	0.90	0.50	0.50	0.70	0.50	0.50	0.50	0.10	0.10	0.10	0.10	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

(continued)

TABLE G4
REQUIRED SCHEDULES FOR CALCULATING PROPOSED AND *BASELINE BUILDING PERFORMANCE*—continued

C-14 GYMNASIUM			HOUR ENDING																							
Description	**Type**	**Day**	**1 am**	**2 am**	**3 am**	**4 am**	**5 am**	**6 am**	**7 am**	**8 am**	**9 am**	**10 am**	**11 am**	**12 am**	**1 pm**	**2 pm**	**3 pm**	**4 pm**	**5 pm**	**6 pm**	**7 pm**	**8 pm**	**9 pm**	**10 pm**	**11 pm**	**12 pm**
Occupancy	Fraction	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.00	0.00	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lights	Fraction	WD	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.18	0.18	0.18
		Sat	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
		Sun	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Receptacle	Fraction	WD	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.35	0.35	0.35	0.35	0.35	0.35	0.35
		Sat	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
		Sun	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Infiltration	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ClgSetPt	Temperature	WD	85	85	85	85	85	85	85	75	75	75	75	75	75	75	75	75	75	75	75	75	75	85	85	85
		Sat	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
		Sun	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
HtgSetPt	Temperature	WD	60	60	60	60	60	60	60	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60	60	60
		Sat	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
		Sun	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Service Hot Water	Fraction	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.00	0.00	0.00
		Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sun	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Servers/24/7 load	Fraction	WD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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RESIDENTIAL PROVISIONS

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CHAPTER 1 [RE]

SCOPE AND ADMINISTRATION

User note:

About this chapter: *Chapter 1 establishes the limits of applicability of this code and describes how the code is to be applied and enforced. Chapter 1 includes two parts: Part 1—Scope and Application (Sections 101–102) and Part 2—Administration and Enforcement (Sections 103–109). Section 101 identifies which buildings and structures come under its purview and references other I-Codes as applicable. Standards and codes are scoped to the extent referenced (see Section 108.1).*

The provisions of Chapter 1 establish the authority and duties of the code official appointed by the authority having jurisdiction and also establish the rights and privileges of the design professional, contractor and property owner.

PART 1—SCOPE AND APPLICATION

SECTION R101
SCOPE AND GENERAL REQUIREMENTS

R101.1 Title. This code shall be known as the 2024 *City of Boulder Energy Conservation Code*, and shall be cited as such. It is referred to herein as "this code."

R101.2 Scope. This code applies to *residential buildings* and the *building* sites and associated systems and equipment.

R101.3 Intent. This code shall regulate the design and construction of *buildings* for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

R101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

R101.4.1 Mixed residential and commercial buildings. Where a *building* includes both *residential* building and *commercial building* portions, each portion shall be separately considered and meet the applicable Commercial Provisions of this code or Residential Provisions of this code.

R101.5 Compliance. *Residential buildings* shall meet the Residential Provisions of this code. *Commercial buildings* shall meet the Commercial Provisions of this code.

R101.5.1 Compliance materials. The *code official* is authorized to require *compliance* documentation, certificates, or reports prior to issuance of the building permit, the certificate of occupancy, or prior to passing inspections. The production of this documentation shall be in support of demonstrating compliance with the applicable requirements, construction installation method, or the energy compliance path being utilized.

SECTION R102
ALTERNATIVE MATERIALS, DESIGN AND METHODS OF CONSTRUCTION AND EQUIPMENT

R102.1 General. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. The *chief building official* shall have the authority to approve an alternative material, design or method of construction upon the written application of the owner or the owner's authorized agent. The *chief building official* shall first find that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code for strength, effectiveness, fire resistance, durability, energy conservation and safety. The *code official* shall respond to the applicant, in writing, stating the reasons why the alternative was approved or was not *approved*.

R102.1.1 Above code programs. The *chief building official* shall be permitted to deem a national, state or local energy-efficiency program to exceed the energy efficiency required by this code. *Buildings approved* in writing by such an energy-efficiency program shall be considered to be in compliance with this code where such buildings also meet the requirements identified as "mandatory" and in Table R406.1.1 and the building thermal envelope is greater than or equal to the levels of efficiency and solar heat gain coefficients in Tables 402.1.1 and 402.1.3 of the 2009 *International Energy Conservation Code*.

R102.1.2 Compliance with Federal and State Law and Regulations. The *chief building official* may modify for individual cases the provisions of this code to allow a design, installation, or construction not in compliance with the provisions of this code, if otherwise the provisions of this code would result in a violation of federal or state legislation or regulations and the modification would be the minimum modification that provides relief.

PART 2—ADMINISTRATION AND ENFORCEMENT

SECTION R103
CONSTRUCTION DOCUMENTS

R103.1 General. Construction documents, technical reports and other supporting data shall be submitted in one or more sets, or in digital format where allowed by the *code official,* with each application for a permit. The construction documents and technical reports shall be prepared by a *registered design professional* where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

Exception: The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.

R103.2 Information on construction documents. Construction documents shall be drawn to scale on suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the *building*, systems and equipment as herein governed. Details shall include the following as applicable:

1. Energy compliance path.
2. Insulation materials and their *R*-values.
3. Fenestration *U*-factors and *solar heat gain coefficients* (SHGC).
4. Area-weighted *U*-factor and *solar heat gain coefficients* (SHGC) calculations.
5. Mechanical system design criteria.
6. Mechanical and service water-heating systems and equipment types, sizes, and efficiencies.
7. Equipment and system controls.
8. Duct sealing, duct and pipe insulation and location.
9. Air sealing details.
10. Details of additional electric infrastructure, including branch circuits, conduit, or pre-wiring, and panel capacity in compliance with the provisions of this code.
11. Location of pathways for routing of raceways or cable from the solar ready zone to the electrical service panel.
12. Total area of glazed vertical fenestration as a percentage of conditioned floor area.
13. Location and size of the solar-ready zone.
14. Structural design loads of roof dead load and roof live load.
15. Pathways for routing of conduit from the solar-ready zone to the electrical service panel.
16. Number and location of EV capable light spaces.
17. Number and location of EV capable spaces.
18. Number and location of EV ready spaces.
19. Number and location of EVSE installed spaces.
20. Locations of conduit and termination points serving the aforementioned parking spaces.
21. Location for condensate drainage where combustion equipment for space heating and water heating is installed.
22. Additional Conservation measures selected for compliance with R408.

R103.2.1 Building thermal envelope depiction. The *building thermal envelope* shall be represented on the construction documents in both plan and trans-sectional views and shall outline the extent of the *building thermal* envelope.

R103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. The *code official* is authorized to utilize a registered design professional, or other *approved* entity not affiliated with the building design or construction, in conducting the review of the plans and specifications for compliance with the code.

R103.3.1 Approval of construction documents. When the *code official* issues a permit where construction documents are required, the construction documents shall be endorsed in writing and stamped "Reviewed for Code Compliance." Such *approved* construction documents shall not be changed, modified, or altered without authorization from the *code official*. Work shall be done in accordance with the *approved* construction documents.

One set of construction documents so reviewed shall be retained by the *code official*. The other set shall be returned to the applicant, kept at the site of work and shall be open to inspection by the *code official* or a duly authorized representative.

R103.3.2 Previous approvals. This code shall not require changes in the construction documents, construction, or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

R103.3.3 Phased approval. The *code official* shall have the authority to issue a permit for the construction of part of an energy conservation system before the construction documents for the entire system have been submitted or *approved*, provided adequate information, and detailed statements have been filed complying with all pertinent requirements of this code. The holders of such permit shall proceed at their own risk without assurance that the permit for the entire energy conservation system will be granted.

R103.4 Amended construction documents. Work shall be installed in accordance with the *approved* construction documents, and any changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.

R103.5 Retention of construction documents. One set of *approved* construction documents shall be retained by the *code official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

SECTION R104
FEES

R104.1 Fees. A permit shall not be issued until the fees prescribed in Section R104.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

R104.2 Schedule of permit fees. Where a permit is required, a fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

R104.3 Work commencing before permit issuance. Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the *code official* that shall be in addition to the required permit fees.

R104.4 Related fees. The payment of the fee for the construction, *alteration*, removal, or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

R104.5 Refunds. The *code official* is authorized to establish a refund policy.

SECTION R105
INSPECTIONS

R105.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his or her designated agent, and such construction or work shall remain visible and able to be accessed for inspection purposes until *approved*. It shall be the duty of the permit applicant to cause the work to remain visible and able to be accessed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

R105.2 Required inspections. The *code official* or his or her designated agent, upon notification, shall make the inspections set forth in Sections R105.2.1 through R105.2.5.

R105.2.1 Footing and foundation inspection. Inspections associated with footings and foundations shall verify compliance with the code as to *R-value*, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications.

R105.2.2 Framing and rough-in inspection. Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to: types of insulation and corresponding *R-values* and their correct location and proper installation; fenestration properties such as *U*-factor and SHGC and proper installation; and air leakage controls as required by the code; and approved plans and specifications.

R105.2.3 Plumbing rough-in inspection. Inspections at plumbing rough-in shall verify compliance as required by the code, *approved* plans, and specifications as to types of insulation and corresponding *R*-values, protection, and required controls.

R105.2.4 Mechanical rough-in inspection. Inspections at mechanical rough-in shall verify compliance as required by the code, *approved* plans, and specifications as to installed HVAC equipment type and size, required controls, system insulation and corresponding *R*-value, system air leakage control, programmable thermostats, dampers, whole-house ventilation, and minimum fan efficiency.

Exception: Systems serving multiple dwelling units shall be inspected in accordance with Section C105.2.4 of this code.

R105.2.5 Electrical system. Inspections shall verify lighting system controls, components, meters, and additional electric infrastructure, as required by the code, *approved* plans, and specifications.

R105.2.6 Solar ready. As required by the code, approved plans and specifications, inspections shall verify the location and size of the *solar-ready zone* or the capacity of an installed on-site renewable energy system and the electrical capacity and reserved physical space for circuit breakers in the main electrical service panel that are properly labeled.

R105.2.7 Electric Vehicle Ready. As required by this code, approved plans and specifications, inspections shall verify the EV power transfer infrastructure requirements, the branch circuits, conduit and/or raceway, junction boxes, receptacles and EVSE are properly labeled and installed for each parking space type. If applicable, inspections shall also verify the electrical capacity and reserved physical space for circuit breakers in the main electrical service panel are properly labeled.

R105.2.8 Electric ready. As required by this code, approved plans and specifications, inspections shall verify the branch circuits, conduit and/or raceways, wiring, junction boxes and receptacles for *future electric equipment* or appliances are properly labeled and installed, as applicable. Inspections shall also verify reserved physical space for *future electric equipment* or appliances as well as electrical capacity and reserved physical space for circuit breakers in the main electrical service panel are properly labeled.

R105.2.9 Final inspection. The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* systems, equipment and controls and their proper operation and the required number of lamps and fixtures.

R105.3 Reinspection. A *building* shall be reinspected where determined necessary by the *code official*.

R105.4 Approved third party inspection agencies. The *code official* is authorized to accept reports of third-party inspection agencies not affiliated with the *building* design or construction, provided that such agencies are *approved* as to qualifications and reliability relevant to the *building* components and systems that they are inspecting or testing, and approval is granted prior to issuance of the building permit.

R105.4.1 Authorization of approved third party inspection agency. To be approved, a third-party inspection agency shall provide all requested information for the *code official* to determine that the agency meets the applicable requirements specified in Sections R105.4.1.1 through R105.4.1.3 and to authorize its work in the jurisdiction.

R105.4.1.1 Independence. An *approved* third-party inspection agency shall be an independent business identity. The agency shall perform its duties in accordance with the scope of delegated responsibilities established by the *code official.* The agency shall disclose to the *code official* any conflicts of interest including where fees for service are derived. The agency shall acknowledge in writing that it is only authorized to work within the scope of delegated responsibilities.

R105.4.1.2 Equipment. An *approved* third-party inspection agency shall have adequate equipment to perform inspections and tests required by the *code official* and this code. All testing equipment shall be periodically calibrated as required by the manufacturer, testing standards used in this code, or certifications held by the *approved* third-party inspection agency.

R105.4.1.3 Personnel. Personnel assigned by an approved third-party inspection agency to perform inspections and testing shall be trained or credentialed and documentation of training or credentials shall be available to the *code official* upon request.

R105.4.1.4 Delegated authority. Where an *approved* third-party inspection agency shall have the authority to perform delegated inspections and determine compliance or noncompliance of work with approved construction documents.

R105.4.2 Approved third-party inspection agency reporting. An *approved* third-party inspection agency shall keep records of delegated inspections, tests, and compliance documentation required by this code. The agency shall submit reports of delegated inspections and tests to the code official and to the owner or owner's representative. Reports shall indicate the compliance determination for the inspected or tested work based on approved construction documents. A final report documenting required delegated inspections and tests, and correction of any discrepancies noted in the inspections or tests, shall be submitted, with other required compliance documentation, at a time required by the *code official.*

R105.5 Inspection requests. It shall be the duty of the permit holder or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

R105.6 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

SECTION R106
NOTICE OF APPROVAL

R106.1 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.

R106.2 Revocation. The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the *building* or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

SECTION R107
VALIDITY

R107.1 General. If a portion of this code is held to be illegal or void, such a decision shall not affect the validity of the remainder of this code.

SECTION R108
REFERENCED STANDARDS

R108.1 Referenced codes and standards. The codes and standards referenced in this code shall be those indicated in Chapter 6, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections R108.1.1 and R108.1.2.

R108.1.1 Conflicts. Where conflicts occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

R108.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

R108.2 Application of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section, or provision of this code.

R108.3 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state, or federal law. This code is intended to comply with and be interpreted and enforced so as to comply with 42 U.S.C. Section 6297(f)(3) and any other federal requirements to avoid preemption. For purposes of 42 U.S.C. Section 6297(f)(3), this code, including all provisions contained herein, is a local building code for new construction.

SECTION R109
STOP WORK ORDER

R109.1 Authority. Where the *code official* finds any work regulated by this code being performed in a manner contrary to the provisions of this code or in a dangerous or unsafe manner, the *code official* is authorized to issue a stop work order.

R109.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property, the owner's authorized agent or the person performing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work is authorized to resume.

R109.3 Emergencies. Where an emergency exists, the code official shall not be required to give a written notice prior to stopping the work.

R109.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to fines established by the authority having jurisdiction.

SECTION R110
MEANS OF APPEALS

R110.1 General. Appeals of orders, decisions or determinations made by the code official relative to the application and interpretation of this code shall be heard by the board of building appeals established under Section 2-3-4, "Board of Building Appeals," B.R.C. 1981, unless the city manager determines that, due to the nature of the issues in a particular appeal., to appoint a hearing office under Section 1-3-5, "Hearings and Determinations," B.R.C. 1981.

R110.2 Limitations on authority. An application for appeal shall be based on a claim that the provisions of this code or the rules legally adopted thereunder have been incorrectly interpreted or applied or that an equally good or better material, design, or method of construction is proposed. The board or hearing officer has no authority to waive requirements of this code or interpret the administration of this code.

R110.3 Application. An application for appeal must be filed in writing with the city manager within fourteen days after the date of refusal of the building permit or refusal of approval of the work performed under the permit or revocation or suspension of the building permit or certificate of occupancy or certificate of completion stating the basis for the appeal.

R110.4 Administration. The code official shall take immediate action in accordance with the decision of the board.

R110.5 Fee. An applicant for an appeal shall pay the fee prescribed by Section 4-20-47, "Zoning Adjustment and Building Appeals Filing Fees," B.R.C. 1981. The fee for an appeal heard by a hearing officer shall be the same as the fee for an appeal heard by the board of building appeals.

SECTION R111
VIOLATIONS

R111.1 General. The provisions for violations set forth in Chapter 1 of the City of Boulder Building Code as part of Chapter 10-5, "Building Code," B.R.C. 1981, shall apply to violations of this code.

CHAPTER 2 [RE]

DEFINITIONS

User note:

About this chapter: *Codes, by their very nature, are technical documents. Every word, term and punctuation mark can add to or change the meaning of a technical requirement. It is necessary to maintain a consensus on the specific meaning of each term contained in the code. Chapter 2 performs this function by stating clearly what specific terms mean for the purpose of the code.*

SECTION R201
GENERAL

R201.1 Scope. Unless stated otherwise, the following words and terms in this code shall have the meanings indicated in this chapter and Section C202 when applicable.

R201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural includes the singular.

R201.3 Terms defined in other codes. Terms that are not defined in this code but are defined in the *International Building Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code* or the *International Residential Code* shall have the meanings ascribed to them in those codes.

R201.4 Terms not defined. Terms not defined by this chapter shall have ordinarily accepted meanings such as the context implies.

SECTION R202
GENERAL DEFINITIONS

ABOVE-GRADE WALL. A wall more than 50 percent above grade and enclosing *conditioned space*. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and *skylight* shafts.

ACCESS (TO). That which enables a device, appliance, or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel or similar obstruction.

ACCESSORY DWELLING UNIT (ADU). A separate and complete single housekeeping unit within a detached dwelling unit or within an accessory structure to the principal dwelling unit of the lot or parcel upon which the unit is located.

AIR BARRIER. One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the *building thermal envelope* and its assemblies.

AIR-HANDLING UNIT. A blower or fan used for the purpose of distributing supply air to a room, space or area.

ALL-ELECTRIC. Refers to an energy source for a system, appliance or piece of equipment that is fueled by electricity.

ALL-ELECTRIC BUILDING. A *building* that uses a permanent supply of electricity as the source of energy for all space heating, water heating (including pools and spas), cooking appliances, and clothes drying appliances, and has no natural gas, propane or fuel-oil plumbing installed in the building.

ALTERATION. Any construction, retrofit or renovation to an existing structure other than *repair* or *addition*. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.

ALTERATION, LEVEL 1. An *alteration* that includes the removal and replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that serve the same purpose.

ALTERATION, LEVEL 2. An *alteration* that includes the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment.

ALTERATION, LEVEL 3. An *alteration* where the work exceeds 50 percent of the building floor area.

APPROVED. Acceptable to the *code official*.

APPROVED AGENCY. An established and recognized agency that is regularly engaged in conducting tests furnishing inspection services, or furnishing product certification, where such agency has been *approved* by the *code official*.

AUTOMATIC. Self-acting, operating by its own mechanism when actuated by some impersonal influence, such as, for example, a change in current strength, pressure, temperature, or mechanical configuration (see "Manual").

BALANCED VENTILATION SYSTEM. A ventilation system that simultaneously supplies outdoor air to and exhausts air from a space, where the mechanical supply airflow rate and the mechanical exhaust airflow rate are each within 10% of the average of the two airflow rates.

BASEMENT WALL. A wall 50 percent or more below grade and enclosing *conditioned space*.

BUILDING. Any structure used or intended for supporting or sheltering any use or occupancy, including any mechanical systems, service water heating systems and electric power

and lighting systems located on the building site and supporting the building.

BUILDING SITE. a contiguous area of land that is under the ownership or control of one entity.

BUILDING THERMAL ENVELOPE. The *basement walls, exterior walls*, floors, ceiling, roofs, and any other *building* element assemblies that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.

CARBON DIOXIDE EQUIVALENT (CO2e). A measure used to compare the impact of various greenhouse gases based on their global warming potential (GWP.) CO2e approximates the time-integrated warming effect of a unit mass of a given greenhouse gas relative to that of carbon dioxide (CO2). Also known as embodied carbon.

CAVITY INSULATION. Insulating material located between framing members.

CHIEF BUILDING OFFICIAL. The authority responsible for the administration and enforcement of building codes as well as interpretation of policy and procedure as adopted by the city; head code official.

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.

CLIMATE ZONE. A geographical region based on climatic criteria as specified in this code.

CODE OFFICIAL. The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

COMBUSTION EQUIPMENT. Any equipment or appliances used for space heating, cooling, water heating (including pools and spas), cooking, clothes drying or lighting that uses natural gas, propane, other fuel gas, or fuel oil.

COMMERCIAL BUILDING. For this code, all buildings that are not included in the definition of "Residential building."

COMMON AREAS. All conditioned spaces within Group R occupancy buildings that are not dwelling units or sleeping units.

COMPLIANCE DOCUMENTS. Documents that are not required to be prepared by a registered design professional that demonstrate compliance with this code and are reviewed prior to the issuance of the building permit or before certificate of occupancy is released.

CONDITIONED FLOOR AREA. The horizontal projection of the floors associated with the *conditioned space*.

CONDITIONED SPACE. An area, room or space that is enclosed within the *building thermal envelope* and that is directly or indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors, or ceilings, or where they contain uninsulated ducts, piping or other sources of heating or cooling.

CONTINUOUS AIR BARRIER. A combination of materials and assemblies that restrict or prevent the passage of air through the *building thermal envelope*.

CONTINUOUS INSULATION (ci). Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior, or is integral to any opaque surface, of the *building* envelope.

CONTINUOUS PILOT. A pilot which, once placed in operation, is intended to remain ignited continuously until it is manually interrupted.

CO2 INDEX. An operational carbon index derived when using ANSI/RESNET/ICC 301 2022 Addendum B CO2e Rating Index.

CRAWL SPACE WALL. The opaque portion of a wall that encloses a crawl space and is partially or totally below grade.

CURTAIN WALL. Fenestration products used to create an external non load-bearing wall that is designed to separate the exterior and interior environments.

DAMPER. A manually or automatically controlled device to regulate draft or the rate of flow of air or combustion gases.

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system where one or more pumps prime the service hot water piping with heated water upon demand for hot water.

DIMMER. A control device that is capable of continuously varying the light output and energy use of light sources.

DUCT. A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.

DUCT SYSTEM. A system that consists of space conditioning equipment, ductwork, and includes any apparatus installed in connection therewith.

DUCTWORK. The assemblies of connected ducts, plenums, boots, fittings, dampers, supply registers, return grilles, and filter grilles through which air is supplied to or returned from the space to be heated, cooled, or ventilated. Supply ductwork delivers air to the spaces from the space conditioning equipment. Return ductwork conveys air from the spaces back to the space conditioning equipment. Ventilation ductwork conveys air to or from any space.

DWELLING UNIT. A single unit providing completely independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

DWELLING UNIT ENCLOSURE AREA. The sum of the area of ceiling, floors, and walls separating a *dwelling unit's conditioned space* from the exterior or from adjacent conditioned or unconditioned spaces. Wall height shall be measured from the finished floor of the *dwelling unit* to the underside of the sheetrock unless the ceiling cavity above the unit is blocked at unit separation and corridor walls then it shall extend to the underside of the floor above.

ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, including but not limited to, passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, EVSE, a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current. Off-road, self-propelled electric mobile equipment, including but not limited to, industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, and boats are not considered electric vehicles.

ELECTRIC VEHICLE CAPABLE LIGHT SPACE (EV CAPABLE LIGHT SPACE). A designated vehicle parking space that has conduit and/or raceway installed to support future implementation of *electric vehicle* charging installation and has sufficient physical space adjacent to the existing electrical equipment for future electric upgrades.

ELECTRIC VEHICLE CAPABLE SPACE (EV CAPABLE SPACE). A designated vehicle parking space that has the electric panel capacity and conduit and/or raceway installed to support future implementation of *electric vehicle* charging.

ELECTRIC VEHICLE READY SPACE (EV READY SPACE). A designated vehicle parking space that has the electric panel capacity, raceway wiring, receptacle, and circuit overprotection devices installed to support future implementation of *electrical vehicle* charging.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). An electric vehicle charging system or device that is used to provide electricity to a plug-in *electric vehicle* or plug-in hybrid electric vehicle, is designed to ensure that a safe connection has been made between the electrical grid and the vehicle, and is able to communicate with the vehicle's control system so that electricity flows at an appropriate voltage and current level.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) INSTALLED SPACE. A vehicle parking space that is provided with dedicated *EVSE* connection.

ENERGY ANALYSIS. A method for estimating the annual energy use of the *proposed design* and *standard reference design* based on estimates of energy use.

ENERGY COST. The total estimated annual cost for purchased energy for the building functions regulated by this code, including applicable demand charges.

ENERGY IMPACT OFFSET FUND. A city-approved and city-managed offset fund providing a payment option in lieu of complying with city program renewable energy and/or offset requirements.

ENERGY RATING INDEX (ERI). A numerical integer value that represents the relative energy performance of a rated design or constructed dwelling unit as compared with the energy performance of the ERI Reference Design, where an ERI value of 100 represents the energy performance of the ERI Reference Design and an ERI value of 0 represents a rated design or constructed dwelling unit with zero net energy performance.

ENERGY SIMULATION TOOL. An *approved* software program or calculation-based methodology that projects the annual energy use of a *building*.

ERI REFERENCE DESIGN. A version of the *rated design* that meets the minimum requirements of the 2006 *International Energy Conservation Code.*

EXISTING BUILDING. A building erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued.

EXTERIOR WALL. Walls including both above-grade walls and *basement walls*.

FENESTRATION. Products classified as either *vertical fenestration* or *skylights*.

Skylights. Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal.

Vertical fenestration. Windows that are fixed or operable, opaque doors, glazed doors, glazed block, and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of not less than 60 degrees (1.05 rad) from horizontal including unit skylights, tubular daylighting devices, and glazing materials in solariums, sunrooms, roofs, and sloped walls.

FENESTRATION PRODUCT, SITE-BUILT. A fenestration designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory-formed framing and glazing units. Examples of site-built fenestration include storefront systems, curtain walls and atrium roof systems.

GLOBAL WARMING POTENTIAL (GWP). A measurement that combines the impact of the various greenhouse gases relative to an equivalent unit of carbon dioxide (kg C02e) over a given period of time.

HEATED SLAB. Slab-on-grade construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under, the slab.

HISTORIC BUILDING. Any building or structure that is locally designated by ordinance as an individual landmark or recognized as a contributing resource within a historic district.

INDUSTRY-WIDE TYPE III ENVIRONMENTAL PRODUCT DECLARATION (IW-EPD). Type III environmental product declaration (EPD) that estimates the average global warming potential of a specific product within an industry. IW-EPD's must comply with the goal and scope for the production stage of at least cradle-to-gate in accordance with ISO Standards 14025 and 21930 and be available in a publicly accessible database. The EPD results represent production weighted average data across multiple manufacturers.

INFILTRATION. The uncontrolled inward air leakage into a *building* caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.

INSULATED SIDING. A type of continuous insulation with manufacturer-installed insulating material as an integral part of the cladding product having an *R*-value of not less than R-2.

LABELED. Equipment, materials, or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, *approved* agency or other organization concerned with product evaluation that maintains periodic inspection of the production of such labeled items and whose labeling indicates either that the equipment, material, or product meets identified standards or has been tested and found suitable for a specified purpose.

LISTED. Equipment, materials, products, or services included in a list published by an organization acceptable to the *code official* and concerned with evaluation of products or services that maintains periodic inspection of production of *listed* equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

LOW-VOLTAGE LIGHTING. Lighting equipment powered through a transformer such as a cable conductor, a rail conductor and track lighting.

MANUAL. Capable of being operated by personal intervention (see "Automatic").

MIXED-FUEL BUILDING. A *building* and building site that contains *combustion equipment*, or plumbing for *combustion equipment*, for space heating, cooling, water heating (including pools and spas), cooking, or clothes drying.

OCCUPANT SENSOR CONTROL. An automatic control device that detects the presence or absence of people within an area and causes lighting, equipment, or appliances to be regulated accordingly.

OCCUPIABLE SPACE. An enclosed space intended for human activities, excluding those spaces intended primarily for other purposes, such as storage rooms and equipment rooms, that are only intended to be occupied occasionally and for short periods of time.

OFF-SITE SOLAR SUBSCRIPTION. A 20-year subscription to a solar generation facility where the beneficial use of the electricity generated by the facility belongs to subscribers to the solar generation facility as authorized in §40-2-127, C.R.S.

ON-SITE RENEWABLE ENERGY. Energy from renewable energy resources harvested at the building site.

OPAQUE DOOR. A door that is not less than 50-percent opaque in surface area.

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics, and other components, exclusive of tracker, designed to generate DC power.

PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

PLUG-IN HYBRID ELECTRIC VEHICLE. An *electric vehicle* having a second source of motive power.

PRODUCT. Any material or product procured for permanent installation in the building that has the same specification requirements and is classified by the same product category rule.

PROPOSED DESIGN. A description of the proposed *building* used to estimate annual energy use for determining compliance based on total building performance.

PRODUCT-SPECIFIC TYPE III ENVIRONMENTAL PRODUCT DECLARATION (EPD). Type III environmental product declaration (EPD) that estimates the average global warming potential of a specific product. A product-specific Type III environmental product declaration (EPD) must comply with the goal and scope for the production stage of at least cradle-to-gate in accordance with ISO Standards 14025 and 21930 and be available in a publicly accessible database. The data can represent the impacts of a specific design and manufacturer across multiple facilities or be facility specific. Also known as manufacturer specific EPD.

RATED DESIGN. A description of the proposed *building* used to determine the energy rating index.

READY ACCESS (TO). That which enables a device, appliance, or equipment to be directly reached without requiring the removal or movement of any panel or similar obstruction.

REGISTERED DESIGN PROFESSIONAL. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

RENEWABLE ENERGY CERTIFICATE (REC). An instrument that represents the environmental attributes of one megawatt hour of renewable energy; also known as an energy attribute certificate (EAC).

RENEWABLE ENERGY RESOURCES. Energy derived from solar radiation, wind, waves, tides, landfill gas, biogas, biomass or extracted from hot fluid or steam heated within the earth.

REPAIR. The reconstruction or renewal of any part of an existing *building* for the purpose of its maintenance or to correct damage.

REROOFING. The process of recovering or replacing an existing roof covering. See "Roof recover" and "Roof replacement."

RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and townhouses, and *Group* R-3 and R-4 buildings three stories or less in height above grade plane with separate means of egress.

ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly

includes the roof covering, underlayment and roof deck, and can also include a thermal barrier, an ignition barrier, insulation, or a vapor retarder.

ROOF RECOVER. The process of installing an additional roof covering over an existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate, and installing a new roof covering.

***R*-VALUE (THERMAL RESISTANCE).** The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($h \cdot ft^2 \cdot °F/Btu$) [$(m^2 \cdot K)/W$].

SERVICE WATER HEATING. Supply of hot water for purposes other than comfort heating.

SOLAR HEAT GAIN COEFFICIENT (SHGC). The ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation that is then reradiated, conducted, or convected into the space.

SOLAR-READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.

SPACE CONDITIONING. The treatment of air so as to control the temperature, humidity, filtration, or distribution of the air to meet the requirements of a conditioned space.

SPACE CONDITIONING EQUIPMENT. The heat exchangers, air-handling units, filter boxes, and any apparatus installed in connection therewith used to provide space conditioning.

STANDARD REFERENCE DESIGN. A version of the *proposed design* that meets the minimum requirements of this code and is used to determine the maximum annual energy use requirement for compliance based on total building performance.

SUBSTANTIAL THERMAL ENVELOPE ALTERATION. An *alteration* greater than or equal to 50 percent of the *building thermal envelope*.

SUBSTANTIAL MECHANICAL ALTERATION. An *alteration* in which the *space conditioning equipment* or *service water heating equipment* is replaced.

SUNROOM. A one-story structure attached to a dwelling with a glazing area in excess of 40 percent of the gross area of the structure's *exterior walls* and roof.

THERMAL DISTRIBUTION EFFICIENCY (TDE). The resistance to changes in air heat as air is conveyed through a distance of air duct. TDE is a heat loss calculation evaluating the difference in the heat of the air between the air duct inlet and outlet caused by differences in temperatures between the air in the duct and the duct material. TDE is expressed as a percent difference between the inlet and outlet heat in the duct.

THERMAL ISOLATION. Physical and space conditioning separation from *conditioned spaces*. The *conditioned spaces* shall be controlled as separate zones for heating and cooling or conditioned by separate equipment.

THERMOSTAT. An automatic control device used to maintain temperature at a fixed or adjustable setpoint.

***U*-FACTOR (THERMAL TRANSMITTANCE).** The coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films ($Btu/h \cdot ft^2 \cdot °F$) [$W/(m^2 \cdot K)$].

UNIVERSAL VEHICLE CHARGING STATIONS. Parking spaces provided for electric vehicle charging stations that can be utilized for all users and complies with Chapter 11.

VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

VENTILATION AIR. That portion of supply air that comes from outside (outdoors) plus any recirculated air that has been treated to maintain the desired quality of air within a designated space.

VISIBLE TRANSMITTANCE (VT). The ratio of visible light entering the space through the fenestration product assembly to the incident visible light, Visible Transmittance, includes the effects of glazing material and frame and is expressed as a number between 0 and 1.

WHOLE BUILDING LIFECYCLE ANALYSIS (WB LCA). An analysis of a building and its building components lifetime environmental impact, including but not limited to embodied and operational carbon impact, on the environment locally and globally.

WHOLE HOUSE MECHANICAL VENTILATION SYSTEM. An exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air with outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rates.

ZONE. A space or group of spaces within a *building* with heating or cooling requirements that are sufficiently similar so that desired conditions can be maintained throughout using a single controlling device.

CHAPTER 3 [RE]
GENERAL REQUIREMENTS

User note:

About this chapter: *Chapter 3 covers general regulations for energy conservation features of buildings. The climate zone for a building is established by geographic location tables and figures in this chapter.*

SECTION R301
LOCATION

R301.1 General. This code applies to projects located in the City of Boulder and the City Boulder is in *Climate Zone* 5B.

SECTION R302
DESIGN CONDITIONS

R302.1 Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

SECTION R303
MATERIALS, SYSTEMS AND EQUIPMENT

R303.1 Identification. Materials, systems, and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

R303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation that is 12 inches (305 mm) or greater in width. Alternatively, the insulation installers shall provide a certification that indicates the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown-in or sprayed fiberglass and cellulose insulation, the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be indicated on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and the *R*-value of the installed thickness shall be indicated on the certification. For reflective insulation, the number of reflective sheet(s), the number and thickness of the enclosed reflective air space(s) and the R-value for the installed assembly determined in accordance with Section R303.1.6, shall be listed on the certification. For insulated siding, the *R*-value shall be on a label on the product's package and shall be indicated on the certification. The insulation installer shall sign, date, and post the certification in a conspicuous location on the job site.

Exception: For roof insulation installed above the deck, the *R*-value shall be labeled as required by the material standards specified in Table 1508.2 of the *International Building Code* or Table R906.2 of the *International Residential Code*, as applicable.

R303.1.1.1 Blown-in or sprayed roof and ceiling insulation. The thickness of blown-in or sprayed fiberglass and cellulose roof and ceiling insulation shall be at not less than one for every 300 square feet (28 m^2) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers not less than 1 inch (25 mm) in height. Each marker shall face the attic access opening. The thickness and installed *R*-value of sprayed polyurethane foam insulation shall be indicated on the certification provided by the insulation installer.

R303.1.2 Insulation mark at installation. Insulating materials shall be installed such that the manufacturer's *R*-value mark is readily observable at inspection. For insulation materials that are installed without an observable manufacturer's R-value mark, such as blown or draped products, an insulation certificate complying with Section R303.1.1 shall be left immediately after installation by the installer, in a conspicuous location within the building, to certify the installed R-value of the insulation material.

R303.1.3 Fenestration product rating. *U*-factors of fenestration products such as windows, doors and *skylights* shall be determined in accordance with NFRC 100.

Exception: Where required, garage door *U*-factors shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

U-factors shall be determined by an accredited, independent laboratory, and labeled and certified by the manufacturer.

Products lacking such a labeled *U*-factor shall be assigned a default *U*-factor from Table R303.1.3(1) or R303.1.3(2). The *solar heat gain coefficient* (SHGC) and *visible transmittance* (VT) of glazed fenestration products such as windows, glazed doors and *skylights* shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC or VT shall be assigned a default SHGC or VT from Table R303.1.3(3).

