

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

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Executive Summary

The Sonoma City Council approved a reenacted Construction Codes at first hearing on October 6, 2010. The revised municipal Construction Codes adopts 2010 CAL Green and its Appendices A4 and A5 by reference; and then changes the Scope of CAL Green within the ordinance in section 301.1 to make Tier 1 measures mandatory, including the Tier 1 energy requirement to exceed the 2008 Title 24 standards by at least 15%:

301.1 Scope. New buildings shall be designed to include the green building measures specified as mandatory in the application checklists contained in this code. New buildings shall also be designed to include the prerequisite and applicable elective measures to achieve Tier 1 status as prescribed in Appendix A4 and A5 of this code. Voluntary green building measures are also included in the application checklists and may be included in the design and construction of structures covered by this code. All buildings subject to the requirements of this code shall meet all applicable requirements of the California Energy Code (California Code of Regulations, Title 24, Part 6).

Gabel Associates has researched and reviewed the feasibility and energy cost-effectiveness of permit applicants exceeding the state's 2008 Building Energy Efficiency Standards by 15% in order to meet the minimum energy efficiency requirements of the proposed local ordinance.

Overall Scope of the Ordinance

New ordinance or revision to previous ordinance?	New Ordinance
Projected Effective Date:	January 1, 2011
Green building or stand-alone energy ordinance?	Green Building Ordinance
Do minimum energy requirements increase after initial effective date?	No
Occupancies covered?	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?	Within the Ordinance

Key Features of the Ordinance By Occupancy Type

Occupancy Type	General Requirements	Minimum Energy Requirement Effective January 1, 2011
Low-rise Residential Buildings:		
New Construction	CAL Green Tier 1	15% Better-than-Title 24
Additions & Alterations	CAL Green Mandatory Requirements	2008 Title 24 Standards
Nonresidential and High-rise Residential Buildings:		
New Construction	CAL Green Tier 1	15% Better-than-Title 24
Additions & Alterations	CAL Green Mandatory Requirements	2008 Title 24 Standards

CITY OF SONOMA

ORDINANCE NO. __-2010

AN ORDINANCE OF THE CITY OF SONOMA REPEALING CHAPTER 14.10 OF THE SONOMA MUNICIPAL CODE AND REENACTING A NEW CHAPTER 14.10 ADOPTING A NEW ADMINISTRATIVE CODE AND ADOPTING BY REFERENCE PARTS 2, 2.5, 3, 4, 5, 6, 8, 9, 10, 11 AND 12 OF THE 2010 CALIFORNIA BUILDING STANDARDS CODE AND AMENDMENTS THERETO AND THE 1997 UNIFORM CODE FOR THE ABATEMENT OF DANGEROUS BUILDINGS AS PUBLISHED BY THE INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS AND AMENDMENTS THERETO

THE CITY COUNCIL OF THE CITY OF SONOMA DOES HEREBY ORDAIN AS FOLLOWS:

SECTION 1.

Chapter 14.10, Construction Codes, of the Sonoma Municipal Code is hereby repealed in its entirety and reenacted to read as follows:

Chapter 14.10

CONSTRUCTION CODES

Sections:

- 14.10.005 Findings.
- 14.10.010 Administrative Code.
- 14.10.015 Technical Codes Adopted.
- 14.10.020 2010 California Building Code Amendments.
- 14.10.025 2010 California Residential Code Amendments.
- 14.10.030 2010 California Electrical Code Amendments.
- 14.10.035 2010 California Mechanical Code Amendments.
- 14.10.040 2010 California Plumbing Code Amendments.
- 14.10.045 2010 California Fire Code Amendments.
- 14.10.050 2010 California Green Building Standards Code Amendments.
- 14.10.055 1997 Uniform Code for the Abatement of Dangerous Buildings Amendments.
- 14.10.060 Board of Appeals.
- 14.10.065 Modification of Fee Schedules.
- 14.10.070 Enforcement Authority.

14.10.005 Findings.

A. The City Council finds that in order to best protect the health, safety and welfare of the citizens of Sonoma, the standards for building construction within the City of Sonoma should comply with specified parts of the 1997 Uniform Code for the Abatement of Dangerous Buildings and the 2010 Edition of the California Building Standards Code, also known as the California Code of Regulations, Title 24, including Parts 2, 2.5, 3, 4, 5, 6, 8, 9, 10, 11 and 12, as further amended by this chapter.

