

**Application for Locally Adopted Energy Standards
by the City of Napa In Accordance With
Section 10-106 of the California Code of Regulations,
Title 24, Part 1**

December 8, 2010

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1.0 Executive Summary

The Napa City Council approved its revised Green Building Ordinance at a first hearing on December 7, 2010. This revised ordinance is scheduled to take effect on or shortly after January 1, 2010. Gabel Associates has researched and reviewed the feasibility and energy cost-effectiveness of permit applicants exceeding the state's 2008 Building Energy Efficiency Standards in order to meet the minimum energy efficiency requirements of the proposed ordinance.

Overall Scope of the Ordinance

New ordinance or revision to previous ordinance?	Revised Ordinance
Projected Effective Date:	January 1, 2010
Green building or stand-alone energy ordinance?	Green Building Ordinance
Do minimum energy requirements increase after initial effective date?	No
Occupancies covered?	All New Residential and Nonresidential Buildings
Energy requirements apply to new construction, additions, alterations?	New Construction Only
Special or unusual energy requirements?	No
Third party verification?	No
Implementation details in the ordinance or in a separate document?	None

Key Features of the Ordinance By Occupancy Type

Occupancy Type	General Requirements	Minimum Energy Requirement
New Low-rise Residential Buildings	2010 CALGreen Tier 1	15% Better-than-Title 24
New Nonresidential, High-rise Residential & Hotel/Motel Buildings	2010 CALGreen Tier 1	15% Better-than-Title 24

Text of the City of Napa Ordinance

Approved by the Napa City Council on December 7, 2010.

ATTACHMENT 1

ORDINANCE O2010 ___

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF NAPA, STATE OF CALIFORNIA, AMENDING NAPA MUNICIPAL CODE CHAPTER 15.04, ADOPTING BY REFERENCE THE 2010 EDITION OF THE CALIFORNIA BUILDING STANDARDS CODE (CALIFORNIA CODE OF REGULATIONS TITLE 24, PARTS 1, 2, 2.5, 3, 4, 5, 6, 8, 9, 10, 11 AND 12, INCLUDING APPENDICES IDENTIFIED HEREIN), INCLUDING ADOPTION OF LOCAL AMENDMENTS TO THE CALIFORNIA BUILDING STANDARDS CODE, AND AMENDING NAPA MUNICIPAL CODE 17.54.060 TO MODIFY STANDARDS FOR BICYCLE PARKING

WHEREAS, the California Building Standards Commission ("Commission") adopts a comprehensive update to the California Building Standards Code every three years; and

WHEREAS, the Commission completed the adoption of the 2010 update to the California Building Standards Code ("2010 Code") on January 30, 2010, with updates made available to the public by July 1, 2010, and an effective date of January 1, 2011; and

WHEREAS, if the city takes no action regarding the 2010 Code (without appendices), it shall become effective in the City of Napa on January 1, 2011, pursuant to California Health and Safety Code Section 17958, and pursuant to the 2010 Code Part 2 (the "2010 California Building Code"), Appendix Chapter 1, Section 101.4; and

WHEREAS, the city is authorized to adopt amendments to the 2010 Code in order to incorporate appendices, address unique administrative requirements of the city, and in order to modify building standards to the extent that the modifications are reasonably necessary because of local climatic, geological, or topographical conditions (pursuant to California Health and Safety Code Sections 17958.7 and 18941.5, and California Government Code Section 50022.2); and

WHEREAS, the city has previously adopted local amendments to previous versions of the California Building Standards Code, and codified those local amendments at Napa Municipal Code Chapter 15.04; and

WHEREAS, on July 20, 2010, the City Council adopted a High Performance Building Ordinance, requiring compliance with certain provisions in the 2008 California Green Building Standards Code ("2008 CALGreen Code") in advance of their statewide effective date of January 1, 2011, adopting various local amendments and modifications to the 2008 CALGreen Code, and supplementing the 2008 CALGreen Code standards with a regulatory framework for high performance buildings that requires the submission of design review prepermitting documentation, building permit documentation, and compliance documentation in order to ensure compliance with applicable high performance building construction standards prior to issuance of a final certificate of occupancy for new residential and commercial construction, and combining the city's first phase green building program requirements with the 2008 CALGreen Code standards as modified to set forth a comprehensive high performance building program that encompassed both residential and commercial construction; and

WHEREAS, on September 9th, October 21st and November 15th of 2010, the city's High Performance Building Task Force met and reviewed the 2010 California Green Building Standards Code ("2010 CALGreen Code") and prepared recommendations for local amendments requiring mandatory compliance of local residential and nonresidential construction with certain measures currently identified as voluntary in appendices A4 and A5 of the 2010 CALGreen Code; and

WHEREAS, the City Council finds that, in addition to these local amendments to the appendices of the 2010 CALGreen Code, further amendments to Napa Municipal Code Chapter 15.04 are warranted in order to adapt other parts of the 2010 Code to the unique administrative requirements of the City, and in order to address local climatic, geological, or topographical conditions; and

WHEREAS, a minor amendment to the city's zoning ordinance is warranted in order to update requirements for bicycle parking for nonresidential projects required to provide 10 or more vehicular parking spaces consistent with the mandatory measures contained in the 2010 CALGreen Code; and

WHEREAS, the City Council finds that the adoption of this ordinance is exempt from the California Environmental Quality Act ("CEQA"), in that the adoption of state codes and the local amendments herein described do not have the potential for causing a significant effect on the environment, pursuant to sections 15060(c)(3), 15061(b)(3), 15308, and 15378(b)(5) of the CEQA Guidelines (Title 14, Chapter 3 of the California Code of Regulations); and

WHEREAS, the City Council hereby finds that, in order to best protect the health, safety and welfare of the residents of the City of Napa, the standards of building within the city must conform to state law except where local conditions warrant more restrictive regulations. The city is authorized to adopt amendments to the 2010 Code in order to incorporate appendices, address unique administrative requirements of the city, and in order to modify building standards to the extent that the modifications are reasonably necessary because of local climatic, geological, or topographical conditions (pursuant to California Health and Safety Code Sections 17958.5, 17958.7, and 18941.5, and California Government Code Section 50022.2). Based on the materials presented and following the recommendation of the High Performance Building Task Force, city staff, the City Building Official and the City Fire Code Official, the City Council finds that changes and modifications to portions of the 2010 Code, as identified in Attachment A (including changes to the 2010 California Building Code, Residential Code, Plumbing Code, Mechanical Code, Electrical Code, Energy Code, Existing Building Code, Historic Building Code, Referenced Standards Code, CALGreen Code and Fire Code) are warranted because the changes and modifications are reasonably necessary due to the local climatic, geological, or topographical conditions identified herein. Modifications and local amendments to the 2010 California Fire Code are warranted due to local climatic and meteorological conditions as described more fully below. The City Council further finds that it is necessary to make modifications to the 2010 California Building Code in order to achieve greater energy and water use efficiency than is provided for by the 2010 CALGreen Code. Under the provisions of Section 17958.5 of the California Health and Safety Code, the City Council hereby finds that the following local conditions exist to justify the adoption of the proposed local amendments and modifications to the 2010 Code (Note: Findings AE are made in support of the City's modification of requirements of the 2010 Building, Residential and Fire Codes; Findings FN are made in support of the City's amendments to the 2010 CALGreen Code, including the modification of requirements, early adoption of certain mandatory measures, and adoption as mandatory of measures identified as voluntary in Appendices A4 and A5 of the 2010 CalGreen Code):

- A. The City of Napa experiences periods of high temperatures, accompanied by low humidity and seasonal high winds. These factors can cause small fires to spread quickly, are a contributing factor to the high fire danger in Napa County, and create a need for an increased level of fire protection. This added protection in the form of fire sprinklers will supplement normal fire department response available and provide immediate protection for life and safety of residents during fire occurrence.
- B. Napa County and the City of Napa are located in a semiarid Mediterranean type climate which predisposes all fuels including wood shingles, to rapid ignition and spread of fire. Therefore, there exists a need for additional fire protection measures.
- C. The City of Napa is located in a region that contains active fault zones: the San Andreas, Hayward, Calaveras and Healdsburg Rogers Creek. Three active faults are located within Napa County: the Cordelia, Green Valley and West Napa. After a large seismic event, the potential for multiple fires and hazardous materials incidents occurring simultaneously will tax available firefighting resources. Built-in fire protection and limitations on the quantity of certain hazardous materials will assist in extinguishing or controlling fires in structures, and limit the extent of hazardous materials releases which will increase the availability of firefighting resources after a seismic event.
- D. Traffic circulation congestion presently existing in the City of Napa often places fire department response time to fire occurrences at risk. This condition will be exacerbated by any major disaster, including any earthquake wherein damage to the highway and road system will occur. This condition makes the need for additional onsite fire protection for property occupants necessary.

- E. The City of Napa is divided geographically into three parts by the north-south flow of the Napa River and the north/south orientation of State Highway 29. The east and west portions of the city contain steep hillsides with residential development intermixed. These natural and manmade barriers can serve as severe impediments to the delivery of public safety services due to increased response times and delays in fire suppression efforts due to flooding or traffic congestion. An extended response time allows fires to grow beyond the control of initial attack fire suppression resources. Built-in fire protection in the form of automatic fire sprinklers has proven effective in controlling and extinguishing fires in the incipient stages.
- F. In order for the City of Napa to attain greenhouse gas emission reduction targets as set forth in State Assembly Bill 32, the state Global Warming Solutions Act, and reduce emissions levels to 1990 levels in metric tons, the City will need to reduce Citywide greenhouse gas emissions by 157,769 metric tons, or 29 percent from baseline 2005 levels.
- G. Within the City of Napa, buildings are one of the most significant sources of greenhouse gas emissions accounting for approximately one-third of all such emissions. Establishing expectations for energy efficiency above the baseline for the 2010 CALGreen Code will enable the City of Napa to contribute in a meaningful manner to the State's goals for reducing greenhouse gas emissions. Such adoption of more stringent energy efficiency standards is encouraged by the State (CALGreen has been explicitly identified as a "floor") and is feasible for local builders and developers, given recent developments in energy-efficient building construction materials and methods.
- H. The reduction of fossil fuel consumption by implementing and utilizing high-performance building practices such as sustainable materials, more stringent energy efficiency standards, mechanical system efficiencies and the use of renewable sources of energy will help to reduce greenhouse gas emissions within the City of Napa.
- I. Napa County, including the City, is home to a particularly diverse population of native flora, which supports a wide array of wildlife, including many rare, threatened and endangered species. Scientific evidence suggests that the rising mean temperatures associated with climate change as a result of greenhouse gas emission may cause species to migrate to northern latitudes, and can create conditions conducive to invasive species or weeds, insects and other threats to native species and pathogens. Establishment of a high-performance building ordinance will encourage landscaping strategies that create conditions favorable to native species of plants, beneficial insects and wildlife corridors that will contribute to the health of the County's ecosystem and agriculture.