R303.1.4 Insulation product rating. The thermal resistance, *R*-value, of insulation shall be determined in accordance with Part 460 of US-FTC CFR Title 16 in units of h • ft^2 • °F/Btu at a mean temperature of 75°F (24°C).

TABLE R303.1.3(1)
DEFAULT GLAZED WINDOW, GLASS DOOR AND SKYLIGHT U-FACTORS

FRAME TYPE	WINDOW AND GLASS DOOR		SKYLIGHT	
	Single pane	Double pane	Single	Double
Metal	1.20	0.80	2.00	1.30
Metal with Thermal Break	1.10	0.65	1.90	1.10
Nonmetal or Metal Clad	0.95	0.55	1.75	1.05
Glazed Block	0.60			

TABLE R303.1.3(2)
DEFAULT OPAQUE DOOR U-FACTORS

DOOR TYPE	OPAQUE *U*-FACTOR
Uninsulated Metal	1.20
Insulated Metal (Rolling)	0.90
Insulated Metal	0.60
Wood	0.50
Insulated, nonmetal edge, not exceeding 45% glazing, any glazing double pane	0.35

TABLE R303.1.3(3)
DEFAULT GLAZED FENESTRATION SHGC AND VT

	SINGLE GLAZED		DOUBLE GLAZED		GLAZED BLOCK
	Clear	Tinted	Clear	Tinted	
SHGC	0.8	0.7	0.7	0.6	0.6
VT	0.6	0.3	0.6	0.3	0.6

R303.1.4.1 Insulated siding. The thermal resistance, *R*-value, of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's instructions.

R303.1.5 Air-impermeable insulation. Insulation having an air permeability not greater than 0.004 cubic feet per minute per square foot [0.002 L/(s × m^2)] under pressure differential of 0.3-inch water gauge (75 Pa) when tested in accordance with ASTM E2178 shall be determined air-impermeable insulation.

R303.1.6 Air spaces. Where the R-value of an enclosed reflective air space or enclosed nonreflective air space is used for compliance with this standard, the air space shall be enclosed in a cavity bounded on all sides by building components and constructed to minimize airflow into and out of the enclosed air space. Airflow shall be deemed minimized where one of the following conditions occur:

1. The enclosed air space is unventilated.
2. The enclosed air space is bounded on one or more sides by an anchored masonry veneer, constructed in accordance with Chapter 7 of the International Residential Code, and vented by veneer weep holes located only at the bottom portion of the air space and spaced not less than 15 inches (381 mm) on center with the top of the cavity air space closed.

   Exception: For ventilated cavities, the effect of the ventilation of air spaces located on the exterior side of the continuous air barrier and adjacent to and behind the exterior wall covering material shall be determined in accordance with ASTM C1363 modified with an airflow entering the bottom and exiting the top of the air space at an air movement rate of not less than 70 mm/second.

R303.2 Installation. Materials, systems and equipment shall be installed in accordance with the manufacturer's recommended installation instructions and this code, the *International Building Code* or the *International Residential Code*, as applicable.

R303.2.1 Protection of exposed foundation insulation. Insulation applied to the exterior of *basement walls*, crawl space walls and the perimeter of slab-on-grade floors shall have a rigid, opaque, and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend not less than 6 inches (153 mm) below grade.

R303.3 Maintenance information. Maintenance instructions shall be furnished for equipment and systems that require preventive maintenance. Required regular maintenance actions shall be clearly stated and incorporated on a readily visible label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.

CHAPTER 4 [RE]

RESIDENTIAL ENERGY EFFICIENCY

User note:

About this chapter: *Chapter 4 provides requirements for the thermal envelope of a building, including minimum insulation values for walls, ceiling, and floors; maximum fenestration U-factors; minimum fenestration solar heat gain coefficients; and methods for determining building assembly and a total building U-factor. A performance alternative and an energy rating alternative are also provided to allow for energy code compliance other than by the prescriptive method.*

SECTION R401
GENERAL

R401.1 Scope. This chapter applies to *residential buildings*.

R401.2 New and existing residential application. New residential buildings less than or equal to 1,000 square feet of *conditioned floor area* shall comply with either Sections R401.2.1 or R402.2.2. New buildings greater than 1,000 square feet of *conditioned floor area* shall comply with Section R402.2.2. *Additions, alterations, repairs* and changes of occupancy to an existing building shall comply with Chapter 5 as applicable.

R401.2.1 Prescriptive Compliance Option. The Prescriptive Compliance Option is available for newly constructed *residential buildings* and *additional dwelling units (ADUs)* that are 1,000 square feet or less, and shall require compliance with Sections R401 through R404, R407 and R408.

R401.2.2 Energy Rating Index Compliance. The *Energy Rating Index* (ERI) Option is available for newly constructed *residential buildings* and ADUs of ANY size, and shall require compliance with Section R406 and Table R406.2.

R401.3 Documentation.

R401.3.1 Certificate. A permanent certificate shall be completed by the builder or other *approved* party and posted on a wall in the space where the furnace is located, a utility room or an *approved* location inside the *building*. Where located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall indicate the following:

1. The predominant *R*-values of insulation installed in or on ceilings, roofs, walls, foundation components such as slabs, *basement walls*, crawl space walls and floors and ducts outside *conditioned spaces*.
2. *U*-factors of fenestration and the *solar heat gain coefficient* (SHGC) of fenestration, and the results from any required duct system and *building* envelope air leakage testing performed on the *building*. Where there is more than one value for any component, the certificate shall indicate the value covering the largest area and the area-weighted average value if applicable.
3. The results from any required duct system and building envelope air leakage testing performed on the building.
4. The types, sizes, fuel sources and efficiencies of heating, cooling, and service water heating equipment. Where a gas-fired unvented room heater, electric furnace or baseboard electric heater is installed in the residence, the certificate shall indicate "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be indicated for gas-fired unvented room heaters, electric furnaces, and electric baseboard heaters.
5. Where on-site *photovoltaic panel systems* have been installed, the array capacity, inverter efficiency, panel tilt and orientation shall be noted on the certificate.
6. For buildings where an Energy Rating Index score is determined in accordance with Section R406, the Energy Rating Index score, both with and without on-site generation, as determined in accordance with Section R406, shall be listed on the certificate.
7. The code edition under which the structure was permitted and the compliance path used.
8. The additional conservation package options selected.
9. The fuel sources for cooking and clothes drying equipment.
10. Where combustion equipment is installed, the certificate shall indicate information on the installation of additional electric infrastructure including which equipment and/or appliances include additional electric infrastructure, capacity reserved on the electrical service panel for replacement of each piece of combustion equipment and/or appliance.
11. Where a solar-ready zone is provided, the certificate shall indicate the location, dimensions, and capacity reserved on the electrical service panel.

R401.3.2 Homeowner's manual. The builder or owner's agent shall provide the owner with a binder of all equipment and appliance manufacturers' installation manuals and maintenance instructions in accordance with Section R303.3, except for manuals that are required to be affixed to the equipment. These include the energy rating

report and ERI certificate. If the *code official* approved a community solar garden subscription attributed to the property as a means to meet the requirements of this chapter, the manual shall include any requirements for a continued subscription to a community solar garden necessary to meet the requirements of this chapter.

SECTION R402
BUILDING THERMAL ENVELOPE

R402.1 General The *building thermal envelope* shall comply with the requirements of Sections R402.1.1 and R402.1.2.

Exceptions:

1. The following low-energy *buildings*, or portions thereof, separated from the remainder of the building-by-*building thermal envelope* assemblies complying with this section shall be exempt from the *building thermal envelope* provisions of Section R402.
   1.1. Those with a peak design rate of energy usage less than 3.4 Btu/h • ft^2 (10.7 W/m^2) or 1.0 watt/ft^2 of floor area for space-conditioning purposes.
   1.2. Those that do not contain *conditioned space*.
2. Log homes designed in accordance with ICC 400.

R402.1.1 Vapor retarder. Wall assemblies in the *building thermal envelope* shall comply with the Class two or three vapor retarder requirements of Section R702.7 of the *International Residential Code* or Section 1404.3 of the *International Building Code,* as applicable. A minimum vented air space shall be defined as one that is $^3/_8$ of an inch or bigger.

R402.1.2 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Table R402.1.2. Assemblies shall have a U-factor equal to or less than that specified in Table R402.1.4. Fenestration shall have a U-factor and glazed fenestration SHGC equal to or less than that specified in Table R402.1.2 or R402.1.4.

R402.1.2.1 R-value alternative. Assemblies with R-value of insulation materials equal to or greater than that specified in Table R402.1.2 shall be an alternative to the U-factor in Table R402.1.4.

R402.1.2.2 *R*-value computation. Cavity insulation alone shall be used to determine compliance with the cavity insulation R-value requirements in Table R402.1.2. Where cavity insulation is installed in multiple layers, the R-values of the cavity insulation layers shall be summed to determine compliance with the cavity insulation R-value requirements. The manufacturer's settled *R*-value shall be used for blown-in insulation. Continuous insulation (ci) alone shall be used to determine compliance with the continuous insulation R-value requirements in Table R402.1.2. Where continuous insulation is installed in multiple layers, the R-values of the continuous insulation layers shall be summed to determine compliance with the continuous insulation R-value requirements. Cavity insulation R-values shall not be used to determine compliance with the continuous insulation R-value requirements in Table R402.1.2. Computed *R*-values shall not include an *R*-value for other building materials or air films. Where insulated siding is used for the purpose of complying with the continuous insulation requirements of Table R402.1.2, the manufacturer's labeled *R*-value for the insulated siding shall be reduced by R-0.6.

TABLE R402.1.2
INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

Fenestration U-Factor	0.27
Skylight *U*-Factor	0.50
Glazed Fenestration SHGC	0.40
Ceiling *R*-Value	R-60
Insulation Entirely Above Roof Deck *R*-Value	R-0+39 ci
Wood Frame Wall *R*-Value[f]	R-30 or R-20&5ci or R-13&10ci or R-0&20ci
Mass Wall *R*-Value[e]	15/20
Floor *R*-Value	R-38 or R-4 per inch
Basement Wall *R*-Value[b, f]	15ci or R-20 or R-15&5ci
Unheated Slab R-Value & Depth[c]	15ci, 2 ft
Heated Slab *R*-Value & Depth[d]	20ci, 2ft and 10ci full slab
Crawl Space Wall *R*-Value	15ci or R-20 or R-15&5ci

For SI: 1 foot = 304.8 mm.

ci = continuous insulation.

a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.

b. "15ci or R-20 or R-15&5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-20 cavity insulation on the interior side of the wall; or R-15 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or the exterior surface of the wall.

c. Unheated slab insulation refers to slab edge insulation that shall be installed in accordance with Section R402.2.9.1. Slab edge depth (2 feet) may be comprised of insulation from the top of slab down + horizontal insulation installed in a continuous manner under the slab.

d. A heated slab requires insulation at both the slab edge and under the full slab. Slab edge depth may be comprised of insulation from the top of slab down + horizontal insulation installed under the slab.

e. Mass walls shall be in accordance with Section R402.2.6. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.

f. The first value is cavity insulation; the second value is continuous insulation. Therefore, as example, (R-20&5ci" means R-20 cavity insulation plus R-5 continuous insulation.

TABLE R402.1.4
MAXIMUM ASSEMBLY *U*-FACTORS[a] AND FENESTRATION REQUIREMENTS

Fenestration *U*-Factor	0.27
Skylight *U*-Factor	0.50
Glazed Fenestration SHGC [c]	0.40
Ceiling *R*-Value	0.024
Insulation Entirely Above Roof Deck	0.025
Wood Frame Wall R-Value	0.040
Mass Wall R-Value [b]	0.056
Floor *R*-Value	0.029
Basement Wall *R*-Value	0.042
Unheated Slab R-Value & Depth	F-0.64
Heated Slab *R*-Value & Depth	F-0.50
Crawl Space Wall R-Value	0.042

For SI: 1 foot = 304.8 mm.

NR = Not Required.

ci = continuous insulation.

a. Nonfenestration *U*-factors shall be obtained from measurement, calculation, or an approved source

b. Mass walls shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall *U*-factors shall not exceed 0.065.

c. The SHGC value applies to all glazed fenestrations, including skylights.

R402.1.2.3 Total UA alternative. The building shall be considered to be in compliance with Section R402.1.2 when the total *building thermal envelope* UA of the proposed design is equal to or less than the total UA resulting from multiplying the *U*-factors in Table R402.1.2 by the same assembly area as in the proposed *building*. The UA calculation shall be performed using a method consistent with the ASHRAE *Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials. In addition to UA compliance, the SHGC requirements of Table R402.1.2 in this code, and the maximum fenestration U-factors of Section R402.5 in this code shall be met.

R402.2 Specific insulation requirements. In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through R402.2.12.

R402.2.1 Ceilings with ventilated attic spaces. Where Section R402.1.2.1 requires R-60 ceiling insulation is installed, installing R-49 over 100 percent of the ceiling or attic area requiring insulation shall satisfy the requirement for R-60 insulation wherever the full height of uncompressed R-49 insulation extends over the wall top plate at the eaves. The reduction shall not apply to the insulation and fenestration criteria in Section R402.1.2 and the Total UA alternate in Section R402.1.2.3.

R402.2.2 Unvented Attic or Ceilings without attics. Whenever the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation R-value shall be R-30. The installed insulation shall extend over the top of the wall plate to the outer edge of such plate and shall not be compressed. The reduction of insulation from the requirements of Section R402.1.2.1 shall be limited to 500 square feet (46 m^2) or 20 percent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the Total UA alternative in Section R402.1.23.

R402.2.3 Eave baffle. For air-permeable insulations in vented attics, a baffle shall be installed adjacent to soffit and eave vents. Baffles shall maintain a net free area opening equal or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material. The baffle shall be installed to the outer edge of the exterior wall top plate so as to provide maximum space for attic insulation coverage over the top plate. Where soffit venting is not continuous, baffles shall be installed continuously to prevent ventilation air in the eave soffit from bypassing the baffle.

R402.2.4 Access hatches and doors. Access Hatches and doors from *conditioned spaces* to *unconditioned spaces* such as vented attics and crawl spaces shall be weather-stripped and insulated to the same R-value required by Table R402.1.2 or Section R406 for the wall or ceiling in which they are installed. Where loose-fill insulation is installed, a wood-framed or equivalent baffle or retainer shall be installed to prevent the loose-fill insulation from spilling into the living space when the attic access is opened. The baffle or retainer shall provide a permanent means of maintaining the required installed *R*-value of the loose-fill insulation. Access that prevents damaging or compression of the required insulation R-value shall be provided to all equipment installed in the space. Equipment platforms installed in the space shall be installed to prevent damaging or compression of the required installed insulation R-value.

R402.2.5 Mass walls. Mass walls where used as a component of the *building thermal envelope* shall be one of the following:

1. Above-ground walls of concrete block, concrete, insulated concrete form, masonry cavity, brick but not brick veneer, adobe, compressed earth block, rammed earth, solid timber, mass timber or solid logs.
2. Any wall having a heat capacity greater than or equal to 6 Btu/ft^2 • °F (123 kJ/m^2 • K).

R402.2.6 Steel-frame ceilings, walls, and floors. Steel-frame ceilings, walls, and floors shall comply with the insulation requirements of Table R402.2.6 or the *U*-factor requirements of Table R402.1.4. The calculation of the *U*-factor for a steel-frame envelope assembly shall use a series-parallel path calculation method.

TABLE R402.2.6
STEEL-FRAME CEILING, WALL, AND FLOOR INSULATION *R*-VALUES

WOOD FRAME *R*-VALUE REQUIREMENT	COLD-FORMED STEEL-FRAME EQUIVALENT *R*-VALUE[a]
Steel Truss Ceilings[b]	
R-30	R-38 or R-30 + 3 or R-26 + 5
R-38	R-49 or R-38 + 3
R-49	R-38 + 5
Steel Joist Ceilings[b]	
R-30	R-38 in 2 × 4 or 2 × 6 or 2 × 8 R-49 in any framing
R-38	R-49 in 2 × 4 or 2 × 6 or 2 × 8 or 2 × 10
Steel-Framed Wall, 16 inches on center	
R-13	R-13 + 4.2 or R-21 + 2.8 or R-0 + 9.3 or R-15 + 3.8 or R-21 + 3.1
R-13 + 5	R-0 + 15 or R-13 + 19 or R-15 + 8.5 or R-19 + 8 or R-21 + 7
R-13 + 10	R-0 + 20 or R-13 + 15 or R-15 + 14 or R-19 + 13 or R-21 + 13
R-20	R-0 + 14.0 or R-13 + 8.9 or R-15 + 8.5 or R-19 + 7.8 or R-21 + 7.5
R-20 + 5	R-13 + 12.7 or R-15 + 12.3 or R-19 + 11.6 or R-21 + 11.3 or R-25 + 10.9
R-21	R-0 + 14.6 or R-13 + 9.5 or R-15 + 9.1 or R-19 + 8.4 or R-21 + 8.1 or R-25 + 7.7
Steel Framed Wall, 24 inches on center	
R-13	R-0 + 9.3 or R-13 + 3.0 or R-15 + 2.4
R-13 + 5	R-0 + 15 or R-13 + 7.5 or R-15 + 7 or R-19 + 6 or R-21 + 6
R-13 + 10	R-0 + 20 or R-13 + 13 or R-15 + 12 or R-19 + 11 or R-21 + 11
R-20	R-0 + 14.0 or R-13 + 7.7 or R-15 + 7.1 or R-19 + 6.3 or R-21 + 5.9
R-20 + 5	R-13 + 11.5 or R-15 + 10.9 or R-19 + 10.1 or R-21 + 9.7 or R-25 + 9.1
R-21	R-0 + 14.6 or R-13 + 8.3 or R-15 + 7.7 or R-19 + 6.9 or R-21 + 6.5 or R-25 + 5.9
Steel Joist Floor	
R-13	R-19 in 2 × 6, or R-19 + 6 in 2 × 8 or 2 × 10
R-19	R-19 + 6 in 2 × 6, or R-19 + 12 in 2 × 8 or 2 × 10

a. The first value is cavity insulation *R*-value, the second value is continuous insulation *R*-value. Therefore, for example, "R-30+3" means R-30 cavity insulation plus R-3 continuous insulation.

b. Insulation exceeding the height of the framing shall cover the framing.

R402.2.7 Floors. Floor *cavity insulation* shall be enclosed on all sides and comply with one of the following:

1. Insulation shall be installed to maintain permanent contact with the underside of the subfloor decking in accordance with manufacturer instructions to maintain required *R*-value or readily fill the available cavity space.
2. Floor framing cavity insulation shall be permitted to be in contact with the top side of sheathing separating the cavity and the unconditioned space below. Insulation shall extend from the bottom to the top of all perimeter floor framing members and the framing members shall be air sealed.
3. A combination of cavity and continuous insulation shall be installed so that the cavity insulation is in contact with the top side of the continuous insulation that is installed on the underside of the floor framing separating the cavity and the unconditioned space below. The combined R-value of the cavity and continuous insulation shall equal the required R-value for floors. Insulation shall extend from the bottom to the top of all perimeter floor framing members and the framing members shall be air sealed.

R402.2.8 Basement walls. Basement walls shall be insulated in accordance with Table R402.1.2 or the R-value determined by section R406.

Exception: *Basement walls* associated with unconditioned basements where all of the following requirements are met:

1. The floor overhead including the underside stairway stringer leading to the basement, is insulated in accordance with the proposed design and applicable provisions of Sections R402.2 and R402.2.7.
2. There are no uninsulated ductwork, domestic hot water piping, or hydronic heating surfaces exposed to the basement.
3. There are no HVAC supply or return diffusers serving the basement.
4. The walls surrounding the stairway and adjacent to conditioned space are insulated in accordance with the proposed design which shall be in compliance with Section R402.1.2.1 and the applicable provisions of Section R402.2.
5. The door(s) leading to the basement from conditioned spaces are insulated in accordance with the proposed design, which shall be in compliance with Section R402.1.2.1 and the applicable provisions of Section R402.2, and weather stripped in accordance with Section R402.4.
6. The building thermal envelope separating the basement from adjacent conditioned spaces complies with Section R402.4.

R402.2.8.1 Basement wall insulation installation. Where basement walls are insulated, the insulation shall be installed from the top of the basement wall down to 10 feet (3048 mm) below grade or to the basement floor, whichever is less. Where installed, Basement wall insulation shall be secured to the wall and extend downward from the sill plate to not less than the top of the foundation wall footing.

Exception: Where the basement wall insulation is installed on the interior side of the wall it shall be secured to the wall and extend downward from the top of the concrete wall at the sill plate to not less than 3 inches from the basement slab.

R402.2.9 Slab-on-grade floors. Slab-on-grade floors with a floor surface less than 12 inches (305 mm) below grade shall be insulated in accordance with Table R402.1.2 and Section R402.2.9.1 or R402.2.9.2.

R402.2.9.1 Slab-on-grade floor insulation installation. Where installed, the insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall and shall create a thermal break between attached slabs that are located outside of the building's thermal envelope. Insulation located below grade shall be extended the distance provided in Table R402.1.2 or the distance of the proposed design, as applicable, by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Insulation extending away from the building shall be protected by pavement or by not less than 10 inches (254 mm) of soil. The top edge of the insulation installed between the exterior wall and the edge of the interior slab shall be permitted to be cut at a 45-degree (0.79 rad) angle away from the *exterior wall.* For heated slabs, full slab insulation shall be continuous under the entire area of the slab-on-grade floor, except at structural column locations and service penetrations. Slab edge insulation required at the heated slab perimeter shall not be required to extend below the bottom of the heated slab and shall be continuous with the full slab insulation.

R402.2.9.2 Alternative slab-on-grade insulation configurations. For buildings complying with Section R406, slab-on-grade insulation shall be installed in accordance with the proposed design or rated design. The proposed design or rated design shall use an alternative insulation configuration and associated F-factor complying with Appendix A of ASHRAE 90.1. Where used to comply with Section R401.2.1, the F-factor shall be equal to or less than the F-factor required by Table R402.1.4 for a heated or unheated slab, as applicable.

R402.2.10 Crawl space walls. Crawl space walls shall be insulated in accordance with Table R402.1.2.

Exception: Crawl space walls associated with a crawl space that is vented to the outdoors and the floor overhead is insulated in accordance with Table R402.1.2 and Section R402.2.7.

R402.2.10.1 Crawl space wall insulation installation. Where installed, crawl space wall insulation shall be secured to the wall and extend downward from the sill plate to not less than the top of the foundation wall footing. Exposed earth in unvented crawl space foundations shall be covered with a continuous Class I vapor retarder in accordance with the International Building Code or International Residential Code, as applicable. Joints of the vapor retarder shall overlap by 6 inches (153 mm) and be sealed or taped. The edges of the vapor retarder shall extend not less than 6 inches (153 mm) up stem walls and shall be attached to the stem walls.

Exception: Where the crawl space wall insulation is installed on the interior side of the wall and the crawl space floor is more than 24 inches (610 mm) below the exterior grade, the crawl space wall insulation shall be permitted to extend downward from the top of the concrete wall at the sill plate at the top of the foundation to not less than the interior floor of the crawl space.

R402.2.10.2 Alternative crawl space wall insulation configurations. For buildings complying with Sections R406, crawl space wall insulation shall be installed in accordance with the proposed design or rated design. The proposed design or rated design shall use an alternative insulation configuration and associated U-factor or C-factor complying with Appendix A of ASHRAE 90.1. Where used to comply with Section R401.2.1, the U-factor or C-factor shall be equal to or less than the U-factor required by Table R402.1.4 for crawl space walls.

R402.2.11 Masonry veneer. Insulation shall not be required on the horizontal portion of a foundation that supports a masonry veneer.

R402.2.12 Sunroom and heated garage insulation. *Sunrooms* enclosing *conditioned space* and heated garages shall meet the insulation requirements of this code.

Exception: For *sunrooms* and heated garages with *thermal isolation*, and enclosing *conditioned space*, the following exceptions to the insulation requirements of this code shall apply:

1. The minimum ceiling insulation *R*-value shall be R30.
2. The minimum wall insulation *R*-value shall be R-15. Walls separating a *sunroom* or heated garage with a *thermal isolation* from *conditioned space* shall comply with the *building thermal envelope* requirements of this code.

R402.3 Fenestration. In addition to the requirements of Section R402, fenestration shall comply with Sections R402.3.1 through R402.3.5.

R402.3.1 *U*-factor. An area-weighted average of fenestration products shall be permitted to satisfy the *U*-factor requirements.

R402.3.2 Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50-percent glazed shall be permitted to satisfy the SHGC requirements.

Dynamic glazing shall be permitted to satisfy the SHGC requirements of Table R402.1.2 provided that the ratio of the higher to lower labeled SHGC is greater than or equal to 2.4, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps. *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall be prohibited.

Exception: Dynamic glazing shall not be required to comply with this section where both the lower and higher labeled SHGC comply with the requirements of Table R402.1.2.

R402.3.3 Glazed fenestration exemption. Not greater than 15 square feet (1.4 m^2) of glazed fenestration per *dwelling unit* shall be exempt from the *U*-factor and SHGC requirements in Section R402.1.2. This exemption shall not apply to the Total UA alternative in Section R402.1.2.3.

R402.3.4 Opaque door exemption. One side-hinged opaque door assembly not greater than 24 square feet (2.22 m^2) in area shall be exempt from the *U*-factor requirement in Section R402.1.2. This exemption shall not apply to the Total UA alternative in Section R402.1.2.3.

R402.3.5 Sunroom and heated garage fenestration. *Sunrooms* and heated garage enclosing *conditioned space* shall comply with the fenestration requirements of this code. New fenestration that is part of an assembly providing *thermal isolation* between a *sunroom* or heated garage and *conditioned space* shall comply with the *thermal envelope* requirements of this code.

Exception: For *sunrooms* and heated garages with *thermal isolation* and enclosing *conditioned space*, the fenestration *U*-factor shall not exceed 0.45 and the *skylight U*-factor shall not exceed 0.70.

R402.4 Air leakage. The *building thermal envelope* shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.6.

R402.4.1 Building thermal envelope. The *building thermal envelope* shall comply with Sections R402.4.1.1 and R402.4.1.2. The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

R402.4.1.1 Installation. The components of the *building thermal envelope* as indicated in Table R402.4.1.1 shall be installed in accordance with the manufacturer's installation instructions and the criteria indicated in Table R402.4.1.1, as applicable to the method of construction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

TABLE R402.4.1.1
AIR BARRIER, AIR SEALING AND INSULATION INSTALLATION[a]

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General requirements	A continuous air barrier shall be installed in the building envelope. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material. Air permeable insulation installed in building cavities assemblies shall be enclosed by an air barrier on all sides.
Ceiling/attic	An air barrier shall be installed in any dropped ceiling or soffit to separate it from unconditioned space. Access openings, drop downstairs or knee wall doors to unconditioned attic spaces shall be air sealed with gasketing materials that allow for repeated entrance over time.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier. Access hatches and doors shall be installed and insulated in accordance with Section R402.2.4. Eave Baffles shall be installed in accordance with Section R402.2.3.
Above grade walls	The junction of the foundation and sill plate shall be air sealed. The junction of the top plates and the drywall adjacent to unconditioned spaces shall be air sealed. The junction of the bottom plate to the subfloor on exterior walls separating conditioned space from unconditioned space shall be air sealed.	Air permeable insulation installed in wall cavities shall be enclosed by an air barrier on all sides. Building thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Corners in exterior frame walls shall be insulated with a material having a thermal resistance, R-value, of not less than R-3 per inch. Headers on exterior walls framed with 2x6 lumber or greater in size shall be insulated to a minimum R-5. Engineering evidence may be requested for header locations where insulation cannot be added due to structural requirements of the design.
Knee wall	Knee walls shall have a sealed air barrier on the unconditioned side of the assembly to separate conditioned from unconditioned space.	Insulation installed in a knee wall assembly shall be installed in accordance with the above-grade walls section from this Table.
Windows, skylights and doors	The rough opening gap between framing and the frames of skylights, jambs of windows, and doors shall be sealed in accordance with fenestration manufacturer's instructions.	Framing cavities around windows, skylights and doors shall be insulated per window manufacturer's instructions
Rim joists	Rim joists shall include an exterior air barrier [b] The junctions of the rim board to the sill plate and the rim board and the subfloor shall be air sealed.	Rim joists shall be insulated so that the insulation maintains permanent contact with the exterior rim board.[b] Air permeable insulation installed in rim joists shall be enclosed by an air barrier.
Floors, separating conditioned from unconditioned space, including cantilevered floors and floors above garages	The air barrier shall be installed at any exposed edge of insulation. Floor framing members that are part of the building thermal envelope shall be air sealed to maintain a continuous air barrier.	Air permeable insulation installed in floor cavities shall be enclosed on all sides Floor framing cavity insulation shall be installed in accordance with the requirements of Section R402.2.7.

(continued)

TABLE R402.4.1.1-continued
AIR BARRIER, AIR SEALING AND INSULATION INSTALLATION[a]

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
Basement crawl space and slab foundations	Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder/air barrier in accordance with Section R402.2.10.1. Penetrations through concrete foundation walls and slabs shall be air sealed. Class 1 vapor retarders shall not be used as an air barrier on below-grade walls and shall be installed in accordance with Section R702.7 of the *International Residential Code*.	Crawl space insulation, where provided instead of floor insulation, shall be installed in accordance with Section R402.2.10. Conditioned basement foundation wall insulation shall be installed in accordance with Section R402.2.8.1. Slab-on-grade floor insulation shall be installed in accordance with Section R402.2.9.1.
Shafts, penetrations	Duct and flue shafts, and other similar penetrations to exterior or unconditioned space shall be sealed to allow for expansion, contraction, and mechanical vibration. Utility penetrations of the air barrier shall be caulked, gasketed or otherwise sealed and shall allow for expansion, contraction of materials and mechanical vibration.	Insulation shall be fitted tightly around utilities passing through shafts and penetrations in the building thermal envelope to maintain required R-value.
Narrow cavities	Narrow cavities of 1 inch or less that are not able to be insulated shall be air sealed.	Batts to be installed in narrow cavities shall be cut to fit or narrow cavities shall be filled with insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	Insulated portions of the garage separation assembly shall be installed in accordance with Sections R303, and R402.2.7.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air sealed in accordance with Section R402.4.5.	Recessed light fixtures installed in the building thermal envelope shall be airtight and IC rated and shall be buried or surrounded with insulation.
Plumbing, wiring or other obstructions	All holes created by wiring, plumbing or other obstructions in the air barrier assembly shall be air sealed.	Insulation shall be installed to completely fill the available space and surround wiring, plumbing, or other obstructions, unless the required R-value can be met by installing insulation and air barrier systems completely to the exterior side of the obstructions.
Showers, tubs, and fireplaces adjacent to the *building thermal envelope*	An air barrier shall separate insulation in the *building thermal envelope* from the shower, tub, or fireplace assembly adjacent to it. Tub and shower drain trap penetrations through the subfloor shall be air sealed. Fireplaces shall comply with the requirements of Section R402.4.2	Exterior framed walls adjacent to showers,-tubs, and fireplace shall be insulated to the same level as the proposed above grade or foundation wall they are adjacent to.
Electrical communication, and other equipment boxes, housings, and enclosures	Boxes, housings, and enclosures that penetrate the *air barrier* shall be caulked, taped, gasketed, or otherwise sealed to the *air barrier* element being penetrated. All concealed openings into the box, housing, or enclosure shall be sealed. Alternatively, air-sealed boxes shall be installed in accordance with R402.4.6	Boxes, housing, and enclosures shall be completely buried in or surrounded by insulation.
HVAC register boots	HVAC supply and return register boots shall be sealed to the subfloor, wall covering, or ceiling penetrated by the boot.	HVAC supply and return register boots located within the *buildings thermal envelope* assembly shall be completely buried in or surrounded by insulation.
Concealed sprinklers	Where required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer.	—
Common walls or double walls separating attached single-family dwellings or townhouses	An interior air barrier shall be provided. Air sealing at the intersections with building thermal envelope shall be provided. Where installed in a fire resistance rated wall assembly, air sealing materials shall comply with one of the following: 1. be in accordance with an approved design for the fire resistance-rated assembly. 2. be supported by approved data that shows the assembly as installed complies with the required fire-resistance rating	Insulation materials recognized in the approved common wall or double wall design and installed in accordance with the approved design, shall be permitted to be used.

a. Inspection of log walls shall be in accordance with the provisions of ICC 400.
b. Air barrier and insulation full enclosure is not required in unconditioned/ventilated attic spaces and at rim joists.

R402.4.1.2 Testing. The *building* or dwelling unit shall be tested for air leakage. The maximum air leakage rate for any building or dwelling unit under any compliance path shall not exceed 3.0 air changes per hour for single family buildings or 0.16 cubic feet per minute (CFM) per square foot (0.81 L/s • m^2) of dwelling unit enclosure area for other than a single-family building. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2-inch w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* have been sealed. Mechanical ventilation shall be provided in accordance with Section M1505 of the International Residential Code or Section 403.3.2 of the International Mechanical Code, as applicable, or with other approved means of ventilation.

Exceptions:

1. The b*uilding thermal envelope* and *continuous air barrier* shall separate and isolate heated and nonheated, attached private garage spaces and heated and nonheated, detached private garage spaces from all other habitable, *conditioned spaces* in accordance with the items in Table R402.4.1.1. The volume of these garage spaces shall not be included in the calculated habitable conditioned volume for the purpose of calculating the air changes per hour compliance metric. Doors between habitable conditioned spaces and all attached garages shall be closed during air leakage testing unless the blower door testing assembly is installed in the doorway. Where required by the *code official*, an approved third party independent from the installer shall inspect both air barrier and insulation installation criteria.
2. When testing individual dwelling units, an air leakage rate not exceeding 0.20 cubic feet per minute per square foot (1.0 L/s • m^2) of the dwelling unit enclosure area, tested in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2-inch w.g. (50 Pa), shall be an accepted alternative permitted for:
    a. Attached single-family and multiple-family building dwelling units.
    b. Buildings or dwellings units that are 1,000 square feet (93m2) or smaller.

R402.4.2 Fireplaces and wood burning stoves. Only EPA Phase II or Colorado Phase III certified woodburning devices shall be permitted to be installed. Colorado Phase III stoves must pass both particulate matter and carbon monoxide emission standards. EPA Phase II certified stoves must only pass standards for particulate emissions.

R402.4.3 Fenestration air leakage. Windows, *skylights* and sliding glass doors shall have an air infiltration rate of not greater than 0.3 cfm per square foot (1.5 L/s/m^2), and for swinging doors, not greater than 0.5 cfm per square foot (2.6 L/s/m2), when tested in accordance with NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer.

Exception: Site-built windows, *skylights,* and doors.

R402.4.4 Rooms containing fuel-burning appliances. Where open combustion air ducts provide combustion air to open combustion fuel-burning appliances, the appliances and combustion air opening shall be located outside the building thermal envelope or enclosed in a room that is fully isolated from conditioned space inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table R402.1.2, where the walls, floors and ceilings shall meet not less than the basement wall R-value requirement. The door into the room shall be fully gasketed and any penetrations from water/electrical lines and ducts into the room insulated in accordance with Section R403 and sealed per Table R402.4.1.1. The combustion air duct shall be insulated where it passes through conditioned space to an R-value of not less than R-8.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Section R402.4.2 of this code and Section R1006 of the International Residential Code.

R402.4.5 Recessed lighting. Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. Recessed luminaires shall be IC-rated and labeled as having an air leakage rate of not greater than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E283 at a pressure differential of 1.57 psf (75 Pa). Recessed luminaires shall be sealed with a gasket or caulked between the housing and the interior wall or ceiling covering.