Based on the materials presented by and the recommendations of the City's building official and fire chief, the City Council further finds that it is necessary to make procedural and administrative modifications and changes to the California Building Standards Code and to adopt certain appendices to the California Building Standards Code as specifically adopted in this ordinance, to provide more efficient, economical and expeditious enforcement of the building standards of the city. The City

Council further finds and determines that pursuant to Health and Safety Code Sections 179588.7, 18941.5 and 13143.5, the substantive amendments to California Building Standards Code, which are adopted by this chapter, are reasonable and necessary because of local climatic, geographical or topographical conditions and do not lessen, diminish or change the standards set forth within the California Building Standards Code except as authorized by law.

The City Council hereby makes the following express findings of necessity for the modifications to the California Building Standards Code:

Express Finding of Necessity #1: The City's topography and terrain contain areas which are very susceptible to wildland fires, having a local climate characterized by hot, dry summers with periodic high winds which are a predominate factor in the spread of fire by burning embers that are carried by the wind to adjacent exposed areas. This is further compounded by agricultural use of lands contained within the City, as well as the open space, brush and hills that are part of and immediately adjacent to the City. These topographic and climatic conditions impact the City's emergency services in such a way that their effects should be mitigated through appropriate amendments to the construction codes where practical.

Express Finding of Necessity #2: Earthquake activity represents significant potential hazards which could result in road closures, loss of housing, fires, injuries, collapsed buildings, and isolation of persons requiring assistance. Additionally, soil conditions within the City are such that liquefaction may occur during seismic activity, creating the potential for structure collapse or mudslides. There are only a limited number of thoroughfares through the City, and during periods of traffic congestion resulting from roadway obstructions, emergency services response times are increased. The City is comprised of a relatively large number of historically significant buildings which contain archaic materials and designs which present unique safety, remodeling and upgrading problems due to their age and proximity to earthquake faults. The proximity of the Rogers Creek earthquake fault, located only a few miles from the City, represents a geologic hazard that could significantly impact the City's occupants, its emergency services and its economic well-being in such a way that the potential hazards should be mitigated through appropriate amendments to the construction codes where practical.

Express Finding of Necessity #3: Due the elevation of the City in relation to sea level and periodic storms resulting in significant rainfall, flooding during the rainy season often restricts traffic, has a detrimental effect on structures, housing and their occupants and can impair emergency services ability to respond to life threatening emergencies. Additionally, high ground water, clay soils and the location of the "hardpan" within the City can slow rain and surface water absorption often resulting in localized ponding and flooding. These geologic and climatic conditions impact the City in such a way that their effects should be mitigated through appropriate amendments to the construction codes where practical.

14.10.010 Administrative Code.

The following administrative provisions shall apply to the technical codes adopted by reference as may be amended herein:

**SECTION 101
GENERAL**

101.1 Title. These provisions are hereby made a part of the technical codes of the City and shall be known as the Administrative Code and shall be cited as such and will be referred to herein as "this code."

101.2 Scope. The provisions of this code shall serve as the administrative, organizational and enforcement rules and regulations for the technical codes adopted by the City which regulate site preparation, construction, alteration, moving, demolition, repair, use and occupancy of buildings, structures, building service equipment and any appurtenances connected or attached to such buildings or structures within the City.

101.3 Intent. The purpose of this code is to provide for the administration and enforcement of the technical codes adopted by the City. The purpose of the technical codes adopted by the City is to establish minimum requirements to safeguard the public safety, health and general welfare through sustainability, affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.

SECTION 102 APPLICABILITY

102.1 General. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. When conflicting provisions or requirements occur between this code, the technical codes and other codes or laws, the most restrictive shall govern.

102.2 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

102.3 Application of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

102.4 Referenced codes and standards. The codes and standards referenced in this code and all other codes adopted by reference by the City shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and other referenced codes and standards, the more restrictive provision shall apply. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and manufacturer's instructions shall apply.

102.5 Appendices. Provisions in the appendices shall not apply unless specifically referenced in the adopting ordinance.

102.6 Partial invalidity. In the event any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

102.7 Existing installations. Building electrical, plumbing and mechanical equipment, components and systems lawfully in existence at the time of the adoption of the technical codes may have their use, maintenance or repair continued if the use, maintenance or repair is in accordance with the original design and a hazard to life, health or property has not been created by such building service equipment.