- J. With warming average temperatures, more winter precipitation is likely to fall in the form of rain instead of snow, shortening the winter snowfall season and accelerating the rate of spring snowmelt. The City relies primarily on a system of surface water collection and reservoirs for its water supply, and the changed hydrologic conditions presented by increased winter rainfall and decreased snowpack could potentially result in an adverse impact to availability of outside City water supplies creating the need for additional reservoir storage capacity. The high performance building ordinance will promote efficient use and conservation of water, goals of great importance for a community with a Mediterranean climate, and goals that prepare the city to adapt to the water supply effects of climate change.
- K. The City of Napa is located in an agricultural region, and airborne pollutants create a significant set of public health challenges, among them asthma. Local amendments that set standards affecting indoor air quality that are higher than those in the 2010 CALGreen Code are necessary to reduce respiratory health problems in this agricultural area.
- L. Tourism is an important ingredient in the economic vitality of the City of Napa. Increasingly, sustainability and “green” practices are ingredients sought by high end visitors. The City has taken care to brand itself as a destination that features both luxury and sustainability; and this combination of attractive qualities is significant for future prosperity. Setting ambitious standards for new construction will help guarantee the city’s future as a destination that offers both elegance and environmental stewardship.
- M. The City of Napa is home to a community of architects, developers and builders who are leaders in their industries, and who keep up-to-date on design and construction methods that increase the efficiency, lower the life cycle costs and protect the aesthetic qualities of new construction. This business community is well prepared to manage local expectations that are more ambitious than those contained in the 2010 CALGreen Code.
- N. The City of Napa is proud of its historic architectural heritage, and appropriately views this heritage as a valued quality for both residents and visitors. Adoption of the local amendments for high performance new construction will help assure that new additions to the city’s building stock are well designed and well-constructed additions to the city’s heritage.
- O. The City Council hereby finds that the adoption of the local amendments and heightened building standards are reasonably necessary in order to increase fire safety, achieve greater energy and water use efficiency than is provided for by the 2010 CALGreen Code, to reduce overall greenhouse gas emission consistent with state directives to achieve 1990 reduction targets by 2020 as required under AB 32, and that the implementation of measures more restrictive than those set forth under the state building code is warranted by the specific climatic, geographical and topographic conditions set forth in greater detail above.

WHEREAS, the City Council hereby finds that the facts and findings set forth in the recitals to this ordinance accurately reflect the findings and determinations of the City Council, and form the basis for the adoption of this ordinance.

WHEREAS, the City Council has considered all information related to this matter, as presented at the public meetings of the City Council identified herein, including any supporting reports by city staff, and any information provided during public meetings.

NOW, THEREFORE, BE IT ORDAINED, by the City Council of the City of Napa as follows:

SECTION 1. Amendment. Napa Municipal Code Chapter 15.04 (Building Standards and Regulations) is hereby amended by repealing the previous language in its entirety, and adopting language to read as set forth on Exhibit "A," attached hereto and incorporated herein by reference.

SECTION 2. Amendment. Napa Municipal Code Section 17.54.060(A), "Bicycle parking," is hereby amended to read as follows (NOTE: only Subsection (A) of Section 17.54.060 is amended by the Ordinance. The prefatory language of Section 17.54.060 and Subsections 17.54.060(B)(D) are not modified by this Ordinance).

17.54.060 Bicycle parking

A. Spaces. A minimum of two bicycle parking spaces with an additional space for each 10 vehicular spaces in excess of 20 vehicle spaces.

SECTION 3. Severability. If any section, subsection, subdivision, paragraph, clause or phrase in this Ordinance, or any part thereof, is for any reason held to be invalid or unconstitutional, such decision shall not affect the validity of the remaining sections or portions of this Ordinance or any part thereof. The City Council hereby declares that it would have passed each section, subsection, subdivision, paragraph, sentence, clause or phrase of this Ordinance, irrespective of the fact that anyone or more sections, subsections, subdivisions, paragraphs, sentences, clauses or phrases may be declared invalid or unconstitutional.

SECTION 4. Effective Date. This Ordinance shall become effective 30 days following adoption.

City of Napa, a municipal corporation

MAYOR: _____

ATTEST: _____
CITY CLERK OF THE CITY OF NAPA

STATE OF CALIFORNIA) COUNTY OF
NAPA) SS: CITY OF NAPA)

I, Dorothy Roberts, City Clerk of the City of Napa, do hereby certify that the foregoing Ordinance had its first reading and was introduced during the regular meeting of the City Council on the ____ day of _____, 2010, and had its second reading and was adopted and passed during the regular meeting of the City Council on the ____ day of _____, 2010, by the following vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

ATTEST: _____ Dorothy Roberts City Clerk

Approved as to Form:

Michael W. Barrett City
Attorney

EXHIBIT "A"

AMENDING NAPA MUNICIPAL CODE CHAPTER 15.04 (BUILDING STANDARDS AND REGULATIONS)

Chapter 15.04

BUILDING STANDARDS AND REGULATIONS

Sections:

- 15.04.010 Adoption of California Building Standards Code, as amended
- 15.04.020 Administration, interpretation, and enforcement of this chapter
- 15.04.030 Amendments to California Building Code
- 15.04.040 Amendments to California Residential Code
- 15.04.050 Amendments to California Electrical Code
- 15.04.060 Amendments to California Mechanical Code
- 15.04.070 Amendments to California Plumbing Code
- 15.04.080 Amendments to California Fire Code
- 15.04.090 Amendments to California Green Building Standards Code
- 15.04.100 Building and Fire Code Board of Appeals
- 15.04.110 Disability Access Board of Appeals

15.04.010 Adoption of California Building Standards Code, as amended.

The city hereby adopts by reference the 2010 edition of the California Building Standards Code, as adopted by the California Building Standards Commission and published in California Code of Regulations, Title 24, and as defined and amended by this Chapter. The California Building Standards Code is hereby adopted by reference by the city to include the parts (1, 2, 2.5, 3, 4, 5, 6, 8, 9, 10, 11 and 12), appendices, and amendments identified in this Chapter:

A. California Administrative Code (Part 1 of Title 24).

- 1 Appendices: none.
- 2 Amendments: none.

B. California Building Code (Part 2 of Title 24; based on the 2009 International Building Code of the International Code Council).

1. Appendices: Appendix G (Flood Resistant Construction); and Appendix I (Patio Covers)
2. Amendments: as set forth in Napa Municipal Code Section 15.04.030.

C. California Residential Code (Part 2.5 of Title 24; based on the 2009 International Residential Code of the International Code Council).

1. Appendices: Appendix G (Flood Resistant Construction); Appendix G (Swimming Pools, Spas and Hot Tubs); Appendix H (Patio Covers); and Appendix K (Sound Transmission).

2. Amendments: as set forth in Napa Municipal Code Section

15.04.040.

D. California Electrical Code (Part 3 of Title 24; based on the 2008 National Electrical Code).

1 Appendices: All appendices and annexes are adopted.

2 Amendments: as set forth in Napa Municipal Code Section

15.04.050.

E. California Mechanical Code (Part 4 of Title 24; based on the 2009 Uniform Mechanical Code).

1 Appendices: All appendices are adopted.

2 Amendments: as set forth in Napa Municipal Code Section

15.04.060.

F. California Plumbing Code (Part 5 of Title 24; based on the 2009 Uniform Plumbing Code, published by the International Association of Plumbing and Mechanical Officials).

1 Appendices: All appendices are adopted.

2 Amendments: as set forth in Napa Municipal Code Section

15.04.070.

G. California Energy Code (Part 6 of Title 24).

1 Appendices: All appendices are adopted.

2 Amendments: none.

H. California Historical Building Code (Part 8 of Title 24).

1 Appendices: All appendices are adopted.

2 Amendments: none.

I. California Fire Code (Part 9 of Title 24; based on the 2009 International Fire Code).

1. Appendices: Appendix Chapter 4 (Special Detailed Requirements Based On Use and Occupancy), B, BB (Fire Flow Requirements for Buildings) C, CC (Fire Hydrant Locations and Distribution) E (Hazard Categories), and H (Hazardous Materials Management Plans and Hazardous Materials Inventory Statements).

2. Amendments: as set forth in Napa Municipal Code Section

15.04.080.

J. California Existing Building Code (Part 10 of Title 24; based on the 2006 International Existing Building Code).

- 1 Appendices: none.
- 2 Amendments: none.

K. California Green Building Standards Code (Part 11 of Title 24)

- 1 Appendices: All appendices are adopted.
- 2 Amendments: as set forth in Napa Municipal Code Section

15.04.090.

L. California Referenced Standards Code (Part 12 of Title 24).

- 1 Appendices: none.
- 2 Amendments: none.

15.04.020 Administration, interpretation, and enforcement of this Chapter.

A. Identification of this Chapter. This Chapter may be referred to as the “Napa Building Standards Code.” Individual parts of the Napa Building Standards Code may be referred to as the “Napa Building Code, “Napa Residential Code, “Napa Electrical Code,” “Napa Mechanical Code,” “Napa Plumbing Code,” “Napa Energy Code,” “Napa Historical Building Code,” “Napa Fire Code,” “Napa Existing Building Code” , and “Napa High Performance Building Code.”

B. Administration of this Chapter. The provisions of this Chapter shall be interpreted, administered, and enforced by the Chief Building Official; except the Fire Code Official shall interpret, administer, and enforce the Napa Fire Code and other provisions related to the Napa Fire Code as set forth in this Chapter. The Chief Building Official and the Fire Code Official are authorized to establish and maintain written regulations which implement and are consistent with the requirements of this Chapter. The City Manager (or designee) shall designate the individuals responsible, under this Chapter, for performing the responsibilities of the Chief Building Official and the Fire Code Official.

C. Interpretation of this Chapter. If there are any conflicts among the provisions of this Chapter, or between the provisions of this Chapter and the provisions of the California Building Standards Code, the more restrictive requirements (those which establish a higher standard of safety) shall prevail.

D. Fees. The city shall establish fees by resolution or ordinance for services rendered under this Chapter (including fees for plan check and inspection). Fees shall be established, implemented, and enforced in accordance with Napa Municipal Code Chapter 3.04, particularly Sections 3.04.040 and 3.04.050.

E. Enforcement of this Chapter. In addition to other remedies for violation of the Code, if an enforcement officer (as defined at section 1.24.020) determines that a person has failed to obtain a permit required under this Chapter (or has exceeded the scope of work covered by the permit, or done work not covered by the permit), the enforcement officer is authorized to issue a compliance order or an administrative citation, pursuant to sections 1.24.040 or 1.24.050. The enforcement officer is authorized to impose penalties of three to ten times the value of the permit fee. In determining the amount of any penalty owed by a responsible person, the enforcement officer shall consider the factors set forth in this chapter, as well as those set forth at subsection 1.24.090(A)(2).

1. The penalty authorized by this subsection 15.04.020(E) does not apply if the property owner establishes that:

- a. at the time he or she acquired the property, (a) a violation of this Chapter existed on the property, (b) the property owner did not have actual or constructive notice of the existence of that violation, and (c) within 30 days after the mailing of the notice advising the owner of the violation, the property owner initiated and pursued good faith efforts to meet the requirements of this Chapter; or
- b. within 30 days after the date of mailing the notice of the existence of the violation, the property owner removed the use or structure which constituted that violation and (b) the property owner had not previously been mailed a notice of violation of the same Chapter section.

15.04.030 Amendments to California Building Code.

A. Chapter 1, Division II, Subsection 109.02 (“Schedule of permit fees”) is amended to read as follows:

109.2 Schedule of permit fees. Fees owed under Napa Municipal Code Chapter 15.04 shall be established, implemented, and enforced in accordance with Napa Municipal Code Chapter 3.04, particularly Sections 3.04.040 and 3.04.050.

B. Chapter 1, Division II, Section 113 (“Board of appeals”) is repealed in its entirety. Appeals of order, decisions, or determinations made under this Chapter shall be heard pursuant to Napa Municipal Code Section 15.04.100.

C. Chapter 1, Division II, Subsections 114.3 and 114.4 (“Prosecution of violation” and “Violation penalties”) are repealed in their entirety. Violations under this Chapter are subject to the enforcement procedures set forth in Napa Municipal Code Chapter 1.16 and Napa Municipal Code Section 15.04.020.

D. Chapter 9, Subsection 901.2 (“Fire protection systems”) is amended by repealing the Exception.

E. Chapter 9, Subsection 903.2 (“Where required”) is repealed in its entirety (with the exception of Sub Subsections 903.2.5, 903.2.11.1, 903.2.11.1.1, 903.2.11.1.2, 903.2.11.1.3, 903.2.11.2, 903.2.11.4, 903.2.11.5, 903.2.11.6, 903.2.12, which shall remain in effect). New sections 903.2, 903.2.1, 903.2.2, 903.2.4, 903.2.6, 903.2.7, and 905.3.1 are hereby adopted to read as follows:

903.2 Where required. Approved automatic sprinkler systems in new and existing buildings shall be provided in the locations described in this section.