R402.4.6 Air-Sealed electrical and communication outlet boxes. Air-sealed electrical and communication outlet boxes that penetrate the air barrier of the building thermal envelope shall be caulked, taped, gasketed, or otherwise sealed to the air barrier element being penetrated. Air sealed boxes shall be buried in or surrounded by insulation. Air-sealed boxes shall be tested and marked in accordance with NEMA OS 4. Air-sealed boxes shall be installed in accordance with the manufacturer's instructions.

R402.5 Maximum fenestration U-factor and SHGC. The area-weighted average maximum fenestration U-factor permitted using tradeoffs from Section R402.2.1.3 shall be 0.48 for vertical fenestration and 0.75 for skylights.

Exception: The maximum U-factor and solar heat gain coefficient (SHGC) for fenestration shall not be required in storm shelters complying with ICC 500.

SECTION R403
SYSTEMS

R403.1 Mechanical System energy sources. All mechanical systems such as for heating, cooling, water heating, cooking, clothes drying, pool and spa heating, snow- and ice- melt systems and any mechanical systems outside the building shall be all-electric or fueled by other non-fossil fuel derived energy sources.

R403.2 Controls. Not less than one thermostat shall be provided for each separate heating and cooling system.

R403.2.1 Programmable thermostat. The thermostat controlling the primary heating or cooling system of the *dwelling unit* shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature setpoints at different times of the day and different days of the week. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures of not less than 55°F (13°C) to not greater than 85°F (29°C). The thermostat shall be programmed initially by the manufacturer with a heating temperature setpoint of not greater than 70°F (21°C) and a cooling temperature setpoint of not less than 78°F (26°C).

R403.2.2 Heat pump supplementary heat. Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

R403.3 Hot water boiler temperature reset. The manufacturer shall equip each boiler (other than a boiler equipped with a tankless domestic water heating coil) with automatic means of adjusting the water temperature supplied by the boiler to ensure incremental change of the inferred heat load will cause an incremental change in the temperature of the water supplied by the boiler. This can be accomplished with outdoor reset, indoor reset, or water temperature sensing.

R403.4 Duct Systems. Ducts and air handlers shall be installed in accordance with Sections R403.4.1 through R403.4.7. The air handler shall be installed within the conditioned space of the building or dwelling unit.

R403.4.1 Ducts located outside conditioned space. Supply and return ducts located outside *conditioned space* shall be insulated to an *R*-value of not less than R-8 and shall comply with Section R403.4.3. Duct work shall not be buried beneath a building or underground.

R403.4.2 Ducts located in conditioned space. For ductwork to be considered inside a conditioned space, it shall comply with one of the following:

1. The duct system shall be located completely within the continuous air barrier and within the building thermal envelope.
2. Ductwork in ventilated attic spaces shall be buried within ceiling insulation in accordance with Section R403.4.3 and all of the following conditions shall exist:
    2.1. The air handler is located completely within the *continuous air barrier* and within the building thermal envelope.
    2.2. The duct leakage, as measured either by a rough-in test of the ducts or a post-construction total system leakage test to outside the building thermal envelope in accordance with Section R403.4.6, is less than or equal to 1.5 cubic feet per minute (42.5 L/min) per 100 square feet (9.29 m^2) of conditioned floor area served by the duct system.
    2.3. The ceiling insulation *R*-value installed against and above the insulated duct is greater than or equal to the proposed ceiling insulation *R*-value, less the *R*-value of the insulation on the duct.
3. Ductwork in floor cavities located over unconditioned space shall comply with all of the following:
    3.1. A continuous air barrier installed between unconditioned space and the duct.
    3.2. Insulation installed in accordance with Section R402.2.7.
    3.3. A minimum R-19 insulation installed in the cavity width separating the duct from unconditioned space.
4. Ductwork located within exterior walls of the building thermal envelope shall comply with the following:
    4.1. A continuous air barrier installed between unconditioned space and the duct.
    4.2. Minimum R-10 insulation installed in the cavity width separating the duct from the outside sheathing.
    4.3. The remainder of the cavity insulation shall be fully insulated to the drywall side.

R403.4.3 Ducts buried within ceiling insulation. Supply and return air ducts located in unconditioned attic or ceiling spaces shall comply with all of the following:

1. The supply and return ducts shall have an insulation *R*-value not less than R-8.
2. The duct shall be installed against the truss bottom cord or ceiling joist closest to the ceiling finish material separating conditioned space from unconditioned space and the sum of the ceiling insulation *R*-value above the top of the duct, and against the sides of the duct, shall enclose the duct in insulation and shall be greater than or equal to the proposed ceiling insulation R-value.

R403.4.3.1 Effective *R*-value of deeply buried ducts. When using the Energy Rating Index compliance option Section R406, ducts that are installed in accordance with Section R403.4.3 shall be considered as having an effective duct insulation *R*-value of R-25.

R403.4.4 Sealing. Ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

R403.4.4.1 Sealed air handler. Air handlers shall have a manufacturer's designation for an air leakage of not greater than 2 percent of the design airflow rate when tested in accordance with ASHRAE 193.

R403.4.5 Duct testing. Ducts shall be pressure tested in accordance with ANSI/RESNET/ICC 380 or ASTM E1554 to determine air leakage by one of the following methods:

1. Rough-in test: Total leakage shall be measured with a pressure differential of 0.1-inch w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure if installed at the time of the test. All portions of the duct system, including air handler, filter box, supply and return boots shall be tested.
2. Postconstruction test: Total leakage shall be measured with a pressure differential of 0.1-inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All portions of the duct system, including air handler, filter box, supply and return boots shall be tested.
3. Postconstruction test: When using the Energy Rating Index compliance option Section R406, duct leakage to outside testing shall be measured in accordance with ANSI/RESNET/IECC 380.

   A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*.

   Exception: A duct air-leakage test shall not be required for ducts serving ventilation systems that are not integrated with ducts serving heating or cooling systems.

R403.4.6 Duct leakage. The total leakage of the ducts system, where measured in accordance with Section R403.4.5, shall be determined by one of the following methods:

1. Rough-in test: The total leakage shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 m2) of conditioned floor area where the air handler is installed at the time of the test.

   Exceptions:

   a. Where the air handler is not installed at the time of the test, the total leakage shall be less than or equal to 3.0 cubic feet per minute (85 L/min) per 100 square feet (9.29 m2) of conditioned floor area.

   b. If the HVAC duct system is serving less than or equal to 1,200 square feet of conditioned floor area, the allowable duct leakage shall be 50 cubic feet per minute or less.
2. Postconstruction test: Total leakage shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 m2) of conditioned floor area.

   Exception: If the HVAC duct system is serving less than or equal to 1,200 square feet of conditioned floor area, the allowable duct leakage shall be 50 cubic feet per minute or less.
3. Postconstruction duct leakage to outside: duct leakage to outside the *building thermal envelope* shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 m2) of conditioned floor area when using the Energy Rating Index compliance option Section R406. This option is available for unique circumstances and shall obtain the code officials approval prior to proceeding with the test.

R403.4.7 Building cavities. *Building* framing cavities shall not be used as ducts or plenums.

R403.5 Mechanical system and service hot water piping insulation. Mechanical system piping capable of carrying fluids greater than 105°F (41°C) or less than 55°F (13°C) shall be insulated to an *R*-value of not less than R-3.

R403.5.1 Protection of piping insulation. Piping insulation exposed to weather shall be protected from damage, including that caused by sunlight, moisture, equipment maintenance and wind. The protection shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall be prohibited.

R403.6 Service hot water systems. Service hot water systems shall be *all-electric* or fueled by other non-fossil fuel derived energy sources. Energy conservation measures for service hot water systems shall be in accordance with Sections R403.6.1 through R403.6.3. Service hot water systems shall not be permitted to service accessory structures from the main building.

R403.6.1 Heated water circulation and temperature maintenance systems. Where installed heated water circulation systems shall be in accordance with Section R403.6.1.1. Heat trace temperature maintenance systems shall be in accordance with Section R403.6.1.2. Automatic controls, temperature sensors and pumps shall be in a location with access. Manual controls shall be in a location with *ready access.*

R403.6.1.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold-water supply pipe. Gravity and thermosyphon circulation systems shall be prohibited. Controls for circulating hot water system pumps shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water. The controls shall limit the temperature of the water entering the cold-water piping to not greater than 104ºF (40ºC).

R403.6.1.1.1 Demand recirculation water systems. Where installed, *demand recirculation water systems* shall have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture, or sensing the flow of hot or tempered water to a fixture fitting or appliance.

R403.6.1.2 Heat trace systems. Where installed, electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

R403.6.2 Hot water pipe insulation. Insulation for service hot water piping with a thermal resistance, *R*-value, of not less than R-3 shall be applied to the following:

1. Piping $^{3}/_{4}$ inch (19.1 mm) and larger in nominal diameter located inside the *conditioned space.*
2. Piping serving more than one dwelling unit.
3. Piping located outside the *conditioned space*.
4. Piping from the water heater to a distribution manifold.
5. Piping located under a floor slab.
6. Buried piping.
7. Supply and return piping in circulation and recirculation systems other than cold water pipe return demand recirculation systems.

R403.6.3 Drain water heat recovery units. Where installed, drain water heat recovery units shall comply with CSA B55.2. Drain water heat recovery units shall be tested in accordance with CSA B55.1. Potable water-side pressure loss of drain water heat recovery units shall be less than 3 psi (20.7 kPa) for individual units connected to one or two showers. Potable water-side pressure loss of drain water heat recovery units shall be less than 2 psi (13.8 kPa) for individual units connected to three or more showers.

R403.7 Mechanical ventilation. *Residential buildings* and *dwelling units* shall be provided with mechanical ventilation that complies with the requirements of Section M1505 of the *International Residential Code* or *International Mechanical Code*, as applicable, or with other *approved* means of ventilation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

R403.7.1 Heat or energy recovery ventilation. *Dwelling units* shall be provided with a heat recovery or energy recovery ventilation system. The system shall be a balanced ventilation system with a sensible recovery efficiency (SRE) of no less than 65 percent at 32°F (0°C) at an airflow greater than or equal to the design airflow. The SRE shall be determined from a listed value or from interpolation of listed values.

R403.7.2 Whole-dwelling mechanical ventilation system fan efficacy. Fans used to provide whole-dwelling mechanical ventilation shall meet the efficacy requirements of Table R403.7.1 at one or more rating points. Fans shall be tested in accordance with HVI 916 and listed. The airflow shall be reported in the product listing or on the label. Fan efficacy shall be reported in the product listing or shall be derived from the input power and airflow values reported in the product listing or on the label. Fan efficacy for fully ducted HRV, ERV, balanced, and in-line fans shall be determined at a static pressure of not less than 0.2-inch w.c. (49.85 Pa). Fan efficacy for ducted range hoods, bathroom and utility room fans shall be determined at a static pressure of not less than 0.1-inch w.c. (24.91 Pa).

TABLE R403.7.1
WHOLE-DWELLING MECHANICAL VENTILATION SYSTEM FAN EFFICACY[a]

FAN LOCATION	AIRFLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)
HRV, ERV	Any	1.2 cfm/watt [a]
Range hood	Any	2.8 cfm/watt
In-line supply or exhaust fan	Any	3.8 cfm/watt
Other exhaust fan	< 90	2.8 cfm/watt
Other exhaust fan	> 90	3.5 cfm/watt
Air-handler that is integrated to tested and listed HVAC equipment	Any	1.2 cfm/watt

For SI: 1 cubic foot per minute = 28.3 L/min.

a. For balanced systems, HRVs, and ERVs determine the efficacy as the outdoor airflow divided by the total fan power.

R403.7.3 Testing. Mechanical ventilation systems shall be tested and verified to provide the minimum ventilation flow rates required by Section R403.7 in accordance with ANSI/ RESNET/ICC 380. Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.

Exception: Kitchen range hoods that are ducted to the outside with 6-inch (152 mm) or larger duct and not more than one 90-degree (1.57 rad) elbow or equivalent in the duct run.

R403.7.4 Intermittent exhaust control for bathrooms and toilet rooms. Where an exhaust system serving a bathroom or toilet room is designed for intermittent operation, the exhaust system controls shall include one or more of the following:

1. A timer control with one or more delay setpoints that automatically turns off exhaust fans when the selected setpoint is reached. Not fewer than one delay-off setpoint shall be 30 minutes or less.
2. An occupant sensor control with one or more delay setpoints that automatically turns off exhaust fans in accordance with the selected delay setpoint after all occupants have vacated the space. Not fewer than one delay-off setpoint shall be 30 minutes or less.
3. A humidity control with an adjustable setpoint ranging between 50 percent or more and 80 percent or less relative humidity that automatically turns off exhaust fans when the selected setpoint is reached.
4. A contaminant control that responds to a particle or gaseous concentration and automatically turns off exhaust fans when a design setpoint is reached.

Manual-off functionality shall not be used in lieu of the minimum setpoint functionality required by this section.

Exception: Bathroom and toilet room exhaust systems serving as an integral component of an outdoor air ventilation system or a whole-house mechanical ventilation system.

R403.8 Space heating and cooling equipment sizing and efficiency rating. Heating and cooling equipment shall be sized in accordance with ACCA Manual S based on *building* loads calculated in accordance with ACCA Manual J or other *approved* heating and cooling calculation methodologies. Where the installed heating and cooling delivery system uses duct work, ACCA Manual D or other approved design manual shall be used. New space heating and cooling equipment shall be *all-electric* or fueled by other non-fossil fuel derived energy sources and have an efficiency rating greater than or equal to the minimum required by federal law for the geographic location where the equipment is installed.

R403.9 Systems serving multiple dwelling units. Systems serving multiple dwelling units shall be all-electric or fueled by other non-fossil fuel derived energy sources and comply with Sections C403 and C404 of the Commercial Provisions of this code instead of Section R403.

R403.10 Snow melt and ice system controls. Snow- and ice-melting systems, supplied through energy service to the building, shall comply with Sections R403.10.1 and R403.10.2.

R403.10.1 Controls. Snow- and ice-melting systems shall include automatic controls capable of shutting off the system when the pavement temperature is greater than 50°F (10°C) and precipitation is not falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is greater than 40°F (4.8°C).

R403.9.2 Renewable energy offset. Energy use by snow- and ice-melting systems shall be offset by on-site renewable energy generation equipment designed to provide 34,425 BTUs per square foot for the installed snow- and ice-melting system per year. Plans shall be submitted that detail the type, size, and location of the on-site renewable energy generation equipment.

Note: A separate building permit is required for on-site renewable energy generation equipment.

R403.11 Energy consumption of pools and spas. Pools and permanent spas shall be controlled by the requirements in Sections R403.11.1 through R403.11.3.

R403.11.1 Heaters. The electric power to heaters shall be controlled by an on-off switch that is an integral part of the heater mounted on the exterior of the heater in a location with ready access, or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Only heat pumps rated for cold climates shall be permitted or other non-fossil fueled equipment.

Exception: Unheated pools.

R403.11.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in time switches shall be in compliance with this section.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- and waste-heat-recovery pool heating systems.

R403.11.3 Covers. Outdoor heated pools and outdoor permanent spas shall be provided with a vapor-retardant cover or other *approved* vapor-retardant means.

Exception: Where more than 75 percent of the energy for heating, computed over an operation season of not fewer than three calendar months, is from a heat pump or an on-site renewable energy system, covers or other vapor-retardant means shall not be required.

R403.11.4 Filters. Swimming pool filters shall be cartridge-type filters.

R403.11.5 Pumps. Swimming pool pumps shall be multi-speed pumps.

R403.11.6 Load calculations. For the purpose of calculating the energy use of swimming pools, the following are assumed:

1. Swimming pool season.
    1.1. Outdoor pools: 3 months.
    1.2. Indoor pools: 12 months.
2. Pool heating temperature: 82°F (28°C) or less.
3. On-site renewable energy requirements: 29,000 BTUs per square foot of pool surface area per year.

Note: This section is not intended to limit the season or temperature of swimming pools.

R403.12 Portable spas. The energy consumption of electric-powered portable spas shall be controlled by the requirements of APSP 14.

R403.13 Residential pools and permanent residential spas. Where installed, the energy consumption of residential swimming pools and permanent residential spas shall be controlled in accordance with the requirements of APSP 15.

R403.14 Spas. Any energy use by indoor or outdoor spas must be offset by on-site renewable energy generation equivalent to the energy use by the spa. Plans must show the annual energy use of the spa, the calculation method used to determine the expected energy use, and the on-site renewable energy system(s) that will be used to offset the energy used by the spa. All spas must be equipped with an insulated cover that is listed to provide a minimum *R*-value of at least 12.

Exception: Spas and hot tubs that have been tested and listed for compliance with the requirements of the California Energy Commission (CEC) Title 20 [standby power for portable electric spas shall be not greater than $5(V^2/3)$ watts where V = the total volume of the spa in gallons], and are less than 64 square feet (5.9 m^2) in surface area shall be exempted from the requirement to offset their energy usage by on-site renewable energy generation. Spas larger than 64 square feet (5.9 m^2) in surface area that are certified to meet the requirements of

the CEC shall offset their requirements at the rate of 140,000 BTUs per square foot per year.

R403.14.1 Design criteria for spas. The requirements of this section apply to spas that do not meet the exception in Section R403.14.

Spa season: 12 months

On-site renewable energy requirements: 430,000 BTUs per square foot per year

SECTION R404
ELECTRICAL POWER AND LIGHTING SYSTEMS

R404.1 Lighting equipment. Lighting equipment shall comply with the requirements of this section.

R404.1.1 Exterior lighting. Connected exterior lighting for residential buildings shall comply with Section C405.4.

Exceptions:

1. Detached one- and two- family dwellings.
2. Townhouses.
3. Solar-powered lamps not connected to any electrical service.
4. Luminaires controlled by a motion sensor.
5. Lamps and luminaires that comply with Section R404.1.

R404.1.2 Fuel gas lighting equipment. Fuel gas lighting systems shall not be permitted.

R404.2 Interior lighting controls. Permanently installed lighting fixtures shall be controlled with either a dimmer or an occupant sensor control or other control that is built into the fixture.

Exception: Lighting controls shall not be required for the following:

1. Bathrooms.
2. Hallways.
3. Exterior lighting fixtures.
4. Lighting designed for safety or security.

R404.3 Exterior lighting controls. Where the total permanently installed exterior lighting power is greater than 30 watts, the permanently installed exterior lighting shall comply with the following:

1. Lighting shall be controlled by a manual on and off switch which permits automatic shut-off actions.

Exception: Lighting serving multiple dwelling units.

2. Lighting shall be automatically shut off when daylight is present and satisfies the lighting needs.
3. Controls that override automatic shut-off actions shall not be allowed unless the override automatically returns automatic control to its normal operation within 24 hours.

R404.4 Electric vehicle (EV) charging for new construction. The building shall be provided with electric vehicle (EV) charging in accordance with this section and the *National Electrical Code* (NFPA 70). Where parking spaces are added or modified without an increase in building size, only the new parking spaces are subject to this requirement. The number of parking spaces can be determined by actual spaces provided or consistent with Boulder's Municipal Code, Title 9: Land Use Code, Chapter 9: Development Standards, 9-9-6: Parking Standards.

R404.4.1 One- and two-family dwellings and townhouses. Each dwelling unit with a dedicated attached or detached garage or other onsite designated parking provided for the dwelling unit shall be provided with at least one electric vehicle ready space.

R404.4.1.1 EV Ready Spaces. Each EV ready space shall have a branch circuit that complies with all of the following:

1. Terminates at a receptacle, located within 3 feet of each EV ready space it serves. EV ready includes two adjacent parking spaces if the receptacle for the electrical facilities of this section is installed adjacent to and between both parking spaces.
2. Has a minimum circuit capacity of 8.3 kVA (40A 208/240V).
3. The electrical panel, electrical distribution equipment directory, and all outlets or enclosures shall be marked "For future electric vehicle supply equipment".

Exception: A receptacle need not be provided if a hard-wired EVSE is installed.

R404.4.2 Identification. Construction documents shall designate the EV ready space and indicate the locations of raceway and/or conduit and the termination points serving them. The circuits or spaces reserved in the electrical panel for EV ready spaces shall be clearly identified in the panel or subpanel directory.

R404.4.3 Group-R occupancies. Group-R occupancies with three or more dwelling units and/or sleeping units shall be provided with electric vehicle charging in accordance with Table C405.13.1. Calculations for the number of spaces shall be rounded up to the nearest whole number. If there is off street parking that is not otherwise assigned to individual units, it must comply with C405.13 for R-2 occupancies.

R404.4.4 Accessible parking. Where new EVSE installed spaces and/or new EV ready spaces and new accessible parking, as defined by the *City of Boulder Building Code,* Chapter 11, "Accessibility," are both provided, parking facilities shall be designed so that at least one accessible parking space shall be EV ready or EVSE installed.

R404.4.5 Number and features of universal vehicle spaces. Refer to section C405.13.5 for requirements.

SECTION R405
RESERVED

SECTION R406
ENERGY RATING INDEX COMPLIANCE ALTERNATIVE

R406.1 Scope. This section establishes criteria for compliance using an Energy Rating Index (ERI) analysis.

R406.1.1 ERI compliance. Compliance based on the Energy Rating Index (ERI) requires that the rated design meet all of the following:

1. The Energy Rating index score shall be developed using the most recent version of RESNET/ICC/ ANSI Standard 301.
2. The requirements of the sections indicated within Table R406.1.1, Mandatory Requirements.
3. Maximum ERI of Table R406.3.
4. Compliance with all sections listed in Table R406.2.

TABLE R406.1.1
MANDATORY REQUIREMENTS

SECTION[a]	TITLE
R303	Materials, systems, and equipment
R401.3	Documentation
R402.1.1	Vapor retarder
R402.2	Specific Insulation Requirements
R402.4	Air leakage Requirements
R402.5 (ERI Path Only)	Maximum fenestration U-factor and SHGC
R403	Systems
R404	Electrical Power and Lighting Systems
R407	Solar ready
R408	Additional conservation requirements

a. Reference to a code section includes all the relative subsections.

R406.2 Building thermal envelope. Building and portions thereof shall comply with Table R406.1.1 Mandatory Requirements.

R406.2.1 ERI with and without on-site renewable energy sources. The building shall comply with the ERI scores as defined in Table R406.3. The proposed and confirmed design compliance reports shall be provided for the building both without On-site renewables and with onsite renewables respectively.

R406.3 Energy Rating Index. The Energy Rating Index (ERI) shall be determined in accordance with RESNET/ICC 301.

Where roof space is maximized for renewable energy, the post solar ERI target shall be adjusted so as to not require off-site renewable energy to achieve compliance. Energy used to recharge or refuel a vehicle used for transportation on roads that are not on the building site shall not be included in the *ERI reference design* or the *rated design*.

TABLE R406.3
MAXIMUM ENERGY RATING INDEX (ERI)[a] COMPLIANCE SCORES

NEW CONSTRUCTION: ≥3000 ft²	
Pre-Renewable ERI Score	**Post-Renewable ERI Score**
50	0
NEW CONSTRUCTION: 0 to 2999 ft²	
Pre-Renewable ERI Score	**Post-Renewable ERI Score**
50	30

a. The target Energy Rating Index shall be determined utilizing the square footage as calculated for the Energy Rating Index.

R406.4 Reserved.

R406.5 ERI-based compliance. Compliance based on an ERI analysis requires that the *rated proposed design* and confirmed built dwelling be shown to have an ERI less than or equal to the appropriate value indicated in Table R406.3 when compared to the *ERI reference design*. Compliance shall be shown for the required ERI scores before and, if provided, with on-site renewable energy production. Projects with on-site renewable energy production shall comply with Sections R406.5.1, R406.5.2, and R406.5.3.

R406.5.1 Pre-Renewables ERI Target. Prior to incorporating on-site renewable energy production into the project design, the project shall achieve the ERI target set in Table R406.3 before on-site renewable energy production (pre-renewables ERI score).

R406.5.2 Post-Renewables ERI Target. Once a pre-renewables ERI score has been determined for compliance, the project shall achieve the ERI target set in Table R406.3 with on-site renewable energy production (post-renewables ERI score).

Exception:

1. **Technical infeasibility.** The *chief building official* has the authority to modify the ERI requirement to the lowest ERI score that is reasonably feasible to be achieved in the following circumstances:
   a. It has been demonstrated to the *chief building official* that it is not possible to install an on-site solar array that is unshaded for more than 70 percent of daylight hours annually that is of sufficient size to meet the requirements. The submittal documents for such requests shall include an ERI compliance report that includes the size and annual kWh production of the hypothetical on-site renewable energy system that would be required to achieve an ERI score of 0.

R406.5.3 On-site renewable energy. On-site renewable energy systems shall be used for compliance with Section 406.5. On-site renewable energy systems must be permanently installed on the property of the building.

Exception:

1. ERI achieved without on-site renewable sources. No on-site renewable energy system is required if it has been demonstrated to the *chief building official* that the building has achieved the required post-renewables ERI score per Table R406.3 for new construction without on-site renewable energy production.

R406.6 Verification by approved agency. Verification of compliance with Section R406 as outlined in Sections R406.3and R406.6 shall be completed by an approved third party. Verification of compliance with Section R406.2 shall be completed by the authority having jurisdiction or an approved third-party inspection agency in accordance with Section R105.4.

R406.7 Documentation. Documentation of the software used to determine the ERI and the parameters for the

residential building shall be in accordance with Sections R406.7.1 through R406.7.3.

R406.7.1 Compliance software tools. Software tools used for determining the ERI shall be Approved Software Rating Tools in accordance with RESNET/ICC 301.

R406.7.2 Compliance report. Compliance software tools shall generate a report that documents that the home and the ERI score of the *rated design* complies with R406.2, R406.3 and R406.5. The compliance documentation shall be created for the proposed design and shall be submitted with the application for the building permit. Confirmed compliance documents of the built dwelling unit shall be created, registered with RESNET, and submitted to the *code official* for review before a certificate of occupancy is issued. Compliance reports shall include information in accordance with Sections R406.7.2.1 and R406.7.2.2.

R406.7.2.1 Proposed compliance report for permit application. Compliance reports submitted with the application for a building permit shall include the following:

1. Building street address, or other building site identification.
2. Declare ERI on title page and building plans.
3. The name of the individual performing the analysis and generating the compliance report.
4. The name and version of the compliance software tool.
5. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home.
6. A certificate indicating that the proposed design has an ERI less than or equal to the appropriate score indicated in Table R406.3 when compared to the ERI reference design. The certificate shall document the building component energy specifications that are included in the calculation, including: component level insulation R-values or U-factors; assumed duct system and building envelope air leakage testing results; and the type and rated efficiencies of proposed heating, cooling, mechanical ventilation, and service water-heating equipment to be installed. If *on-site renewable energy systems* are installed, the certificate shall report the type and production size of the proposed system.
7. When a site-specific report is not generated, the proposed design shall be based on the worst-case orientation and configuration of the rated home.

R406.7.2.2 Confirmed compliance report for a certificate of occupancy. A confirmed compliance report submitted for obtaining the certificate of occupancy shall be made site and address specific and include the following:

1. Building street address or other building site identification.
2. Declaration of ERI on title page and on building plans.
3. The name of the individual performing the analysis and generating the report.
4. The name and version of the compliance software tool.
5. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home.
6. A final confirmed certificate indicating that the confirmed rated design of the built home complies with Sections R406.3 and R406.5 and is registered with RESNET. The certificate shall report the energy features that were confirmed to be in the home, including: component-level insulation R-values or U-factors; results from any required duct system and building envelope air leakage testing; and the type and rated efficiencies of the heating, cooling, mechanical ventilation, and service water-heating equipment installed. Where *on-site renewable energy systems* have been installed on or in the home, the certificate shall report the type and production size of the installed system.

R406.7.3 Renewable energy compliance documentation. Where on-site renewable energy is utilized for compliance with an ERI, the renewable energy system will need to pass final inspection prior to final approval of ERI report.

R406.7.4 Additional documentation. The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *ERI reference design*.
2. A certification signed by the builder providing the building component characteristics of the *rated design.*
3. Documentation of the actual values used in the software calculations for the *rated design*.

R406.7.5 Specific approval. Performance analysis tools meeting the applicable sections of Section R406 shall be *approved*. Documentation demonstrating the approval of performance analysis tools in accordance with Section R406.7.1 shall be provided.

R406.7.6 Input values. Where calculations require input values not specified by Sections R402, R403 and R404, those input values shall be taken from RESNET/ICC 301.

SECTION R407
SOLAR READY

R407.1 General. *Residential buildings* with not less than 600 square feet (55.74 m^2) of roof area oriented between 110 degrees and 270 degrees true north shall comply with this section.

Exceptions:

1. New residential buildings with a permanently installed on-site renewable energy system.
2. A building where all areas of the roof that would otherwise meet the requirements of Section R407.5

are in full or partial shade for more than 70 percent of daylight hours annually.

R407.2 Minimum renewable energy system capacity. New *residential buildings* shall be provided with an onsite renewable energy system(s) capable of producing annual renewable energy output of no less than is needed to achieve the Energy Rating Index score listed in Table R406.3 with onsite power production.

R407.3 Construction document requirements. System specifications and system renewable calculations demonstrating that the system(s) meet(s) the requirements of Section R407 shall be included in the construction documents. The onsite renewable energy system(s) used to comply with this section shall not be included in the calculations for Section R406.5.1 ERI compliance without onsite renewables**.**

R407.5 Solar-ready zone area. The total *solar-ready zone* area for each dwelling unit shall be not less than 300 square feet (27.87 m^2), exclusive of mandatory access or setback areas as required by the *City of Boulder Fire Code,* except that the total *solar-ready zone* area for a townhouse three stories or less in height above grade plane and with a total floor area less than or equal to 2,000 square feet (185.8 m^2) of conditioned space shall be not less than 150 square feet (13.94 m^2). The *solar-ready zone* shall be composed of areas not less than 5 feet (1524 mm) in width and not less than 80 square feet (7.43 m^2), exclusive of access or setback areas as required by the *City of Boulder Fire Code.*

R407.5.1 Obstructions. *Solar-ready zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof-mounted equipment.

R407.5.2 Shading. The *solar-ready zone* shall be set back from any existing or new permanently affixed object on the building or site that is located south, east, or west of the *solar-ready zone* a distance not less than two times the object's height above the nearest point on the roof surface. Such objects include, but are not limited to, taller portions of the building itself, parapets, chimneys, antennas, signage, rooftop equipment, trees, and roof plantings either existing at the time of permit application or planned for on the construction documents.

R407.5.3 Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

R407.6 Interconnection pathway. Construction documents shall indicate at least one potential pathway for routing of conduit and/or raceway from the *solar-ready zone* to the electrical service panel or service hot water system and shall be labeled as "Potential Pathway" on the construction documents.

R407.7 Electrical service reserved space. The main electrical service panel shall have space to allow installation of a dual pole circuit breaker for solar electric installation and shall be labeled "For Future Solar Electric." The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

R407.8 Construction documentation certificate. A permanent certificate, indicating the solar-ready zone and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or *registered design professional*.

SECTION R408
ADDITIONAL CONSERVATION REQUIREMENTS

R408.1 Additional Conservation requirements. This Section R408 establishes an additional conservation objective for *residential buildings.* For *additions* and *alterations* to *existing buildings* see Section R502 and R503 for the requirements. New *residential buildings* shall comply with the following to achieve the compliance:

1. When producing the final confirmed ERI score in accordance with Section R406.7.2.2 the Operational Carbon CO2 index shall be produced and submitted. In addition, a CO2 Emissions Comparison report shall be produced and submitted.
2. All new residential construction shall achieve a total of 10 credits from Table R408.1. Credit calculations shall be as specified in relevant subsections of Section R408.
3. Credits claimed pertaining to embodied carbon in Table R408.1 shall provide a product-specific Type III environmental product declarations (EPD). Credit sections that claim "X" percent pertains to the percentages from Table R408.1.
4. Confirmation of the product's $kgCO2e/m^2$ and *product specific Type III EPDs* shall be reported to the *code official* and verified by a *registered design professional* or *approved third party* on the project, and a summary shall be made available to the *code official* that includes a list of each product and associated kgCO2e/(unit specified), per the *product specific Type III EPD*.
    a. See Example kgCO2e/unit Summary Reporting Form at the end of this section.
5. All credits taken shall be specified on the plans for permitting. Prior to project completion, documentation shall be provided for all credits pursued under R408.

TABLE R408.1
ADDITIONAL CONSERVATION CREDITS

EMBODIED CARBON CONSERVATION CREDIT OPTIONS	CREDIT VALUE AND CREDIT VALUE PER PERCENT REDUCTION							
Measure Description	**Credit**	**50%**	**40%**	**25%**	**15%**	**10%**	**5%**	**2%**
R408.2 Whole building lifecycle analysis (WB LCA)	10							
R408.3 Embodied CO2e in Concrete Products		3		2		1		
R408.4 Embodied CO2e in Grade Lumber Products						3	2	1
R408.5 Embodied CO2e of Prefabricated Joist Products				3	1	1		
R408.6 Embodied CO2e of Glued Cross-laminated Timber Products		3		2		1		
R408.7 Embodied CO2e of Structural Composite Lumber Products				3	2	1		
R408.8 Embodied CO2e of Particleboard and Fiberboard Products				3	2	1		
R408.9 Embodied CO2e in Steel Product manufacturing				3	2	1		
R408.10 Embodied CO2e of Structural Steel Products		3		2		1		
R408.11 Embodied CO2e of Nonstructural Steel Products				3	2	1		
R408.12 Embodied CO2e of Steel Reinforcing Bar Products		3		2		1		
R408.13 Embodied CO2e of Insulation Products			3	2		1		
R408.14 Embodied CO2e of Foam Plastic Insulation Products				3	2	1		
R408.15 Embodied CO2e of Gypsum Products			3	2		1		
R408.16 Embodied CO2e of Interior Floor Covering Products			3	2		1		
R408.17 Embodied CO2e of Glazing Products				3	2	1		
R408.18 Embodied CO2e of Siding Products			3	2		1		
R408.19 Embodied CO2e of Clay Bricks				3	2	1		
R408.20 Embodied CO2e of Masonry Cement				3	2	1		
R408.21 Embodied CO2e of Roofing Products			3		2	1		
R408.22 Battery Storage:	10							
R408.23 Energy Monitoring System	5							
R408.24 Smart electrical panel	5							
R408.25 Energy Star Appliances (2pt additional for Most Efficient)	4							
R408.26 Condensing Clothes Dryer	2							
R408.27 Reduced Air-Leakage w/ ERV Installed	4							
R408.28 Roof Reflectance/Cool Roof	2							
R408.29 Ground Source Heat Pump	7							
R408.30 Heat Pump Water Heater w/ Demand Response Controls	5							
R408.31 Duct Leakage (≤ 2 CFM per square foot of floor area)	3							
R408.32 100% the duct system installed within the building thermal envelope	5							
R408.33 Reserved	-							
R408.34 Drain Water Heat Recovery (IgCC Section 607.5)	5							
R408.35 Hot water delivery and demand control circulation system	5							
R408.36 Reserved	-							
R408.37 Passive House certification	-							
Additional Conservation Requirement options for Section a*dditions* and a*lterations* only (R502 and R503)								
Measure Description	**Credit**	**50%**	**40%**	**25%**	**15%**	**10%**	**5%**	**2%**
R408.38 Energy Audit performed on the existing building prior to permit application	10							
R408.39 Use ERI Compliance option R502.2.2 or R503.2.2	10							
R408.40 Whole House Controlled mechanical ventilation	5							
R408.41 ENERGYSTAR Cold Climate Air Source Heat Pump	5							

R408.2 *Whole building lifecycle analysis (WB LCA)*: Conduct a whole building life-cycle assessment, including operating energy, against a baseline building that demonstrates a minimum of 10% reduction for at least three of the six impact categories listed below, one of which must be global warming potential. The building envelope, structural elements including footings and foundations, interior ceilings, walls, and floors; and exterior finishes shall be studied for the assessment. The baseline and proposed buildings must be of comparable size, function, complexity, orientation, and operating energy performance. The service life of the baseline and proposed buildings must be the same and at least 60 years. The same life-cycle assessment software tools and data sets shall be used to evaluate both the baseline building and the proposed building. The construction documents shall report all listed impact categories. Data sets must comply with the standards of ISO 14044.