102.8 Existing occupancy. The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically required in Chapter 34 of the California Building Code, the California Existing Building Code, the California Historical Building Code, the California Fire Code, State Housing Law or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public.

102.9 Additions, alterations or repairs. Additions, alterations or repairs to any electrical, mechanical or plumbing equipment, components or systems or any structure shall conform to

the requirements for new construction without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. Additions, alterations or repairs shall not cause an existing structure or electrical, mechanical or plumbing equipment, components or systems to become unsafe or adversely affect the performance of the building. Additions, alterations or repairs shall comply with the requirements of Chapter 34 of the California Building Code.

102.10 Moved Buildings. Moved buildings shall comply with the requirements of Chapter 34 of the California Building Code.

102.10 Maintenance. Buildings, structures and parts thereof and electrical, plumbing and mechanical equipment, components and systems shall be maintained in a safe, sanitary and proper operating condition as determined by the building official. Maintenance of buildings, structures and parts thereof and electrical, plumbing and mechanical equipment, components and systems shall comply with the requirements of Chapter 34 of the California Building Code and the other applicable technical codes adopted by the City.

SECTION 103 DEFINITIONS

For the purpose of this code, certain terms, phrases, words and their derivatives shall be construed as specified in this section or as otherwise defined in the technical codes. Where terms are not defined, they shall have their ordinarily accepted meanings within the context with which they are used. Webster's Third New International Dictionary of the English Language, Unabridged, shall be considered as providing ordinarily accepted meanings.

...**ADDITION.** See California Building Code Section 202.

...**ALTER or ALTERATION.** See California Building Code Section 202.

...**APPROVED.** See California Building Code Section 202.

...**BUILDING.** See California Building Code Section 202.

...**BUILDING, EXISTING.** See California Building Code Section 202.

...**BUILDING OFFICIAL.** See California Building Code Section 202.

...**BUILDING SERVICE EQUIPMENT.** The plumbing, mechanical, electrical and elevator equipment including piping, wiring, fixtures and other accessories which provide sanitation, lighting, heating, ventilation, cooling, refrigeration, fire-fighting and transportation facilities essential to the occupancy of the building or structure for its designated use.

...**DANGEROUS BUILDING.** See Section 302 of the 1997 Uniform Code for the Abatement of Dangerous Buildings, as amended and adopted by the jurisdiction.

...**JURISDICTION.** See California Building Code Section 202.

...**OCCUPANCY** is the purpose for which a building, or part thereof, is used or intended to be used.

OWNER is any person, agent, firm or corporation having a legal or equitable interest in the property.

...**PERMIT.** See California Building Code Section 202.

...**REPAIR.** See California Building Code Section 202.

...**STRUCTURE.** See California Building Code Section 202.

...**TECHNICAL CODES** are those codes adopted by the City containing the provisions for design, construction, alteration, addition, repair, removal, demolition, use, location,

occupancy and maintenance of buildings and structures and building service equipment as herein defined.

... **VALUATION or VALUE**, as applied to a building and its building service equipment, shall be the estimated cost to replace the building and its building service equipment in kind, based on current replacement costs.

SECTION 104 BUILDING DEPARTMENT

104.1 Creation of enforcement agency. The building department is hereby created and the official in charge thereof shall be known as the building official.

104.2 Appointment. The building official shall be appointed by the chief appointing authority of the jurisdiction.

104.3 Deputies. In accordance with the prescribed procedures of this jurisdiction and with the concurrence of the appointing authority, the building official shall have the authority to appoint a deputy building official, technical officers, inspectors, plans examiners and other employees or official representatives of the Building Department. Such employees or official representatives shall have powers as delegated by the building official.

SECTION 105 DUTIES AND POWERS OF THE BUILDING OFFICIAL

105.1 General. The building official is hereby authorized and directed to enforce the provisions of this code. The building official shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in conformance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

105.2 Applications and permits. The building official shall receive applications, review construction documents and issue permits for the erection and alteration, demolition and moving of buildings and structures, inspect the premises for which such permits have been issued and enforce compliance with the provisions of this code.

105.3 Notices and orders. The building official shall issue all necessary notices or orders to ensure compliance with this code.