903.2.1 Required installations. An automatic fire sprinkler system shall be installed and maintained in all newly constructed buildings or structures.

Exceptions:

- 1 Detached Group U private garages and carports accessory to a Group R3 occupancy, less than 1,000 square feet and with non habitable space above.
 - 2 Detached pool houses, workshops, barns and similar structures, built in conjunction with an existing non-sprinklered single family residences and provided the new structure is less than 1,000 square feet and is not intended for use as a dwelling unit.
 - 3 Detached canopies used exclusively for vehicle washing facilities or vehicle fuel dispensing stations.
4. Group B or M occupancies less than 1000 square feet.
- 1 Detached, unenclosed gazebos, solar trellises or parking shade structures.
 - 2 Detached restroom facilities associated with golf courses, parks and similar uses.

903.2.2 Additions. An automatic sprinkler system shall be installed throughout any existing commercial or multifamily residential building when the floor area of the addition (including mezzanines) exceeds 50% of the existing floor area of the building or when an additional story is added.

903.2.4 Change of Occupancy. For any change of occupancy, when the proposed new occupancy classification is more hazardous based on a fire and life safety evaluation by the Fire Code Official and Chief Building Official, including conversion of buildings to single family residences, accessory dwelling units, bed and breakfast, inns, lodging houses or congregate residences for 10 or less persons or other similar uses, an automatic fire sprinkler system shall be installed throughout.

903.2.6 Floor control valves. Approved supervised indicating control valves and flow switches shall be provided at the point of connection to the riser on each floor in buildings two or more stories in height.

903.2.7 Alarms. Approved audible and visual notification devices shall be connected to every automatic sprinkler system to alert occupants within each separate occupancy, or separate residential dwelling unit. Audible alarm devices shall be provided on the exterior of the building in an approved location. Where a fire alarm system is installed, actuation of the automatic sprinkler system shall actuate the building fire alarm system.

905.3.1 Height. In other than Group R3 and R3.1 occupancies, Class III standpipe systems shall be installed throughout each floor where buildings are three or more stories in height.

F. Chapter 15, Table 1505.1 (Minimum roof covering classification for types of construction," is hereby amended to read as follows:

"TABLE 1505.1^a MINIMUM ROOF COVERING CLASSIFICATION FOR TYPES OF CONSTRUCTION

IA IB IIA IIB IIIA IIIB IV VA VB AAAAAAAAAA For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

a. Unless otherwise required in accordance with Chapter 7A.

G. Chapter 15, Subsection 1505.1.3 ("Roof covering within all other areas") is amended to read as follows:

1505.1.3. Roof coverings within all other areas. The entire roof covering assembly of every existing structure where more than 50 percent of the total roof area is replaced within any one year period, the entire roof covering of every new structure, and any roof covering applied in the alteration, repair or replacement of the roof of every existing structure, shall be a fire retardant roof covering assembly that is at least Class

A.

H. Chapter 1, Division II, Subsection 105.2 ("Work exempt from permit") is amended by adding an exemption #14 to the list of "Building" exemptions to read as follows:

14. Platforms, decks, walks and driveways which are not more than 30 inches above grade and not over any basement or story below, and when not part of a required path of travel for disabled access as defined herein.

15.04.040 Amendments to California Residential Code.

A. Chapter 1, Division II, Subsection R108 ("Fees") is amended to read as follows:

R108 FEES. Fees owed under Napa Municipal Code Chapter 15.04 shall be established, implemented, and enforced in accordance with Napa Municipal Code Chapter 3.04, particularly Sections 3.04.040 and 3.04.050.

B. Chapter 1, Division II, Section R112 ("Board of appeals") is repealed in its entirety. Appeals of order, decisions, or determinations made under this Chapter shall be heard pursuant to Napa Municipal Code Section 15.04.100.

C. Chapter 1, Division II, Subsections R113.3 and R113.4 ("Prosecution of violation" and "Violation penalties") are repealed in their entirety. Violations under this Chapter are subject to the enforcement procedures set forth in Napa Municipal Code Chapter 1.16 and Napa Municipal Code Section 15.04.020.

D. Chapter 1, Division II, Subsection 105.2 (“Work exempt from permit”) is amended by amending building exemption 10 to read as follows:

10. Platforms, decks, walks and driveways which are not more than 30 inches above grade and not over any basement or story below, and when not part of a required path of travel for disabled access as defined herein.

E. The Exception identified under Chapter 3, Section R313.2, (“One and two family dwellings automatic fire systems”) is amended to read as follows:

Exception: An automatic residential fire sprinkler system shall be installed throughout existing one – and two – family dwellings when the floor area of an addition exceeds 50% of the existing floor area.

F. Chapter 9 is amended by adding a new Section R908, “Solar/Photovoltaic Panels and Modules,” to read as follows:

R908 SOLAR/ PHOTOVOLTAIC PANELS AND MODULES

Section R908.1 Where installed. Solar photovoltaic panels/modules shall comply with the requirements of the California Residential Code, California Electrical Code, California Building Code, California Fire Code and California State Fire Marshal Solar Photovoltaic Installation Guidelines (the “Solar Photovoltaic Installation Guideline,” published April 22, 2008 by the Office of the California State Fire Marshall, California Department of Forestry and Fire Protection, incorporated herein by reference)..

Exception: Detached Group U nonhabitable structures such as parking shade structures, carports, solar trellises, and similar type structures are not subject to the requirements of this section.

15.04.050 Amendments to California Electrical Code.

A. Annex H, Section 80.15 (“Board of appeals”) is repealed in its entirety. Appeals of order, decisions, or determinations made under this Chapter shall be heard pursuant to Napa Municipal Code Section 15.04.100.

B. Annex H, Section 80.23 (“Prosecution of violations”) is repealed in its entirety. Violations under this Chapter are subject to the enforcement procedures set forth in Napa Municipal Code Chapter 1.16 and Napa Municipal Code Section 15.04.020.

15.04.060 Amendments to California Mechanical Code.

A. Chapter 1, Division II, Section 110.0 (“Board of appeals”) is repealed in its entirety. Appeals of order, decisions, or determinations made under this Chapter shall be heard pursuant to Napa Municipal Code Section 15.04.100.

B. Chapter 1, Division II, Section 115.0 (“Fees”) is repealed in its entirety. The city shall establish fees by resolution or ordinance for services rendered under this Chapter (including fees for plan check and inspection). Fees shall be established, implemented, and enforced in accordance with Napa Municipal Code Chapter 3.04, particularly Sections 3.04.040 and 3.04.050.

15.04.070 Amendments to California Plumbing Code.

A. Chapter 1, Division II, Section 102.3 (“Violations and Penalties”) is repealed in its entirety. Violations under this Chapter are subject to the enforcement procedures set forth in Napa Municipal Code Chapter 1.16 and Napa Municipal Code Section 15.04.020.

B. Chapter 1, Division II, Section 103.4 (“Fees”) is repealed in its entirety. The city shall establish fees by resolution or ordinance for services rendered under this Chapter (including fees for plan check and inspection). Fees shall be established, implemented, and enforced in accordance with Napa Municipal Code Chapter 3.04, particularly Sections 3.04.040 and 3.04.050.

15.04.080 Amendments to California Fire Code.

A. Chapter 1, Section 103.2 (“Appointment”) is repealed in its entirety. The City Manager (or the City Manager’s designee) shall designate the individuals responsible under this Chapter for performing the responsibilities of the Fire Code Official.

B. Chapter 1, Section 105.4.4.1 (“Phased approval”) is repealed in its entirety.

C. Chapter 1 Section 105 (“Permits”) is amended by adding a new Subsection 105.7.15 (“Solar photovoltaic power systems”), to read as follows:

105.7.15 Solar photovoltaic power systems. A construction permit is required to install or modify solar photovoltaic power systems.

D. Chapter 1, Section 108 (“Board of Appeals”) is repealed in its entirety.

E. Chapter 1, Subsection 109.2 (“Notice of violation”) is repealed (with the exception of Subsection 109.2.4, which shall remain in effect). Violations under this Chapter are subject to the enforcement procedures set forth in Napa Municipal Code Chapter 1.16 and Napa Municipal Code Section 15.04.020.

F. Chapter 1, Section 111.4 (“Failure to Comply”) is repealed in its entirety. Violations under this Chapter are subject to the enforcement procedures set forth in Napa Municipal Code Chapter 1.16 and Napa Municipal Code Section 15.04.020.

G. Chapter 3, Subsection 307.1 (“General”) is hereby amended to read as follows:

307.1 General. A person shall not kindle or maintain or authorize to be kindled or maintained any open burning unless conducted for agricultural operations, approved in accordance with this Section and a permit obtained from the Fire Code Official.

H. Chapter 3, Subsection 307.4.2 (“Recreational fires”) is hereby amended to read as follows:

307.4.2 Recreational fires. Recreational fires are prohibited within the City of Napa.

I. Chapter 3, Subsection 308.1.4 (“Open Flame Cooking Devices”) is hereby repealed in its entirety.

J. Chapter 4, Subsection 401.3.3 (“Delayed Notification”) is hereby amended to read as follows:

401.3.3 Delayed Notification. A person, alarm company, remote, central or proprietary station shall not, by verbal or written directive, require any delay in the reporting of a fire or fire alarm signal to the fire department. Upon receipt of an alarm signal an alarm monitoring company shall first notify the fire department dispatch center prior to contacting the alarm subscriber.

K. Chapter 5, Subsection 501.3 (“Construction documents”) is hereby amended to read as follows:

501.3 Construction documents. Construction documents for proposed fire apparatus access, location of fire lanes, construction documents, hydraulic calculations for fire hydrants systems, and all fire protection system plans shall be submitted and approved prior to the issuance of a building permit.

L. Chapter 5, Subsection 503.4 (“Obstruction of fire apparatus access roads”) is hereby amended to read as follows:

503.4 Obstruction of fire apparatus access roads. Fire apparatus access roads shall not be obstructed in any manner, including the parking of vehicles. Vertical traffic calming in the form of speed bumps, humps or dips are prohibited along fire access roads without prior approval of the Fire Code Official. The minimum width and clearances established in Section 503.2.1 shall be maintained at all times.

M. Chapter 5, Subsection 505.1 (“Address Identification”) is amended to read as follows:

505.1 Address identification. New and existing buildings shall be provided with approved address numbers or letters. Each character shall be a minimum 4 inches high and a minimum of 0.5 inch wide. They shall be installed on a contrasting background and be plainly visible from the street or road fronting the property. When required by the Fire Code Official, address numbers shall be provided in additional approved locations to facilitate emergency response. Where access is by means of a private road and the building address cannot be viewed from the public way, a monument, pole or other approved sign or means shall be used to identify the structure. Address numbers shall be maintained.

N. Chapter 5, Section 505 (“Premise Identification”) is amended by adding a new Subsection 505.3, “Utility identification,” to read as follows:

505.3 Utility identification. When required by the Fire Code Official, gas shut off valves; electric meters, service switches and other utility equipment shall be clearly and legibly marked to identify the unit or space that it serves. Identification shall be made in an approved manner, shall be readily visible, and shall be maintained.

O. Chapter 5, Subsection 507.2 (“Type of water supply”) is hereby amended to read as follows:

507.2 Type of water supply. A water supply shall consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems connected to the municipal water system and capable of providing the required fire flow.

P. Chapter 6, Subsection 603.8 (“Incinerators”) is hereby amended to read as follows:

603.8 Incinerators. Commercial, industrial and residential type incinerators and chimneys are prohibited within the City of Napa.

Q. Chapter 6, Section 605 is hereby amended by adding a new Subsection 605.11, “Solar/ Photovoltaic Power Systems,” to read as follows:

605.11 Solar/ Photovoltaic Power Systems. Solar Photovoltaic Power Systems shall be installed in accordance the California Building Code, California Fire Code, California Electrical Code and California State Fire Marshal Solar Photovoltaic Installation Guidelines (the “Solar Photovoltaic Installation Guideline,” published April 22, 2008 by the Office of the California State Fire Marshall, California Department of Forestry and Fire Protection, incorporated herein by reference).