Impact Categories:

1. global warming potential (greenhouse gases), in kg CO2e.
2. depletion of the stratospheric ozone layer, in kg CFC-11e.
3. acidification of land and water sources, in moles H+ or kg SO2e.
4. eutrophication, in kg nitrogen eq or kg phosphate eq.
5. formation of tropospheric ozone, in kg NOx, kg O3 eq, or kg ethene; and
6. depletion of nonrenewable energy resources, in MJ using CML / depletion of fossil fuels in TRACI.

R408.3 Embodied CO2e in concrete products. Credits for embodied CO2e in concrete products are achieved if X% or more of all concrete mixes used in the building's primary structural foundations does not exceed the project limit (CO2Emax) determined by 125% of *IW-EPD's* kgCO2e/y3. Precast and cast in place concrete products may be considered in this category. Products shall have a *product-specific Type III EPD*.

R408.4 Embodied CO2e in grade lumber products: Credits for embodied CO2e in grade lumber products are achieved if X% or more of all softwood and redwood lumber products used in the building, based on cost or volume, do not exceed 125% of *IW- EPD's* kg-CO2e/m^3. Products shall have a *product-specific Type III EPD*.

R408.5 Embodied CO2e of prefabricated joist products. Credits for prefabricated joist products are achieved if X% or more of all prefabricated wood I-joist products used in the building, based on cost or length, do not exceed 125% of *IW-EPD's* kgCO2e/m^3. Products shall have a *product-specific Type III EPD*.

R408.6 Embodied CO2e of glued cross-laminated timber products: Credits for embodied CO2d of glued cross-laminated timber products are achieved if X% or more of all glued laminated timber products used in the building, based on cost or volume, do not exceed 125% of *IW-EPD's* kgCO2e/m^3. Products shall have a *product-specific Type III EPD*.

R408.7 Embodied CO2e of structural composite lumber products. Credits for embodied CO2e of structural composite lumber products if X% or more of all laminated veneer lumber and laminated strand lumber products used in the building, based on cost or volume, do not exceed 125% of *IW-EPD's* kgCO2e/m^3. Products shall have a *product-specific Type III EPD*.

R408.8 Embodied CO2e of particleboard and fiberboard products. Credits for embodied CO2e of particle board and fiberboard are achieved if X% of all medium density fiberboard, cellulosic fiberboard, and particleboard products used in the building, based on cost or volume, do not exceed 125% of *IW-EPD's* kgCO2e/m^3. Products shall have a *product-specific Type III EPD*.

R408.9 Embodied CO2e in steel product manufacturing: Credits for embodied CO2e in steel product manufacturing are achieved if X% or more of steel products used in the construction of the building, based on cost or weight, is produced in a facility or facilities where at least 50% of the energy sourced for production at the facility is a renewable energy resource as documented by one or more of the following:

a. On-site renewable energy system.

b. Off-site renewable energy system owned by the production facility owner.

c. Community renewable energy facility.

d. Power Purchase Agreement (PPA).

R408.10 Embodied CO2e of structural steel products. Credits for embodied CO2e of structural steel products is achieved if X% or more, of all structural steel used in the building's primary structural frame does not exceed 125% of *IW-EPD's* kgCO2e/metric ton. Products shall have a *product-specific Type III EPD*.

R408.11 Embodied CO2e of nonstructural steel products. Credits for embodied CO2e of nonstructural steel products is achieved if X% or more of all nonstructural steel building products used in the building do not exceed 125% of *IW-EPD's* kgCO2e/metric ton. Products shall have a *product-specific Type III EPD*.

R408.12 Embodied CO2e of steel reinforcing bar products. Credits for embodied CO2e of steel reinforcing bar products are achieved if X% or more of all concrete reinforcing bars used in the building do not exceed 125% of *IW-EPD's* kgCO2e/metric ton. Products shall have a *product-specific Type III EPD*.

R408.13 Embodied CO2e of insulation products. Credits for embodied CO2e of insulation products are achieved if X% or more of the installed insulation used in the building, based on product cost or area, does not exceed 125% of *IW-EPD's* kgCO2e/m2- RSI. Products shall have a *product-specific Type III EPD*.

R408.14 Embodied CO2e of foam plastic insulation products. Credits for embodied CO2e of foam plastic insulation products are achieved if X% or more of all insulation products, including expanded polystyrene (EPS) and polyurethane foam insulation (HFC or HFO) used in the building, based on

cost and area, do not exceed 125% of *IW-EPD's* kgCO2e/m2-RSI. Products shall have a *product-specific Type III EPD*.

R408.15 Embodied CO2e of gypsum products. Credits for embodied CO2e of gypsum products are achieved if X% or more of all gypsum board, gypsum sheathing, and glass-mat gypsum board products used in the building, based on cost or area, do not exceed 125% of *IW-EPD's* kgCO2e/m^2. Products shall have a *product-specific Type III EPD*.

R408.16 Embodied CO2e of interior floor covering products. Credits for embodied CO2e of floor covering products are achieved if X% or more of solid and engineered flooring, ceramic tile, natural stone floor, and resilient flooring (homogeneous and heterogeneous vinyl, and rigid core) used in the building, based on cost or area, does not exceed 125% of *IW-EPD's* kgCO2e/m^2. Products shall have a *product-specific Type III EPD*.

R408.17 Embodied CO2e of glazing products. Credits for embodied CO2e of glazing products are achieved if X% or more of all flat glass used in window products installed in the building, based on cost or weight, does not exceed 125% of *IW-EPD's* kgCO2e/metric ton. Products shall have a *product-specific Type III EPD*.

R408.18 Embodied CO2e of siding products. Credits for embodied CO2e of siding products are achieved if X% or more of all siding products used in the building, based on cost or area, do not exceed 125% of *IW-EPD's* kgCO2e/m^2.

R408.19 Embodied CO2e of clay bricks. Credits for embodied CO2e of clay bricks area achieved if X% or more of all clay brick products used in the building, based on cost or volume, do not exceed 125% of *IW-EPD's* kgCO2e/m^3. Products shall have a *product-specific Type III EPD*.

R408.20 Embodied CO2e of masonry cement. Credits for embodied CO2e of masonry cement if X% or more of all masonry cement used in the building, based on cost or weight, does not exceed 125% of *IW-EPD's* kgCO2e/metric ton. Products shall have a *product-specific Type III EPD*.

R408.21 Embodied CO2e of roofing products. Credits for embodied CO2e of roofing products are achieved if X% or more of all roofing products used in the building, based on product cost or area, do not exceed 125% of *IW-EPD's* kgCO2e/m^2. Products shall have a *product-specific Type III EPD*.

R408.22 Battery storage. Credits for battery storage are achieved if 10kWh of battery storage is installed. The battery storage system shall be installed in accordance with all NEC and IRC codes and shall be clearly documented on an electrical plan for the project. Signage shall be installed on the exterior of the home informing owners and residents that a battery storage system is installed.

R408.23 Energy monitoring system. Credits for an energy monitoring system are achieved if each residential unit has an energy monitoring system. Documentation of the installation shall be provided to the *code official*.

R408.24 Smart electrical panel. Credits are achieved for a smart electrical panel if each residential unit has a smart electrical panel installed in compliance with the NEC. Documentation of the installation shall be provided to *the code official.*

R408.25 Energy Star Appliances. Credits for ENERGYSTAR appliances are achieved if an ENERGYSTAR qualified refrigerator, dishwasher, clothes washer, and clothes dryer are installed in each residential unit and documentation of the installation shall be provided to the *code official* at the time of final inspection. Any ceiling fans that were installed shall also be ENERGYSTAR qualified. Two additional points will be achieved if all appliances installed, as mentioned above, are from the current year's ENERGYSTAR Most Efficient list.

R408.26 Condensing clothes dryer. Credits for a condensing clothes dryer are achieved if the residential unit has a condensing clothes dryer at time of final inspection.

R408.27 Reduced air-leakage w/ ERV installed. Credits for reduced air-leakage are achieved if the air leakage rate of the building is less than 2.0 air changes per hour when calculated in accordance with Section R402.4.1.2, and all ventilation air is provided by and an energy recovery ventilator with a sensible recovery efficiency of not less than 75%.

R408.28 Roof reflectance/cool roof. Credits for reflectance/cool roof are achieved for a low sloped (less than 2/12 pitch or 2 percent) roofed building if roofing material is used for the entire roof that has a minimum 3-year aged solar reflectance of .63 and a minimum thermal emittance of .75 or a standard reflectance Index of 75. Credits are achieved for steep sloped roofed buildings if roofing material is used for the entire roof that has a minimum 3-year aged solar reflectance of .20 and a minimum thermal emittance of .75 or a standard reflectance Index of 16.

R408.29 Ground source heat pump. Credits for a ground source heat pump are achieved if the has a ground source heat pump HVAC system design is sized in accordance with Section R403.8.Documentation of the installation shall be provided to the *code official*.

R408.30 Heat pump water heater w/ demand response controls. Credits for pump water heater with demand response area are achieved if the building has a heat pump water heating system with demand response controls listed for participation in a demand response program that serves the building site and a UEF of not less than 2.0.

R408.31 Low duct leakage (≤ 2 CFM per square foot of floor area). Credits for low duct leakage are achieved if the duct leakage rate of the building is ≤ 2 CFM per 100 square foot of floor area served when tested in accordance with Section R403.4.5 at a post construction test.

R408.32 100% the duct system installed within the building thermal envelope. Credits for a duct system within the building thermal envelope are achieved if all components of the duct system as defined by this code are located within the building thermal envelope in accordance with Section R403.4.2.

R408.33 Reserved.

R408.34 Drain Water Heat Recovery. Credits for drain water heat recover are achieved if the building has a drain water heat recovery unit for all shower, bathtub, laundry and sink drains with a heat recovery efficiency of at least 50%.

R408.35 Hot water delivery and demand control circulation system. Credits for hot water delivery and demand control circulation systems are achieved if the building has a demand control hot water circulation system that stores no more than 0.5 gallons (1.9 liters) of water in any piping/manifold between the hot water source and any hot water fixture. The system shall be field verified per the DOE Zero Energy Ready Homes v2 Calculation method or field verification method and results shall be provided to the *code official*.

R408.36 Reserved.

R408.37 Certification under the Passive House program. The building shall be certified and labeled under the 2021 or newer PHIUS Zero Passive House Institute US program, or the Passive House Institute classic or higher program category.

R408.38 Energy audit: Credits for an energy audit are achieved if documentation is submitted showing that a RESNET or BPI Energy Audit was performed on the existing building prior to permit application. Credits for this measure are only available for additions and alterations to existing buildings.

R408.39 Use ERI compliance option R502.2.2 or R503.2.2.

R408.40 Whole house controlled mechanical ventilation: Credits for whole house controlled mechanical ventilation is achieved when it is installed in accordance with Section M1505 of the 2021 International Residential Code (IRC) or newer version. Credits for this measure are only available for additions and alterations to existing buildings.

R408.41 ENERGYSTAR Cold Climate Air Source Heat Pump: Credits for CCASHP shall be achieved if the CCASHP has a minimum HSPF 9.5 or HSPF2 8.1 and a minimum SEER 16 or SEER2 15.3. The unit shall have the capacity maintenance of max at 5°F/Rated 47°F of at least 70% and documentation of the installation shall be provided to the *code official*. Credit for this measure are only available for additions and alterations to existing buildings.

Example kgCO2e/unit Summary Reporting Form

Documentation requires that Environmental Product Declarations (EPDs) are "verified by a registered design professional on the project, and a summary shall be made available to the *code official* that includes a list of each product and associated kgCO2e/unit, per the EPD." The following is an example table summary:

Product	Required Percent Of Compliance	Procured Product Amount	Total Product Amount	Percentage Confirmed	Target KGCO2E/UNIT 150% IW-EPD	Actual KGCO2E/ UNIT PER THE EPD	Confirmed Compliance
Ex. Blown - Fiberglass	50%	2,200 sf	2,200 sf	50%	0.73	0.983	

CHAPTER 5 [RE]
EXISTING BUILDINGS

User note:

About this chapter: *Many buildings are renovated or altered in numerous ways that could affect the energy use of the building as a whole. Chapter 5 requires the application of certain parts of Chapter 4 in order to maintain, if not improve, the conservation of energy by the renovated or altered building.*

SECTION R501
GENERAL

R501.1 Scope. The provisions of this chapter shall control the *alteration*, *repair*, *addition* and change of occupancy of existing *buildings* and structures.

R501.1.1 General. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing *building* or *building* system lawfully in existence at the time of adoption of this code. Unaltered portions of the existing building or building supply system shall not be required to comply with this code unless triggered by a higher level of alteration.

R501.2 Compliance. *Additions*, *alterations*, *repairs* or *changes of occupancy* to, or relocation of, an existing *building*, *building* system or portion thereof shall comply with Section R502, R503, R504 or R505, respectively, in this code and the provisions for alterations, repairs, additions, and changes of occupancy or relocation, respectively, in *the International Residential Code, International Building Code, International Existing Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code* and NFPA 70 as applicable. Changes where unconditioned space is changed to conditioned space shall comply with Section R502. Where both *additions* and *alterations* are included in the scope of work, the larger portion of work will govern the direction (R502 or R503) for compliance.

R501.2.1 Consecutive permits. Any two or more building permits for the same dwelling unit that are applied for in any 24-month period shall be considered as one permit for the purpose of determining and meeting the requirements of Section R501.2.

R501.3 Maintenance. *Buildings* and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and systems that are required by this code shall be maintained in conformance to the code edition under which installed. The owner or the owner's authorized agent shall be responsible for the maintenance of *buildings* and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

R501.4 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for *repairs*, provided that hazards to life, health or property are not created. Hazardous materials shall not be used where the code for new construction would not allow their use in *buildings* of similar occupancy, purpose and location.

R501.5 Designated historic buildings. The provisions of this code relating to the construction, *repair, alteration,* restoration and movement of structures, and change of occupancy shall apply to *designated historic buildings.* The *chief building official* shall have the authority to waive certain requirements for a *designated historic building* if the *chief building official* finds that compliance with a requirement would have an adverse impact upon the historic character of the individual landmark or, if the building is contributing to a historic district, upon the historic character of the contributing building or the historic district.

R501.6 Change in space conditioning. Any unconditioned or low-energy space that is altered to become conditioned space shall be required to be brought into full compliance with Section R502.

SECTION R502
ADDITIONS

R502.1 General. *Additions* to an existing *building*, *building* system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction. *Additions* shall not create an unsafe or hazardous conditions or overload existing *building* systems. *Additions* shall demonstrate compliance in accordance with Sections R502 through R502.7.

R502.2 Compliance. *Additions* shall comply with Section R502.2.1 or R502.2.2 except that a*dditions* greater than 1,000 square feet of conditioned floor area shall comply with R502.2.2.

R502.2.1 Existing building plus addition prescriptive compliance option. The prescriptive compliance option requires compliance with the provisions of Section R401.2.1. The applicant shall demonstrate that the *addition* alone complies with this code including section R402.4 air leakage testing of the addition plus the existing structure.

Exception: Where the measured air leakage rate exceeds 3.0 air changes per hour or 0.16 cubic feet per minute (CFM) per square foot of dwelling unit

enclosure area but is less than 7.0 ACH when tested in accordance with Section R402.4.1.2, a diagnostic evaluation using smoke tracer or infrared imaging shall be conducted while the building is pressurized or depressurized along with a visual inspection of the air barrier. Noted air leaks shall be sealed where such sealing can be made without the destruction of existing or new building components. A report documenting corrective actions taken to seal leaks and pre- and post-corrective action blower door results shall be submitted to the *code official* and shall be deemed to comply with the requirements of this section if testing does not exceed 7 ACH.

R502.2.1.1 Prescriptive option compliance reports. The following compliance reports shall be submitted for permitting and to obtain the certificate of occupancy.

1. For permitting: Submit a plan set documenting the proposed R-values to be installed per Table R402.1.2 or Section R402.1.2.3 Total UA compliance report.
2. For certificate of occupancy: Submit a blower door and duct leakage compliance report.

R502.2.2 Existing building plus addition Energy Rating Index (ERI) compliance option. The energy rating index compliance option requires compliance with the provisions of Section R406. The applicant shall demonstrate that the existing building plus the addition achieves a maximum ERI of 50 or a 30% reduction from the existing building ERI. This method requires the project to create energy rating index verification at two stages as outlined in Section R502.2.2.1.

R502.2.2.1 ERI option compliance reports. The following compliance reports shall be submitted for permitting and to obtain the certificate of occupancy:

1. For permitting: Submit a baseline energy rating index compliance report of the existing structure prior to construction.
2. For permitting: Submit a projected energy rating index compliance report of the existing building plus the addition based on the proposed design for the building in its entirety demonstrating an ERI of 50 or less or that the building plus the addition uses 30% less than the existing *building* did prior to the addition.
3. For certificate of occupancy: Submit a final confirmed energy rating index compliance report prior to final inspection.
4. For certificate of occupancy: Submit a blower door and duct leakage compliance report.

R502.3 Building thermal envelope. New *building* envelope assemblies that are part of the *addition* shall comply with Table R401.2.1.

R502.4 Heating and cooling systems. HVAC ductwork newly installed as part of an *addition* shall comply with Section R403, including R403.7.

Exception: Where ductwork from an existing heating and cooling system is extended to an *addition*, that does not exceed 400 square feet.

R502.5 Service hot water systems. New service hot water systems that are part of the *addition* shall comply with Section R403.6.

R502.6 Lighting. New lighting systems that are part of the *addition* shall comply with Section R404.1.

R502.7 Additional Efficiency credits requirements for additions. *Additions* shall comply with sufficient measures from Table R408.1 to achieve not less than 5 credits. *Alterations* to the existing building that are not part of the *addition* but permitted with the *addition*, shall be permitted to use the same credit(s) to achieve this requirement.

Exceptions:

1. *Additions* that increase the building's total conditioned floor area by less than 25 percent.
2. *Additions* that do not include the addition or replacement of equipment covered in Sections R403.6 or R403.8.
3. *Additions* that do not increase the conditioned space of the building.

SECTION R503
ALTERATIONS

R503.1 General. *Alterations* to any *building* or structure shall comply with the requirements of Section C503. *Alterations* shall be such that the existing *building* or structure is not less conforming to the provisions of this code than the existing *building* or structure was prior to the *alteration*.

Alterations shall not create an unsafe or hazardous condition or overload *existing* building systems. *Alterations* shall comply with the requirements of Section R503.2 through R503.8.

R503.2 Compliance. *Alterations* to existing *buildings* shall comply with Sections R503.2.1 or R503.2.2, except that *alterations* that are part of an *addition* with more than 1,000 square feet of conditioned floor area shall comply with Section R503.2.2. Where the *building* undergoes a *Level 3 alteration*, the *building* shall comply with Section R503.2.2 and demonstrate that the *rated design* of the existing building plus the alteration has a maximum ERI of 50 pr show a 30% reduction over the existing building's ERI prior to the alteration. Where the *building* undergoes a *Level 3 alteration* with *substantial mechanical alteration* and *substantial thermal envelope alteration*, primary space and water heating equipment shall be all-electric or fueled by other non-fossil fuel derived energy source and the *building* shall comply with

Section R503.2.2 and demonstrate that the *rated design* of the existing building plus the alteration has a maximum ERI of 50 or show a 30% reduction over the existing building's ERI prior to the alteration. The alteration shall comply with Section R408 for existing buildings.

R503.2.1 Existing building, plus alteration prescriptive compliance option. The prescriptive compliance option requires compliance with Section R401.2.1 shall demonstrate that the *alteration* complies with this code including section R402.4 air leakage testing of the *alteration* plus the existing structure.

Exception: Where the measured air leakage rate exceeds 3.0 air changes per hour (ACH) or 0.16 cubic feet per minute (CFM) per square foot of dwelling unit enclosure area when tested in accordance with Section R402.4.1.2, a diagnostic evaluation using smoke tracer or infrared imaging shall be conducted while the building is pressurized or depressurized along with a visual inspection of the air barrier. Noted air leaks shall be sealed where such sealing can be made without the destruction of existing or new building components. A report documenting corrective actions taken to seal leaks and pre- and post-corrective action blower door results shall be submitted to the *code official* and shall be deemed to comply with the requirements of this section if testing does not exceed 7 ACH. Level 1 and 2 alterations are exempt from blower door testing requirements.

R503.2.1.1 Prescriptive option compliance reports. The following compliance reports shall be submitted for permitting and to obtain the certificate of occupancy.

1. For permitting: Submit a plan set documenting the proposed R-values to be installed per Table R402.1.2 or a Section R402.1.2.3 Total UA compliance report to demonstrate compliance with Section R503.3 and that the existing *building* or structure is not less conforming to the provisions of this code than the existing *building* or structure was prior to the *alteration*.
2. For permitting: submit a blower door test compliance report to demonstrate the existing homes air tightness before beginning the *alteration*.
3. For certificate of occupancy: Submit a blower door and duct leakage compliance report when applicable.

R503.2.2 Energy Rating Index compliance option. The energy rating index compliance option requires compliance with the provisions of Section R406. The applicant shall demonstrate that the existing building plus the alteration is not less conforming to the provisions of this code than the existing *building* or structure was prior to the *alteration.* This method requires the project to create an energy rating index verification report at three stages as outlined in Section R503.2.2.1.

R503.2.2.1 ERI option compliance reports. The following compliance reports shall be submitted for permitting and to obtain the certificate of occupancy.

1. For permitting: Submit a baseline energy rating index compliance report of the existing structure prior to the *alteration*.
2. For permitting: Submit a projected energy rating index compliance report of the existing building plus the alteration based on the proposed design for the building in its entirety demonstrating that the building plus the alteration is not less conforming to the provisions of this code than the existing *building* or structure was prior to the *alteration.*
3. For certificate of occupancy: Submit a final confirmed energy rating index compliance report prior to final inspection.
4. For certificate of occupancy: Submit a blower door duct leakage compliance report as applicable.

R503.3 Building thermal envelope. *Building thermal* envelope assemblies that are part of the *alteration* shall comply with Section R503.3. New building thermal envelope assemblies that are part of the alteration shall comply with Section R402. The *R*-value of insulation shall not be reduced, nor the U-factor of a building thermal envelope assembly be increased as part of a building thermal envelope alteration except where the building, after the alteration complies with section R503.2.

Exception: The following *alterations* shall not be required to comply with the requirements for new construction provided that the energy use of the *building* is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Roof re-cover.
5. Roofs with insulation in the rafter cavities provided that where the decking is exposed during reroofing it is insulated either above or below the sheathing.
6. Surface-applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain provided that the code does not require the glazing or fenestration assembly to be replaced.
7. Roof replacement where roof assembly insulation is integral to or located below the structural roof deck.

R503.4 New and replacement fenestration. New and replacement fenestration units, including sash and glazing, shall meet the applicable requirements for *U*-factor and

SHGC as specified in Table R402.1.2. Where more than one replacement *fenestration* unit is to be installed, an area-weighted average of the *U*-factor, SHGC or both of all replacement *fenestration* units shall be an alternative that can be used to show compliance.

R503.25 Heating and cooling systems. HVAC ducts newly installed as part of an *alteration* shall comply with Section R403.

Exception: Where ducts from an existing heating and cooling system are extended to an addition that is less than 25% of the existing building's floor area.

R503.6 Service hot water systems. New service hot water systems that are part of the *alteration* shall comply with Section R403.5.

R503.7 Lighting. New lighting systems that are part of the *alteration* shall comply with Section R404.1.

Exception: *Alterations* that replace less than 10 percent of the luminaires in a space, provided that such *alterations* do not increase the installed interior lighting power.

R503.8 Electric ready (level 3 alterations only). The provisions of this section apply only to level 3 alterations that include replacement of mechanical or water heating equipment.

Exception: Level 3 alterations that include substantial mechanical alteration and substantial thermal envelope alteration.

R503.8.1 Additional electric infrastructure. *Combustion equipment* that is replaced as part of a level 3 alteration in *residential buildings* must meet the requirements of Sections R503.8.2 through R503.8.6.

Exception: Level 3 alterations that include substantial mechanical alteration and substantial thermal envelope alteration.

R503.8.2 Combustion equipment. *Combustion equipment* shall be provided with all of the following:

1. A dedicated, appropriately phased branch circuit sized to accommodate future electric equipment or appliances to serve a comparable capacity to meet the heating load.
2. An electric receptacle or junction box that meets the requirements of Section RE302.5, and is connected to the electrical panel through the branch circuit. Each electrical receptacle or junction box shall have reasonable access to the combustion equipment or dedicated physical space for future electric equipment with no obstructions other than the current combustion equipment.
3. Where combustion equipment is used for space or water heating, dedicated physical space shall be provided for future electric equipment, including an electric resistance backup coil for ducted systems, if applicable.

Exceptions:

1. Dwelling units with installed air conditioning systems are not required to provide additional dedicated physical space for an outdoor heat pump.
2. Dwelling units with insufficient panel space and/or service capacity.

R503.8.3 Electrical panel space. The electrical panel shall have a reserved space for a minimum two-pole circuit breaker for each branch circuit provided for future electric equipment or appliances.

R503.8.4 Labeling. The junction box or receptacle and the dedicated circuit breaker space serving future electric equipment or appliances in the electrical panel shall be labeled for their intended use.

R503.8.5 Adjacency. The electrical receptacle or junction box must be provided within 3 feet of the combustion equipment or appliances, or within 3 feet of the dedicated physical space for future electric equipment or appliances.

Exception: For combustion equipment dedicated to space or water heating, the electrical receptacle or junction box shall be located not more than 6 feet from the combustion equipment or the dedicated physical space for future electric equipment.

R503.8.6 Condensate Drain. Where combustion equipment for space heating and water heating is installed, a location shall be provided for condensate drainage.

R503.9 Additional Efficiency credits requirements for alteration. Alterations shall achieve the additional energy conservation objective through the credit system established in Section R408. Alterations shall achieve at least 5 credits through implementation of measures set forth in Table R408. *Alterations* to the existing building that are not part of the addition, but permitted with the addition, may be used the same credit(s) to achieve this requirement..

Exceptions:

1. Level 1 and 2 alterations
2. Alterations that do not include the addition or replacement of equipment covered in Sections R403.6 or R403.8.

SECTION R504
REPAIRS

R504.1 General. *Buildings*, structures and parts thereof shall be repaired in compliance with Section R501.3 and this section. Work on nondamaged components necessary for the required *repair* of damaged components shall be considered to be part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section R501.3, ordinary *repairs* exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

R504.2 Application. For the purposes of this code, the following shall be considered to be *repairs*:

1. Glass-only replacements in an existing sash and frame.
2. Roof *repairs*.

3. *Repairs* where only the bulb, ballast or both within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

SECTION R505
CHANGE OF OCCUPANCY OR USE

R505.1 General. Any space that is converted to a dwelling unit or portion thereof from another use or occupancy shall comply with this code.

Exception: Where ERI-based compliance in Section R406.4 is used to comply with this section, the building shall comply with Section R406 as new construction. Rated designs are permitted to be 10 percent greater than allowed by Section R406.4.

R505.1.1 Unconditioned space. Any unconditioned or low-energy space that is altered to become a conditioned space shall comply with Section R502.

CHAPTER 6 [RE]

REFERENCED STANDARDS

User note:

***About this chapter**: This code contains numerous references to standards promulgated by other organizations that are used to provide requirements for materials and methods of construction. Chapter 6 contains a comprehensive list of all standards that are referenced in this code. These standards, in essence, are part of this code to the extent of the reference to the standard.*

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section R107

AAMA

American Architectural Manufacturers Association
1827 Walden Office Square
Suite 550
Schaumburg, IL 60173-4268

AAMA/WDMA/CSA 101/I.S.2/A C440—17: North American Fenestration Standard/Specifications for Windows, Doors, and Unit Skylights
R402.4.3

ACCA

Air Conditioning Contractors of America
2800 Shirlington Road, Suite 300
Arlington, VA 22206

Manual J—16: Residential Load Calculation Eighth Edition
R403.7

Manual S—14: Residential Equipment Selection
R403.7

APSP

The Association of Pool & Spa Professionals
2111 Eisenhower Avenue, Suite 500
Alexandria, VA 22314

ANSI/APSP/ICC 14—2014: American National Standard for Portable Electric Spa Energy Efficiency
R403.11

ANSI/APSP/ICC 15a—2011: American National Standard for Residential Swimming Pool and Spa Energy Efficiency—includes Addenda A Approved January 9, 2013
R403.12

ASHRAE

ASHRAE
1791 Tullie Circle NE
Atlanta, GA 30329

ASHRAE—2017: ASHRAE Handbook of Fundamentals
R402.1.6

ASHRAE 193—2010(RA 2014): Method of Test for Determining the Airtightness of HVAC Equipment
R403.3.4.1

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959

C1363—11: Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
R303.1.4.1

ASTM—continued

E283—2004(2012): Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
R402.4.4

E779—10: Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
R402.4.1.2

E1554/E1554M—E2013: Standard Test Methods for Determining Air Leakage of Air Distribution Systems by Fan Pressurization
R403.3.5

E1827—2011(2017): Standard Test Methods for Determining Airtightness of Building Using an Orifice Blower Door
R402.4.1.2

E2178—2013: Standard Test Method for Air Permanence of Building Materials
R303.1.5

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland, OH 44131-5516

AAMA/WDMA/CSA 101/I.S.2/A440—17: North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights
R402.4.3

CSA B55.1—2015: Test Method for Measuring Efficiency and Pressure Loss of Drain Water Heat Recovery Units
R403.5.3

CSA B55.2—2015: Drain Water Heat Recovery Units
R403.5.3

DASMA

Door & Access Systems Manufacturers Association
1300 Sumner Avenue
Cleveland, OH 44115-2851

105—2016: Test Method for Thermal Transmittance and Air Infiltration of Garage Doors and Rolling Doors
R303.1.3

HVI

Home Ventilating Institute
1000 North Rand Road, Suite 214
Wauconda, IL 60084

916—09: Airflow Test Procedure
Table R403.6.1

ICC

International Code Council, Inc.
500 New Jersey Avenue NW
6th Floor
Washington, DC 20001

ANSI/APSP/ICC 14—2019: American National Standard for Portable Electric Spa Energy Efficiency
R403.11

ANSI/APSP/ICC 15a—2020: American National Standard for Residential Swimming Pool and Spa Energy Efficiency—includes Addenda A Approved January 9, 2013
R403.12

IBC—21: International Building Code®
R201.3, R303.1.1, R303.2, R402.1.1, R501.4

ICC 400—17: Standard on the Design and Construction of Log Structures
R402.1, Table R402.5.1.1

ICC 500—2020: ICC/NSSA Standard for the Design and Construction of Storm Shelters
R402.5

IEBC—21: International Existing Building Code®
R501.4

ICC—continued

IECC—18: International Energy Conservation Code®
R101.4.1, R403.8

IECC—06: 2006 International Energy Conservation Code®
R202

IFC—21: International Fire Code®
R201.3, R501.4

IFGC—21: International Fuel Gas Code®
R201.3, R501.4

IMC—21: International Mechanical Code®
R201.3, R403.3.4, R403.3.3, R403.6, R501.4

IPC—21: International Plumbing Code®
R201.3, R501.4

IPSDC—21: International Private Sewage Disposal Code®
R501.4

IPMC—21: International Property Maintenance Code®
R501.4

IRC—21: International Residential Code®
R201.3, R303.1.1, R303.2, R402.1.1, R402.2.10, R403.3.4, R403.3.3, R403.6, R501.4

ANSI/RESNET/ICC 301—2019: Standard for the Calculation and Labeling of the Energy Performance of Dwelling and Sleeping Units using an Energy Rating Index
R406.4

ANSI/RESNET/ICC 380—2019: Standard for Testing Airtightness of Building, Dwelling Unit and Sleeping Unit Enclosures; Airtightness of Heating and Cooling Air Distribution Systems and Airflow of Mechanical Ventilation Systems
R402.4.1.2

IEEE

Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue, 17th Floor
New York, NY 10016-5997

515.1—2012: IEEE Standard for the Testing, Design, Installation and Maintenance of Electrical Resistance Trace Heating for Commercial Applications
R403.5.1.2

NBI

New Buildings Institute
151 SW 1st Ave, Suite 300
Portland, OR 97204

Embodied Carbon Building Code (2023): An overlay o model code language for limiting the climate impact of building products
Table R408.1

NEMA

National Electrical Manufacturers Association
1300 17th Street North No. 900
Arlington, VA 22209

OS 4—2016: Requirements for Air-Sealed Boxes for Electrical and Communication Applications
R402.4.6

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

70—20: National Electrical Code
R501.4

NFRC

National Fenestration Rating Council, Inc.
6305 Ivy Lane, Suite 140
Greenbelt, MD 20770

100—2020: Procedure for Determining Fenestration Products *U*-factors
R303.1.3

200—2020: Procedure for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittance at Normal Incidence
R303.1.3

400—2020: Procedure for Determining Fenestration Product Air Leakage
R402.4.3

RESNET

Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561

ANSI/RESNET/ICC 301—2019: Standard for the Calculation and Labeling of the Energy Performance of Dwelling and Sleeping Units using an Energy Rating Index
R406.4, R406.7.1, R406.7.5

ANSI/RESNET/ICC 380—2019: Standard for Testing Airtightness of Building, Dwelling and Sleeping Unit Enclosures; Airtightness of Heating and Cooling Air Distribution Systems, and Airflow of Mechanical Ventilation Systems
R402.4.1.2

UL

UL LLC
333 Pfingsten Road
Northbrook, IL 60062

127—2011: Standard for Factory Built Fireplaces—with Revisions through July 2016
R402.4.2

515—2015: Electrical Resistance Heat Tracing for Commercial and Industrial Applications Including Revisions through July 2015
R403.5.1.2

US-FTC

United States-Federal Trade Commission
600 Pennsylvania Avenue NW
Washington, DC 20580

CFR Title 16 (2015): R-value Rule
R303.1.4

WDMA

Window and Door Manufacturers Association
2025 M Street NW, Suite 800
Washington, DC 20036-3309

AAMA/WDMA/CSA 101/I.S.2/A440—17: North American Fenestration Standard/Specification for Windows, Doors, and Unit Skylights
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WINDOW AREA (see FENESTRATION and GLAZING AREA)

Do you have any concerns with the proposed changes?	Do you have any suggestions for the updated code?	Do you have any suggestions for the updated code? (continued)	Response
Many foundational ones, but CC has directed staff to ignore cost implications for a decade or more. CC is to blame for the outsize cost to build in Boulder. On affordability we are in a DEEP hole, and we continue to dig. No one reads these comments, so I'll have some fun.	Lots of reliance on closed cell insulation now, for arguably minimized returns as we go to R-30 walls and R-60 ceilings. Dept Energy report says the new code will save a zone 5 ownerless than $150/year in energy costs. Extra 4-6" of closed cell insulation will cost 20x that, alone. Zip sheathing is pricey. Will now need to spec as a norm. Affordability yadda. See note above inre diminishing returns for added R-10 to exterior walls. County this is the norm. ALL clients building in the County are super wealthy. County prefers this too! The real kick in the nuts is your invented 'with and without' onsite solar. ERI 50 without onsite solar is HARD for some projects. Rich folks will buy expensive windows etc. PV was always the way to get there. This takes away a lot of alternative options that save on cost for non rich Boulderites. This is class war, really. The few remaining middle class folks will... not do projects I guess. That's the goal right? City owns and manages the middle and lower class housing all over this city? R407.5. Please keep the energy reviewers out of our already difficult form, shape and zoning issues. It is hard enough to solve all of the zoning, siting, Compat Dev, solar shadow issues and NOW you are going to empower an energy code staff to fuck with us on TREES/utility poles/neighbor building/etc etc in the path of a solar ready zone?	FFS delete R407.5.1 and .2. We already aim for this, don't infantilize designers. This is a power trip couple of lines. Pun intended, sparky. (Solar zones are virtue signals, performative code and cost - just stop) "Optional Energy Codes" or "How I Learned to Stop Worrying and Love my CC Overlords (I just wanted to renovate my house)": LEAVE THESE SECTIONS TO COMMERCIAL ONLY - AND NEVER BRING THEM INTO HOMES: Section R408 + R506. Delete all. Holy fuck. These are houses and additions. New reports, new submittals, new costs. WE ARE IN AN AFFORDABILTY CRISIS. Why do this? Huge complexity and overhead effort for ALL applicants to source and provide meaningless reports and drivel for staff to file away. FOR WHAT PURPOSE? We are not currently all rich here in town. But I think we will be ... in 2030 just in time for Energy Zero. Weird, huh? The incremental updates here (envelope insulation for example) are fine. The window U value drop will add cost - significantly - but fine we'll buy Alpen windows at 2x the cost of cheaper units. The embodied carbon issues are total overreach by a careerist staff (no offense - call em like I see em). There are some weird control/review items thrown in that should be thrown tf right back out (solar ready obstacles - we often have little control for that if off site).	None
With the goal of electrification in mind, the switch in ASHRAE 90.1-2019 and still in 90.1-2022 to having Appendix G mandate gas baseline for Climate Zone 5 dramatically hurts all-electric designs when considering annual utility costs. This is due to the fact that gas is significantly cheaper per Btu than electricity. The 5% credit for all-electric design in CoBECC C407.4.1 does not counter balance this effect leading to the situation were electric heating and hot water systems are disadvantages in energy analysis.	Either allow for the use of EUI in place of annual energy cost when calculating compliance targets or increase the reduced PIt reduction target from exceeding 20% to exceeding by 10-15% or provide additional compliance benefits for all-electric design.		This is valueable feedback. We are looking at a site EUI target for the 2024 CoBECC. We are also looking to set the performance requirement at 10-15% above as to your comments

Do you have any concerns with the proposed changes?	Do you have any suggestions for the updated code?	Do you have any suggestions for the updated code? (continued)	Response
Boulder Housing Partners is pleased to comment on the recommended updates to the City of Boulder's Energy Code. We want to recognize that in passing this updated energy code, there exists a pronounced and competing priority within the City of Boulder, namely clean energy goals aimed at slowing or preventing climate change and housing affordability goals aimed at promoting equity and inclusivity. The increased costs that are required to build in accordance with the new energy code exacerbate the challenges in financing affordable housing. Accordingly, in order to meet the requirements of Boulder's updated 2024 Energy Conservation Code, affordable housing developers will require additional funding to accomplish affordable housing development. In consideration of the City's goals around inclusivity and equity, coupled with the goals of the 2024 Energy Conservation Code, we recommend some portion of the City's Climate Tax be set aside for the development or redevelopment of affordable housing.	We support sustainability and responsible, green development. There needs to be an understanding of the cost implications of implementation and to that end, recommend real cost data inform the adoption of the final code update.		Thank you for your feedback and support. We are working through the costing information as there will be an upfront cost to bear but also want to take into account the cost savings of no gas infrastructure as well as the saving overtime for the solar systems.
CONFUSED IF THE LEVEL 3 ALTERATIONS TO AN EXISTING BUILDING ENERGY REQUIREMENTS ARE CHANGING FROM THE CURRENT CODE. IS IT 110% OR 125% OF EUI? SECTIONS C503.7 AND C503.8 ARE UNCLEAR. C503.7 Level 3 alterations. Level 3 alterations shall also comply with Section C407.3 where the proposed design EUI shall be not greater than 125 percent of the EUI otherwise permitted by Section C407.3. C503.8 Level 4 alterations. Level 3 alterations that include substantial mechanical and thermal envelope alteration shall also comply with Section C407.3 where the proposed design EUI shall be not greater than 110			Thank you for catching this in the draft. This have been corrected for the next draft that will be out in February. **C503.8 Level 3 alterations**. Level 3 alterations shall also comply with Section C407.3 where the proposed design EUI shall be not greater than 125 percent of the EUI otherwise permitted by Section C407.3. Level 3 alterations that also include substantial mechanical alteration and substantial thermal envelope alteration shall install only space conditioning equipment fueled by an energy source other than fossil fuels as the principle/primary space conditioning system.
Lack of basic energy efficiency recommendations found in passive solar fundamentals.	Add a leading chapter on how to incorporated fundamental passive energy design concepts, and how this would save money on capital equipment and long-term energy purchases.		Thank you for the feedback. We don't disagree some basic energy efficiency fundamentals around passive design beneficial, we just feel that the code book is not the best platform t understand the basics buidling science.