105.4 Inspections. The building official is authorized to make all required inspections, or the building official shall have the authority to accept reports of inspection by agencies or individuals approved by the building official for the specific purpose. Reports of such inspections shall be in writing and be prepared by a responsible officer of such approved agency or by the responsible individual. The building official may seek and engage expert opinion as deemed necessary to report upon unusual technical issues that arise.

105.5 Identification. The building official shall carry proper identification when inspecting structures or premises in the performance of duties under this code.

104.6 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or where the building official has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises potentially unsafe, dangerous or hazardous, the building official is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises are unoccupied, the building official shall first make a reasonable effort to locate

the owner or other person having charge or control of the structure or premises and request entry. If entry is refused, the building official shall have recourse to the remedies provided by law to secure entry.

105.7 Department records. The building official shall keep official records of applications received, permits and certificates issued, fees collected, reports of inspections, and notices and orders issued. Such records shall be retained in the official records for the period required for the retention of public records.

105.8 Liability. The building official or his/her designee, member of the board of appeals or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered liable personally and is hereby relieved from personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties. Any suit instituted against an officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by legal representative of the jurisdiction until the final termination of the proceedings.

The building official or any subordinate shall not be liable for cost in any action, suit or proceeding that is instituted in pursuance of the provisions of this code.

105.9 Approved materials and equipment. Materials, equipment and devices approved by the building official shall be constructed and installed in accordance with such approval.

105.9.1 Used materials and equipment. Used materials, equipment and devices shall not be reused unless approved by the building official.

105.10 Modifications. Wherever there are practical difficulties involved in carrying out the provisions of this code, the building official shall have the authority to grant modifications for individual cases, provided the building official shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, life and fire safety requirements or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

105.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code.

105.11.1 Research reports. Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from sources approved by the building official.

105.11.2 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the building official shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the building official shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests

shall be retained by the building official for the period required for retention of public records.

SECTION 106 PERMITS

106.1 Required. Any owner or authorized agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the building official and obtain the required permit.

106.1.1 Annual permit. In lieu of an individual permit for each alteration to an already approved electrical, gas, mechanical or plumbing installation, the building official is authorized to issue an annual permit upon application therefore to any person, firm or corporation regularly employing one or more qualified tradespersons in the building, structure or on the premises owned or operated by the applicant for the permit.

106.1.2 Annual permit records. The person to whom an annual permit is issued shall keep a detailed record of alterations made under such annual permit. The building official shall have access to such records at all times or such records shall be filed with the building official as designated.

106.2 Work exempt from permit. Permits shall not be required for the following. Exemption from permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction.

Building:

1. One-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 120 square feet and the total height does not exceed 9 feet.
2. Fences constructed of other than stone, masonry or concrete, not over 8 feet in total height.
3. Retaining walls that are not over 4 feet in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge or impounding Class I, II or IIIA liquids.
4. Water tanks supported directly upon grade if the capacity does not exceed 5,000 gallons and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways not more than 30 inches above adjacent grade, and not over any basement or story below and are not part of an accessible route.
6. Painting, papering, tiling, carpeting, cabinets, countertops and similar finish work.
7. Temporary motion picture, television and theater stage sets and scenery.
8. Prefabricated swimming pools accessory to a Group R-3 occupancy that are less than 24 inches deep, do not exceed 5,000 gallons, and are installed entirely above ground.
9. Shade cloth structures constructed for nursery or agricultural purposes, not including service systems.

10. Swings and other playground equipment accessory to detached one- and two-family dwellings.

11. Window awnings of Groups R-3 and U occupancies supported by an exterior wall which do not project more than 54 inches from the exterior wall and do not require additional support.

12. Decks not exceeding 200 square feet in area, that are not more than 30 inches above grade at any point, are not attached to a building and do not serve a required exit door or an accessible route.