Exception: Detached Group U nonhabitable structures such as parking shade structures, carports, solar trellises, and similar type structures are not subject to the requirements of this section.

R. Chapter 6, Subsection 609.2, (“Where required”) is hereby amended to read as follows:

609.2 Where required. A Type I hood shall be installed at or above all commercial cooking appliances and domestic cooking appliances used for commercial purposes that produce grease laden vapors. Cooking facilities in assembly occupancies and congregate residences shall be considered commercial operations.

S. Chapter 9, Subsection 901.2 (“Construction documents”) is hereby amended to read as follows:

901.2 Construction documents. The Fire Code Official shall have the authority to require construction documents and calculations for all fire protection systems and to require permits be issued for the installation, rehabilitation or modification of any fire protection system. Construction documents for fire protection systems shall be submitted for review and approval prior to the issuance of a building permit.

T. Chapter 9, Subsection 901.4.2 (“Nonrequired fire protection systems”) is hereby repealed in its entirety.

U. Chapter 9, Subsection 903.2 (Where required) is hereby repealed (with the exception of Sub Subsections 903.2.5, 903.2.11.1, 903.2.11.1.1, 903.2.11.1.2, 903.2.11.1.3, 903.2.11.2, 903.2.11.4, 903.2.11.5, 903.2.11.6, 903.2.12 which shall remain in effect), and replaced with the following:

903.2 Where required. Approved automatic sprinkler systems in new and existing buildings shall be provided in the locations described in this section.

903.2.1 Required installations. An automatic fire sprinkler system shall be installed and maintained in all newly constructed buildings or structures.

Exceptions:

- 1 Detached Group U private garages and carports accessory to a Group R3 occupancy, less than 1,000 square feet and with non-habitable space above.
- 2 Detached pool houses, workshops, barns and similar structures, built in conjunction with an existing non-sprinklered single family residence, provided the new structure is less than 1,000 square feet and not intended for use as a dwelling unit.
- 3 Detached canopies used exclusively for vehicle washing facilities or vehicle fuel dispensing stations.

- 1 Group B or M occupancies of less than 1000 square feet.
- 2 Detached, unenclosed gazebos, solar trellises or parking shade structures.
6. Detached restroom facilities associated with golf courses, parks and similar uses.

903.2.2 Additions. An automatic sprinkler system shall be installed throughout any existing commercial or multi-residential building when the floor area of the addition (including mezzanines) exceeds 50% of the existing floor area of the building or when an additional story is added.

903.2.4 Change of Occupancy. For any change of occupancy when the proposed new occupancy classification is more hazardous based on a fire and life safety evaluation by the Fire Code Official and Chief Building Official, including conversion of buildings to single family residences, accessory dwelling units, bed and breakfast, inns, lodging houses or congregate residences for 10 or less persons or other similar uses, an automatic fire sprinkler system shall be installed throughout.

V. Chapter 9, Section 903.3.8, subsection 2 (“Floor Control Valves”) is amended to read as follows (Note: Subsections 1 and 3, the “Exception,” and the primary text of Section 903.3.8 are not modified and remain in effect):

2. Buildings that are two or more stories in height.

W. Chapter 9, Subsection 903.4.2 is amended by repealing Subsection 903.4.2 in its entirety, and replacing it with a new Subsection 903.4.2 to read as follows:

903.4.2 Alarms. Approved audible and visual notification devices shall be connected to every automatic sprinkler system to alert occupants within each separate occupancy or separate residential dwelling unit. Audible alarm devices shall be provided on the exterior of the building in an approved location. Where a fire alarm system is installed, actuation of the automatic sprinkler system shall actuate the building fire alarm system.

X. Chapter 9, Subsection 905.3.1, subsection 2 (“Height”) is amended to read as follows (Note: Subsections 1, 3 and 4,, the “Exceptions,” and the primary text of Section 905.3.1 are not modified and remain in effect):

2. Buildings that are three or more stories in height.

Y. Chapter 9, Section 907.1.1 (Construction documents) is amended to read as follows:

907.1.1 Construction documents. Construction documents for fire alarm systems shall be of sufficient clarity to indicate the location, nature and extent of work proposed and show in detail that the work will conform to the provisions of this code, the California Building Code, and relevant laws, ordinances, rules and regulations, as determined by the Fire Code Official. Required plans shall be submitted and approved prior to the issuance of a building permit.

Z. Chapter 9, Section 907.2.13.1.2, (“Duct smoke detection”) is amended by adding a new subsection 3 to read as follows:

3. Duct smoke detectors shall be capable of being reset by a readily accessible remote push button or key activated switch as approved by the Fire Code Official.

AA. Chapter 22, Subsection 2206.2.2 (“Aboveground tanks located inside buildings”) is amended to read as follows:

2206.2.2 Aboveground tanks located inside buildings. Aboveground tanks for the storage of Class I, II, and III liquid fuels are allowed to be located in buildings but shall not be used for automotive fuel dispensing stations open to the public. Such tanks shall be located in special enclosures complying with Section 2206.2.6, in a liquid storage room or a liquid storage warehouse complying with Chapter 34, or shall be listed and labeled as protected aboveground tanks.

BB. Chapter 22, Subsection 2206.2.3 (“Aboveground tanks located outside, above grade”) is amended to read as follows (NOTE: Sub Subsections 1, 2, and 4, are not modified):

2206.2.3 Aboveground tanks located outside, above grade. Aboveground tanks shall not be used for automotive fuel dispensing stations open to the public. Such tanks shall be located in special enclosures complying with Section 2206.2.6. Aboveground tanks shall not be used for the storage of Class I, II, III liquid motor fuels except as provided by this section.

3. Tanks containing fuels shall not exceed 1,000 gallons individual capacity or 2,000 gallons in aggregate capacity. Installations with the maximum allowable aggregate capacity shall be separated from other such installations by no less than 100 feet.

CC. Chapter 34, Subsection 3404.2.9.5.1 (“Locations of where aboveground tanks are prohibited”) is hereby amended to read as follows:

3404.2.9.5.1 Locations where aboveground tanks are prohibited. Storage of Class I, II and III liquids in aboveground tanks outside of buildings is prohibited.

Exception: Protected aboveground tanks for the purpose of emergency power generator installations and for facilities on an individual basis as approved by the Fire Code Official. Tank size shall not exceed to 1,000 gallons for Class I or II liquids and 2,000 gallons for Class III liquids.”

15.04.090 Amendments to California Green Building Standards Code.

A. Measures 4.303.13 of Chapter 4, "Residential Mandatory Measures" shall be mandatory starting 1/20/11, instead of on 7/01/11 as provided for under the 2010 CALGreen Code.

B. The following voluntary residential measures identified in Appendix A4, "Residential Voluntary Measures," shall be mandatory:

A4.203.1 (Tier 1 shall be mandatory), A4.207.7, A4.207.8, A4.210.1, A4.303.1 (both Tier 1 and Tier 2 shall be mandatory), A4.304.3, A4.306.1, A4.405.3 (Tier 1 shall be mandatory), A4.504.1, A4.504.3 (Tier 1 shall be mandatory), A4.506.1

C. A Note is added to follow the text of Measure A4.304.1, "Low-water consumption irrigation system," of Appendix A4 to read as follows:

NOTE: Projects of a certain minimum landscape area must conform to the City of Napa Water Efficient Landscape Ordinance (see Napa Municipal Code Section 17.52.520).

D. Measure A4.304.3, "Water budget," of Appendix A4 is hereby amended to read as follows:

A4.304.3 Water budget. A water budget shall be developed for landscape irrigation use that conforms to the City of Napa Water Efficient Landscape Ordinance (Napa Municipal Code Section 17.52.520). This measure shall apply to landscaping with the minimum landscape areas specified in Napa Municipal Code 17.52.520.

E. A Note is added to follow the text of Measure A4.304.4, "Potable water reduction," of Appendix A4 to read as follows:

NOTE: Projects of a certain minimum landscape area must conform to the City of Napa Water Efficient Landscape Ordinance (see Napa Municipal Code Section 17.52.520).

F. A Note is added to follow the text of Measure A4.305.3, "Recycled water for landscape irrigation," of Appendix A4 to read as follows:

NOTE: Projects of a certain minimum landscape area must conform to the City of Napa Water Efficient Landscape Ordinance (see Napa Municipal Code Section 17.52.520). In those projects, areas irrigated with recycled water are defined as "Special Landscape Areas" and receive a higher Maximum Applied Water Allowance.

G. Two new measures are added as Items 1 and 2 of Measure A4.306.1, "Innovative concepts and local environmental conditions," of Appendix A4, and Measure A4.306.1 is hereby amended to read as follows:

A4.306.1 Innovative concepts and local environmental conditions.

Item 1. Residential structures shall be limited to a maximum of 60 psi static service pressure; sites consistently experiencing greater than 65 psi shall require the installation of a pressure regulator. Piping for fire sprinkler systems is excluded from this requirement.

Item 2. If water softeners installed as part of project, they shall comply with NSF/ANSI Standard 44 provisions, including the following features:

- Demand-initiated regeneration (DIR) system, not time-clock initiated
- Minimum salt efficiency of 3,350 grains total hardness per pound of salt
- Generate no more than five gallons of water per 1,000 grains of hardness removed during service cycle

H. A Note is added to follow the text of Measures 4.408.1 and 4.408.2 of Chapter 4, "Residential Mandatory Measures," to read as follows:

NOTE: All "Covered Projects," as that term is defined by Napa Municipal Code 15.32.020, shall comply with the requirements of the City's Construction and Demolition Debris Recycling and Diversion ordinance contained at Napa Municipal Code Chapter 15.32.

I. The following voluntary nonresidential measures identified in Appendix A5, "Nonresidential Voluntary Measures," shall be mandatory:

A5.203.1.1 (Tier 1), A5.204.1, A5.204.3, A5.204.3.1, A5.204.3.2, A5.204.3.3, A5.212.1, A5.303.2.3.1 (Tier 1), A5.303.3, A5.304.9, A5.404.1, A5.405.1, A5.405.2.1, A5.405.4 (Tier 1), A5.405.5 (and following sections as enumerated therein), A5.406.1.1, A5.504.1.1, A5.504.1.2, A5.504.2, A5.504.5.1, A5.504.5.2, 5.504.7, A5.507.1.1, A5.507.1.1.1, A5.507.1.1.2, A5.507.1.2, A5.507.2, A5.507.3, A5.507.3.1, A5.507.3.2, 5.507.4, 5.507.4.1, 5.507.4.2

J. A Note is added to the text of Measure 5.106.1, "Stormwater pollution prevention plan," of Chapter 5, "Nonresidential Mandatory Measures," to read as follows:

Note: All projects disturbing one (1.0) acre or less shall comply with the requirements of Napa Municipal Code Section 8.36 "Stormwater Runoff Pollution Control."

K. Measure 5.303.2.1, "Multiple showerheads serving one shower," of Chapter 5, "Nonresidential Mandatory Measures," is hereby amended to read as follows:

5.303.2.1 Multiple showerheads serving one shower.

When single shower fixtures are served by more than one showerhead, the combined flow rate of all the showerheads shall not exceed the maximum flow rates specified in the 30% reduction column contained in Table A5.303.2.3.1 or the shower shall be designed to only allow one showerhead to be in operation at a time.

Exception: The maximum flow rate for showerheads when using the calculation method specified in Section A5.303.2.3.1, Item 2 is 2.5 gpm @ 80 psi.

L. Measure 5.303.4, "Wastewater reduction," of Chapter 5 is hereby amended to read as follows:

5.303.4 Wastewater reduction.

Each building shall reduce by 30 percent the generation of wastewater by one of the following methods:

- 1 The installation of water conserving fixtures (water closets, urinals) meeting the criteria established in section A5.303.2.3.1 or
- 2 Utilizing non-potable water systems

M. Measure A5.303.3, "Appliances," of Appendix A5 is hereby amended to read as follows:

A5.303.3 Appliances.