Do you have any concerns with the proposed changes?	Do you have any suggestions for the updated code?	Do you have any suggestions for the updated code? (continued)	Response
I'm concerned that MEP Engineer was not included in the "Please tell us a little about yourself." section above.	C403.3 Mechanical System energy source, Exceptions: suggest including additional onsite renewables or carbon free power along with the onsite solar power requirement to include potential for future technology. Also the word 'more' looks to be missing from the final sentence. C405.15.1 Solar Zone location note 4: Suggest updating to "within 165 and 195 degrees of true North." to stay consistent with the convention use in C405.15.2 Orientation. C405.15.1 Solar Zone Roof Area total roof area exclusions note 2: Suggest either providing a calculation for "Solar insolation" and a baseline value for solar insolation without shade or updating to be similar to section C405.15.3 Shading note 2. C405.15.2 Orientation: Suggest providing a rise per 12" to better define "steep sloped roofs".		Thank you for the feedback on this, apologies for the MEP engineer not being list on the feedback listed as an option (we didn't create the form) it should have been. Thank you for writing in. For C403.3, we added language '..all-electric or other non-fossil fuel derived energy source' to allow for new technologies that may become available. We updated C405.15.2 to align with the state code for the zone to be between 110 degrees and 270 degrees of true north. On C405.15.1 and C405.15.2, we plan to look back at these and re-evaluate. Thank you fo catching that steep sloped roof's needs to be defined.
I met with your team earlier, this is Andrew Ehrnstein, owner of Solar 4 Planet A LLC. Solar installation area: For residential and commercial you do exclude the fire setbacks from the minimum installable area, which is good. However, since solar panels used in residential installations are generally about 6' long, I'm concerned that property owners cannot have a financially and operationally effective system installed with the installable areas you've described. Commercial panels can range a little larger in size, and it's also much more common that we're dealing with flat/low-slope roofs, which require racking to tilt the panels. When doing so we either have to add ballast or penetrate the roof material. Ballast per panel can be minimized if we have blocks of at least 9 panels to tie together. I have made my suggestions below. In general, your awareness of insolation requirements for solar to make financial sense at a particular site is much appreciated. I think the proposed code changes are reasonable in general, just need the tweaks detailed below for it to be implementable.	Solar installation area: For residential, in sections R407.1-407.5 you do exclude the fire setbacks from the minimum installable area, which is good. However, since solar panels used in residential installations are generally about 6' long, please increase the minimum dimension for any "solar installation zone" to 6' for sloped roofs. For flat/low-slope roofs, racking is required and I would recommend areas at least 15' running N-S, and 22' running E-W. This gives us space for 9 panels in a ballasted array. Otherwise we will have to install tilt racks using penetrating attachments, which is not advisable on membrane roof materials. This critique also applies to section C405.15.1 Please change "The solar zone total area shall be comprised of one or more rectangular areas that are not less than 80 square feet and no side of any rectangular area shall be less than 5 feet in length." to read instead: "The solar zone total area shall be comprised of one or more rectangular areas. For sloped roofs each area must be not less than 200 square feet and no side of any rectangular area shall be less than 11 feet in length.	For low-sloped or flat roofs, each area must be not less than 330 square feet, with a minimum length running generally north to south of 15' and a minimum length running generally east to west of 22'and no side of any rectangular area shall be less than 11 feet in length."	Thank you for this valuable feedback. We have looked at incrporating some of the lanugage that you recommended to make it more feasible for future solar versus a solar-ready zone that it outside of panel design dimensions.

Do you have any concerns with the proposed changes?	Do you have any suggestions for the updated code?	Do you have any suggestions for the updated code? (continued)	Response
C407.4.2 Performance backstop. Suggest rewording "prescriptive requirements" to mandatory requirements. C407.4.2 Performance backstop. Consider making slab-on-grade perimeter insulation mandatory. 2022 Denver Energy Code performance path projects to date have not included slab-on-grade insulation. C407.7 Performance feedback. Suggest rewording "predicted energy use" as compliance modeling following ASHRAE 90.1 is a separate activity from predicted energy modeling (predictive energy modeling should include an error tolerance).	There is interest in alignment in energy / carbon codes between Denver and Boulder. Will be back in touch with additional review of redline version. C406 Based on timelines for REScheck/COMcheck from DOE PNNL, suggest you contact pnnl to get in their queue when your code is in a solid draft and prior to Council approval. C407 Consider the DOE supported ASHRAE Standard 90.1 Compliance Form. Denver has adopted this with a custom Companion Tool prepared by DOE. Happy to show you our internal review process and templates.		Thank you for the feedback, we have updated the language as recommended in C407.4.2. As for the slab-on-grab insulation, when modeling if the desire is to use better walls/windows/systems to trade off slab insulation than that would be allowed. There is a reason it is required prescriptively, but it is up to the deisgn team if modeling how they want to proceed. We have updated the language to provide more clarity in C407.7 like suggested. In terms of the COMchecks/RESchecks, we currently don't allow these other than for alterations. WE are still considering the ASHRAE companion tool and thank you for willingness to show us how it works.
No concerns, just encouraging the City of Boulder to adopt the 2021 IECC with minimal amendments and changes to make professional design and compliance consistent with other jurisdictions adopting the same code. Thank you for your consideration and advancement of building efficiency that benefit your citizens by adopting up-to-date and more efficient codes for your buildings.			Thank you for the feedback, unfortuantely at this time the City of Boulder is on path to adopt it's localized version of the International Energy Code, the 2024 CoBECC. The City of Boulder originally parted ways with the Internaitional Ernergy Conservation Code as it wasn't aligning with climate and energy eficiency targets of the city. By the time the 2027 code cycle comes around we might seriously look at coming back into the IECC but with amendments. I appriciate your encouragment for alignment across the front range with energy efficiency.

Do you have any concerns with the proposed changes?	Do you have any suggestions for the updated code?	Do you have any suggestions for the updated code? (continued)	Response
The Colorado Restaurant Association on behalf of its Boulder Chapter, is writing to express its concern with the proposed 2024 Energy Conservation Code Update language as published on the city's web page. While we understand and appreciate the city's efforts to address climate change, we are concerned the proposed exemption for new or renovated commercial kitchens to continue to use natural gas only if the energy consumption is 100 percent off-set by renewable energy installed on site sets a standard that is impossible to comply with and would result in a de-facto ban on natural gas for commercial kitchens. While the restaurant industry is by no means monolithic, the industry standard for most cooks and chefs in commercial settings has been to work with some or all natural gas power appliances in their kitchen. Many chefs and cooks learn techniques and processes of food preparation using natural gas appliances over an entire career that cannot be easily transferred to electric alternatives. Indeed in certain cases, such as wok cooking in Asian cuisine, there is no electric appliance alternative that can achieve the heat application required to properly cook many dishes. This is why many electrification efforts around the state and country have explicitly exempted commercial kitchens from electrification requirements.	(cont. from concerns with proposed changes?) Cities such as Denver and Crested Butte have enacted similar electrification requirements but both municipalities specifically exempted commercial kitchens from their requirements with no requirement for an on-site renewable offset. Indeed, even the residential portion of this 2024 Energy Conservation Code Update allows for the purchase of off-site credits and owners to apply for exemptions from that requirement. In discussing this proposed code with commercial developers in Boulder, we have been told that the square footage required to install renewable energy to comply with the 100 percent on-site off-set requirement is functionally impossible to achieve for almost every commercial building currently in the city which would have a chilling effect on both renovations and new build restaurants in the city. If the code were to allow for the purchase of off-site credits (similar to what is proposed in the residential code) the average one-time cost for a typical commercial kitchen would be upwards of $150,000.00. While this would present a significant financial challenge for most restaurants, it is certainly preferable to the de-facto ban that takes place in the current code.	The Colorado Restaurant Association on behalf of its Boulder Chapter, would like to request a "clean" exemption from the prohibition on natural gas in new and renovated commercial kitchens similar to what has been enacted in Denver and Crested Butte. In lieu of that, we request that any off set requirement can be satisfied with the purchase of off-site credits with an option to apply for an exemption, similar to what is being proposed in the residential code.	Thank you for your feedback, we hear you and understand your concerns. We have updated the code to provide an exception that would exemption commercial cooking and process heat from the renewable offset requirements. It would still require space and water heating to be electric but no offset required for commercial cooking or process heat.
Yes, the requirements of these changes do not look attainable for the restaurant industry. 100% do not support.	Make an exemption of offsetting natural gas usage for commercial kitchens.		Thank you for this feedback and we have heard you. We are providing an exception for commercial cooking and process heat that would exempt it from the 100% renewable offset. The only piece that would remain is that space and water heating would be all electric.

Do you have any concerns with the proposed changes?	Do you have any suggestions for the updated code?	Do you have any suggestions for the updated code? (continued)	Response
BioMed supports City of Boulder updating energy code to support the future of Boulder. Energy conservation and sustainability is a key value of BioMed that we plan for in our developments. We have been reviewing the code in detail and do want to ensure we are aligned with the city on how this will work for the future of R&D/ laboratories in Boulder. For context, our question below on C403.3, we are looking for optionality in the code so we can still achieve energy goals.	Code section C403.3 'Mechanical System energy source' states the following exceptions for mechanical system not to be fully electric - Laboratories, Hospitals, S-1, Emergency Generators, Commercial cooking equipment. The exception language states that if the energy source is not electric than the energy usage shall be offset by 100 percent onsite solar power. If it is not feasible to provide sufficient onsite solar power to meet 100 percent onsite solar power, due to site limitations, can it be demonstrated, similar to the residential sections of the energy code, that 100 percent onsite solar power is not required? If not, can the use exceptions above be eligible to purchase an 'offsite solar subscription' or Renewable Energy Credits (RECs) to make up the shortfall?		Thank you for the feedback here. We have heard you and are providing exceptions for commercial cooking or in the instaces of labs process heat. WE also have updated the code to that if you can demonstrate infeasibility in terms of solar the building offical has the ability to waive the requirement (or if some solar can be installed but not all). We know solar that is on-site is utilized, we are moving away from requiring RECs and off-site subscriptions as they are harder to manage.

C404.5.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section C404.5.2.1. Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered to be sources of heated water.

The volume from the nearest source of heated water to the termination of the fixture supply pipe shall be as follows:

1. For a public lavatory faucet: not more than 2 ounces (0.06 L).
2. For other plumbing fixtures or plumbing appliances; not more than 0.5 gallon (1.89 L).

C404.5.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters, and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the "Volume" column in Table C404.5.1 or from Table C404.5.2.1. The volume contained within fixture shutoff valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where

heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

C404.6 Heated water circulating and temperature maintenance systems. Heated-water circulation systems shall be in accordance with Section C404.6.1. Heat trace temperature maintenance systems shall be in accordance with Section C404.6.2. Controls for hot water storage shall be in accordance with Section C404.6.3. Automatic controls, temperature sensors and pumps shall be in a location with *access*. Manual controls shall be in a location with *ready access*.

C404.6.1 Circulation systems. Heated-water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold-water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Controls for circulating hot water system pumps shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is not a demand for hot water. The controls shall limit the temperature of the water entering the cold-water piping to not greater than 104ºF (40°C).

C404.6.1.1 Demand recirculation controls. Demand recirculation water systems shall have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture, or sensing the flow of hot or tempered water to a fixture fitting or appliance.

C404.6.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy. Heat trace shall be arranged to be turned off automatically when there is not a demand for hot water.

C404.6.3 Controls for hot water storage. The controls on pumps that circulate water between a water heater and a heated-water storage tank shall limit operation of the pump from heating cycle startup to not greater than 5 minutes after the end of the cycle.

C404.7 Demand responsive water heating. Electric storage water heaters with a rated water storage volume of 40 gallons (150 L) to 120 gallons (450 L) and a nameplate input rating equal to or less than 12kW shall be provided with demand responsive controls in accordance with Table C404.10 or another equivalent approved standard**.**

Table 404.10
DEMAND RESPONSIVE CONTROLS FOR WATER HEATING

EQUIPMENT TYPE	CONTROLS	
	BEFORE 7/1/2025 [a]	AFTER 7/1/2025 [a]
Electric storage water heaters	ANSI/CTA-~~2045-B Level 1~~ and also capable of initiating water heating to meet the temperature set point in response to a *demand response signal*.	ANSI/CTA-2045-~~B Level 2~~, except "Price Stream Communication" functionality as defined in the standard.

Exceptions:

1. Water heaters that provide a hot water delivery temperature of 180F (82C) or greater.
2. Water heaters that comply with Section IV, Part HLW or Section X of the ASME Boiler and Pressure Vessel Code.
3. Water heaters that use 3-phase electric power.

C404.8 Water heating equipment location. Water heaters with *combustion equipment* shall be located in a space meeting the following requirements:

1. Minimum dimensions of 3 feet by 3 feet by 7 feet high.
2. Minimum volume of 760 cubic feet, or the equivalent of one 16-inch by 24-inch grill to a heated space and one 8-inch duct of no more than 10 feet in length for cool exhaust air.
3. Contains a condensate drain that is no more than 2 inches higher than the base of the installed water heater and allows natural draining without pump assistance, installed within 3 feet of the water heater.

Exceptions:

1. Instantaneous water heaters located within 10 feet of the point of use.
2. Water heats with an input capacity of more than 300,000 Btu/h.

C404.9 Drain water heat recovery units. Drain water heat recovery units shall comply with CSA B55.2. Potable water-side pressure loss shall be less than 10 psi (69 kPa) at maximum design flow. For *Group R* occupancies, the efficiency of drain water heat recovery unit efficiency shall be in accordance with CSA B55.1.

C404.10 Energy consumption of pools and permanent spas. The energy consumption of pools and permanent spas shall be controlled by the requirements in Sections C404.10**.1** through C404.10.3.

a. Manufacture date.

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C407.2 Mandatory requirements. Compliance under the total building performance path of Section C407 requires compliance with the sections of this code identified in Table C407.2.

TABLE C407.2
MANDATORY REQUIREMENTS

Section	Title
C401	General
C402.5	Air leakage—thermal envelope
C403.1	General
C403.2	System design
C403.3	Mechanical system energy source
C403.4	Heating and cooling system controls
C403.5.5	Economizer fault detection and diagnostics
C403.7 (except C403.7.5.1)	Ventilation and exhaust systems
C403.8 (except C403.8.6)	Fans and fan controls
C403.9	Large-diameter ceiling fans
C403.11 (except C403.11.3)	Refrigeration equipment performance
C403.12	Construction of HVAC system elements
C403.13	Mechanical systems located outside of the building thermal envelope
C404	Service Water Heating
C405 (except C405.3)	Electrical Power and Lighting Systems
C406	~~Additional conservation requirements~~ Reserved
C408	Maintenance information and system commissioning

a. Reference to a code section includes all the relative subsections except as indicated in the table.

C407.3 Performance-based compliance. Compliance based on building performance shall be determined in accordance with Section C407.3.1, C407.3.2 or C407.3.3. Energy use for the *proposed design* shall be reported to the *code official* as *energy use intensity* (EUI) in kBtu/sf/yr.

C407.3.1 Modeled baseline. Projects shall comply with Section 4.2.1.1 of ASHRAE Standard 90.1-2022, as modified in Section C407.4. Projects complying using this Section C407.3.1 to demonstrate compliance shall use a site energy index as defined in Appendix I of ASHRAE 90.1-2022 and as defined in Section C407.4.

C407.3.2 Fixed performance target. Only project types listed in Table C407.3.2 may use this section for compliance with Section C407.3. Eligible projects may demonstrate compliance by meeting the EUI targets identified in the Table C407.3.2. The *proposed building model* predicted performance shall be demonstrated using the energy modeling procedures for the proposed building performance in Appendix G of ASHRAE 90.1-2022, as modified in Section C407.4. Buildings with multiple occupancy types listed in Table C407.3.2 shall develop a performance target based on area weighted-average EUI calculated by floor area of each occupancy type.

TABLE C407.3.2
FIXED EUI TARGETS

BUILDING TYPE	PERFORMANCE TARGETS (kBtu/ft²)
Medium office (5,000–50,000 sf)	23
Mid-rise apartment (Type R2)	32
Primary school	34
Large Office (>50,000 sf)	40
Small office (< 5000 sf)	19
Secondary school	31
Warehouse	11
Retail Store	40
Small Hotel	35
Hospital	76
Restaurant	200
Strip Mall	40

C407.3.3 Measured performance outcome. With approval of the *chief building official*, projects may demonstrate compliance with this code by documenting that the building has achieved the EUI target calculated per C407.3.1 or C407.3.2 within 10 percent based on metered energy use after occupancy.

C407.3.3.1 Excluded energy use. Energy used for data centers and EV charging equipment may be excluded from the total EUI of the building, provided that this energy use is separately metered per the requirements of Section C407.6.

C407.3.3.2 Demonstration of operating energy use. Metered energy data shall be reported to the *code official* using Energy Star Portfolio Manager and adjusted for the percentage of occupied floor area. The applicant shall demonstrate that, while at least 75 percent occupied, the building operates at or below its assigned EUI target established in Section C407.3.2 for any recording period of 12 consecutive months that is completed within three years of the date of the Certificate of Occupancy. The owner shall notify the *code official* when this 12-month period has been successfully completed.

C407.3.3.3 Adjustments to EUI targets. The *chief building official* may approve an adjustment to a building's EUI target based on unanticipated changes to building operation and conditions as set forth in Items 1 through 3 below. The applicant shall demonstrate the need for adjustment based on the standards set forth Items 1 through 3 with specific documentation of the need.:

1. **Adjustment for change in occupancy.** When the occupancy of the building or a portion of the building changes from that assumed in the permit submittal, the *code official* will adjust the assigned EUI target to reflect the new occupancy. If the new occupancy is not listed in Section C407.3.2, either the *code official* shall assign it an EUI target based on the best-performing local examples of that occupancy type, or a metering system shall be provided that excludes the energy loads for the additional occupancy.

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APPENDIX CA

BOULDER MODIFIED APPENDIX G PROTOCOL

User note:

About this appendix: *This appendix contains sections of ASHRAE 90.1-2022 Normative Appendix G that have been modified to reflect specific requirements of the 2024 City of Boulder Energy Conservation Code (CoBECC). Only sections of Appendix G that have been modified from the original language are included in this document.*

Section G1 GENERAL

Section G1.2. Performance Rating

G1.2.1 Mandatory Provisions

This *performance rating method* requires conformance with the following provisions:

a. All mandatory requirements of Chapter 4 of the *2024 City of Boulder Energy Conservation Code (COBECC)* must be met. These supersede the mandatory requirements in Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 of ASHRAE Standard 90.1-2022.
b. The interior lighting power shall not exceed the *interior lighting power allowance* determined using either:
   1. Tables G3.7-1 and G3.7-2 and the methodology described in Section 9.5.2, or
   2. Table G3.8 and the methodology described in Section 9.5.1.
c. Energy *efficiency* levels of installed components and *systems* shall meet or exceed the efficiency levels used to calculate the *proposed building performance*.
d. The proposed envelope U factors shall not exceed the performance requirements of ASHRAE 90.1-2016 listed in Table 5.5-5. No tradeoffs of envelope performance below these levels are allowed.
e. Verification, testing and *commissioning* requirements of Section C408 of the 2024 City of Boulder Energy Conservation Code shall supersede the requirements of Section 4.2.5.
f. The proposed HVAC equipment efficiencies at a minimum shall meet the performance requirements determined in Tables 6.8.1-1 through Table 6.8.1-21.

G1.2.2 Performance Rating Calculation

All new construction in Boulder with a construction value of $500,000 or more must comply with Section G1.2.2.1, G1.2.2.2 or G1.2.2.3, below.

G1.2.2.1 Modeled Baseline

Compliance with Section C407.3.1 of the 2024 CoBECC, Modeled Baseline path requires that the Performance Index target (PI_t) (site energy) for the *proposed design* be reduced by 15 percent for mixed-fuel buildings and 10 percent for all-electric buildings from a PI_t (site energy) target that complies with the ASHRAE 90.1-2022 as modified by Appendix I for "site energy".

The performance of the *proposed design* is calculated in accordance with the provisions of this protocol using the equation G1.2.2.1.1 or G1.2.2.1.2 below as applicable. Both the proposed building performance and baseline building performance shall include all end-use load components within and associated with the building when calculation the Performance EUI for Site Energy.

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Mixed Fuel Buildings:

$$PIt_{site} = 0.85 \times \frac{(BBUE + (BPF_{site} \cdot BBRE) - PRE)}{BBP} \quad \text{(Eq. G1.2.2.1.1)}$$

All Electric Buildings:

$$PIt_{site} = 0.90 \times \frac{(BBUE + (BPF_{site} \cdot BBRE) - PRE)}{BBP} \quad \text{(Eq. G1.2.2.1.2)}$$

where:

PIt_{site} = The maximum Performance Index (Site Energy) for the *proposed design* to comply with the Boulder Energy Code

BBUE = Baseline Building Unregulated *Site Energy*, the portion of the annual site energy of a *baseline building design* that is due to *unregulated energy use*.

BBRE = Baseline *Building* Regulated *Site Energy*. The portion of the annual *site energy* of a *baseline building design* that is due to *regulated energy use*.

BPF_{site} = *Building* Performance Factor (BPF) from Table G1.2 below. For *building* area types not listed in the table, use "All Others." Where a *building* includes multiple *building* area types, the required BPF shall be equal to the area-weighted average of the *building* area types. (Table G1.1 replaces Table 4.2.1.1 in 90.1- 2022)

BBP = *Baseline Building Performance*. The annual *site energy* of the *baseline building design* including both *regulated* and *unregulated energy use*.

~~$PRE = PBP_{nre} - PBP_{pre}$~~

~~where:~~

~~PRE =~~ ~~Prescriptive renewable *energy.*~~

~~PBP =~~ ~~*Proposed building performance*, including the reduced, annual *site energy* associated with all *on-site renewable energy* generation systems.~~

~~PBP_{nre} =~~ ~~*Proposed building performance* without any credit for reduced annual *site energy* from *on-site renewable energy* generation *systems*. (no renewable energy)~~

~~PBP_{pre} =~~ ~~*Proposed building performance*, excluding any *renewable energy system* in the *proposed design* and including an *on-site renewable energy system* that meets but does not exceed the requirements of Section 10.5.1.1 of ASHRAE 90.1 2022 modeled following the requirements for a *budget building design* in Table 12.5.1 of ASHRAE 90.1 2022. (prescriptive renewable energy)~~

~~When $(PBP_{pre} - PBP)/BBP > 0.05$, new *buildings* shall also comply with the following:~~

~~$PI + [(PBP_{pre} - PBP)/BBP] < PI_t$ (Eq. G1.2.2.1.3)~~

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COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Addressing Impacts of Gas-Powered Landscape Equipment

PRIMARY STAFF CONTACT
Carolyn Elam, Sustainability Senior Manager

ATTACHMENTS:

Description

- **Item 6A - Addressing Impacts of Gas-Powered Landscape Equipment**

CITY OF BOULDER
CITY COUNCIL AGENDA ITEM

MEETING DATE: May 16, 2024

AGENDA TITLE

Addressing the Impacts of Gas-Powered Landscape Equipment

PRESENTER(S)

Nuria Rivera-Vandermyde, City Manager
Pam Davis, Assistant City Manager
Jonathan Koehn, Director of Climate Initiatives
Carolyn Elam, Sustainability Senior Manager
Kara Mertz, Senior Project Manager

EXECUTIVE SUMMARY

Commercial landscaping companies provide a variety of lawn and plant care services to residents and commercial businesses. While these services are an important part of the local economy, they are also a source of routine concern among some community members. Two-stroke engines, such as those commonly found in leaf blowers, are the most cited area of concern due largely to their noise. While this concern has been longstanding, recent years have seen a heightened level of interest, due to an increased number of people working from home during and following the pandemic. In addition to noise pollution, there is also a growing understanding of gas-powered landscaping equipment's contribution to air pollution, particularly ground-level ozone.

In 2022, staff launched the Addressing the Impacts of Landscaping Equipment Project to better understand the local impacts and opportunities presented by gas-powered landscaping equipment use in Boulder. On April 27, 2023, City Council held a study session to provide staff with feedback on the direction for the project. The staff memo

from that study session provides analysis of the emissions contribution of landscaping, best practices from other jurisdictions, results of the Be Heard Boulder community survey, and the racial equity analysis. Also included is a summary of the pilot project the city launched in partnership with Boulder County to support small landscaping business adoption of electric solutions.

Council's feedback from the study session was to prioritize education and outreach, support voluntary electrification through the pilot voucher program, monitor state regulatory changes and return to council in early 2024 for further discussions of potential local regulation. Council identified phased-in restrictions on the use of gas equipment and a potential local sales ban as regulatory strategies to be further explored. For use restrictions, council was largely supportive of continuing to allow the use of gas-powered leaf blowers for some years but restricting this allowance to a limited number of weeks in the spring and fall. This consideration recognized feedback from the landscaping industry about potential productivity losses during heavy debris seasons should they be restricted only to electric or manual solutions.

Based on council's original feedback, staff continued to explore strategies to drive the transition of landscaping equipment from gasoline to electric. The purpose of this memo is to provide council with an update on the project to include:

- Final results from the cost and pollution impact analysis.
- Year 1 results and Year 2 planned efforts for the landscaping equipment pilot program.
- State regulatory changes and programs.
- Regulatory strategy resource needs analysis.

The key issues to be discussed include:

- Equity considerations and potential disparate impacts of regulatory strategies;
- Technology readiness, cost and risks associated with electric equipment alternatives;
- Overall contribution to local pollution;
- Best practices and lessons learned from other jurisdictions; and
- Holistic strategies in coordination with other code and regulation updates.

QUESTIONS FOR COUNCIL

1. Does council wish to pursue a regulatory strategy at this time? If so:
    a. Does council still support a phased in strategy that would continue to allow some gas-powered leaf blower use?
    b. Does council have feedback on the timeline for ordinance adoption and enforcement?
2. Does council still have interest in pursuing a sales ban? If so, what equipment should be included in such a ban? (see **Table 2** in Analysis section)

BACKGROUND

Landscaping service is synonymous with entrepreneurship. Since there has been the suburban lawn, there has been the kid from the neighborhood who starts by earning extra money mowing their neighbors' lawns and then ends up with a career in the landscaping industry. Other than acquiring the landscaping equipment, there are little to no other overhead costs, allowing business owners to enter the industry with a small capital investment, usually starting with used equipment, and then growing their business and adding more workforce over time.

While landscaping service is a successful entrepreneurial industry, the margins are thin, particularly for smaller businesses. Earnings are limited to the months during which they operate, late spring to early fall. Because of the small business nature of the industry, there are many businesses competing for work, keeping the price of service relatively low. Margins are based on productivity and reliability. This push for increasing efficiency led naturally to increasingly mechanized approaches including the evolution of the leaf blower. The powerful leaf blower reduced wear and tear on workforce in an industry that requires crews to service 100 to 200 yards per week to break even, much less be profitable.

It is estimated that 2000-2500 commercial landscaping companies provide a variety of lawn and plant care services to residents and commercial businesses in Boulder County, including the City of Boulder. Businesses range in size from larger, multi-crew corporations that tend to serve Homeowners Associations (HOA) and large campuses throughout the front range, to microbusinesses with a sole owner operator who tend to serve many individual residences and businesses locally. Approximately 80 percent of the workforce is Hispanic, and it is estimated that more than half the businesses are minority owned.

While a vital component of the local and regional economy, landscaping services are a frequent source of concern within the community. While climate advocacy is a component of this concern, other environmental impacts, specifically noise and dust are the more common cited issues, with both issues specifically centered on commercial grade leaf blowers.

In response to ongoing concerns, staff launched the Addressing Impacts of Landscaping Equipment Project in early 2022 to explore options that might be suitable for the city to pursue to mitigate the impacts of landscaping equipment. This includes better understanding of the actual impacts of landscaping services within Boulder, where other communities have been successful with regulatory approaches or run into challenges, and assessing the potential local and regional impacts adopting a more restrictive code might present to Boulder residents, businesses, and to service providers and their workforce in the event such a strategy were to be pursued.

To support the project, the city hired American Green Zone Alliance (AGZA). Based out of Los Angeles, AGZA specializes in training, education, strategic planning and

implementation of low-impact solutions for municipalities, land care operators and property managers to transition from gas-powered land care to low-impact, zero-emissions operations. Of note, the State of California selected AGZA to lead its engagement efforts for California's Clean Off-Road Equipment Voucher Incentive Project (CORE). The goal of that particular effort is to connect with professional landscapers by organizing in-person and online events where landscapers can test out zero-emission professional landscaping equipment, connect with industry professionals and learn more about CORE voucher incentives.

In addition to bringing on AGZA as an expert consultant, staff also partnered with Boulder County's Partners for a Clean Environmental (PACE) team to design and implement a pilot program aimed at supporting early adoption of electric equipment. Launched in 2023, the pilot uses a multi-pronged approach of education and outreach, partnership with local retailers and equipment buy downs to drive adoption of electric equipment for small landscaping businesses. Staff were successful in obtaining an initial grant of $211,774 through Boulder County's Sustainability Grants Program to fund the pilot. Staff have since successfully secured another $165,990 grant to continue the pilot through at least 2024. Participating businesses receive a voucher for up to 80% of cost for electric landscaping tools, a smart charging box to provide for safe managed charging, two fire extinguishers and a fire blanket.

The project has prioritized extensive engagement with the community as a whole, customers of landscaping services, landscaping businesses and wholesale and retail equipment suppliers. The Boulder County Latino Chamber of Commerce has also been an active participant, as well as liaison to businesses. Activities have included business shadowing, hosted workshops and training, and offering of on-line certification programs. Staff reviewed jurisdictional programs from around the country and interviewed several officials implementing those programs.

The scope of this project has focused on commercial landscaping services, which is inclusive of both service providers that serve many customers and self-served large property owners who perform daily landscaping maintenance, such as municipal governments, universities, and larger homeowners' associations. While gas equipment is also owned and operated by individual property owners and tenants, the impact from this equipment is far less given the limited duty hours of use each year. Additionally, the residential equipment market is already largely transforming given that available electric equipment is more accessible and often superior to gas counterparts.