Electrical:

1. Listed cord-and-plug connected temporary decorative lighting.
2. Reinstallation of attachment plug receptacles but not the outlets therefore.
3. Replacement of branch circuit overcurrent devices of the required capacity in the same location
4. Electrical wiring, devices, appliances, apparatus or equipment operating at less than 25 volts and not capable of supplying more than 50 watts of energy.
5. Minor repair work, including installation or replacement of equipment such as lamps and of electric utilization equipment approved for connection to suitable permanently-installed receptacles.
6. The provisions of the code shall not apply to electrical equipment used for radio and television transmissions, but do apply to equipment and wiring for a power supply and the installations of towers and antennas.
7. A permit shall not be required for the installation of any temporary system required for the testing or servicing of electrical equipment or apparatus or the process of manufacturing, testing, servicing, or repairing electrical equipment or apparatus.
8. Replacement of flush or snap switches, fuses, lamp sockets, receptacles, contactor or control device and other minor maintenance and repair work, such as replacing worn cords and tightening connections on a wiring device.
9. Portable motors or other portable appliances energized by means of a cord or cable having an attachment plug end to be connected to an approved receptacle when that cord or cable is permitted by the Electrical Code.
10. Repair or replacement of electrodes or transformers of the same size and capacity for signs or gas tube systems.
11. The wiring for temporary theater, motion picture or television stage sets.
12. A permit shall not be required for the installation, alteration or repair of electrical wiring, apparatus or equipment or the generation, transmission, distribution or metering of electrical energy or in the operation of signals or the transmission of intelligence by a public or private utility in the exercise of its function as a serving utility.

Mechanical:

1. A portable heating appliance, portable ventilating equipment, a portable cooling unit, or a portable evaporative cooler.
2. A closed system of steam, hot, or chilled water piping within heating or cooling equipment regulated by this code.

3. Replacement of any component part or assembly of an appliance that does not alter its original approval and complies with other applicable requirements of this code.
4. Self-contained refrigeration systems containing 10 pounds or less of refrigerant or that are actuated by motors of 1 horsepower (746 W) or less and refrigerating equipment that is part of the equipment for which a permit has been issued pursuant to the requirements of this code.
5. A unit refrigerating system.
6. Portable plug-and-cord connected cooking or clothes-drying appliances.
9. Portable fuel-cell appliances that are not connected to a fixed piping system and are not interconnected to a power grid.

Plumbing:

1. The stopping of leaks in drains, water, soil, waste or vent pipes; provided, however, that if any concealed trap, drain pipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a permit shall be obtained and inspection made as provided in this code.
2. The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

106.2.1 Emergency repairs. Where equipment replacements and repairs must be performed in an emergency situation, the permit application shall be submitted within the next working business day to the building official.

106.2.2 Minor Repairs. Application or notice to the building official is not required for ordinary or minor repairs to structures, replacement of lamps or the connection of approved portable electrical equipment to approved permanently-installed receptacles. Such repairs shall not include the cutting away of any wall, partition or portion thereof, the removal or cutting of any structural beam or load-bearing support, or the removal or change of any required means of egress, or rearrangement of parts of a structure affecting the egress requirements; nor shall ordinary repairs include addition to, alteration of, replacement or relocation of any water supply, sewer, drainage, drain leader, gas, soil, waste, vent or similar piping, electric wiring or mechanical or other work affecting public health or general safety.

106.2.3 Public service agencies. A permit shall not be required for the installation, alteration or repair of generation, transmission, distribution, metering or other related equipment that is under the ownership and control of public service agencies by established right.

106.3 Application for permit. To obtain a permit, the applicant shall first file an application therefore in writing on a form furnished by the building department for that purpose.

Such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, street address or similar description that will readily identify and definitely locate the proposed building or work.
3. Indicate the use and occupancy for which the proposed work is intended.

4. Be accompanied by construction documents and other information as required herein.
5. State the valuation of the proposed work.
6. Be signed by the applicant or the applicant's authorized agent.
7. Give such other data and information as required by the building official.

106.3.1 Action on application. The building official shall examine or cause to be examined applications for permits and amendments thereto within a reasonable time after filing. If the application or the construction documents do not conform to the requirements of pertinent laws, the building official shall reject such application in writing stating the reasons therefor. If the building official is satisfied that the proposed work conforms to the requirements of this code and laws and ordinances applicable thereto, the building official shall issue a permit therefor as soon as practicable.

106.3.2 Time limitation of application. An application for a permit for any proposed work shall be deemed to have been abandoned 180 days after the date of filing unless such application has been pursued in good faith or a permit has been issued; except that the building official is authorized to grant one or more extensions of time for additional periods not exceeding 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

106.4 Validity of permit. The issuance or granting of a permit shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or of any other ordinance of the jurisdiction. Permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid. The issuance of a permit based on construction documents and other data shall not prevent the building official from requiring the correction of errors in the construction documents and other data. The building official is also authorized to prevent occupancy or use of a structure where in violation of this code or of any other ordinances of this jurisdiction.