1. Clothes washers shall have a maximum Water Factor (WF) of 6.0.
2. Dishwashers shall meet the following water use standards:
 - a. Residential – 5.8 gallons per cycle
 - b. Commercial – refer to Table A5.303.3
3. Ice makers shall be air cooled or, if water-cooled, be part of a closed loop cooling system.
4. Food steamers shall be connectionless or boiler less.
5. If water softeners installed as part of project, they shall comply with NSF/ANSI Standard 44 provisions, including the following features:
 - Demand initiated regeneration (DIR) system, not time clock initiated
 - Minimum salt efficiency of 3,350 grains total hardness per pound of salt
 - Generate no more than five gallons of water per 1,000 grains of hardness removed during service cycle

N. Measure 5.304.1, "Water budget," of Chapter 5 is hereby amended to read as follows:

5.304.1 Water budget.

A water budget shall be developed for landscape irrigation use that conforms to the City of Napa Water Efficient Landscape Ordinance (Napa Municipal Code Section 17.52.520). This measure shall apply to landscaping with the minimum landscape areas specified in Napa Municipal Code 17.52.520.

O. Measure 5.304.2, "Outdoor potable water use," of Chapter 5 is hereby amended to read as follows:

5.304.2 Outdoor potable water use.

For new water service, separate meters or submeters shall be installed for indoor and outdoor potable water use for landscaped areas between 1,000 square feet and 5,000 square feet. Dedicated City irrigation meters are required for projects subject to the City of Napa Water Efficient Landscape Ordinance (Napa Municipal Code Section 17.52.520). Submeters shall be required for other projects with landscape areas greater than 1,000 square feet.

P. Measures 5.304.3, "Irrigation design," and 5.304.3.1, "Irrigation controllers," of Chapter 5 are hereby amended to read as follows:

5.304.3 Irrigation design.

In new nonresidential projects, install irrigation controllers and sensors which include the following criteria, and meet manufacturer's recommendations.

5.304.3.1 Irrigation controllers.

Automatic irrigation system controllers installed at the time of final inspection shall comply with the following:

- 1 Controllers shall be weather or soil moisture based controllers that automatically adjust irrigation in response to changes in plants' needs as weather conditions change.
- 2 Weather based controllers without integral rain sensors or communication systems that account for local rainfall shall have a separate wired or wireless rain sensor which connects or communicates with the controller(s). Soil moisture based controllers are not required to have rain sensor input.

Q. A Note is added to follow the text of Measure A5.304.4, "Potable water reduction," of Appendix A5 to read as follows: NOTE: Projects of a certain minimum landscape area must conform to the City of Napa Water Efficient Landscape Ordinance (see Napa Municipal Code Section 17.52.520).

R. A new measure A5.304.9, "Service pressure," is hereby added to Appendix A5, to read as follows:

A5.304.9 Service Pressure

Nonresidential structures shall be limited to a maximum of 60 psi static service pressure; sites consistently experiencing greater than 65 psi shall require the installation of a pressure regulator. Piping for fire sprinkler systems is excluded from this requirement.

S. A Note is added to follow the text of Measures 5.408.1, "Construction waste diversion," 5.408.2, "Construction waste management plan," 5.408.2.1, "Documentation," and 5.408.3, "Construction waste," of Chapter 5, "Nonresidential Mandatory Measures," and Measure A5.408.3.1.1 "Verification of compliance," of Appendix A5, "Nonresidential Voluntary Measures," to read as follows:

NOTE: All "Covered Projects," as that term is defined by Napa Municipal Code 15.32.020, shall comply with the requirements of the city's Construction and Demolition Debris Recycling and Diversion ordinance contained at Napa Municipal Code Chapter 15.32.

15.04.100 Building and Fire Code Board of Appeals.

A. There shall be a building and fire code board of appeals ("Building Board of Appeals") to consist of five members. The Building Board of Appeals shall be the "local appeals board" and the "housing appeals board" (as those phrases are defined and used in the California Building Standards Code). Each member shall be appointed and hold office in accordance with procedures established by resolution of the City Council. Each member shall demonstrate necessary qualifications, knowledge, experience, and training in matters related to building construction and fire protection.

B. The Building Board of Appeals shall be considered a "standing committee" with a continuing subject matter jurisdiction. Thus, the Building Board of Appeals shall be subject to the requirements of the Brown Act (California Government Code Sections 54950, et seq.); however, the Building Board of Appeals shall have no regular meetings, and all meetings shall be special meetings noticed pursuant to California Government Code Section 54956. The Building Board of Appeals shall conduct its meetings in accordance with procedures established by resolution of the City Council. The Building Board of Appeals may establish its own rules of procedure or by-laws consistent with city council resolutions and ordinances.

C. Any person adversely affected by a determination made by the Chief Building Official or Fire Code Official in administering or enforcing this Chapter may appeal the determination to the Building Board of Appeals. The appeal shall be filed with the Chief Building Official no later than ten (10) days after receipt of written notice of the determination and the appeal provisions of this Section. Upon receipt of an appeal by the Chief Building Official, a hearing shall be scheduled before the Building Board of Appeals. The Building Board of Appeals shall consider relevant evidence presented at the hearing, and shall render a final written decision within a reasonably prompt time after the conducting the hearing. The authority of the Building Board of Appeals to render a written decision shall be limited to the scope of authority of the Chief Building Official (or Fire Code Official), and the Building Board of Appeals shall have no authority to waive a requirement of this Chapter.

D. Any person aggrieved by a decision of the Building Board of Appeals may request an administrative hearing within ten (10) days of the issuance of the final written decision. Any such request shall be made and heard in the same manner as an administrative hearing related to an administrative citation, in accordance with Napa Municipal Code Sections 1.24.070 through 1.24.100.

E. Failure to timely request an appeal to the Building Board of Appeals (pursuant to Subsection C), or to an administrative hearing officer (pursuant to Subsection D) constitutes a waiver of the hearing and a failure to exhaust administrative remedies.

F. Unless otherwise designated by the City Manager, the Chief Building Official shall be the principal city staff liaison to the Building Board of Appeals, and the Chief Building Official shall appoint a secretary to the Building Board of Appeals to comply with all procedural requirements (such as those identified in Council Policy Resolution No. 10, related to the Brown Act).

G. The Chief Building Official or the Fire Code Official may request a special meeting of the Building Board of Appeals in order to request advisory comments from the Building Board of Appeals regarding issues related to this Chapter, such as the potential adoption of new codes, proposed code changes, or alternate methods and materials.

15.04.110 Disability Access Board of Appeals.

A. There shall be a disability access board of appeals ("Access Board of Appeals") to consist of five members. Each member shall be appointed and hold office in accordance with procedures established by resolution of the City Council. Three of the five members shall be members of the Building Board of Appeals, and shall be appointed by the City Council to be a member of the Building Board of Appeals and the Access Board of Appeals. Two of the five members shall be "physically handicapped persons" (as defined by California Health and Safety Code Section 19957.5).

A. The Access Board of Appeals shall be considered a “standing committee” with a continuing subject matter jurisdiction. Thus, the Access Board of Appeals shall be subject to the requirements of the Brown Act (California Government Code Sections 54950, et seq.); however, the Access Board of Appeals shall have no regular meetings, and all meetings shall be special meetings noticed pursuant to California Government Code Section 54956. The Access Board of Appeals shall conduct its meetings in accordance with procedures established by resolution of the City Council. The Access Board of Appeals may establish its own rules of procedure or bylaws consistent with city council resolutions and ordinances.

B. Any person aggrieved by a determination made by the Chief Building Official or Fire Code Official in administering or enforcing the portions of this Chapter related to access to “public accommodations or facilities” (pursuant to California Health and Safety Code Section 19955, et seq.) may appeal the determination to the Access Board of Appeals. The appeal shall be filed with the Chief Building Official no later than ten (10) days after receipt of written notice of the determination and the appeal provisions of this Section. Upon receipt of an appeal by the Chief Building Official, a hearing shall be scheduled before the Access Board of Appeals. The Access Board of Appeals shall consider relevant evidence presented at the hearing, and shall render a final written decision within a reasonably prompt time after conducting the hearing. The authority of the Access Board of Appeals to render a written decision shall be limited to the scope of authority of the Chief Building Official (or Fire Code Official), and the Access Board of Appeals shall have no authority to waive a requirement of this Chapter.

C. Any person aggrieved by a decision of the Access Board of Appeals may request an administrative hearing within ten (10) days of the issuance of the final written decision. Any such request shall be made and heard in the same manner as an administrative hearing related to an administrative citation, in accordance with Napa Municipal Code Sections 1.24.070 through 1.24.100.

D. Failure to timely request an appeal to the Access Board of Appeals (pursuant to Subsection C), or to an administrative hearing officer (pursuant to Subsection D) constitutes a waiver of the hearing and a failure to exhaust administrative remedies.

E. Unless otherwise designated by the City Manager, the Chief Building Official shall be the principal city staff liaison to the Access Board of Appeals, and the Chief Building Official shall appoint a secretary to the Access Board of Appeals to comply with all procedural requirements (such as those identified in Council Policy Resolution No. 10, related to the Brown Act).

G. The Chief Building Official or the Fire Code Official may request a special meeting of the Access Board of Appeals in order to request advisory comments from the Access Board of Appeals regarding issues related to this Chapter, such as the potential adoption of new codes, proposed code changes, or alternate methods and materials.

Climate Zone 2 Energy Cost-Effectiveness Study

Codes and Standards Title 24 Energy-Efficient Local Ordinances

Title: Climate Zone 2 Energy Cost-Effectiveness Study

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Last Modified: September 30, 2010



Climate Zone 2 Energy Cost-Effectiveness Study

September 30, 2010

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1.0 Executive Summary

This report presents the results of Gabel Associates' research and review of the feasibility and energy cost-effectiveness of building permit applicants exceeding the 2008 Building Energy Efficiency Standards to meet the minimum energy-efficiency requirements of local energy efficiency standards covering **Climate Zone 2**. A local government may use this report as a basis for demonstrating energy cost-effectiveness of a proposed green building or energy ordinance. The study assumes that such an ordinance requires, for the building categories covered, that building energy performance exceeds the 2008 TDV energy standard budget by at least 15%.

The study is also contained in the local government's application to the California Energy Commission (CEC) which must meet all requirements specified in Section 10-106 of the California Code of Regulations, Title 24, Part 1, Article 1: Locally Adopted Energy Standards. An ordinance shall be legally enforceable (a) after the CEC has reviewed and approved the local energy standards as meeting all requirements of Section 10-106; and (b) the ordinance has been adopted by the local government and filed with the Building Standards Commission.

The 2008 Building Energy Efficiency Standards, which took effect on January 1, 2010, are the baseline used to calculate the cost-effectiveness data.

2.0 Methodology and Assumptions

The energy performance impacts of exceeding the performance requirements of the 2008 Title 24 Building Energy Efficiency Standards (2008 Standards) have been evaluated in **Climate Zone 2** using the following residential and nonresidential prototypical building types:

Small Single Family House 2-story 2,025 sf	Large Single Family House 2-story 4,500 sf
Low-rise Multi-family Apartments 8 dwelling units/2-story 8,442 sf	High-rise Multi-family Apartments 40 dwelling units/4-story 36,800 sf
Low-rise Office Building 1-story 10,580 sf	High-rise Office Building 5-story 52,900 sf

Methodology

The methodology used in the case studies is based on a design process for each of the proposed prototypical building types that first meets the minimum requirements and then exceeds the 2008 Standards by 15%. The process includes the following major stages:

Stage 1: Minimum Compliance with 2008 Standards:

Each prototype building design is tested for minimum compliance with the 2008 Standards, and the mix of energy measures are adjusted using common construction options so the building first just meets the Standards. The set of energy measures chosen represent a reasonable combination which reflects how designers, builders and developers are likely to achieve a specified level of performance using a relatively low first incremental (additional) cost.