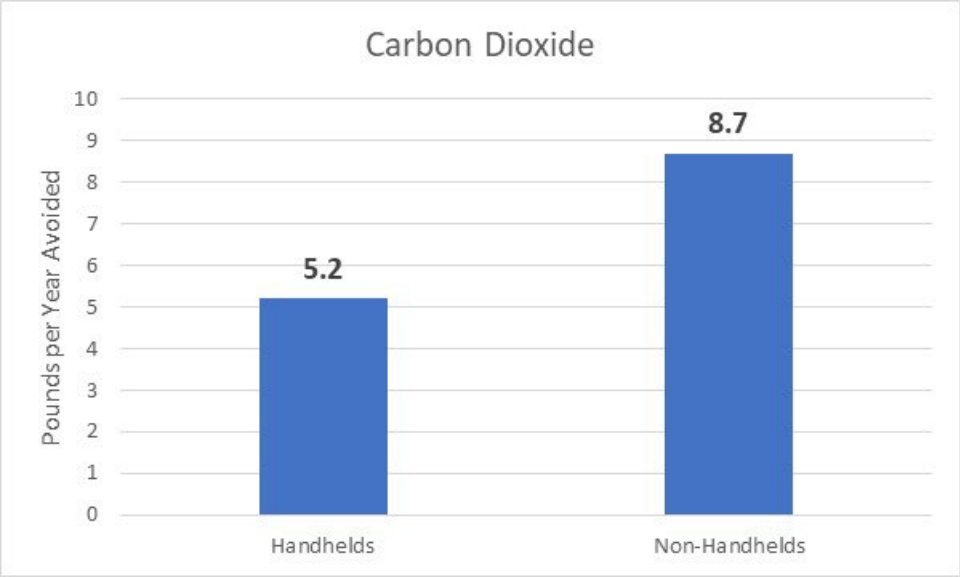
ANALYSIS

Pollution Reduction Benefits

To better quantify the potential pollution reduction benefits of transitioning landscaping equipment from gas to electric, AGZA shadowed local businesses to understand the typical services performed and, thus, the duty hours for the different equipment being used. They then modeled the emissions reduction for the full electrification of 100 service

crews servicing residential properties, excluding electrification of larger riding and deck mowers for which there are no electric alternatives that are readily available. The results of this analysis are shown in Figure 1. Based on the analysis, converting all handhelds, which includes leaf blowers, for 100 service crews, would yield a greenhouse gas (GHG) savings of 5.2 tons per year. By comparison, this is roughly equivalent to the annual emissions of just one residential gas furnace. Because mowers have more duty hours of use during the season, electrifying push mowers would yield a somewhat higher GHG reduction, albeit a relatively small reduction compared to other GHG reduction strategies.

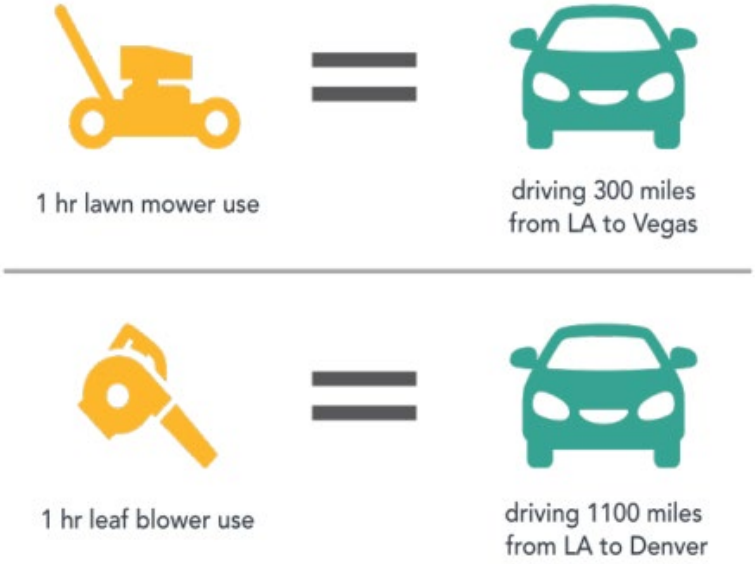
Figure 1 – Analysis of Annual Greenhouse Gas (GHG) emissions for 100 Typical Boulder Residential Landscaping Service Crews



While landscaping equipment has a relatively small GHG impact, the contribution to other pollutants is more notable. EPA estimates that, nationally, gas-powered landscaping equipment is responsible for nearly 4% of volatile organic chemical (VOC) and 12% of carbon monoxide (CO) emissions.[1] Landscaping equipment also produces particulate matter (PM) and nitrogen oxide (NOx) emissions. One study estimates that operating a commercial gas-powered lawn mower for one hour emits as much smog-forming pollution as driving a new light-duty passenger car about 300 miles – about the distance from Los Angeles to Las Vegas, more than four hours of drive time. For a commercial leaf blower, one hour of operation emits smog-forming pollution comparable to driving a new light-duty passenger car about 1,100 miles – about the distance from Los Angeles to Denver, over 15 hours of driving.[2]

[1] https://www.epa.gov/sites/default/files/2015-09/documents/banks.pdf
[2] https://ww2.arb.ca.gov/resources/fact-sheets/sore-small-engine-fact-sheet

Figure 2 – Comparison of Landscaping Equipment Use and Passenger Vehicle Travel



Ground-level ozone forms when NOx and VOC compounds react with each other in sunlight and hot temperatures. Given that landscaping equipment use occurs during the sunniest and hottest months of the year, the emissions from gas-powered landscaping equipment are a leading contributor to Denver Metropolitan/Northern Front Range (DM/NFR) ozone. The EPA acceptable standard for ozone is 70 parts per billion (ppb), a value the DM/NFR has exceeded based on recent 3-year averages.[3] Table 1 provides a summary of the general contributors to summertime ozone in the DM/NFR. Landscaping equipment represents approximately 3% of all ozone sources and approximately 8% of sources targeted for pollution control (sources other than background and naturally occurring).

Landscaping equipment is a broad term that includes mowers (40%), trimmers (18%), tractors (14%), leaf blowers (9%), chainsaws (7%), snow blowers (6%) and other types of equipment (7%).[4] While mowers have a lower emissions impact on a per hour basis, their annual run hours are two or more times that of other equipment. Trimmers have comparable fuel combustion emissions as leaf blowers and have comparatively higher run hours during summer months.

[3] The EPA 8-hour ozone standard is written such that attainment is met if the 3-year average of the 4th max. value from each of the 3 years is less than or equal to 70 ppb.
[4] National estimates (https://www.epa.gov/sites/default/files/2015-09/documents/banks.pdf)

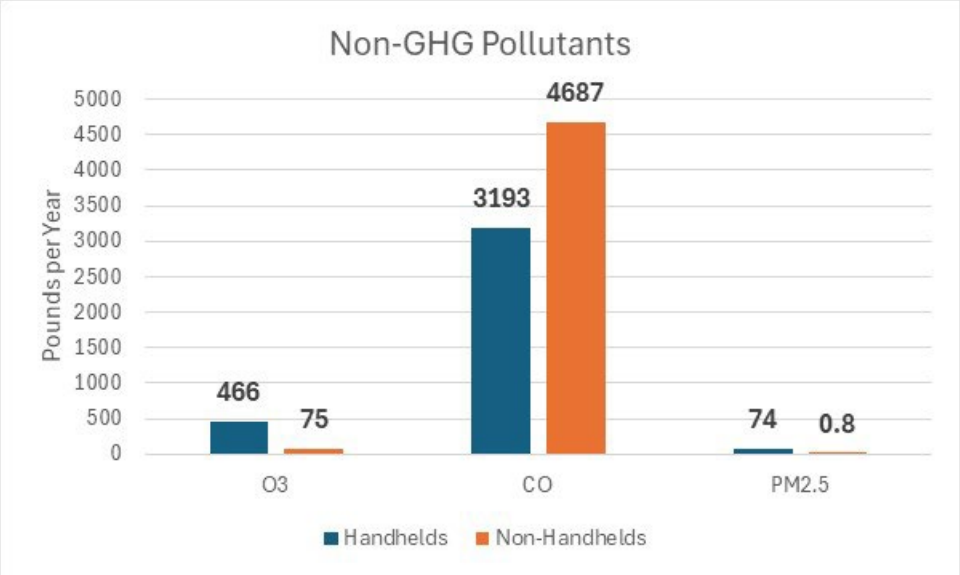
Table 1 – Regional Air Quality Council: General Contribution to Front Range Summertime Ozone Concentrations[5] reported as parts per billion (ppb)

Ozone Source	Contribution	Includes
Oil & Gas	8.6 ppb	Area and point sources (operation, storage facilities, drilling, trucking and engine exhaust)
On-Road Vehicles	6.8 ppb	Light/Medium/Heavy Duty vehicles (SUVs, cars, pickup trucks)
Non-Road Sources	5.4 ppb	Construction operations, rail/train operations, agriculture
Point Sources	5.3 ppb	Industrial sources and electricity generation
Lawn & Garden	2.5 ppb	Commercial lawn equipment and residential lawn and garden equipment (mowers, leaf blowers, trimmers, etc.)
Area	1.2 ppb	Personal care products, cleaning products, paints and solvents
Background and Natural	48.6 ppb	Background ozone, transport, local fires, plant-based emissions

Using the same shadowing data and methodology that assumes full electrification of 100 residential landscaping service providers, AGZA developed a Boulder-specific model for non-GHG pollutant reductions. The results from that model are shown in Figure 3. Based on this analysis, electrification of all handhelds could yield a 466 pound per year reduction in ozone forming pollutants and 74 pounds per year reduction of particulate matter.

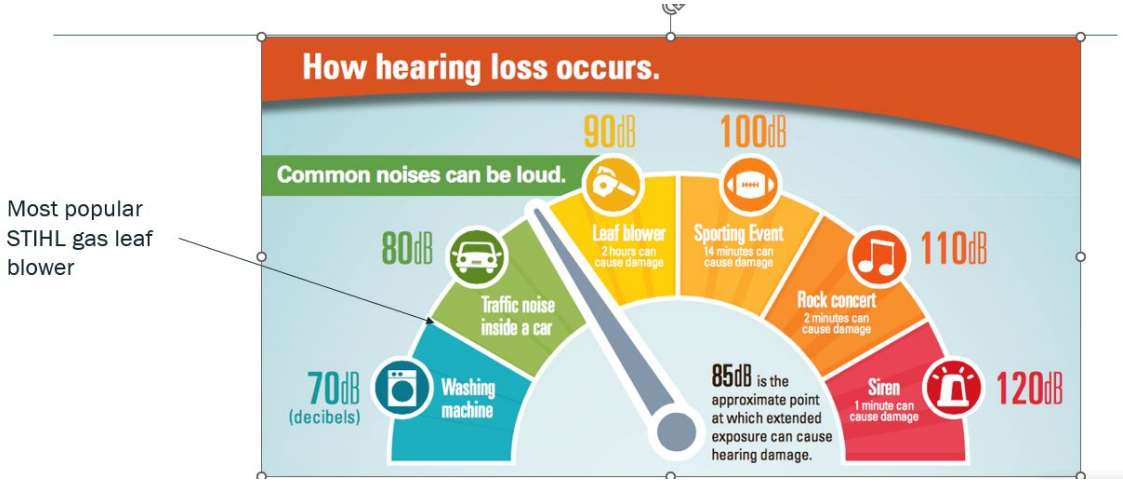
[5] Source: Screenshot of Regional Air Quality Council (RAQC) presentation dated 8/18/22 and labeled AQCC Presentation SIP Planning Process published by the Colorado Sun (https://coloradosun.com/wp-content/uploads/2022/08/Screen-Shot-2022-08-23-at-1.21.25-PM.png?w=710)

Figure 3 – Analysis of Annual Non-GHG Pollutants for 100 Typical Boulder Residential Landscaping Service Crews



For noise pollution, Figure 4 illustrates the decibel ratings of common noise exposures. The actual decibel exposure will depend on the distance of the individual from the source of the noise. For example, the operator of a leaf blower will experience the full decibel exposure, but someone standing at a distance away or inside an adjacent building will still hear the sound, but the actual decibel exposure will be diminished. Gas equipment continues to evolve in terms of sound dampening. As highlighted, the most popular STIHL leaf blower in use is far quieter than the historical average. Electric leaf blowers are quieter than gas, but still exceed the noise thresholds established in the city's noise ordinance for residential areas.

Figure 4 – Decibel Ratings of Common Exposures



Cost Analysis

Based on shadowing data, service provider interviews and other experience, AGZA developed an average equipment inventory for service crews for the types of equipment that can be more readily electrified (so, again, excludes larger deck mowers). This was then used for cost analysis and comparison, the results of which are shown in Table 2. As shown, a fully electric setup is more than three times the cost of a gas setup. The main contributor to this is battery cost. Due to battery life and service reliability concerns, the industry best practice is to have at least two batteries per piece of equipment. In addition to the incremental cost difference overall, another area of concern is the absence of a used electric equipment inventory. As noted previously in this memo, many small business entrants into the landscaping service market start by purchasing lower cost, used equipment.

Table 2 – Cost comparison between gas-powered and all-electric landscaping equipment typically used by landscapers (excludes riding mowers)

	Quantity	Gas	Electric[6]
Blower (backpack)	2	$840	$840
Blower (handheld)	1	$280	$280
String Trimmer	2	$820	$1000
Hedge Trimmer	1	$550	$550
Hedge Trimmer (extended)	1	$480	$450
Pole Saw	1	$690	$620
Chainsaw	1	$370	$370
Self-propelled Mower	1	$850	$850
Backpack Batteries	4	n/a	$6000
Standard Batteries	12	n/a	$3000
Fast Charger	6	n/a	$990
Standard Charger	10	n/a	$1000
Total (sales tax not included):		**$4,880**	**$15,950**

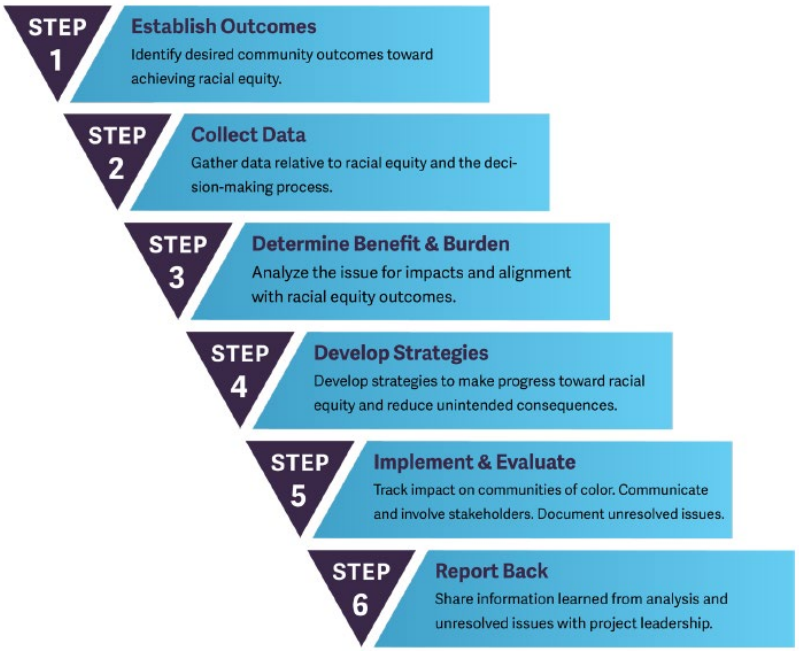
Consistent with models developed in California, making electrification accessible to under-resourced small businesses requires incentives that can lower equipment costs to be comparable to their gas alternatives. AGZA recommends a voucher that can cover 70 percent of the cost of equipment. For the city's current pilot, an 80 percent voucher is being offered to compensate for the sales tax differential that is realized on top of the base equipment cost. Following this model, roughly $1.4 million in vouchers would be needed to support 100 businesses fully electrifying. However, as noted, there are 2000-2500 total businesses that serve Boulder County as a whole. While the exact count of businesses serving Boulder is unknown, it is reasonable to assume that in excess of 1000 businesses would need to electrify equipment were Boulder to adopt electric-equipment only requirements. Given the substantial cost differential, failure to assist in buying down

[6] Battery cost is excluded from the equipment cost and shown as a separate line item.

the cost of equipment would likely result in both substantial increase in cost of service for landscaping service customers in Boulder, as well as many businesses simply forgoing serving customers in Boulder.

RACIAL EQUITY

The city's Racial Equity Instrument was used throughout the course of this project. The instrument is made up of the following six steps:



The Team started by defining the desired outcome as:

> *All Boulder residents will benefit from reduced air and noise pollution; the community and service workers will experience improved health and wellbeing; landscaping businesses will retain or even grow their profitability; and the workforce will realize benefits through higher earning potential as part of a "green collar" workforce.*

In considering all data and influencing factors, substantial risk exists associated with trying to achieve this ideal. Racial disparity already exists within the current baseline of landscaping services. Demographically, the majority of customers in Boulder receiving landscaping services are Caucasian and many would also be considered affluent. In contrast, 80% or more of the landscaping workforce are Hispanic and most business owners and workers earn well below the area median income. In addition to the high potential for negative impacts on Hispanic-owned businesses and workforce, there are customer segments that could also realize disparate impact. For example, fixed-income seniors routinely rely on landscaping services and may lack the financial capacity to bear an increased cost of service. Similarly, landscaping service costs already represent a significant portion of Homeowner Association (HOA) dues for multifamily properties. Dues increases can further impact housing affordability for renters and owners. Finally, the majority of landscaping service providers and equipment retailers and distributors are

based in surrounding communities, such as Longmont. These communities could benefit from increased sales revenue associated with electric equipment purchases but could also realize harm due to economic impacts on businesses and workers.

Engagement Results

The city launched three questionnaires on its online engagement platform, Be Heard Boulder, to evaluate community concerns regarding the use of landscaping equipment. The city sought feedback from three groups: those who live and work in Boulder, rental property owners, and owners/workers of landscaping businesses that operate in Boulder. The results of this engagement were presented at the April 27, 2023, council study session. Overall, survey respondents were supportive of education, outreach and voluntary programs for small businesses. There were also consistent views that a local sales ban would be ineffective. There was wide disparity in opinions regarding strategies such as use restrictions.

There is no single means for identifying or connecting with landscaping businesses serving customers in Boulder. In addition to some responses to the Be Heard Boulder survey, the project team has utilized several other tactics. This included an on-site visit to Western Disposal and interviews with businesses during yard waste and debris disposal, company shadowing (including shadowing all-electric business), interviews with equipment distributors and retailers, outreach through the Latino Chamber and referrals. The city also hosted a series of workshops that included equipment demonstrations and educational seminars. Highlights of some of the feedback obtained include:

- Productivity is critical to their bottom line.
    - Less powerful equipment slows them down.
    - They cannot afford to waste time in the field.
- There is a lack of trust that electric equipment will be reliable.
    - No way to charge batteries in the field and/or recharging takes too long and slows them down.
    - Less knowledge of how to troubleshoot equipment when it isn't working.
- There is a high degree of concern over cost impacts.
    - High first cost of equipment.
    - Need to charge more for service due to higher-cost equipment and lower productivity.
    - High cost of battery replacement.
- Their customers care about the bottom line and quality of service, not the equipment they use.
    - Customers unwilling to pay premium for electric service.[7]
    - Customers complain if there is debris left on the lawn or walk.
- There is concern about how the operational model will work.
    - Workers must charge batteries in their homes.

[7] One business reported that they started as an all-electric company but converted to gas because they were losing jobs.

Pilot Voucher Program

In 2023, staff were successful in obtaining a $211,774 grant through Boulder County's Sustainability Grants Program to implement a pilot rebate program for landscaping equipment. The pilot is being administered through Boulder County's PACE program. The PACE team worked with AGZA, the Latino Chamber and Boulder County distributors and retailers in developing the program. Under the pilot, small landscaping businesses receive a voucher for up to 80% of cost for electric landscaping tools. Participating businesses also receive, at no cost, a smart charging box to provide for safe managed charging, two fire extinguishers and a fire blanket. The goal of the pilot was to test the program design, increase experience with electric equipment and to drive additional participation by landscaping service providers in the city's engagement efforts.

Prior to being able to enroll businesses in the pilot, the team spent time researching program design and assessing equipment availability. Contracts also had to be negotiated with local retailers since the voucher design buys down the cost at the point of sale, rather than working as a post-purchase rebate. Enrollments began over the summer with 33 businesses signing up to participate. One of the biggest challenges encountered was the long lead time for ordering equipment. For this reason, some businesses elected not to use their voucher and those who did acquire equipment had limited operational hours with that equipment.

In fall 2023, businesses were asked to participate in a survey and one-on-one interviews. Businesses were asked a range of questions, including overall satisfaction with the program, what they liked, where they encountered barriers and for recommendations to improve the program. Overall, businesses found the program design and voucher appropriate. Many businesses reported barriers of equipment availability and equipment choice, recommending an expanded offering across more manufacturers. Of those who had successfully purchased equipment and gained some use experience, they found the electric leaf blowers inadequate for fall clean up. Businesses were also asked about perceptions around potential restrictions that could be imposed by the state or Boulder. Concerns expressed included lack of equipment suitable to the job, high cost of battery replacement, impacts on livelihood due to equipment cost and productivity loss, creating an environment that is more hostile and unproductive and a lack of workforce training.

In 2024, staff were able to secure a second grant for and addition $165,990 to allow the program to be extended and expanded for another year. This will allow a full season of experience with equipment purchased in 2023, as well expanding the number of program participants overall. The 2024 program kicked off with a demonstration event at the end of April.

State of Colorado Regulation

As discussed with council at the April 27, 2023, study session, Colorado's Air Quality Control Commission (AQCC) was in the process of developing rules that would cover

landscaping equipment use in the ozone non-attainment region. AQCC Rule 29 has since been adopted with the following restrictions:

- Beginning June 1, 2025, no state government agency in Colorado can use gasoline-powered push and hand-held lawn and garden equipment with an internal combustion engine smaller than 19 kW (25 horsepower) between June 1 and August 31 of each year.
- Beginning June 1, 2025, neither the federal government nor any local government can use gasoline-powered push and held-held lawn and garden equipment with an internal combustion engine smaller than 7 kW (10 horsepower) between June 1 and August 31 of each year in the ozone nonattainment area.
- The restrictions also apply to lawn and garden services contracted for and provided to the federal government, a state government agency, or a local government.

The rules do have exemptions for activities related to fire mitigation.

While AQCC considered restrictions beyond public agencies, including a potential regional sales ban, they elected to limit the initial rule due to concerns over supply chain constraints, costs, and regulatory complexity. It is expected that expansion of the rule will be considered at a future date.

City Resource Needs

In response to council's interest in a potential regulatory strategy, staff evaluated the resource strategies adopted by other jurisdictions. The best practice identified is the establishment of a dedicated compliance manager, who would focus on identifying businesses and conducting education and outreach during the first years of launch. Based on discussions with city's code enforcement team, staff believe the Boulder compliance manager could be a fixed term position, with the term determined based on the timeline established for education and soft launch (e.g., time period established for just warnings and education). The existing code enforcement team would assume responsibility for ongoing enforcement once that term ended.

STAFF RECOMMENDATIONS

Staff remain concerned about adopting a regulatory strategy at this time. Staff cite the potential for significant equity impacts. Staff are also concerned about limited equipment availability and the complexities of regulatory enforcement through noise ordinance. To the extent council wishes to proceed with adopting regulation, staff would make the following recommendations:

- Enforcement should be directed towards property owners and any tenants who procure the landscaping services, not on the landscaping businesses.
- A minimum two-year phase in should be adopted, where year one would be focused solely on education and outreach and year two would be limited to warnings and further education.
- The enforcement timeline should be flexible and adaptable to any supply chain constraints.

NEXT STEPS

Staff will continue to provide updates to council on the results of the ongoing pilot, as well as any changes at the state level. Should council wish to pursue a regulatory approach at this time, staff would begin ordinance development and would return to council for adoption based on council's feedback and desired components for that regulation.

COVER SHEET

MEETING DATE
May 16, 2024

INFORMATION ITEM
Core Arterial Network (CAN) Update

PRIMARY STAFF CONTACT
Stephen Rijo, Transportation Planning Manager / Allison Moore-Farrell, Senior Transportation Planner

ATTACHMENTS:

Description

- **Information Item A: Core Arterial Network (CAN) Update**

INFORMATION ITEM
MEMORANDUM

To: Mayor and Members of Council

From: Nuria Rivera-Vandermyde, City Manager
Pam Davis, Assistant City Manager
Natalie Stiffler, Director of Transportation and Mobility
Valerie Watson, Deputy Director of Transportation and Mobility
Stephen Rijo, Transportation Planning Manager
Gerrit Slatter, Principal Transportation Projects Engineer
Devin Joslin, Principal Traffic Engineer
Melanie Sloan, Principal Project Manager

Date: May 16, 2024

Subject: Information Item: Update on the Core Arterial Network Initiative

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EXECUTIVE SUMMARY

The City of Boulder has been working for decades to create a safe, equitable and reliable transportation and mobility system that offers travel choices and supports achieving our climate goals (2019 Transportation Master Plan, Boulder Valley Comprehensive Plan). As a result, we see significant numbers of people walking, bicycling, scooting, and taking transit as they move about or travel in and out of the city. Although we have made great progress, more work remains to be done along our arterial streets, which often have higher traffic volumes and speeds and can be more complex to navigate compared to other streets in the city. While arterials make up only 17% of streets within the city, findings from the Vision Zero Boulder: Safe Streets Report (SSR) show that citywide 67% of total crashes resulting in severe injury or fatality occur on arterials.

In response, the city is focusing its investments and resources to design and construct improvements on a "Core Arterial Network" (CAN). The CAN is the connected system of protected bicycle lanes, intersection enhancements, pedestrian facilities, and transit facility upgrades that will help reduce the potential for severe crashes and make it more comfortable and convenient for people to get where they need to go along Boulder's main corridors.

In February 2022, the Boulder City Council, in partnership with the Transportation Advisory Board (TAB), elevated work on the CAN as one of its 10 priorities for city department efforts. In April 2024, the Boulder City Council again identified the CAN as a priority.

The 13 corridors and associated street segments identified in the CAN form a prioritized subset of the Transportation & Mobility Department's work plan over the next 3-5 years for project initiation, ongoing project efforts, prioritization of staff efforts and city resources, and pursuit of grant and external funding (Attachment A).

Since the launch of the Core Arterial Network (CAN) initiative in spring 2022, Transportation & Mobility staff have made significant progress on work plan items relating to the three CAN Priority Corridors (Baseline Rd, Iris Ave, and Folsom St) as well as other CAN projects.

Staff provided an information item to the Transportation Advisory Board (TAB) at their April 8, 2024, meeting to provide them with an update on the CAN initiative, including Priority Corridors, current work, and funding. TAB expressed continued support for the CAN, shared expectations that CAN corridors include protected bike lanes, encouraged staff to continue to accelerate work on the CAN, and committed to supporting the CAN through their role in the community.

This information item provides an update of progress since the previous information item was submitted to this Council on July 20, 2023, on the overall CAN initiative, Priority Corridors progress, current work and funding plans, and next steps for the initiative.

FISCAL IMPACT

Since the establishment of the CAN as a City Council priority in early 2022, $15.6 million in funding has been awarded for CAN projects through various external grant pursuits. The primary sources for these funds were the competitive grant programs offered through the Denver Regional Council of Governments (DRCOG) Transportation Improvement Program (TIP) and the Colorado Department of Transportation (CDOT) Transportation Alternatives Program (TAP).

The city recently was awarded over $23 million in federal Safe Streets and Roads for All (SS4A) funding. This award is significant, both in dollar amount and in its recognition of the incredible Vizion Zero work we have done to date: the City of Boulder received the largest allocation of safety funding of similar size communities and only three communities received larger awards than we did: New York City, NY, Detroit, MI and Dearborn, MI. The SS4A funds will significantly accelerate implementation of specific actions from the city's Vision Zero Action Plan that aims to reduce severe crashes, many of which fall along CAN Corridors.

These awarded TIP and TAP funds initiated planning, design and implementation of projects beginning in 2024 and the SS4A funds will continue to do so beginning in 2025, with work continuing through 2028. The relationship between Vision Zero and the CAN represents our long-term commitment to Vision Zero and the Core Arterial Network (CAN) that spans multiple years and is infused in our multi-year Capital Improvement Program (CIP) and departmental work plan. Leveraging our limited local dollars to secure these external grant funds secures a

path forward and defined timeline for key Vision Zero and CAN efforts to achieve high-quality infrastructure for all ages and abilities. The department is, in turn, accelerating the project development and community engagement phases of our work to avail of these funding opportunities and speed overall implementation of a safe, comfortable, and connected transportation network.

Still, improvements to make everyone's travel in our community safer will require more funding in the future. Staff will request funds for future CAN corridor recommendations in departmental budget cycles and continue to pursue future external grant funding opportunities. The overall strategy for funding CAN corridor efforts will focus our limited local dollars on preliminary design, community engagement, and consultant assistance for Priority Corridor and other corridor segments and studies. Funding for final design and construction efforts will generally be solicited from external grant opportunities due to the significant costs associated with infrastructure projects. Staff continues to balance the need to enhance our system with the need to maintain it.

COMMUNITY SUSTAINABILITY ASSESSMENTS AND IMPACTS

- Economic: This initiative helps the city achieve its economic goals by improving multimodal infrastructure that enhances safety and connectivity for people driving, walking, bicycling, and taking transit. Providing improved multimodal infrastructure on Boulder's arterial streets leverages the existing world-class network of off-street multi-use paths, existing on-street bicycle network, and existing transit service to afford even more low-stress connectivity for residents, employees, and visitors of a wide range of ages and abilities to key employment and shopping destinations. Analysis conducted by staff to understand the potential impact of project implementation reveals that 71% of Boulder jobs and 63% of Boulder residents are within one-half mile of a CAN corridor.

- Environmental: This initiative helps the city achieve its environmental goals by facilitating non-vehicular modes of transportation and shifting single occupancy vehicle trips to transit, walking, and biking, thereby reducing vehicle miles traveled and associated greenhouse gases. This shift can also protect water and air quality through reduction of mobile source emissions of pollutants and can work to help achieve the city's energy and climate goals by providing comfortable and convenient modes of transportation throughout the city, especially in areas currently lacking east-west and north-south connectivity for people walking and bicycling.

- Social: This initiative helps the city achieve its social sustainability goals by improving the transportation options for all members of the community to use. This initiative advances the city's Racial Equity goals by focusing on communities of color to support those unjustly burdened by racial inequity and by focusing on equity so that everyone is valued, respected, and heard. With transportation generally accounting for the second highest household cost, connecting people to jobs, healthcare, healthy food, parks, and other opportunity with a range of mobility choices is part of lifting up those in our community who have experienced or currently experience financial hardship.

BACKGROUND

As detailed in the July 21, 2022, November 10, 2022, December 1, 2022, and July 20, 2023 memoranda to Council, there is a strong rationale for focusing the city's resources on the CAN. While arterials make up only 17% of streets within the city, findings from the Vision Zero Boulder: Safe Streets Report (SSR) show that citywide 67% of total crashes resulting in severe injury or fatality occur on arterials. In response, the Boulder City Council, in partnership with the Transportation Advisory Board (TAB), elevated work on the CAN as one of its 10 priorities for city department efforts in January 2022. In April 2024, the Boulder City Council again identified the CAN as a continuing priority. The CAN is a connected system of protected bicycle lanes, intersection enhancements, pedestrian facilities, and transit facility upgrades that will help reduce the potential for severe crashes and make it more comfortable and convenient for people to get where they need to go along Boulder's main corridors.

As discussed at the April 11, 2024 meeting of Council where staff presented an update on the Vision Zero Action Plan, the city also developed the 2023—2027 Vision Zero Action Plan (VZAP) to respond to the findings of the SSR. One result of the VZAP is the High Risk Network (HRN). The HRN is a network of streets in the city that features the most contextual factors associated with fatal and serious injury crashes. Measured by crashes per vehicle miles traveled, the HRN has roughly five times more risk than all of Boulder's arterial streets combined. Managing risk and mitigating crashes on this small percentage of streets can have an outsized impact on reducing fatal and serious injury crashes. The systemic safety analysis used to identify the HRN also turns our focus to proactively installing proven safety countermeasures at key locations across the transportation system. Proactive implementation aims to prevent crashes before they occur. The VZAP contains a series of actions, including proactive actions, that the city will take over the next five years to reduce the number of traffic-related fatalities and serious injuries to zero. One action is to implement capital projects on the HRN and high priority CAN corridors, demonstrating both the overlap of the HRN and CAN and that the CAN is one of the main strategies for achieving Vision Zero (Figure 1).

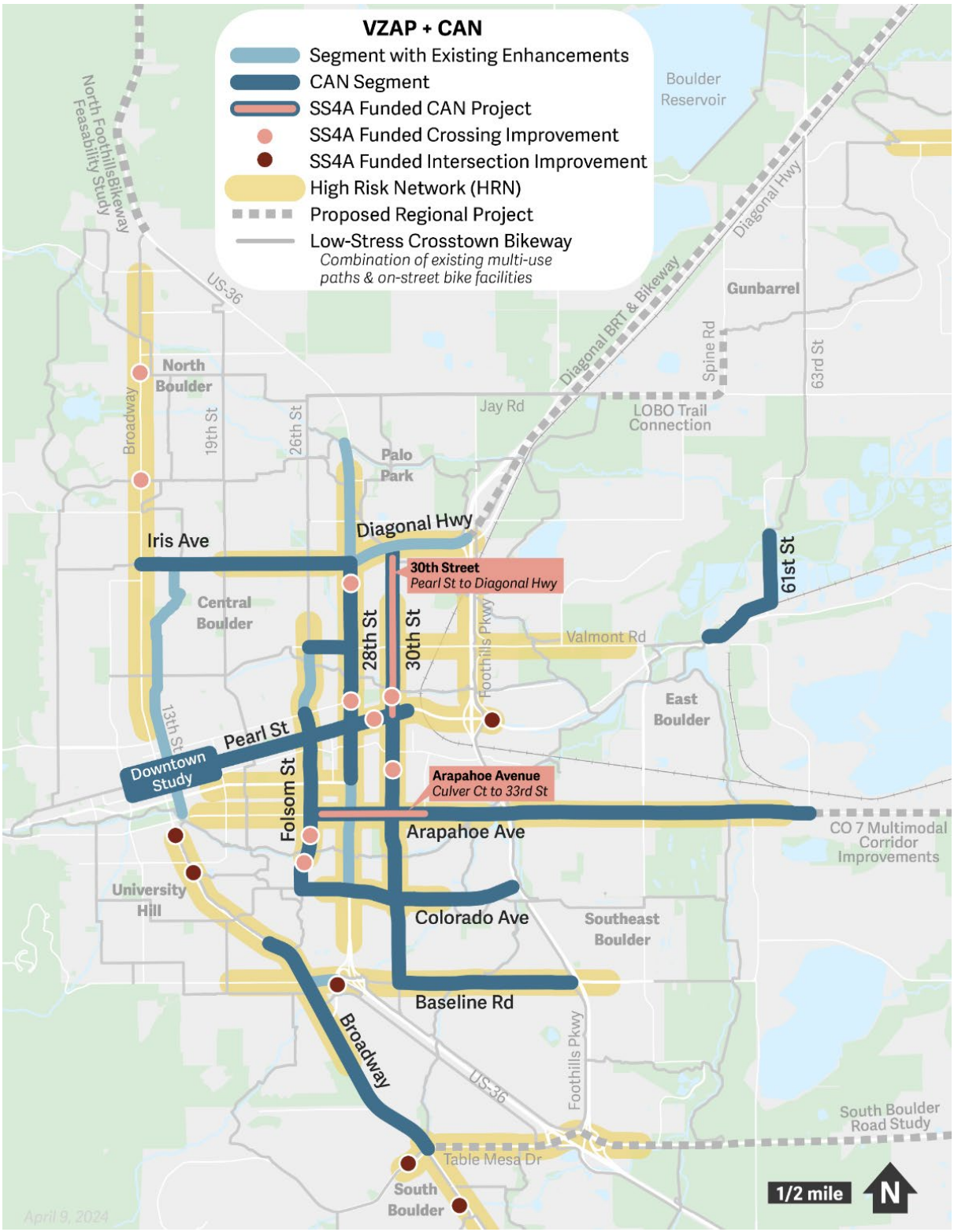


Figure 1: Vision Zero Action Plan, High Risk Network, and Core Arterial Network Map

The VZAP and CAN, like all our work, are grounded in the Sustainability, Equity and Resilience (SER) Framework, particularly the objectives of a Safe and Accessible & Connected city. In addition, the Citywide Strategic Plan includes Priority Actions in support of achieving Vision Zero within the SER framework goal area of Safe.