106.5 Expiration. Every permit issued shall become invalid unless the work authorized by such permit is commenced within 180 days after its issuance, or if the work authorized by such permit is suspended or abandoned for a period of 180 days after the time the work is commenced. For the purposes of this section, work shall be considered abandoned if no regular inspection has been conducted by the building department within any 180-day period. The building official is authorized to grant, in writing, one or more extensions of time, for periods not more than 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

106.6 Suspension or revocation. The building official is authorized to suspend or revoke a permit issued under the provisions of this code wherever the permit is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or regulation or any of the provisions of this code.

106.7 Placement of permit. The building permit or copy thereof shall be kept on the site of the work until the completion of the project.

106.8 Responsibility. It shall be the duty of every person who performs work for the installation or repair of building, structure, electrical, gas, mechanical or plumbing systems, for which this code is applicable, to comply with this code.

106.9 Preliminary inspection. Before issuing a permit, the building official is authorized to examine or cause to be examined buildings, structures and sites for which an application has been filed.

SECTION 107 CONSTRUCTION DOCUMENTS

107.1 Submittal documents. Submittal documents consisting of construction documents, statement of special inspections, geotechnical report and other data shall be submitted in three sets with each permit application. The construction documents shall be prepared by a registered design professional where required by state law. Where special conditions exist, the building official is authorized to require additional construction documents to be prepared by a registered design professional.

Exception: The building official is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that reviewing of construction documents is not necessary to obtain compliance with this code.

107.1.1 Information on construction documents. Construction documents shall be drawn upon suitable material at a size and scale acceptable for readability and document imaging as determined by the building official. Electronic media documents are permitted to be submitted when approved by the building official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the building official. Where required by the building official, all braced wall lines, shall be identified on the construction documents and all pertinent information including, but not limited to, bracing methods, location and length of braced wall panels, foundation requirements of braced wall panels at top and bottom shall be provided.

107.1.2 Manufacturer's installation instructions. Where required by the building official, construction documents shall include manufacturer's installation instructions that provide supporting documentation that the proposed penetration and opening details described in the construction documents maintain the weather resistance of the exterior wall envelope. The supporting documentation shall fully describe the exterior wall system which was tested, where applicable, as well as the test procedure used. Manufacturer's installation instructions, as required by this code, shall be available on the job site at the time of inspection.

107.1.3 Information for construction in flood hazard areas. For buildings and structures located in whole or in part in flood hazard areas, construction documents shall include the following information in a form approved by the building official:

1. Delineation of flood hazard areas, floodway boundaries and flood zones and the design flood elevation, as appropriate;
2. The elevation of the proposed lowest floor, including basement; in areas of shallow flooding (AO Zones), the height of the proposed lowest floor, including basement, above the highest adjacent grade;
3. The elevation of the bottom of the lowest horizontal structural member in coastal high hazard areas (V Zone); and
4. If design flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the building official and the applicant shall obtain and reasonably utilize any design flood elevation and floodway data available from other sources.

107.1.4 Fire protection system shop drawings. Plans or shop drawings for the fire protection system(s) shall be submitted to indicate conformance to this code and the

construction documents and shall be approved prior to the start of system installation. Shop drawings shall contain all information as required by the referenced installation standards.

107.1.5 Means of egress. The construction documents shall show in sufficient detail the location, construction, size and character of all portions of the means of egress in compliance with the provisions of this code. In other than occupancies in Groups R-2, R-3, U, and I-I, the construction documents shall designate the number of occupants to be accommodated on every floor, and in all rooms and spaces.

107.1.6 Exterior wall envelope. Construction documents for all buildings shall describe the exterior wall envelope in sufficient detail to determine compliance with this code. The construction documents shall provide details of the exterior wall envelope as required, including flashing, intersections with dissimilar materials, corners, end details, control joints, intersections at roof, eaves or parapets, means of drainage, water-resistive membrane and details around openings.

107.1.7 Site plan or plot plan. The construction documents submitted with the application for permit shall be accompanied by a site plan showing the size and location of new construction and existing structures on the site and distances from lot lines. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The building official is authorized to waive or modify the requirement for a site plan when the application for permit is for alteration or repair or when otherwise warranted.