Stage 2: Incremental Cost for Exceeding 2008 Standards by 15%:

Starting with that set of measures which is minimally compliant with the 2008 Standards, various energy measures are upgraded so that the building just exceeds the 2008 Standards by 15%. The design choices by the consultant authoring this study are based on many years of experience with architects, builders, mechanical engineers; and general knowledge of the relative acceptance and preferences of many measures, as well as their incremental costs. This approach tends to reflect how building energy performance is typically evaluated for code compliance and how it's used to select design energy efficiency measures. Note that lowest simple payback with respect to building site energy is not the primary focus of selecting measures; but rather the requisite reduction of Title 24 Time Dependent Valuation(TDV) energy at a reasonable incremental cost consistent with other non-monetary but important design considerations. A minimum and

maximum range of incremental costs of added energy efficiency measures is established by a variety of research means. A construction cost estimator, Building Advisory LLC, was contracted to conduct research to obtain current measure cost information for many energy measures; and Gabel Associates performed its own additional research to establish first cost data.

Stage 3: Cost Effectiveness Determination:

Energy savings in kWh and therms is calculated from the Title 24 simulation results to establish the annual energy cost savings and CO₂-equivalent reductions in greenhouse gases. A simple payback analysis in years is calculated by dividing the incremental cost for exceeding the 2008 Standards by the estimated annual energy cost savings.

Assumptions

Annual Energy Cost Savings

1. Annual site electricity (kWh) and natural gas (therms) saved are calculated using Micropas 8, state-approved energy compliance software for the 2008 Building Energy Efficiency Standards.
2. Average residential utility rates of \$0.18/kWh for electricity and \$1.15/therm for natural gas in current constant dollars; nonresidential rates are time-of-use rate schedules modeled explicitly in the DOE-2.1E computer simulation: PG&E A-6 schedule for electricity and PG&E G-NR1 schedule for natural gas.
3. No change (i.e., no inflation or deflation) of utility rates in constant dollars
4. No increase in summer temperatures from global climate change

Simple Payback Analysis

1. No external cost of global climate change -- and corresponding value of additional investment in energy efficiency and CO₂ reduction -- is included
2. The cost of money (e.g., opportunity cost) invested in the incremental cost of energy efficiency measures is not included.

3.0 Minimum Compliance with 2008 Standards

The following energy design descriptions of the following building prototypes just meet the 2008 Standards in Climate Zone 2.

Small Single Family House

- 2,025 square feet
- 2-story
- 20.2% glazing/floor area ratio

Base Case Design With No Air Conditioner

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor over Garage/Open at 2nd Floor
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioner: None
R-6 Attic Ducts
50 Gallon Gas Water Heater: EF=0.62

Base Case Design With Air Conditioner

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor over Garage/Open at 2nd Floor
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioner: 13 SEER, 11 EER (HERS)
Air Conditioner: Refrigerant Charge (HERS)
R-6 Attic Ducts
50 Gallon Gas Water Heater: EF=0.62

Large Single Family House

- 4,500 square feet
- 2-story
- 22.0% glazing/floor area ratio

Base Case Design With No Air Conditioner

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(2) Furnaces: 80% AFUE
Air Conditioner: None
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(2) 50 Gallon Gas Water Heaters: EF=0.60

Base Case Design With Air Conditioner

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(2) Furnaces: 80% AFUE
(2) Air Conditioners: 13 SEER
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(2) 50 Gallon Gas Water Heaters: EF=0.62

Low-rise Multi-family Apartments

- 8,442 square feet
- 8 units/2-story
- 12.5% glazing/floor area ratio

Base Case Design With No Air Conditioner

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier R-13 Walls R-0 Slab on Grade Low E2 Vinyl Windows, U=0.36, SHGC=0.30 (8) Furnaces: 80% AFUE Air Conditioner: None R-6 Attic Ducts (8) 40 Gallon Gas Water Heaters: EF=0.63

Base Case Design With Air Conditioner

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier R-13 Walls R-0 Slab on Grade Low E2 Vinyl Windows, U=0.36, SHGC=0.30 (8) Furnaces: 80% AFUE (8) Air Conditioner: 13 SEER R-8 Attic Ducts (8) 40 Gallon Gas Water Heaters: EF=0.63

High-rise Multifamily Apartments

- 36,800 sf,
- 40 units
- 4-story
- Window to Wall Ratio = 35.2%

Energy Efficiency Measures to Meet Title 24
R-19 Metal Roof w/ R-10 (2") rigid insulation; cool roof Reflectance = 0.55 Emittance = 0.75
R-19 in Metal Frame Walls
R-4 (1.25" K-13 spray-on) Raised Slab over parking garage
Dual Metal Windows: COG U-factor=0.30, COG SHGC=.54
2 ton 4-pipe fan coil, 84% AFUE boiler, 70-ton scroll air cooled chiller 0.72 KW/ton
Central DHW boiler: 84% AFUE and recirculating system w/ timer- temperature controls with variable speed pump

Low-rise Office Building

- Single Story
- 10,580 sf,
- Window to Wall Ratio = 37.1%

Energy Efficiency Measures to Meet Title 24
R-19 under Metal Deck with 3" rigid (R-15) above
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Metal windows: COG U=0.30, COG SHGC=0.54
Lighting = 0.858 w/sf: Open Office Areas: (60) 2-lamp T8 fixtures @58w each; (24) 18w recessed CFLs no lighting controls. Small Offices: (48) 2-lamp T8 fixtures; (40) 18w recessed CFLs, on/off lighting controls. Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces; no controls.
(3) 10-ton DX units EER=11.1; 82% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers
R-6 duct insulation w/ducts on roof, HERS verified duct leakage
(1) Tank Gas Water Heaters EF=0.58

High-rise Office Building

- 5-story
- 52,900 sf,
- Window to Wall Ratio = 34.5%

Energy Efficiency Measures to Meet Title 24
R-19 under Metal Deck with 2" rigid insulation above (R-10), Cool Roof Reflectance = 0.55, Emittance = 0.75
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Metal windows: Default glazing U=0.71, SHGC = .73
Lighting = 0.858 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.
(3) 70 ton Packaged VAV system 10.3 EER/80% TE, standard efficiency variable speed fan motors; 25% VAV boxes, hot water reheat on perimeter zones with 82% AFUE boiler, fixed temp. economizer
R-6 duct insulation w/ ducts in conditioned
(1) Boiler (combined with space heat) 82% AFUE

4.0 Incremental Cost to Exceed 2008 Standards by 15%

The following tables list the energy features and/or equipment included in the 2008 Standards base design, the efficient measure options, and an estimate of the incremental cost for each measure included **to improve the building performance to use 15% less TDV energy than the corresponding Title 24 base case design.**

Small Single Family House

- 2,025 square feet
- 2-story
- 20.2% glazing/floor area ratio

Incremental Cost Estimate to Exceed Title 24 by 15%

Single Family Prototype: 2,025 SF, Option 1 - No AC

2025 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 Roof w/ Radiant Barrier (from R-38 w/Radiant Barrier): 1,443 sf @ 0.30 to 0.45/sf	Downgrade	\$ (649)	\$ (433)	\$ (541)
R-19 Walls (from R-13): 2,550 sf @\$0.31 to \$0.54/sf	Upgrade	\$ 791	\$ 1,377	\$ 1,084
R-19 Raised Floor over Garage/Open at 2nd Floor	-	\$ -	\$ -	\$ -
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
Furnace: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-6)	Downgrade	\$ (325)	\$ (225)	\$ (275)
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 300	\$ 600	\$ 450
50 Gallon Gas Water Heater: EF=0.62	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 116	\$ 1,319	\$ 718
Total Incremental Cost per Square Foot:		\$ 0.06	\$ 0.65	\$ 0.35

Incremental Cost Estimate to Exceed Title 24 by 15%

Single Family Prototype: 2,025 SF, Option 2 - No AC

2025 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier (from R-38 w/Radiant Barrier): 1,443 sf @ 0.15 to 0.20/sf	Downgrade	\$ (289)	\$ (216)	\$ (253)
R-13 Walls	-	\$ -	\$ -	\$ -
R-19 Raised Floor over Garage/Open at 2nd Floor	-	\$ -	\$ -	\$ -
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
Furnace: 92% AFUE (from 80% AFUE)	Upgrade	\$ 500	\$ 1,200	\$ 850
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-8 Attic Ducts (from R-6)	Upgrade	\$ 225	\$ 325	\$ 275
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 300	\$ 600	\$ 450
50 Gallon Gas Water Heater: EF=0.63 (from EF=0.62)	Upgrade	\$ -	\$ 50	\$ 25
Total Incremental Cost of Energy Efficiency Measures:		\$ 736	\$ 1,959	\$ 1,347
Total Incremental Cost per Square Foot:		\$ 0.36	\$ 0.97	\$ 0.67

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 2,025 SF, Option 3 with AC

2025 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 1,443 sf @ 0.25 to 0.35/sf	Downgrade	\$ (505)	\$ (361)	\$ (433)
R-19 Walls (from R-13): 2,550 sf @\$0.31 to \$0.54/sf	Upgrade	\$ 791	\$ 1,377	\$ 1,084
R-19 Raised Floor over Garage/Open at 2nd Floor	-	\$ -	\$ -	\$ -
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
Furnace: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: 13 SEER, 11 EER (HERS)	-	\$ -	\$ -	\$ -
Air Conditioner: Refrig. Charge (HERS)	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-6)	Downgrade	\$ (325)	\$ (225)	\$ (275)
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 300	\$ 600	\$ 450
50 Gallon Gas Water Heater: EF=0.60 (from EF=0.62)	Downgrade	\$ (200)	\$ (100)	\$ (150)
Total Incremental Cost of Energy Efficiency Measures:		\$ 60	\$ 1,291	\$ 676
Total Incremental Cost per Square Foot:		\$ 0.03	\$ 0.64	\$ 0.33

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 2,025 SF, Option 4 with AC

2025 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-21 Walls (from R-13): 2,550 sf @ \$0.45 to \$0.70/sf	Upgrade	\$ 1,148	\$ 1,785	\$ 1,466
R-19 Raised Floor over Garage/Open at 2nd Floor	-	\$ -	\$ -	\$ -
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
Furnace: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: 13 SEER, 11 EER (HERS)	-	\$ -	\$ -	\$ -
Air Conditioner: Refrig. Charge (HERS)	-	\$ -	\$ -	\$ -
R-6 Attic Ducts	-	\$ -	\$ -	\$ -
50 Gallon Gas Water Heater: EF=0.63 (from EF=0.62)	Upgrade	\$ -	\$ 50	\$ 25
Total Incremental Cost of Energy Efficiency Measures:		\$ 1,148	\$ 1,835	\$ 1,491
Total Incremental Cost per Square Foot:		\$ 0.57	\$ 0.91	\$ 0.74

Large Single Family House

- 4,500 square feet
- 2-story
- 22.0% glazing/floor area ratio

Incremental Cost Estimate to Exceed Title 24 by 15% **Single Family Prototype: 4,500 SF, Option 1 - No AC**

4500 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-21 Walls (from R-13): 2,518 sf @ \$0.45 to \$0.70/sf	Upgrade	\$ 1,133	\$ 1,763	\$ 1,448
R-30 Raised Floor (from R-19): 2,700 sf @ \$0.25 to \$0.35	Upgrade	\$ 675	\$ 945	\$ 810
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(2) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-8 Attic Ducts (from R-6)	Upgrade	\$ 450	\$ 650	\$ 550
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
(2) 50 Gallon Gas Water Heaters: EF=0.63 (from EF=0.60)	Upgrade	\$ 200	\$ 500	\$ 350
Pipe Insulation	Upgrade	\$ 300	\$ 400	\$ 350
Total Incremental Cost of Energy Efficiency Measures:		\$ 2,758	\$ 4,258	\$ 3,508
Total Incremental Cost per Square Foot:		\$ 0.61	\$ 0.95	\$ 0.78