Council emphasized the need to "be bold" and to accelerate progress on CAN project development, design, community engagement, and implementation. Subsequently, staff developed an overall CAN initiative work plan and schedule. A total of 13 corridors and associated street segments identified in the CAN form a prioritized subset of the Transportation & Mobility Department's work plan over the next 5 years (Attachment A). The CAN will bring corridor-level transformations to these streets in record time dependent on funding availability, amplified by the spot-location VZAP-related improvements.

Accelerating the CAN is important because staff heard from the community through engagement for priority corridors that they avoid walking on CAN corridors despite the directness they provide to everyday needs, like grocery stores or high frequency transit. We heard from parents who will not walk or ride a bike on these streets - or let their kids– because they do not feel safe traveling along or across them. And we heard from people who feel unsafe driving on or turning onto or off of these streets because of speeding vehicles.

Staff have developed new ways to achieve the work more quickly. Blended teams accelerate planning and design and position projects to leverage local dollars to pursue external grant dollars, or leverage planned work, like pavement management, to implement strategic safety improvements more quickly. This approach was modeled on the Baseline Road Priority CAN corridor and will influence future CAN corridor efforts to expedite projects from design to implementation as quickly as possible.

Over 20,000 older adults and youth, 22,000 people of color, 3,400 car-free households, 6,000 people living with a disability, and 45,000 members of Boulder's essential workforce live along CAN corridors and will have safer transportation options as a result of this work.

Attachment B and Attachment C show the most up-to-date program of work and schedule. Both reflect the substantial progress on design and project development efforts and the result of successful grant funding pursuits for CAN corridors.

Staff offer this information item to provide Council an update since we last reported to Council in July 2023 on the schedule and overall initiative activities, along with current information on overall implementation timelines.

ANALYSIS

The CAN initiative remains on track with 18 projects on 9 of the 13 CAN corridors having funding or being active in planning, design, and/or construction in 2024 (Figure 2).

Since we last updated Council at the July 2023 meeting, staff have the following overall CAN progress summary to report:

- Baseline Road (30th Street to Foothills Parkway) Priority Corridor
    - Phase 1 improvements, including repaving, installing an interim protected intersection, and building the first concrete tall curbs in the U.S. to protect bike lanes, was completed in October 2023.
    - Phase 2 planning and design, which will build more significant improvements on Baseline Road with external grant funds, began community engagement in May 2024 with stakeholder and community engagement including an online questionnaire and pop-ups to meet people where they are.
- Iris Avenue (Broadway to 28th Street) Priority Corridor
    - In 2023, the project focused on data collection and community engagement, hosting 27 engagement activities that reached over 1,600 people and garnered more than 2,100 comments by year end.
    - Conceptual design work began in early 2024 to advance the overall design process, develop design alternatives that respond to the identified issues and opportunities, and to advance the VZAP.
    - An open house was hosted on April 27, 2024, and is followed by additional engagement events to share conceptual design alternatives with the community for their feedback on their priorities to advance a design that will balance multiple tradeoffs.
    - An item for City Council is scheduled for June 6, 2024, to include an update on project process, conceptual designs, and data informed trade-offs.
    - Evaluation of the conceptual design alternatives will follow in summer,
    - Staff will develop a recommended alternative to share with the TAB and City Council in fall.
- 13th Street Neighborhood GreenStreet – enhanced crossing at 15th Street and Iris Avenue
    - Completed contracting and will begin construction of a new pedestrian median and pedestrian signal and improve bike connections to the crossing in May; the work will take about one month to complete.
- 28th Street Improvement Project (Canyon Boulevard to Iris Avenue)
    - Began utility relocation work in fall 2023 in preparation for the start of construction of multi-use paths and Business-Access-Transit lanes later this year.
- 30th Street Preliminary Design (CO 119/Diagonal Highway to CO 7/Arapahoe Ave)
    - Community engagement began April 24 with a youth walk audit led by partners Growing Up Boulder and the Family Learning Center.
    - Contracting for consultant support of preliminary design for the project will be completed in May 2024.
- 30th Street Protected Bike Lanes (Arapahoe Avenue to Colorado Avenue)
    - Began construction in April and will continue protected bike lanes north to Arapahoe Avenue from the recently completed 30th Street and Colorado Avenue protected intersection.
- Broadway Transit Improvements (Table Mesa Drive to Regent Drive)
    - Design begins in May 2024 and will continue through this winter, with construction of intersection improvements and completion of a Business-Access-Transit feasibility study to follow in 2025.
- Colorado Avenue and 28th Street Protected Intersection

- Began construction of the city's second fully protected intersection in winter 2023 with work anticipated to finish by June.

- East Arapahoe Avenue Multi-use Path and Transit Stops Project (Foothills Parkway to Cherryvale Road)
  - Utilities work began in winter 2023 with construction of multi-use path and bus stop improvements to follow, beginning in winter 2024 and completing in late spring 2025.

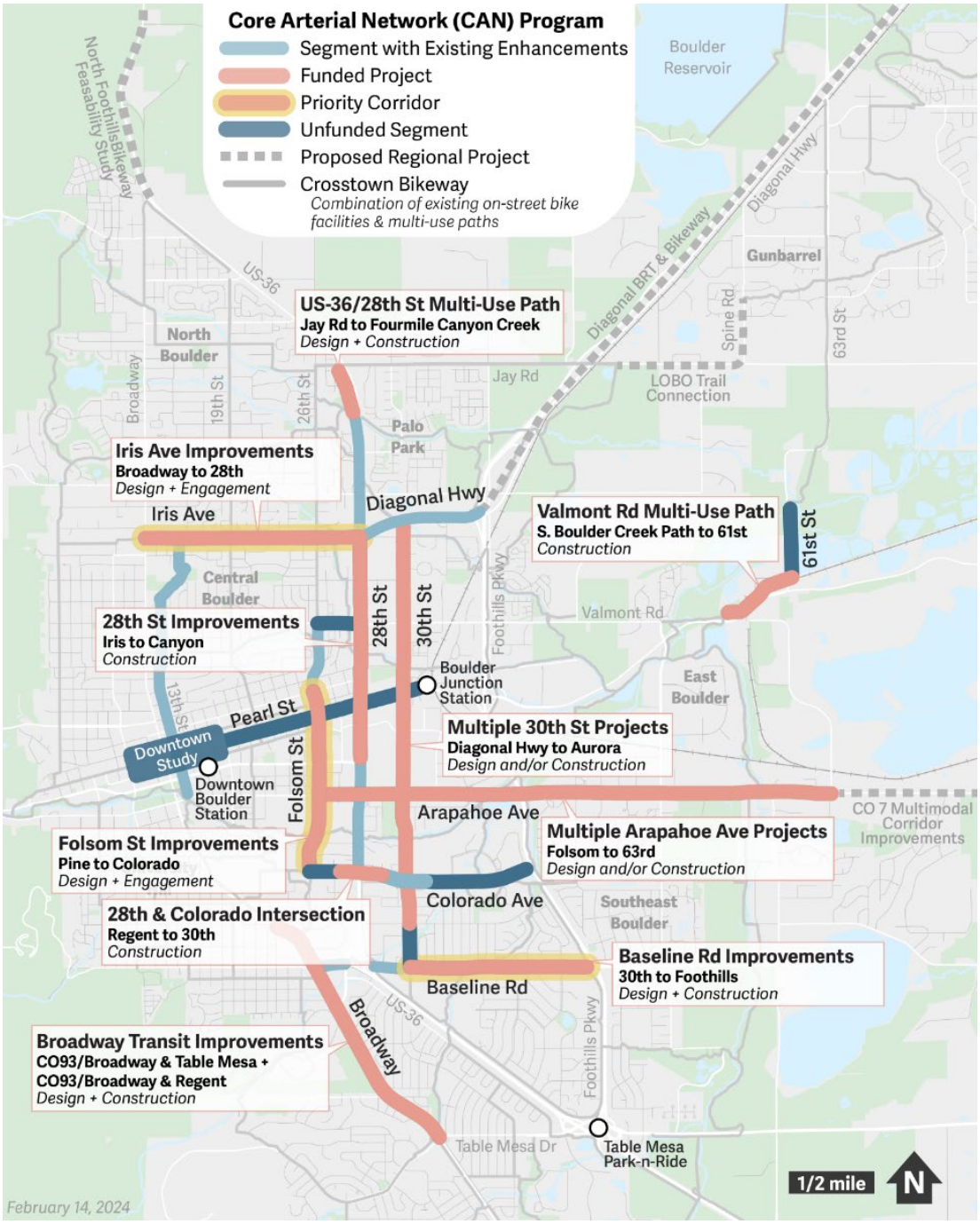


Figure 2: Core Arterial Network Workplan

Active Projects Along the Core Arterial Network (CAN)

Priority Corridor Update

There are three CAN Priority Corridors: Baseline Road, Iris Avenue, and Folsom Street. These were selected for their value to the network in terms of providing enhanced multimodal north-south and east-west connectivity currently lacking in those areas of the city, the opportunity to couple improvements with scheduled pavement resurfacing, and the ability to advance VZAP actions to reduce severe injury crashes on these key High Risk Network corridors.

Baseline Road Priority Corridor

Work on the first Priority Corridor, Baseline Road from 28th Street to Foothills Parkway, began in 2022. The Baseline Road Priority Corridor is one of the most-traveled east-west corridors in the city and is home to many key community destinations and services, including affordable housing, grocery stores, shops, health centers, and student housing for the University of Colorado Boulder. It connects residents, students, and employees and serves regional transit for East Boulder and Boulder County.

The SSR identified this section of Baseline Road as one of the top 10 crash locations for people walking and bicycling in the city, the VZAP identified it as part of the HRN, and the Denver Regional Council of Government's (DRCOG) identified it as part of the Regional High Injury Network as a Critical Corridor. Baseline was identified as a CAN Priority Corridor because of these findings.

Baseline was identified as the first Priority Corridor because it could be phased: Phase 1 used local dollars and leveraged planned Pavement Management Program (PMP) pavement resurfacing to gain the safety benefits of strategic, prioritized location improvements now while the city awaited the distribution of DRCOG 2022-2025 TIP funds in the first quarter of 2024.

After 12 months of design and community engagement, implementation of Phase 1 changes to Baseline Road were completed in October 2023. Changes included the first use of concrete “tall curbs” in the United States and incorporation of public art by local artist Talia Parsell (Figure 3 and Figure 4).

Figure 3: Tall Curb Protected Bike Lane Featuring the Work of Local Artist Talia Parsell

To augment the city's limited local dollars, the department pursued competitive external grant funding to bring more permanent, capital-intensive improvements to the Baseline Road corridor for Phase 2 of the CAN Priority Corridor effort. DRCOG Transportation Improvement Program (TIP) grant funds of $3.1 million awarded in 2023 became available in early 2024. These funds initiated Baseline Phase 2. Phase 2 includes design and engagement to support comprehensive implementation of multimodal, capital-intensive improvements, such as completing the bike lane and intersection protection provided with roadway repaving in Phase 1, additional pedestrian and protected intersection enhancements, and transit efficiency improvements.

Figure 4: Baseline Road Priority Corridor Phase 1 Improvements Completed with Paving

Key stakeholder and community engagement began in May. This second phase of engagement will build off the following themes heard in the first phase of work:

- High speeds and amount of vehicular travel along the corridor
- Drivers turning on/off the corridor feel unsafe due to high speeds on Baseline Road
- Perceived lack of safety and comfort for people bicycling in the existing protected bicycle lanes that are demarcated with flexible delineators
- Conflicts between people bicycling and buses accessing the curb for passengers
- People walking and rolling want more and safer crossings that provide enough time to cross the street and provide enough space for them and for micromobility users
- Sidewalks need repairs in some locations
- Difficulty connecting to/from surrounding infrastructure for people walking and bicycling from or along Baseline Road
- Noise and lack of comfort walking along the corridor or waiting for the bus
- Lack of amenities at transit stops, such as shelters, benches, trash facilities, secure bicycle parking, and visibility due to vegetation growth
- Poor pavement condition within the roadway, bicycle lanes, and crosswalks

Conceptual designs will be informed by these themes, what we heard from partners and the public in this second phase of engagement, data collection, traffic analysis, and incorporate proven safety countermeasures and other engineering solutions identified in the VZAP, such as protected bike lanes, protected intersections, and setback multi-use path crossings.

Additionally, staff will coordinate design with separate, related, and concurrent efforts funded under the Highway Safety Improvement Program (HSIP), the Colorado Safe Routes to School (SRTS) grant program, and the city's pavement management program:

- Realigned crossing and pedestrian signal at Baseline Road and Canyon Creek Road
- Signal upgrades at Baseline Road and Mohawk Drive
- Creating safer routes for Manhattan Middle School students and the Manhattan Neighborhood on Manhattan Drive from Baseline Road south to Iroquois Drive
- Re-Paving Baseline Road from Foothills Parkway to Cherryvale Road

Baseline Road Phase 2 designs will be shared with the community to receive their feedback in summer 2024. This input will inform the final design, which is anticipated to be completed in fall 2024. Work to prepare the Phase 2 project for construction will continue into 2025. Construction is anticipated to begin mid-year 2025 and take 12 months to complete.

Iris Avenue Priority Corridor

Work on the second Priority Corridor, Iris Avenue from 28th Street to Broadway, began in summer 2023. Iris Avenue is an important east-west corridor in north Boulder that provides direct, convenient connections to everyday neighborhood destinations and supports travel within Boulder and between Boulder and communities along the Diagonal Highway (Figure 5).

Figure 5: Iris Avenue Priority Corridor Project Limits

The CO 119 Safety, Mobility and Bikeway Project will bring regional multimodal transportation improvements, including bus rapid transit and off-street multi-use path connections, to the eastern edge of the project corridor. Construction is scheduled to start on this project in 2024 and be completed in spring 2027.

The SSR found crashes occurring at each of the major intersections on the corridor with serious injury crashes at the Broadway and 28th Street intersections, the VZAP identified Iris Avenue from 19th Street to 28th Street as part of the HRN, and the city's Low Stress Walk and Bike Network Plan (2019) calls for greater vertical separation and protection between vehicle and bicycle lanes on Iris Avenue and the need for pedestrian improvements in key areas.

These projects and plans demonstrate the important role Iris Avenue serves in the city and regional transportation networks and why this corridor was selected as the second Priority Corridor.

In 2023 the city focused its efforts on data collection and community engagement by hosting 27 engagement activities that reached over 1,600 people and garnered more than 2,100 comments. Community engagement is an integral part of the overall project development process with feedback from the community on existing conditions, challenges, and opportunities informing the design process. Community partners helped broaden the reach and quality of engagement through walk audits, Spanish-language and older adult-focused engagement activities, bikeabouts, accessible roll and strolls, conversations with business owners and operators, and pop-ups at important community destinations including Safeway, Columbine and Foothills elementary schools, transit stops, and Growing Gardens (Figure 6).

Figure 6: Iris Avenue Priority Corridor Engagement In 2023

Themes heard from the 2023 community engagement are:

- East-west travel is important, and drivers appreciate Iris Avenue as a convenient and reliable route across the city
- People walking, rolling, biking, and taking transit also want Iris Avenue to provide convenient and safe routes
- Sidewalks could be improved to provide comfort, safety, and attractive walking conditions. Sidewalks are currently not wide enough, winding, sloping, bumpy, and often blocked by overgrown vegetation
- Crossing Iris Avenue safely and conveniently is a priority for people of all ages and abilities traveling to school, work, for errands, and for recreation – but today some see it as a barrier to getting where they want to go
- Vehicles travel at high speeds, creating unsafe conditions and excessive street noise
- Safer neighborhood and business access is essential
- Drivers feel unsafe turning onto and off Iris Avenue and feel they're more likely to crash with oncoming traffic when doing so
- Delivery, transit, waste management and other vehicles stop in-lane, blocking the bike and right-side travel lanes
- Residents are concerned changes will impact emergency evacuation and response
- Neighbors want to maintain the character of their neighborhoods, which they see as providing safer, more comfortable alternatives for walking, rolling, and biking than arterial streets like Iris Avenue, and they are concerned that changes to Iris Avenue could create traffic diversion onto nearby streets
- Community members want attractive facilities and opportunities for placemaking
- Better wayfinding and help navigating to local and regional destinations are desired
- Roadway pavement conditions could be improved
- Transit service is infrequent, and many transit stops are not accessible and lack shelters, benches, and trash cans

Data collection and analysis occurred concurrent with engagement throughout 2023. Data included the number and speed of vehicles on Iris Avenue and nearby neighborhood streets, the number of people biking on Iris Avenue, and the number of people walking and biking across Iris Avenue on a typical day, among other information.

The engagement themes, data collection and analysis provided understanding of the existing conditions on Iris Avenue and helped identify issues and opportunities for improvement. Design work began in early 2024 to develop conceptual alternatives to address what staff heard from the community and learned from initial data and analysis.

Conceptual alternatives were shared with the community for their feedback at an in-person open house on April 27, which over 250 people attended (Figure 7). Ongoing engagement events hosted through May, including an online open house in both English and Spanish languages, and community pop-ups at the North Boulder Recreation Center and neighborhood parks, provide additional opportunity for community feedback.

These engagement events provided opportunity for the public to learn about the work completed since the last open house in 2023, share design considerations so that people can compare and contrast the alternatives, and, because there are tradeoffs for each alternative, seek feedback to understand their priorities so that staff can advance design.

Figure 7: People attending the April 24, 2024, Iris Avenue project open house

Staff will advance project design and continue evaluating the conceptual alternatives through a Community and Environmental Assessment Process (CEAP). The CEAP provides the opportunity to balance multiple community goals in the design of a capital project by assessing consistency with policies outlined in citywide and departmental plans, along with environmental, social and fiscal impacts. The evaluation will be shared with the community for feedback to inform development of a recommended alternative. The CEAP and opportunities for the community to provide feedback on it and the evaluation of concept alternatives will happen later this summer.

Staff will then finalize the CEAP and develop a recommended alternative, which will be brought to TAB and City Council this fall. The TAB will be asked to make a recommendation on approval of the CEAP for council to then take action on the recommended design.

The City Council approved design, or preferred alternative, will be implemented as funding is secured.

Folsom Street Priority Corridor

The Folsom Street Multimodal Improvements Project from Pine Street to Colorado Avenue is the third CAN Priority Corridor (Figure 8). Folsom Street is an important north-south corridor in central Boulder. It connects homes, office spaces, restaurants, shops, grocery stores, parks, and

CU's main campus to each other and the city's transportation network for walking, biking, driving, and taking transit.

The SSR found between 2015 and 2019 the corridor had 253 crashes, eight of which were severe, including one fatality, and virtually all involved someone walking or biking, the VZAP identified most of the corridor is on the HRN (Fremont Street to Taft Drive), and the city's Low Stress Walk and Bike Network Plan (2019) calls for greater separation and protection between vehicle and bicycle lanes and the need for pedestrian improvements in key areas.

The project also has high potential to address racial inequity because many of the almost 28,000 people who live along the corridor are historically underserved: 23% are individuals of color, 40% are in low-income households and 15% are in households with no access to a motor vehicle.

Folsom Street is designated by DRCOG as an Active Transportation Corridor for its potential for greater non-single occupancy vehicle use if safer connections were implemented. On an average day, 17,450 vehicles are driven on Folsom Street between Pine Street and Colorado Avenue – and 4,000 people walk, 1,600 people bike, and 1,125 use transit despite the corridor offering little physical protection and few amenities for the most vulnerable road users (Figure 9).

The Folsom Priority Corridor provides important access to opportunity and short trip linkages by providing walkable, bikeable, and transit supportive connections that link to previously implemented protected bicycle lanes on Folsom Street from Valmont Road to Pine Street as well as connect to planned improvements on Colorado Avenue.

Conceptual design and community engagement will initiate in early 2025 when DRCOG TIP funds become available. Depending on project sequencing, the Pavement Management Program will also bring scheduled pavement resurfacing to the corridor.

Final design and implementation will be advanced as funding is secured.

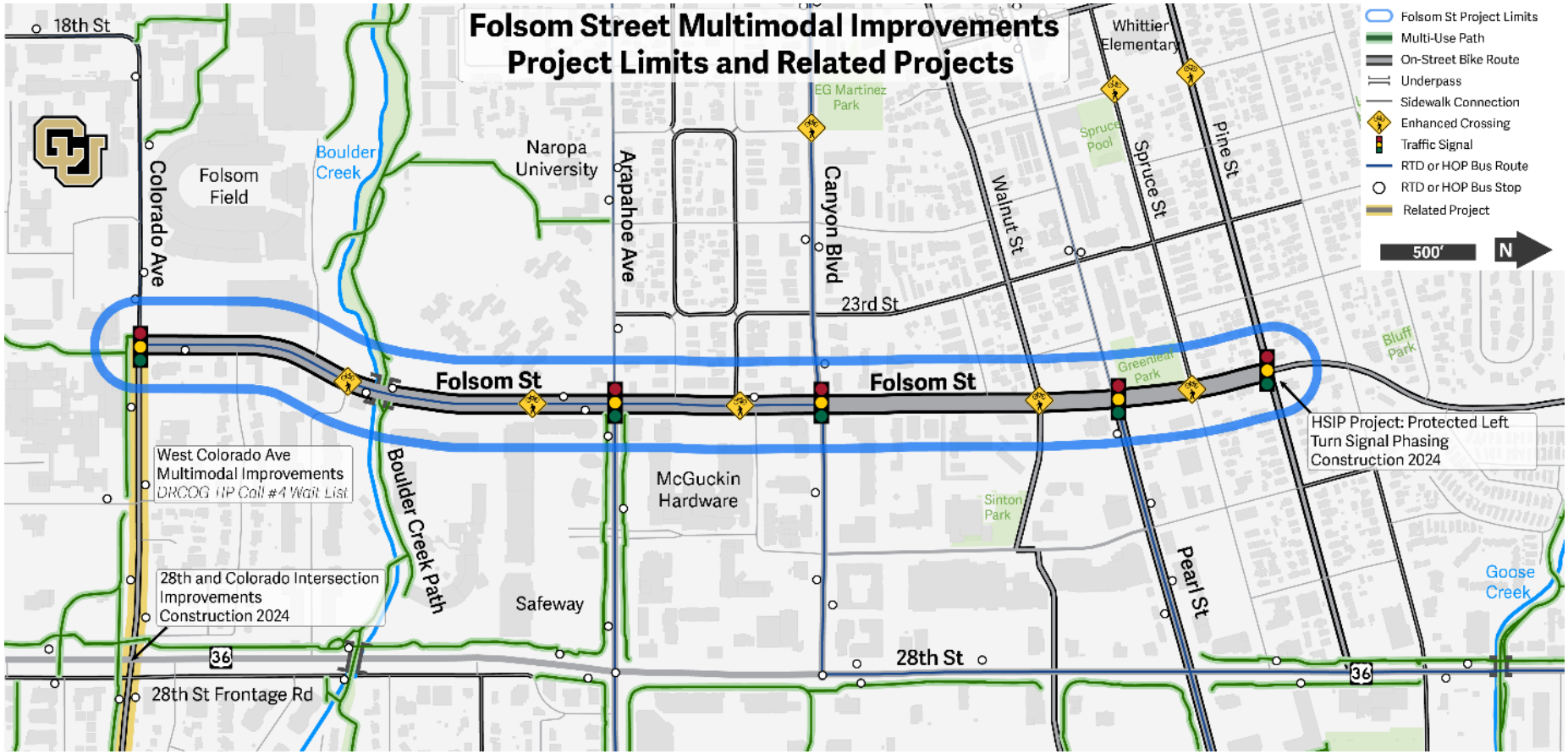


Figure 8: Folsom Street Priority Corridor Project Limi

Figure 9: Folsom Street Priority Corridor Active Transportation Corridor

Current and Future Projects

Planning & Design

30th Street Complete Street Preliminary Design Between Arapahoe Avenue to the Diagonal Highway

30th Street between Arapahoe Avenue (CO-7) and Diagonal Highway (CO-119) is a primary north-south arterial street in Boulder and provides local and regional connections to Boulder Junction, the University of Colorado-Boulder (CU) East Campus, the 29th Street Mall, and thousands of residences and jobs. While it is an important multi-modal travel corridor with 20,000 vehicles, 1,109 transit, and 1,700 walk and bike trips in a typical day, the current design is oriented to facilitating vehicular mobility which creates conflicts between all modes, travel delays for buses, and a high level of stress for bicyclists and pedestrians (Figure 10).

The SSR identified the 30th Street and CO7/Arapahoe Avenue intersection as one of the top 10 crash locations in the city, the VZAP identified 30th Street from Colorado Avenue to Valmont Road on the HRN, DRCOG identified 30th Street from Valmont Road to Diagonal Highway (CO-119) on the Regional High Injury Network and 30th Street from Valmont Road to Arapahoe Avenue as a Critical Corridor, and the city's Low Stress Walk and Bike Network Plan (2019) calls for greater separation and protection between vehicle and bicycle lanes from Pearl Street to the Diagonal Highway (CO-119) and the need for pedestrian improvements in from Arapahoe Avenue to Walnut Street and from Valmont Road to the Diagonal Highway (CO-119).

Figure 10: 30th Street Core Arterial Network Corridor shown with Crash History (2018-2020)

The 30th St Preliminary Design will collect data and conduct collaborative community engagement to inform a 15% preliminary design for the corridor that provides safe, reliable, and equitable transportation choices to eliminate serious injury and fatal crashes on the street. Conceptual design and community engagement will begin in April 2024 with a community partner led youth walk.

A design recommendation based on community feedback, data and analysis, and plans and policies will be brought to TAB and City Council through the CEAP. TAB will be asked to make a recommendation on the CEAP to Council for them to take action on the recommended design. These public meetings are anticipated to take place in 2025.

At the end of 2023, the city received a Safe Streets for All federal grant to advance design and implement improvements on 30th Street between Pearl Street and Diagonal Highway identified by the VZAP and this project. Additional funds will likely be needed to implement all project recommendations, and these will be implemented as funding is secured.

30th Street & Arapahoe Avenue Intersection Preliminary Design

The 30th Street & Arapahoe Avenue Intersection Preliminary Design project is at the nexus of two CAN corridors: 30th Street and Arapahoe Avenue (Figure 11).

The SSR identified the 30th Street and CO7/Arapahoe Avenue intersection as one of the top 10 crash locations in the city, the VZAP identified Arapahoe Avenue as a high priority HRN, and the city's Low Stress Walk and Bike Network Plan (2019) calls for greater separation and protection between vehicle and bicycle lanes as well as for pedestrian improvements.

The intersection is also a high-volume transfer point for transit passengers connecting between the high-frequency north-south BOUND route on 30th Street and the high-frequency east-west JUMP route on CO7/Arapahoe Avenue, which provides transit access to east Boulder County communities. In the future, this will be an even more important regional transit connection as CO119 BRT (between Boulder and Longmont) and CO7 BRT (between Boulder and I-25) come into service.

The project will begin preliminary design and engagement activities in winter 2024 and continue through late summer 2025. Construction will follow in winter 2026. When completed, the project will extend work currently underway to construct protected bike lanes along 30th Street south of the intersection and will integrate with design recommendations from the 30th Street Complete Street Preliminary Design north of Arapahoe Avenue to the Diagonal Highway and the East Arapahoe Avenue Multimodal Corridor final designs.

The project is funded by Colorado Department of Transportation and local funds, with implementation funding being provided by the 2023 awarded Safe Streets and Roads for All federal grant.

Figure 11: 30th Street and Arapahoe Avenue Intersection Preliminary Design Project

East Arapahoe Avenue Preliminary Design from 28th Street to 64th Street

The East Arapahoe Avenue from 28th Street to 64th Street project is a section of segment A in the CO 7 Multimodal Corridor. Segment A is a critical commuter and business route that connects the region to Boulder's core. The project area is commonly known as East Arapahoe, a six-lane road and one of the most heavily traveled commuter corridors in the city (Figure 12).

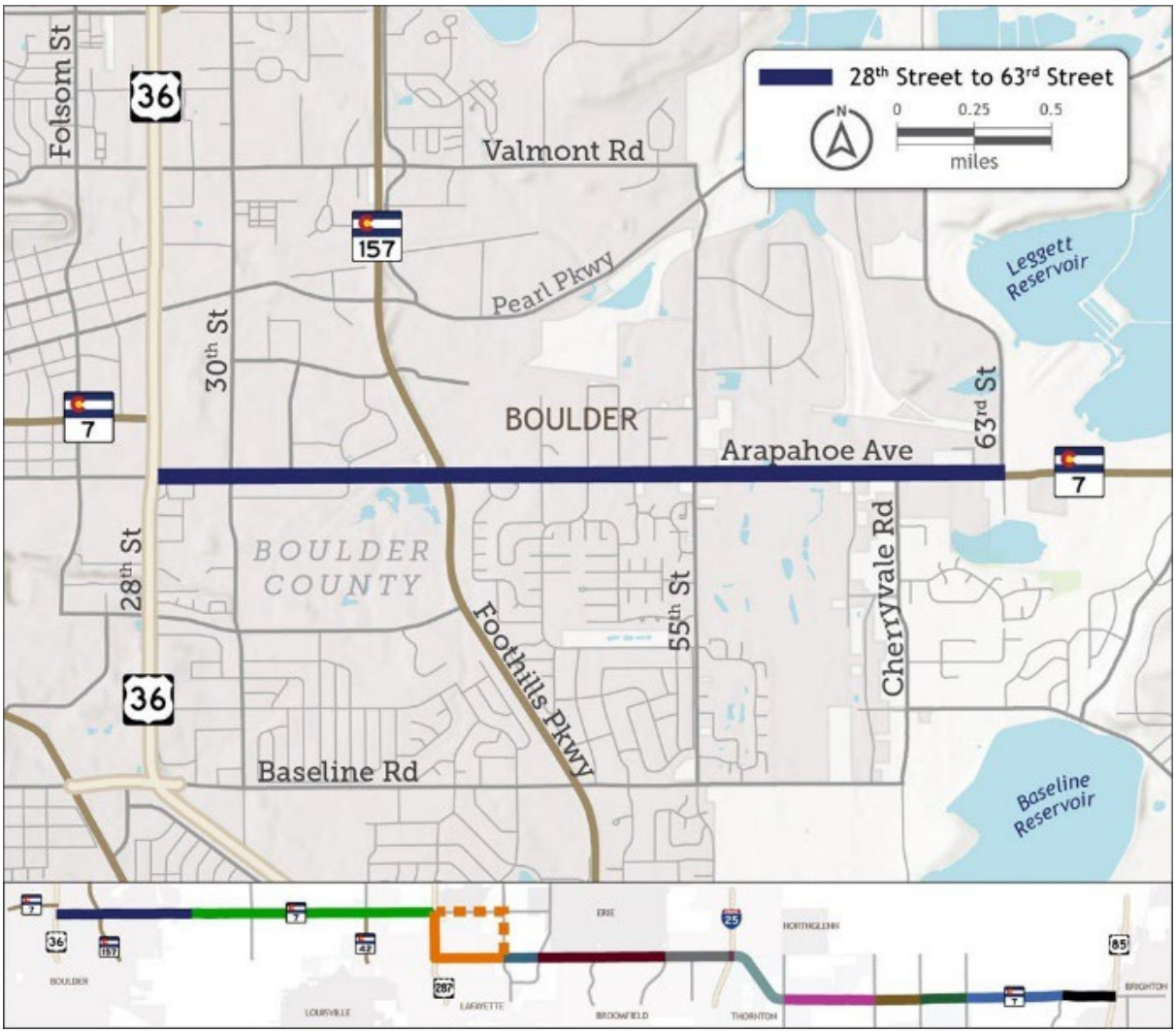


Figure 12: East Arapahoe Avenue Preliminary Design from 28th Street to 64th Street Project Limits

The SSR identified Arapahoe Avenue as a top crash corridor, including a fatal crash and many crashes including people walking and biking, the VZAP identified the corridor as a high priority HRN, DRCOG identified it as part of the Regional High Injury Network and a Critical Corridor, and the city's Low Stress Walk and Bike Network Plan (2019) calls for greater separation and protection between vehicle and bicycle lanes and the need for pedestrian improvements in key areas.

Preliminary design for segment A began in 2022 and will be completed in mid-2024. The city has received some funding to advance final design and implementation for portions of segment A. The city will continue to pursue additional funding to advance the remaining portions.

Final Design and Construction

We are additionally making progress on several other CAN corridors which will be in final design or construction in the next several months. An updated version of the CAN Work Plan Schedule is shown in Attachment C.

A detailed list of ongoing and active implementation work and timelines of non-Priority Corridor projects on CAN corridors are shown in Table 1.