Incremental Cost Estimate to Exceed Title 24 by 15% **Single Family Prototype: 4,500 SF, Option 2 - No AC**

4500 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-19 Walls (from R-13): 2,518 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 781	\$ 1,360	\$ 1,070
R-19 Raised Floor	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(2) Furnaces: 92% AFUE (from 80% AFUE)	Upgrade	\$ 1,000	\$ 2,400	\$ 1,700
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-6 Attic Ducts	-	\$ -	\$ -	\$ -
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
(2) 50 Gallon Gas Water Heaters: EF=0.63 (from EF=0.60)	Upgrade	\$ 200	\$ 500	\$ 350
Total Incremental Cost of Energy Efficiency Measures:		\$ 1,981	\$ 4,260	\$ 3,120
Total Incremental Cost per Square Foot:		\$ 0.44	\$ 0.95	\$ 0.69

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 4,500 SF, Option 3 with AC

4500 sf

Climate Zone 2

Energy Efficiency Measures	Change	Incremental Cost Estimate		
R-38 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-19 Walls (from R-13): 2,518 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 781	\$ 1,360	\$ 1,070
R-19 Raised Floor	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(2) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
(2) Air Conditioners: 13 SEER, 11 EER (HERS)	Upgrade	\$ 50	\$ 150	\$ 100
(2) Air Conditioner: Refrig. Charge (HERS)	Upgrade	\$ 300	\$ 400	\$ 350
R-4.2 Attic Ducts (from R-6)	Downgrade	\$ (650)	\$ (450)	\$ (550)
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
(2) Instantaneous Gas Water Heaters: RE=0.80 (from 50 Gal Gas: EF=0.62)	Upgrade	\$ 1,800	\$ 3,000	\$ 2,400
Total Incremental Cost of Energy Efficiency Measures:		\$ 2,281	\$ 4,460	\$ 3,370
Total Incremental Cost per Square Foot:		\$ 0.51	\$ 0.99	\$ 0.75

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 4,500 SF, Option 4 with AC

4500 sf

Climate Zone 2

Energy Efficiency Measures	Change	Incremental Cost Estimate		
R-38 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-19 Walls (from R-13): 2,518 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 781	\$ 1,360	\$ 1,070
R-19 Raised Floor	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(2) Furnaces: 92% AFUE (from 80% AFUE)	Upgrade	\$ 1,000	\$ 2,400	\$ 1,700
(2) Air Conditioners: 13 SEER, 11 EER (HERS)	Upgrade	\$ 50	\$ 150	\$ 100
(2) Air Conditioner: Refrig. Charge (HERS)	Upgrade	\$ 300	\$ 400	\$ 350
R-4.2 Attic Ducts (from R-6)	Downgrade	\$ (650)	\$ (450)	\$ (550)
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
(2) 50 Gallon Gas Water Heaters: EF=0.63 (from EF=0.62)	Upgrade	\$ -	\$ 100	\$ 50
Pipe Insulation	Upgrade	\$ 300	\$ 400	\$ 350
Total Incremental Cost of Energy Efficiency Measures:		\$ 1,781	\$ 4,360	\$ 3,070
Total Incremental Cost per Square Foot:		\$ 0.40	\$ 0.97	\$ 0.68

Low-rise Multi-family Apartments

- 8,442 square feet
- 8 units/2-story
- 12.5% glazing/floor area ratio

Incremental Cost Estimate to Exceed Title 24 by 15%

Multi-Family Prototype: 8,442 SF, Option 1 - No AC

8442 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-21 Walls (from R-13): 10,146 sf @ \$0.45 to \$0.70/sf	Upgrade	\$ 4,566	\$ 7,102	\$ 5,834
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-6 Attic Ducts	-	\$ -	\$ -	\$ -
(8) 40 Gallon Gas Water Heaters: EF=0.63	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 4,566	\$ 7,102	\$ 5,834
Total Incremental Cost per Square Foot:		\$ 0.54	\$ 0.84	\$ 0.69

Incremental Cost Estimate to Exceed Title 24 by 15%

Multi-Family Prototype: 8,442 SF, Option 2 - No AC

8442 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 4,221 sf @ 0.25 to 0.35/sf	Upgrade	\$ (1,477)	\$ (1,055)	\$ (1,266)
R-19 Walls (from R-13): 10,146 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 3,145	\$ 5,479	\$ 4,312
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-6)	Downgrade	\$ (1,600)	\$ (1,000)	\$ (1,300)
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 2,400	\$ 4,800	\$ 3,600
(8) 40 Gallon Gas Water Heaters: EF=0.60 (from EF=0.63)	Downgrade	\$ (2,000)	\$ (800)	\$ (1,400)
Total Incremental Cost of Energy Efficiency Measures:		\$ 468	\$ 7,424	\$ 3,946
Total Incremental Cost per Square Foot:		\$ 0.06	\$ 0.88	\$ 0.47

Incremental Cost Estimate to Exceed Title 24 by 15%
Multi-Family Prototype: 8,442 SF, Option 3 with AC

8442 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 Roof w/ Radiant Barrier (from R-38 w/Radiant Barrier): 4,221 sf @ 0.30 to 0.45/sf	Downgrade	\$ (1,899)	\$ (1,266)	\$ (1,583)
R-21 Walls (from R-13): 10,146 sf @ \$0.45 to \$0.70/sf	Upgrade	\$ 4,566	\$ 7,102	\$ 5,834
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
(8) Air Conditioners: 13 SEER, 11 EER (HERS)	Upgrade	\$ 200	\$ 600	\$ 400
(8) Air Conditioner: Refrig. Charge (HERS)	Upgrade	\$ 1,200	\$ 1,600	\$ 1,400
R-8 Attic Ducts	-	\$ -	\$ -	\$ -
(8) 40 Gallon Gas Water Heaters: EF=0.63	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 4,066	\$ 8,036	\$ 6,051
Total Incremental Cost per Square Foot:		\$ 0.48	\$ 0.95	\$ 0.72

Incremental Cost Estimate to Exceed Title 24 by 15%
Multi-Family Prototype: 8,442 SF, Option 4 with AC

8442 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-19 Walls (from R-13): 10,146 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 3,145	\$ 5,479	\$ 4,312
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
(8) Air Conditioners: 13 SEER, 11 EER (HERS)	Upgrade	\$ 200	\$ 600	\$ 400
(8) Air Conditioner: Refrig. Charge (HERS)	Upgrade	\$ 1,200	\$ 1,600	\$ 1,400
R-8 Attic Ducts	-	\$ -	\$ -	\$ -
(8) 40 Gallon Gas Water Heaters: EF=0.63	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 4,545	\$ 7,679	\$ 6,112
Total Incremental Cost per Square Foot:		\$ 0.54	\$ 0.91	\$ 0.72

Incremental Cost Estimate to Exceed Title 24 by 15%
Multi-Family Prototype: 8,442 SF, Option 5 with AC

8442 sf

Climate Zone 2

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 Roof w/ Radiant Barrier (from R-38 w/Radiant Barrier): 4,221 sf @ 0.30 to 0.45/sf	Downgrade	\$ (1,899)	\$ (1,266)	\$ (1,583)
R-19 Walls (from R-13): 10,146 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 3,145	\$ 5,479	\$ 4,312
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
(8) Air Conditioners: 13 SEER	-	\$ -	\$ -	\$ -
(8) Air Conditioner: Refrig. Charge (HERS)	Upgrade	\$ 1,200	\$ 1,600	\$ 1,400
R-4.2 Attic Ducts (from R-8)	Downgrade	\$ (3,000)	\$ (2,000)	\$ (2,500)
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 2,400	\$ 4,800	\$ 3,600
(8) 40 Gallon Gas Water Heaters: EF=0.60 (from EF=0.63)	Downgrade	\$ (2,000)	\$ (800)	\$ (1,400)
Total Incremental Cost of Energy Efficiency Measures:		\$ (154)	\$ 7,813	\$ 3,829
Total Incremental Cost per Square Foot:		\$ (0.02)	\$ 0.93	\$ 0.45

High-rise Multifamily Apartments

- 36,800 sf,
- 40 units/4-story
- Window to Wall Ratio = 31.6%

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 1

Climate Zone 2

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 Metal Roof w/ R-15 (3") rigid insulation ; cool roof Reflectance = 0.55 Emittance = 0.75; 9,200 sf @ \$0.75 - \$1.00/sf	Upgrade	\$ 15,600	\$ 24,960	\$ 20,280
R-19 in Metal Frame Walls	-	-	-	-
R-6 (K-13 spray-on) Raised Slab over parking garage; 9,200 sf @ \$0.50 - \$0.75/sf	Upgrade	\$ 4,600	\$ 6,900	\$ 5,750
Dual Metal Windows: COG U-factor=0.3, COG SHGC=0.27 6,240 sf @ \$1.50 to \$2.50/sf	Upgrade	\$ 9,360	\$ 15,600	\$ 12,480
2 ton 4-pipe fan coil, 98% AFUE boiler , 70-ton scroll air cooled chiller 0.72 KW/ton	Upgrade	\$ 2,500	\$ 4,000	\$ 3,250
Central DHW boiler: 98% AFUE and recirculating system w/ timer- temperature controls with premium variable speed pump	Upgrade	\$ 2,500	\$ 4,000	\$ 3,250
Total Incremental Cost of Energy Efficiency Measures:		\$ 34,560	\$ 55,460	\$ 45,010
Total Incremental Cost per Square Foot:		\$ 0.94	\$ 1.51	\$ 1.22

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 2

Climate Zone 2

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 Metal Roof w/ R-10 (2") rigid insulation; cool roof Reflectance = 0.81 Emittance = 0.89 ; 9,200 sf @ \$0.45 - \$0.55/sf	Upgrade	\$ 4,140	\$ 5,060	\$ 4,600
R-19 in Metal Frame Walls	-	-	-	-
R-6 (K-13 spray-on) Raised Slab over parking garage; 9,200 sf @ \$0.50 - \$0.75/sf	Upgrade	\$ 4,600	\$ 6,900	\$ 5,750
Dual Metal Windows: COG U-factor=0.3, COG SHGC=0.27 6,240 sf @ \$1.50 to \$2.50/sf	Upgrade	\$ 9,360	\$ 15,600	\$ 12,480
2 ton 4-pipe fan coil, 98% AFUE boiler , 70-ton scroll air cooled chiller 0.72 KW/ton	Upgrade	\$ 2,500	\$ 4,000	\$ 3,250
Central DHW boiler: 98% AFUE and recirculating system w/ timer- temperature controls with premium variable speed pump	Upgrade	\$ 2,500	\$ 4,000	\$ 3,250
Total Incremental Cost of Energy Efficiency Measures:		\$ 23,100	\$ 35,560	\$ 29,330
Total Incremental Cost per Square Foot:		\$ 0.63	\$ 0.97	\$ 0.80

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 3

Climate Zone 2

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 Metal Roof w/ R-10 (2") rigid insulation; cool roof Reflectance = 0.55 Emittance = 0.75	-			
R-19 in Metal Frame Walls	-			
R-4 (1.25" K-13 spray-on) Raised Slab over parking garage	-			
Dual Metal Windows: COG U-factor=0.3, COG SHGC=0.27 6,240 sf @ \$1.50 to \$2.50/sf	Upgrade	\$ 9,360	\$ 15,600	\$ 12,480
2 ton 4-pipe fan coil, 84% AFUE boiler, 70-ton scroll air cooled chiller 0.72 KW/ton	-			
Central DHW boiler: 84% AFUE and recirculating system w/ timer- temperature controls with 20% solar for hot water and space heating @ \$900 - \$1,500 per dwelling unit	Upgrade	\$ 36,000	\$ 60,000	\$ 48,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 45,360	\$ 75,600	\$ 60,480
Total Incremental Cost per Square Foot:		\$ 1.23	\$ 2.05	\$ 1.64