Table 1: Current Status of CAN Work Plan Projects in Final Design and Construction

Project Name	Status	Improvements	On-Track
28th Street Improvement Project – Canyon Blvd to Iris Ave	Utilities work started in fall 2023 and will take nine months to complete, construction will follow utilities work in summer 2024 and will last 12-18 months.	Multi-use paths, Business-Access-Transit lanes, Drainage upgrades, Utility relocations	Delay due to utility work
Colorado Avenue and 28th Street Intersection Improvements	Construction began in winter 2023 and will be completed in late spring 2024.	Protected intersection, Sidewalk level bike lanes, Bus lanes	Yes
30th Street Multimodal Improvements: Colorado Ave to Aurora Ave	Preliminary design and engagement activities will begin in winter 2024 in preparation for receipt of awarded grant funds in early 2025; construction will follow in winter 2026.	Protected bike lanes, Widened sidewalks, Protected intersection elements, Transit priority	Yes
30th Street Protected Bike Lanes – Arapahoe Ave to Colorado Ave	Construction began in April 2024 and will be completed in late spring 2025.	Protected bike lanes, Widened sidewalks	Yes

Project Name	Status	Improvements	On-Track
Broadway Transit Improvements - Table Mesa Dr to Regent Dr	Design will begin in May and continue through winter 2024 with construction to follow in 2025.	Intersection improvements, Transit signal priority, Business-Access-Transit feasibility study	Yes
East Arapahoe Avenue Multimodal Corridor Final Design and Implementation – 28th St to Foothills Pkwy	Final design will begin in summer/fall 2024 and will be completed in summer/fall 2025. Construction of a portion of the project, from 28th to 33rd streets, will follow in 2026 and 2027.	Multi-Use paths, Business-Access-Transit lanes, Sidewalk level bike lanes	Yes
East Arapahoe Avenue Multi-use Path and Transit Stops Project – Foothills Pkwy to Cherryvale Rd	Utilities work began in winter 2023 and will be followed by construction starting in winter 2024 and completing in late spring 2025.	Multi-use path, Bus stop improvements	Yes
Baseline Road Priority Corridor – Pedestrian Signal at Baseline Rd and Canyon Creek Rd	Construction will begin in early 2025.	Pedestrian Signal	Yes
Baseline Road Priority Corridor – Signal Upgrades at Baseline Rd and Mohawk Dr	Construction is anticipated in 2025 and will be coordinated with the Phase 2 Baseline Road Priority Corridor project.	Traffic signal upgrades	Delayed due to contracting and staff capacity
13th Street Neighborhood GreenStreet – enhanced crossing at 15th St and Iris Ave	Construction will begin in May 2024 and take one month to complete.	Pedestrian signal, Reconstructed median, Improved bike connection,	Yes

Project Name	Status	Improvements	On-Track
		Widened curb ramp	
Gunbarrel Connection – Valmont Road Multi-use Path – 61st St to S. Boulder Creek Path	Construction will begin in June 2024 and take 6-12 months to complete.	Multi-use path, At-grade crossing	Yes

NEXT STEPS

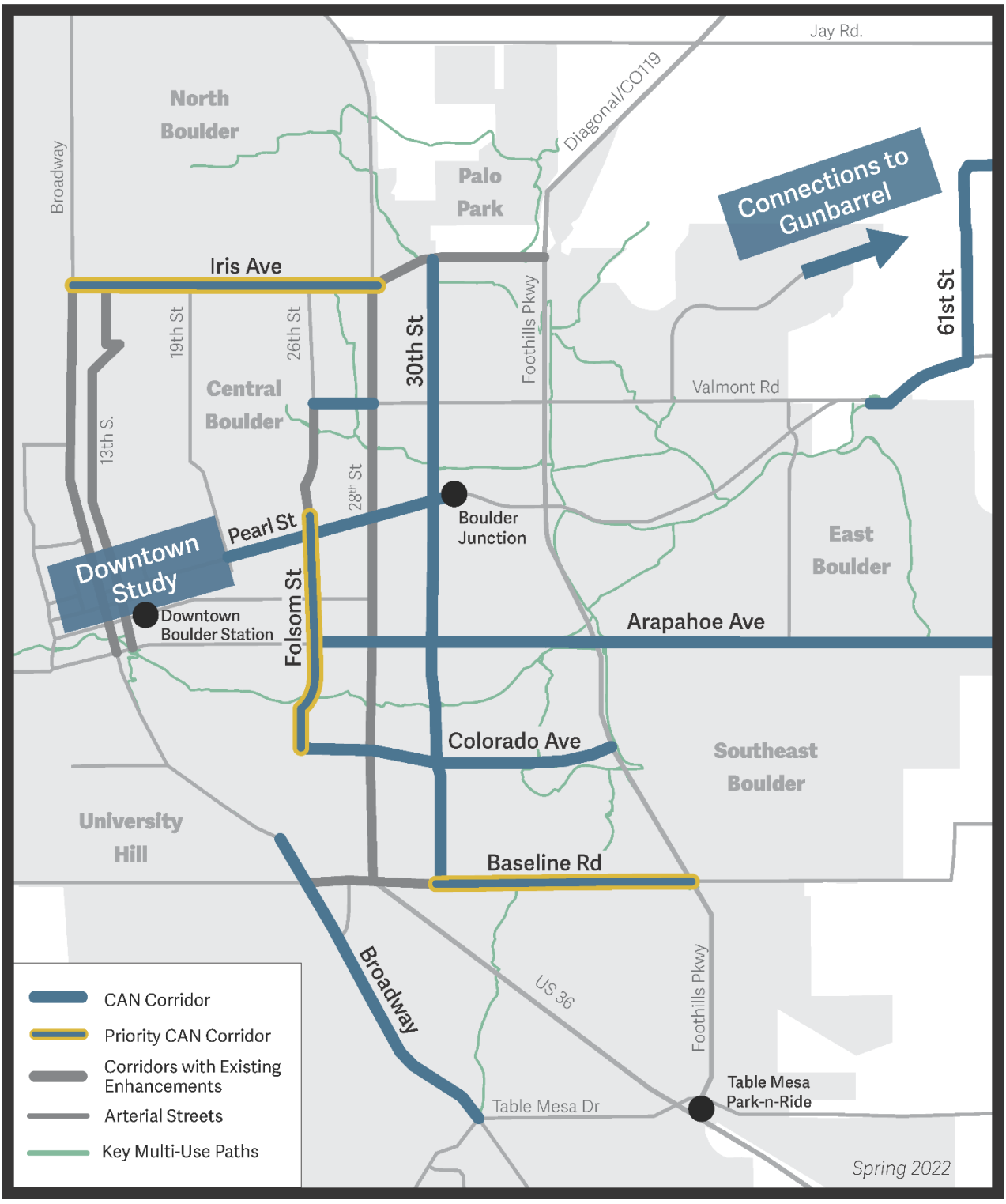
As described above in the Analysis section of this memorandum, overall CAN initiative work along multiple corridors is ongoing and remains on-track from what was previously presented to Council in July 2023. Progress shared here and in Attachment B and Attachment C detail how most of the CAN network will be either completed or funded for design and engagement by 2028. Specific improvements include implementation of phase two of the Baseline Priority Corridor, multimodal improvements on 30th Street south of Arapahoe Avenue, SS4A funded VZAP and CAN implementation on 30th Street from Pearl Street to the Diagonal Highway, and planning and conceptual design completed for Iris Avenue from 28th Street to Broadway, 30th Street from Colorado Avenue to Baseline Road, and Folsom Street from Pine Street to Colorado Avenue.

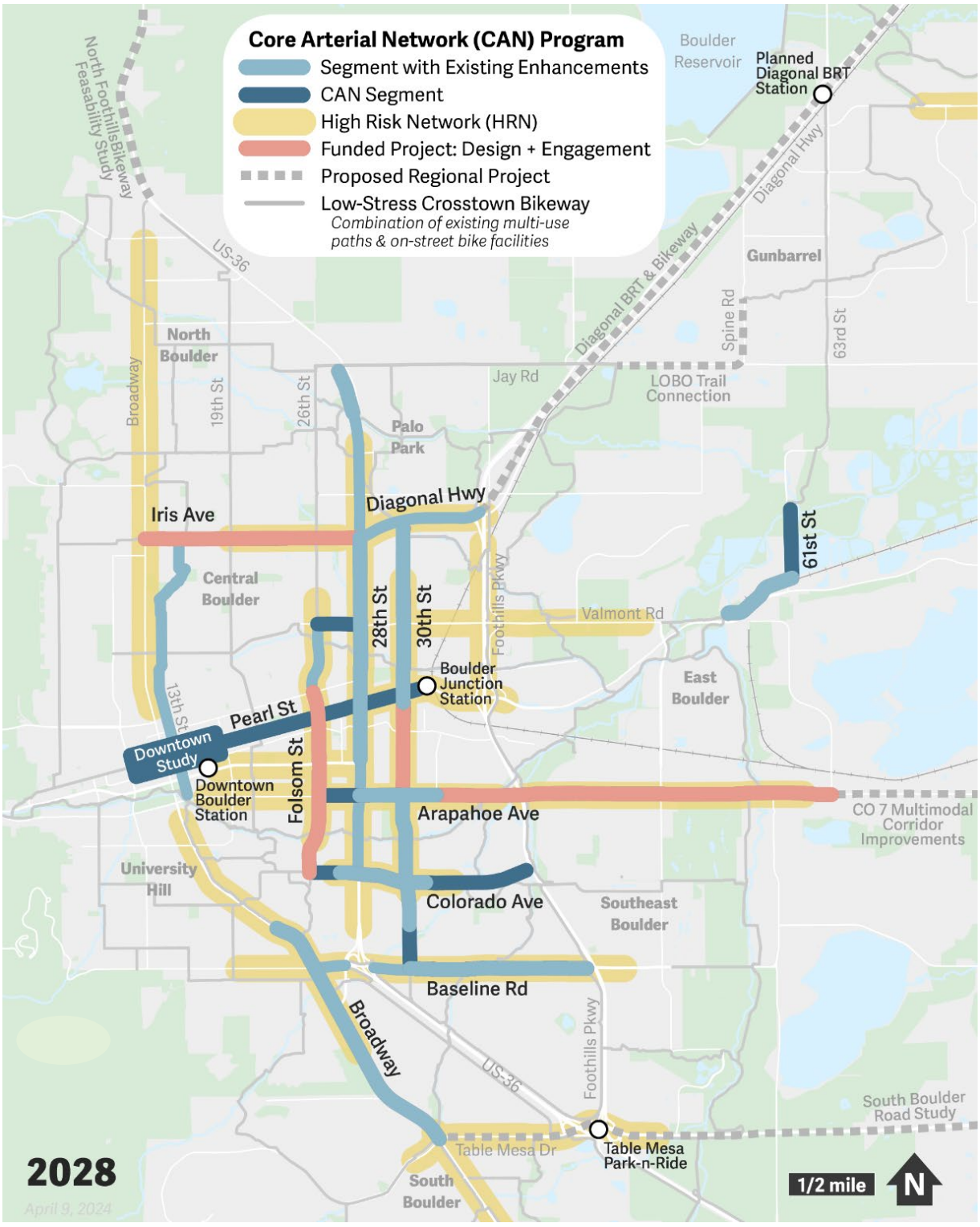
ATTACHMENTS

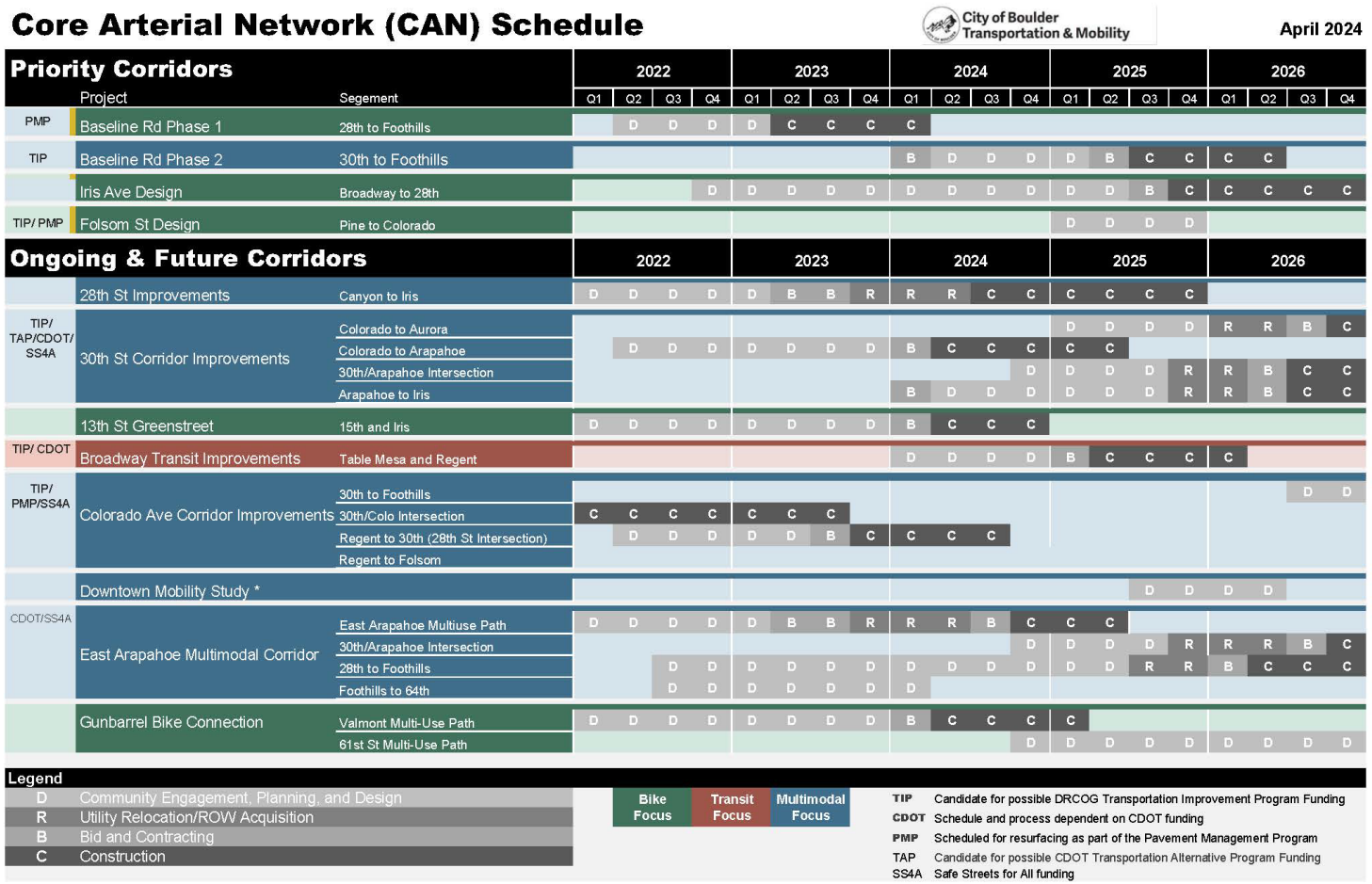
Attachment A - Core Arterial Network (CAN) Map

Attachment B - Core Arterial Network (CAN) Program Map

Attachment C - Core Arterial Network (CAN) Work Plan Schedule – May 2024


Jay Rd.
North Boulder
Broadway
Diagonal/CO119
Palo Park
Connections to Gunbarrel
Iris Ave
19th St
26th St
30th St
Foothills Pkwy
61st St
Valmont Rd
Central Boulder
13th S.
28th St
Boulder Junction
Pearl St
Downtown Study
Downtown Boulder Station
Folsom St
East Boulder
Arapahoe Ave
Colorado Ave
Southeast Boulder
University Hill
Baseline Rd
Broadway
US 36
Foothills Pkwy
Table Mesa Park-n-Ride
Table Mesa Dr
CAN Corridor
Priority CAN Corridor
Corridors with Existing Enhancements
Arterial Streets
Key Multi-Use Paths
Spring 2022


Core Arterial Network (CAN) Program
Segment with Existing Enhancements
CAN Segment
High Risk Network (HRN)
Funded Project: Design + Engagement
Proposed Regional Project
Low-Stress Crosstown Bikeway
Combination of existing multi-use paths & on-street bike facilities
North Foothills Bikeway Feasability Study
Boulder Reservoir
Planned Diagonal BRT Station
Diagonal Hwy
US-36
Diagonal BRT & Bikeway
Gunbarrel
Spine Rd
63rd St
North Boulder
Broadway
19th St
26th St
Jay Rd
LOBO Trail Connection
Palo Park
Iris Ave
Diagonal Hwy
61st St
Central Boulder
28th St
30th St
Foothills Pkwy
Valmont Rd
Boulder Junction Station
East Boulder
13th St
Pearl St
Downtown Study
Downtown Boulder Station
Folsom St
Arapahoe Ave
CO 7 Multimodal Corridor Improvements
University Hill
Colorado Ave
Southeast Boulder
Baseline Rd
Broadway
US-36
Foothills Pkwy
South Boulder Road Study
Table Mesa Dr
Table Mesa Park-n-Ride
South Boulder
2028
April 9, 2024
1/2 mile
N


Core Arterial Network (CAN) Schedule
City of Boulder Transportation & Mobility
April 2024
Priority Corridors
Project
Segement
2022
2023
2024
2025
2026
Q1 Q2 Q3 Q4
PMP
Baseline Rd Phase 1
28th to Foothills
TIP
Baseline Rd Phase 2
30th to Foothills
Iris Ave Design
Broadway to 28th
TIP/ PMP
Folsom St Design
Pine to Colorado
Ongoing & Future Corridors
28th St Improvements
Canyon to Iris
TIP/ TAP/CDOT/ SS4A
30th St Corridor Improvements
Colorado to Aurora
Colorado to Arapahoe
30th/Arapahoe Intersection
Arapahoe to Iris
13th St Greenstreet
15th and Iris
TIP/ CDOT
Broadway Transit Improvements
Table Mesa and Regent
TIP/ PMP/SS4A
Colorado Ave Corridor Improvements
30th to Foothills
30th/Colo Intersection
Regent to 30th (28th St Intersection)
Regent to Folsom
Downtown Mobility Study *
CDOT/SS4A
East Arapahoe Multiuse Path
East Arapahoe Multimodal Corridor
30th/Arapahoe Intersection
28th to Foothills
Foothills to 64th
Gunbarrel Bike Connection
Valmont Multi-Use Path
61st St Multi-Use Path
Legend
D Community Engagement, Planning, and Design
R Utility Relocation/ROW Acquisition
B Bid and Contracting
C Construction
Bike Focus
Transit Focus
Multimodal Focus
TIP Candidate for possible DRCOG Transportation Improvement Program Funding
CDOT Schedule and process dependent on CDOT funding
PMP Scheduled for resurfacing as part of the Pavement Management Program
TAP Candidate for possible CDOT Transportation Alternative Program Funding
SS4A Safe Streets for All funding

COVER SHEET

MEETING DATE
May 16, 2024

BOARDS AND COMMISSIONS ITEM
01.22.24 WRAB Signed Minutes

PRIMARY STAFF CONTACT
Karen Sheridan, WRAB Secretary

ATTACHMENTS:

Description

- **01.22.24 WRAB Signed Minutes**

CITY OF BOULDER, COLORADO
BOARDS AND COMMISSIONS MEETING MINUTES

Name of Board / Commission: Water Resources Advisory Board

Date of Meeting: 22 January 2024

Contact Information for Person Preparing Minutes: Karen Sheridan, 303-441-3208

Board Members Present: Gordon McCurry, John Berggren, Amy Broughton, Steve Maxwell, Lauren Koopman

Staff Present: Joe Taddeucci, Director of Utilities
Joanna Bloom, Utilities Deputy Director of Policy and Planning
Chris Douville, Utilities Deputy Director of Operations
Chris Douglass, Utilities Engineering Manager
Christopher Marks, Treatment Process Engineer
Cole Sigmon, Wastewater Treatment Manager
Kim Hutton, Water Resources Manager
Christopher Olson, Wastewater Engineering Supervisor
Meghan Wilson Outcalt, Water Quality Manager
Steph Klingeman, Principal Budget Analyst
Karen Sheridan, Board Secretary

Agenda Item 1 – Call to Order **[6:02 p.m.]**

Agenda Item 2 – Approval of 18 September 2023 Meeting Minutes **[6:04 p.m.]**

Motion to approve: Maxwell Seconded by: Berggren
Vote: 5:0

Agenda Item 3 – Public Participation and Comment **[6:05 p.m.]**

Lynn Segal: I can't take these $100 water bills. These bills have to go down. I know you have stormwater and wastewater and everything else, but you know who needs to pay for it? The developers in this town need to pay for it. This is much too hard on the consumer in Boulder. $100 water bill and I don't even irrigate at all. So, what is the story going on here? This is ridiculous. I am a very low user, and I heard last week someone has a $35 water bill in a surrounding community. You have a lot of things you have to do about flooding and everything in Boulder, but the more that people live here, I guess some people's logic with the economics of it is then you'll have more income. But that isn't the way it works. The more people that you have, the more demands on an unsustainable system of water in this arid region. I am not telling you anything that you don't already know, but this is hitting the consumer really hard. I am not going to stand for it. $100 a month water bill. I have got $3,000 a year more property tax that I have to fight. My whole life is spent going from taxes to the board of equalization to the board of assessment appeals and everything in between, which is my water bill and my CenturyLink. There isn't anything left for anyone anymore. It is just too much inflation, and what you people need to do in your positions is expand them into planning so that we aren't developing the craziness. I mean this is outrageous. At the Meridian, 900 people. Renting by the bedroom. Boulder is not a subsidiary of CU, and we're funding all of this and the water is key. And why are we doing this? Why don't we have some controls on the growth in this place? You know, Jared wants to grow grow grow, and it's not sustainable and it's not okay. It increases wealth inequity and diversion, equity, inclusion, and it is unsustainable and it's an inelastic market. More people will come the more you build.

Staff Response to Public Comment:

- The budget process is May through July and input is always welcome during this process. The utility has several billion dollars of infrastructure. Condition assessments are closely reviewed, and we try to avoid spikes in setting rates. In the last several years, a lot of emphasis has been placed on bill assistance for customers who have trouble paying. Federal funds through ARPA also provided support to community members.

Agenda Item 4 – 2023 Utilities Year in Review **[6:10 p.m.]**

Christopher Marks, Treatment Process Engineer, and Joe Taddeucci, Director of Utilities, presented this item.

EXECUTIVE SUMMARY

This memo provides the Water Resources Advisory Board (WRAB) with an overview of Utilities' accomplishments and challenges in 2023, and describes major infrastructure projects, policy initiatives, and significant efforts anticipated for 2024. Included are summaries of operations, maintenance, construction, and administration to provide information on capital improvement programs and significant policy issues to help inform future WRAB recommendations.
This memo is generally structured to address the water, wastewater, and stormwater/flood utilities in sequence under each of the following focus areas:

- Staffing Overview and Budget
- Ongoing Operations and Maintenance
- 2023 Project and Programs
- Regulatory Updates
- 2024 Upcoming Projects and Developments

WRAB Board Discussion Included:

- Question how much of available funds for utility bill assistance was spent.
- Request to identify new Utilities Budget Analyst.
- Question if potable water includes irrigation water.
- Question if the Barker gravity pipeline will be rehabilitated in its entirety.
- Question about the life-expectancy of slip lining material used in pipeline rehabilitation.
- Question about source of cost increase for Betasso storage tanks.
- Question about timing of the 60% design report for South Boulder Creek flood mitigation project.
- Request for update on Upper Goose Creek Reach 6 and timeline of consultant report.
- Question about role of Utilities in Safe and Managed Public Spaces (SAMPS) Program.
- Question about coordination with police when dispatching utilities crews.
- Question which other departments are involved in SAMPS program.
- Question how much of Utilities budget goes to SAMPS.
- Question regarding change in the SAMPS metrics over three years.
- Question regarding total city budget for SAMPS.
- Question about the nitrate permit limit being higher than federal standard limit.
- Question if nonrevenue water is tracked and what current percentage is.
- Request for confirmation that no lead service lines have currently been identified.
- Question if state funding for the lead service line inventory project has been discussed.
- Request for update on biogas project.
- Question regarding timeline and SRF funding of phosphorus project.
- Question about maximum daily water usage and analysis of per capita conservation trends.
- Question about regional/national comparisons during same time period.
- Request for update on COVID-tracking.
- Suggestion that presentation content be accessible to the public.

Agenda Item 5 – Matters from Board **[7:33 p.m.]**

- Board Member Broughton asked if meetings will go back to public in-person meetings.
- Board Member McCurry commented on the insert in utility bill advertising 2024 utility rates and asked if customers are providing feedback.

Agenda Item 6 – Matters from Staff **[7:36 p.m.]**

- Boards and Commissions Program Update
  - Role clarity
  - Training tools
  - Onboarding
  - Racial Equity Plan
- Finance Update
  - City received AAA bond rating (highest) from S&P Global in December.
  - Recent bond sale of 20-year, $96.7 million, for 2024 bonds at 3.44%.
  - Last water and sewer bond for near term.
  - State revolving fund (SRF) loan is 3.05%.
- Deep Freeze
  - Main breaks tend to show up during the thaw after the deep freeze.

- Main breaks number around 60 per year.

- E. coli/TMDL Update, presented by Meghan Wilson Outcalt
  - Most activities are routine.
  - MS4 permit compliance activities contribute to mitigation of E. coli reaching the creek.
  - Spill response.
  - Education and targeted outreach to specific industries known to contribute.
  - Creek cleanups part of SAMPS work.
  - Storm sewer cleaning and maintenance.
  - Investigations of sub sewer sheds.
  - Actively working to better manage irrigation water from ditch with University of Colorado.
- COVID Wastewater Sampling
  - Fewer community members testing and reporting.
  - Public health officials relying heavily on wastewater testing.
  - Uptick in COVID appears in September and early November.
  - Turnaround from sample to results is approximately two days.

Agenda Item 7 – Discussion of Future Schedule **[7:48 p.m.]**

- February: Retreat in lieu of regular meeting.
- March: No meeting.
- April: Water Supply Update; Election of Officers and Swearing in of New Board Member
- May through July: Budget process.
- August: No meeting.
- September through December: Water Quality Updates; Area 3 Urban Services Study; Flood Mitigation Plans.

Agenda Item 8 – Adjournment **[7:53 p.m.]**
Motion to adjourn by: Broughton Seconded by: Koopman
Motion Passes 5:0

Date, Time, and Location of Next Meeting:
The next WRAB meeting will be the WRAB Retreat, held in hybrid format on **Monday, February 26, 2024 at 6:00 p.m.** Public may attend virtually but public comment is not taken during the retreat.

APPROVED BY:

Board Chair: John Berggren

Date: 4/16/24

ATTESTED BY:

Board Secretary: Jason Sheridan

Date: 4.15.24

An audio recording of the full meeting for which these minutes are a summary is available on the Water Resources Advisory Board web page via the Access Meeting Agendas and Materials link.
Water Resources Advisory Board | City of Boulder (bouldercolorado.gov)

COVER SHEET

MEETING DATE
May 16, 2024

BOARDS AND COMMISSIONS ITEM
03.11.24 TAB Signed Minutes

PRIMARY STAFF CONTACT
Meredith Schleske, TAB Secretary

ATTACHMENTS:

Description

- **03.11.24 TAB Meeting Minutes - signed**

CI/TY OF BOULDER
BOULDER, COLORADO
BOARDS AND COMMISSIONS MEETING
MINUTES

Name of Board/ Commission: Transportation Advisory Board (TAB)

Date of Meeting: March 11, 2024

Contact Information Preparing Summary: Meredith Schleske 303.441.3204

Board Members Present: Alex Weinheimer, Chair; Rebecca Davies, Vice Chair; Tila Duhaime; Triny Willerton

Staff Present: Natalie Stiffler, Director for Transportation and Mobility
Chris Hagelin, Principal Transportation Planner
Devin Joslin, Transportation Engineering Senior Manager
Stephen Rijo, Transportation Planning Manager
Ericka Amador, Transportation Senior Planner
Sydney Schieffer, Transportation Senior Planner
Daniel Sheeter, Transportation Senior Planner
Jean Sanson, Transportation Senior Planner
Allison Moore-Farrell, Transportation Senior Planner
Melanie Sloan, Transportation Principal Project Manager
Reegan Brown, Senior Project Manager, Community Vitality
Meredith Schleske, Board Secretary

Also Present: Nicole Speer, City Councilmember, Mayor
Ryan Schuchard, City Councilmember

Type of Meeting: Advisory/Regular

Agenda Item 1: Call to Order **[6:00 p.m.]**

Agenda Item 2: Instructions to Virtual Meeting Participants – Sydney Schieffer, technical host reviewed rules and technical operations on the virtual platform. **[6:01 p.m.]**

Agenda Item 3: Appreciation of Service **[6:05 p.m.]**

Alex Weinheimer, 4/2019 – 3/2024
Ryan Schuchard, 4/2021 – 12/2023
Rebecca Davies, 4/2022 – 3/2024
Stiffler thanked volunteers for time, especially work on Core Arterial Network (CAN), displayed personalized traffic sign of appreciation for each.

TAB Comments

- Duhaime: appreciation of Davies, connections with community, other boards; Schuchard for raising equity and diversity, explaining interconnectedness; Weinheimer for making a difference.
- Davies: appreciation of TAB members helping to get up to speed; Weinheimer for educating City Council on importance of prioritization and safety on roads, development of CAN; Schuchard for running for council; staff for managing resources, educating TAB members and community.
- Schuchard: appreciation for ceremony; Duhaime for demeanor, asking leadership to pause with important issues; Stiffler for time, natural great leader, gracious; transportation department team; Weinheimer for encouraging to run for council.
- Weinheimer: privilege to serve with a lot of great members; huge honor.

Schuchard left meeting at 6:17 p.m.

Agenda Item 4: Approval of February 2024 Minutes **[6:17 p.m.]**

Motion to approve February 2024 Minutes as presented.
Motion: Davies **Second:** Duhaime
Motion passes 3:0 Willerton abstain, not present at February meeting.

Agenda Item 5: Public Comment **[6:25 p.m.]**

- Paul Sabini – thanks for time. Concerned about pedestrians, especially nine school-aged children in four houses on Linden from 4th Street to Broadway who walk and ride bikes to school every day on street with speed limit of 30 m.p.h. That's way too high for a neighborhood, in my opinion. No shoulder, no sidewalk on south side, minimal visibility, nothing to slow drivers the entire length. Lived in Boulder 25 years, own small business on Pearl Street, ride bike daily. Dangerous situations I see on this stretch of road are alarming;

inevitably, something tragic will happen. Lowering speed limit is an easy, cheap start, then south sidewalk, slow drivers down. Stretch is called "Lindy 500" because they race. Have been asking city to reduce speed for four years, nobody is listening. Speaking up for pedestrians and kids on road.

- Lynn Segal – riding up the section on Broadway is scary; have to walk my bike and it is happening all over town, potholes in the dark, people are in rush mode. I watch this building and growth boom go through Planning Board, must be frustrating for TAB having to deal with the congestion, incentives to get people out of their cars. TAB should weigh in on the airport because it will add congestion along with CU South. You are always in some form of deficit. The developers are not paying for it. The only Palestine airport has been decommissioned; now planning a settler colony on the side, so analogous to Boulder.

TAB Comments

- Appreciation to Lynn Segal for perseverance.
- Linden and Spine are good streets to apply the new speed limit reduction rubric, engineering judgment.

Agenda Item 6: Vision Zero Action Plan (VZAP) Update **[6:27 p.m.]**

A. Community Mobility Planning & Implementation (CMPI) Speed Limit and Signing Update

Devin Joslin made the report to the board.

Executive Summary

The Speed Limit Setting and Signing Practices project incorporates industry best practices to develop a framework to improve the consistency for establishing and communicating speed limits citywide. The project aims to reduce speed-related crashes on city-owned arterials and collectors. This project has developed a methodology that is data-driven and grounded in Boulder-specific thresholds. This memo presents background information that includes national best practices and peer cities review, a summary of stakeholder engagement efforts, followed by in-depth descriptions of the data collected, methodology developed, an overview of the preliminary results obtained, and next steps for the effort.

Questions for TAB

1. What feedback does TAB have regarding the methodology defined for speed limit setting?
2. What feedback and/or guidance does TAB has to offer to the forthcoming implementation plan and next steps?

TAB Feedback

- Suggestion to reduce speeds on High Risk Network overall.
  - *Staff response:* High Risk Network is planned to be addressed first.
- Questions regarding bike facilities, if there are defining factors, if Low Stress Walk and Bike Network or lack of alternate routes are considerations, whether any reverse engineering/testing was performed and if it changes scores, if other trip generators such as libraries, recreation centers, shopping centers and trailheads were considered, level of ridership (low, medium, high).
  Questions about whether we should be asking what we want it to look like, if there is intentionality now or in future to deliberately suppress drivers' expectations to speed, if travel time impact is calculated/messaged.
  - *Staff response:* Chose 16 most impactful factors, did not explicitly consider mentioned items although some are covered at a higher level by zoning. Note that methodology is very flexible but not sole guidance; engineering judgment is also important, including in considering how a capital project can transform a roadway to set the tone to achieve desired speeds.
- Comment that using presence/absence of vulnerable user infrastructure inadvertently doubles down on past decisions to not install that infrastructure, perpetuating past imbalanced investments that favored motor vehicles over people.
- Suggestion to reconsider, adding the presence of more people biking, walking, using transit, near transit-oriented development, presence of vulnerable street users. Observation that there are very few pedestrians on Iris because it is so difficult and unsafe. Goal is to create a city where it feels comfortable, inviting to walk. Take pride in leading the way in creating a welcoming environment.
- Question whether 55th Street East Boulder Subcommunity Plan area is still treated as industrial or if zoning was changed, comment that it would be a good place for engineering judgment.
  - *Staff response:* Zoning was changed, methodology was applied at a point in time with current road conditions.
- Encouragement to consider downtown blocks of Pearl Street and "the Hill" as Main Street, reduce speed limit to 10 m.p.h. year-round, signal that it is a high traffic, high pedestrian volume area welcoming to all modes of travel.
- Suggestion to reduce upper range for land use classification of residential mixed use which makes up a large part of town for minor arterials to 30 m.p.h. given how much vehicle speed impacts severity of crashes.

B. Pedestrian Crossing Treatment Installation Guidelines (PCTIG) Working Group - appointment of TAB primary and alternate representatives – Willerton primary, Duhaime temporary alternate.

Agenda Item 7: Matters **[7:20 p.m.]**

A. Matters from Staff/Non-Agenda

1. **Commutifi Pilot Preview** – Reegan Brown previewed pilot program launching in partnership with Boulder-based tech startup Commutifi to quantify commuting and encourage sustainable commutes beginning April 1st through year-end. Employers in the downtown Central Area General Improvement District (CAGID) and Boulder Junction Access District (BJAD) are eligible to participate, incent employees up to $2.50 daily to reduce single occupancy vehicle (SOV) trips. Pilot is funded through CAGID and BJAD taxing revenue dollars, paid via virtual debit card usable at locally owned businesses in the two districts, van pool fares, B-Cycle trips, Recycle membership, Lime scooter trips, car share, Uber, Lyft, Park Mobile.

   TAB Feedback

   - Questions why incentive pays for parking, how many employers are eligible.
     - *Staff response:* Expectation is not driving around as much, assume less parking than previously. There were over 1,000 eligible employers pre-Covid, including Google with 1,800 employees.

2. **Resident Travel Diary Preliminary Results** modal shift report – Chris Hagelin stated that it has been tracked since 1990, generally every three years. Trends show declines in SOV and multiple occupancy vehicle (MOV) use continues, increase in bicycle and foot traffic, significant decline in transit rides and ecopasses since Covid, increase in teleworking. Decline in vehicle miles traveled (VMT) per capita directly impacts Transportation Master Plan (TMP) goal.

   TAB Feedback

   - Inquiries regarding how respondents were selected, if rideshares count as MOVs.
   - Observations that university has very little inexpensive private motor vehicle parking; pricing parking appropriately can shift behavior, there was no reduction in average daily traffic on streets, most trips are not work trips.
     - *Staff response:* Respondents are chosen by random sampling from age 16 then responses by age, gender, income are weighted. School trip questions are included.

Davies excused 7:45 p.m.

B. **Matters from the Board** **[7:58 p.m.]**

1. Finalize TAB Letter to City Council – Duhaime will forward to City Council Assistant and copy to TAB Secretary.
2. Open Board Comment
   - Duhaime - TAB Retreat to be scheduled in May to include new TAB members.

Agenda Item 6: Future Agenda Items **[8:19 p.m.]**

Agenda Item 7: Adjournment **[8:19 p.m.]**

There being no further business to come before the board at this time, by motion regularly adopted, the meeting was adjourned at 8:19 p.m.

Motion: Moved to adjourn: Willerton **Second:** Duhaime

Motion passes 3:0

Date, Time, and Location of Next Meeting:

The next meeting will be a regular virtual meeting on Monday April 8, 2024 at 6:00 p.m. unless otherwise decided by staff and the Board.

APPROVED BY:

Apr 18, 2024

Board Chair

Date

ATTESTED:

Meredith Schleske

Board Secretary

4/8/2024

Date

An audio recording of the full meeting for which these minutes are a summary is available on the Transportation Advisory Board web page.

Signature: Tila M Duhaime
Tila M Duhaime (Apr 18, 2024 21:11 MDT)

Email: tilabouldertab@gmail.com

COVER SHEET

MEETING DATE
May 16, 2024

AGENDA ITEM
Memorial Day Declaration

PRIMARY STAFF CONTACT
Megan Valliere, (720) 665-4594

ATTACHMENTS:

Description

- **Memorial Day Declaration**

Memorial Day

May 27, 2024

Memorial Day - originally called Decoration Day - is a day of remembrance for those who died in our Nation's service. It was initially proclaimed on May 5, 1868, by General John Logan, National Commander of the Grand Army of the Republic, in his General Order No. 11. The holiday was first observed on May 30, 1868, when flowers were placed on the graves of Union and Confederate soldiers at Arlington National Cemetery.

Memorial Day each year serves as a solemn reminder of the scourge of war and its bitter aftermath of sorrow. This day has traditionally been devoted to paying homage to lost loved ones and their families.

We, the City Council of the City of Boulder, Colorado declare May 27, 2024, as

Memorial Day

And honor the lives lost serving our country on land, sea, and air.

Aaron Brockett, Mayor