Low-rise Office Building

- Single Story
- 10,580 sf,
- Window to Wall Ratio = 37.1%

Incremental Cost Estimate to Exceed Title 24 by 15%

Nonresidential Prototype: 10,580 SF, Option 1

Climate Zone 2

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck with 3" rigid (R-15) above; with Cool Roof Reflectance = 0.81, Emittance = 0.89; 10,580 sf @ \$0.45 - \$0.55/sf	Upgrade	\$ 4,761	\$ 5,819	\$ 5,290
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: COG U=0.30, COG SHGC=0.38; 3,200 sf @ \$1.00 to \$2.00/sf	Upgrade	\$ 3,200	\$ 6,400	\$ 4,800
Lighting = 0.783 w/sf. Open Office Areas: (60) 2-lamp T8 fixtures @58w each; no lighting controls; (24) 18w recessed CFLs. Small Offices: (56) 2-lamp T8 fixtures, (28) multi-level occupancy sensors @ \$75 to \$100 each; (40) 18w recessed CFLs. Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces; no controls.	Upgrade	\$ 2,100	\$ 2,800	\$ 2,450
(3) 10-ton DX units EER=11.1; 82% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers, DDC with DCV at spaces, cycle on at night	Upgrade	\$ 2,250	\$ 4,500	\$ 3,375
R-6 duct insulation w/ducts on roof, HERS verified duct leakage	-	\$ -	\$ -	\$ -
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 12,311	\$ 19,519	\$ 15,915
Total Incremental Cost per Square Foot:		\$ 1.16	\$ 1.84	\$ 1.50

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 10,580 SF, Option 2

Climate Zone 2

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck with 3" rigid (R-15) above; with Cool Roof Reflectance = 0.81, Emittance = 0.89; 10,580 sf @ \$0.45 - \$0.55/sf	Upgrade	\$ 4,761	\$ 5,819	\$ 5,290
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: COG U=0.30, COG SHGC=0.27; 3,200 sf @ \$1.50 to \$3.00/sf	Upgrade	\$ 4,800	\$ 9,600	\$ 7,200
Lighting = 0.678 w/sf: Open Office Areas: (32) 2-lamp T8 fixtures @74w each; no lighting controls; (24) 18w recessed CFLs. Small Offices: (56) 2-lamp T8 fixtures, (28) multi-level occupancy sensors on T8s @ \$75 to \$100 each; (40) 18w recessed CFLs Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces; no controls.	Upgrade	\$ 820	\$ 1,648	\$ 1,234
(3) 10-ton DX units EER=11.1; 82% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers, cycle on at night	Upgrade	\$ 450	\$ 750	\$ 600
R-6 duct insulation w/ducts on roof, HERS verified duct leakage	-	\$ -	\$ -	\$ -
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 10,831	\$ 17,817	\$ 14,324
Total Incremental Cost per Square Foot:		\$ 1.02	\$ 1.68	\$ 1.35

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 10,580 SF, Option 3

Climate Zone 2

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck with 3" rigid (R-15) above; with Cool Roof Reflectance = 0.81, Emittance = 0.89; 10,580 sf @ \$0.45 - \$0.55/sf	Upgrade	\$ 4,761	\$ 5,819	\$ 5,290
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: COG U=0.30, COG SHGC=0.31; 3,200 sf @ \$1.5 to \$2.50/sf	Upgrade	\$ 4,800	\$ 8,000	\$ 6,400
Lighting = 0.678 w/sf: Open Office Areas: (32) 2-lamp T8 fixtures @74w each; no lighting controls; (24) 18w recessed CFLs. Small Offices: (56) 2-lamp T8 fixtures, (28) multi-level occupancy sensors on T8s @ \$75 to \$100 each; (40) 18w recessed CFLs Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces: no controls	Upgrade	\$ 820	\$ 1,648	\$ 1,234
(3) 10-ton DX units EER=11.1; 82% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers, cycle on at night	Upgrade	\$ 450	\$ 750	\$ 600
R-8 duct insulation w/ducts on roof, HERS verified duct leakage	Upgrade	\$ 450	\$ 900	\$ 675
(1) Tank Gas Water Heaters EF=0.65	Upgrade	\$ 250	\$ 500	\$ 375
Total Incremental Cost of Energy Efficiency Measures:		\$ 11,531	\$ 17,617	\$ 14,574
Total Incremental Cost per Square Foot:		\$ 1.09	\$ 1.67	\$ 1.38

High-rise Office Building

- 5-story
- 52,900 sf,
- Window to Wall Ratio = 34.5%

Incremental Cost Estimate to Exceed Title 24 by 15% Nonresidential Prototype: 52,900 SF, Option 1

Climate Zone 2

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck with 3" rigid insulation above (R-15) , Cool Roof Reflectance = 0.55, Emittance = 0.75; 10580 sf @ \$0.75 - \$1.00/sf	Upgrade	\$ 7,935	\$ 10,580	\$ 9,258
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: COG U=0.30, COG SHGC=0.38 ; 16,000 sf @ \$1.50 to \$3.00/sf	Upgrade	\$ 24,000	\$ 48,000	\$ 36,000
Lighting = 0.858 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	-	\$ -	\$ -	\$ -
(3) 70 ton Packaged VAV system 10.3 EER/80% TE, standard efficiency variable speed fan motors; 20% VAV boxes, hot water reheat on perimeter zones with 82% AFUE boiler, fixed temp. economizer	-	\$ -	\$ -	\$ -
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
(1) Boiler (combined with space heat) 82% AFUE	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 31,935	\$ 58,580	\$ 45,258
Total Incremental Cost per Square Foot:		\$ 0.60	\$ 1.11	\$ 0.86

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 1

Climate Zone 2

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck with 3" rigid insulation above (R-15) , Cool Roof Reflectance = 0.55, Emittance = 0.75; 10580 sf @ \$0.75 - \$1.00/sf	Upgrade	\$ 7,935	\$ 10,580	\$ 9,258
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: COG U=0.30, COG SHGC=0.38 ; 16,000 sf @ \$1.50 to \$3.00/sf	Upgrade	\$ 24,000	\$ 48,000	\$ 36,000
Lighting = 0.858 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	-	\$ -	\$ -	\$ -
(3) 70 ton Packaged VAV system 10.3 EER/80% TE, standard efficiency variable speed fan motors; 20% VAV boxes, hot water reheat on perimeter zones with 82% AFUE boiler, fixed temp. economizer	-	\$ -	\$ -	\$ -
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
(1) Boiler (combined with space heat) 82% AFUE	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 31,935	\$ 58,580	\$ 45,258
Total Incremental Cost per Square Foot:		\$ 0.60	\$ 1.11	\$ 0.86

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 2

Climate Zone 2

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck with 3" rigid insulation above (R-15) , Cool Roof Reflectance = 0.55, Emittance = 0.75; 10580 sf @ \$0.75 - \$1.00/sf	Upgrade	\$ 7,935	\$ 10,580	\$ 9,258
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: COG U=0.30, COG SHGC=0.54 ; 16,000 sf @ \$1.00 to \$2.50/sf	Upgrade	\$ 16,000	\$ 40,000	\$ 28,000
Lighting = 0.785 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures w/ 140 multi-level occupancy sensors on T8s @ \$75 to \$100 each ; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	Upgrade	\$ 10,500	\$ 14,000	\$ 12,250
(3) 70 ton Packaged VAV system 10.3 EER/80% TE, standard efficiency variable speed fan motors; 20% VAV boxes , hot water reheat on perimeter zones with 82% AFUE boiler, fixed temp. economizer, cycle on at night	Upgrade	\$ 11,600	\$ 16,225	\$ 13,913
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
(1) Boiler (combined with space heat) 82% AFUE	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 46,035	\$ 80,805	\$ 63,420
Total Incremental Cost per Square Foot:		\$ 0.87	\$ 1.53	\$ 1.20

5.0 Cost -Effectiveness Determination

Regardless of the building design, occupancy profile and number of stories, the incremental improvement in overall annual energy performance of buildings in exceeding the 2008 Standards is determined to be cost-effective. However, each building's overall design, occupancy type and specific design choices may allow for a large range of incremental costs for exceeding 2008 Standards, estimated annual energy cost savings, and subsequent payback period.

Small Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
2,025 sf (Option 1)	321	97	\$718	\$169	4.2
2,025 sf (Option 2)	172	125	\$1,348	\$175	7.7
2,025 sf (Option 3)	334	94	\$676	\$168	4.0
2,025 sf (Option 4)	336	95	\$1,492	\$170	8.8
Averages:	291	103	\$1,058	\$170	6.2

*Annual Reduction in CO2-equivalent: 0.66 lb./sq.ft.-year, 1,327 lb./building-year
Increased Cost / lb. CO2-e reduction: \$0.80*

Large Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
4,500 sf (Option 1)	475	142	\$3,508	\$249	14.1
4,500 sf (Option 2)	321	168	\$3,121	\$251	12.4
4,500 sf (Option 3)	439	152	\$3,371	\$254	13.3
4,500 sf (Option 4)	439	137	\$3,071	\$237	13.0
Averages:	419	150	\$3,267	\$248	13.2

*Annual Reduction in CO2-equivalent: 0.43 lb./sq.ft.-year, 1,931 lb./building-year
Increased Cost / lb. CO2-e reduction: \$1.69*

Low-rise Multi-family Apartments

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
8-Unit, 8,442 sf (Option 1)	1410	339	\$5,834	\$644	9.1
8-Unit, 8,442 sf (Option 2)	1476	310	\$3,946	\$622	6.3
8-Unit, 8,442 sf (Option 3)	1493	285	\$6,051	\$596	10.1
8-Unit, 8,442 sf (Option 4)	1526	287	\$6,112	\$605	10.1
8-Unit, 8,442 sf (Option 5)	1575	276	\$3,830	\$601	6.4
Averages:	1496	299	\$5,155	\$614	8.4

*Annual Reduction in CO2-equivalent: 0.49 lb./sq.ft.-year, 4,158 lb./building-year
Increased Cost / lb. CO2-e reduction: \$1.24*

High-rise Multi-family Apartments

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
36,800 sf (Option 1)	17462	375	\$45,010	\$3,574	12.6
36,800 sf (Option 2)	18197	206	\$29,330	\$3,512	8.4
36,800 sf (Option 3)	17337	738	\$60,480	\$3,966	15.3
Averages:	17665	440	\$44,940	\$3,684	12.1

*Annual Reduction in CO2-equivalent: 0.36 lb./sq.ft.-year, 13,067 lb./building-year
Increased Cost / lb. CO2-e reduction: \$3.44*

Low-rise Office Building

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
10,580 sf (Option 1)	11312	-152	\$15,915	\$2,875	5.5
10,580 sf (Option 2)	15304	-570	\$14,324	\$3,393	4.2
10,580 sf (Option 3)	13510	-415	\$14,574	\$3,081	4.7
Averages:	13375	-379	\$14,938	\$3,116	4.8

*Annual Reduction in CO2-equivalent: 0.15 lb./sq.ft.-year, 1,607 lb./building-year
Increased Cost / lb. CO2-e reduction: \$9.29*

High-rise Office Building

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
52,900 sf (Option 1)	61230	1282	\$45,258	\$19,272	2.3
52,900 sf (Option 2)	16941	1655	\$63,420	\$6,185	10.3
52,900 sf (Option 3)	33841	5280	\$42,196	\$15,602	2.7
Averages:	37337	2739	\$50,291	\$13,686	5.1

*Annual Reduction in CO2-equivalent: 0.92 lb./sq.ft.-year, 36,513 lb./building-year
Increased Cost / lb. CO2-e reduction: \$1.03*

Conclusions

Regardless of the building design, occupancy profile and number of stories, the incremental improvement in overall annual energy performance of buildings which exceed the 2008 Title 24 Building Energy Efficiency Standards by 15% appears cost-effective. However, each building's overall design, occupancy type and specific design choices may allow for a large range of incremental first cost and payback. As with simply meeting the requirements of the Title 24 energy standards, a permit applicant complying with the energy requirements of a green building ordinance should carefully analyze building energy performance to reduce incremental first cost and the payback for the required additional energy efficiency measures.