107.2 Examination of documents; plan review. The building official shall examine or cause to be examined construction documents for code compliance. The building official may utilize or authorize the use of consultant services to perform all or a portion of the construction documents review. The applicant shall be responsible for the payment of all costs to conduct the plan review.

107.2.1 Approval of construction documents. When the building official issues a permit, the construction documents shall be approved in writing or by a stamp which states, "REVIEWED FOR CODE COMPLIANCE." One set of construction documents so reviewed shall be retained by the building official. One set shall be returned to the applicant, shall be kept at the site of work and shall be open to inspection by the building official or his or her authorized representative.

107.2.2 Previous approvals. This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

107.2.3 Phased approval. The building official is authorized to issue a permit for the construction of foundations or any other part of a building or structure before the construction documents for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such permit for the foundation or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that a permit for the entire structure will be granted.

107.3 Amended construction documents. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

107.4 Design professional in responsible charge. When it is required that documents be prepared by a registered design professional, the building official shall be authorized to require the owner to engage and designate on the building permit application a registered design professional who shall act as the registered design professional in responsible charge. If the circumstances require, the owner shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original registered design professional in responsible charge.

The building official shall be notified in writing by the owner if the registered design professional in responsible charge is changed or is unable to continue to perform the duties. The registered design professional in responsible charge shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building.

107.5 Deferred submittals. For the purposes of this section, deferred submittals are defined as those portions of the design that are not submitted at the time of the application and that are to be submitted to the building official within a specified period.

Deferral of any submittal items shall have the prior approval of the building official. The registered design professional in responsible charge shall list the deferred submittals on the construction documents for review by the building official. Documents for deferred submittal items shall be submitted to the registered design professional in responsible charge who shall review them and forward them to the building official with a notation indicating that the deferred submittal documents have been reviewed and been found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until the deferred submittal documents have been approved by the building official.

107.6 Retention of construction documents. One set of approved construction documents shall be retained by the building official for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

SECTION 108 TEMPORARY STRUCTURES AND USES

108.1 General. The building official is authorized to issue a permit for temporary structures and temporary uses. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The building official is authorized to grant extensions for demonstrated cause.

108.2 Conformance. Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, light, ventilation and sanitary requirements as necessary to ensure the public health, safety and general welfare and shall comply with the applicable requirements of Chapter 31 of the California Building Code.

108.3 Temporary power. The building official is authorized to give permission to temporarily supply and use power in part of an electric installation before such installation has been fully completed and the final certificate of completion has been issued. The part covered by the temporary certificate shall comply with the requirements specified for temporary lighting, heat or power in NFPA 70.

108.4 Termination of approval. The building official is authorized to terminate such permit for a temporary structure or use and to order the temporary structure or use to be discontinued.

SECTION 109 FEES

109.1 Payment of fees. Fees shall be assessed in accordance with the provisions of this section and applicable state law. Permit applicants, permit holders and persons in violation of

any provision of this code shall pay all fees necessary to cover the full cost of providing the building department service related to the permit or activity in accordance with the schedule of fees adopted by the City. A permit shall not be valid until the fees prescribed by law have been paid nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

109.2 Schedule of fees. Fees for building department services necessary to bring violations of the technical codes into compliance, verify conformance with the technical codes or to reimburse the jurisdiction for other services rendered shall be paid in accordance with the fee schedule established by the City.

109.3 Permit Inspection Fees. The inspection fees for each permit shall be as set forth in the fee schedule adopted by the City.

When the permit holder's work is incomplete or changed so as to require more than one additional inspection, an additional inspection fee shall be charged at the hourly rate set forth in the fee schedule adopted by the jurisdiction. When said additional inspection fees are assessed, they shall be paid prior to scheduling any further inspections.

In lieu of assessing the inspection fees set forth in the fee schedule established by the City, the building official may calculate and charge a fee equal to the actual cost of providing the inspection and associated services in accordance with the hourly rate set forth in the fee schedule.

109.4 Plan Review Fees. The plan review fees specified in this section are separate from and in addition to permit inspection fees. The plan review fee to review compliance with the technical codes shall be as set forth in the fee schedule adopted by the City. When submitting an application for a building permit, the applicant shall pay a plan review deposit in an amount determined by the building official to defray all or a portion of the cost to review the plans and construction documentation associated with the permit application.

When submittal documents are incomplete or changed so as to require additional plan review or when the project involves deferred submittal items, an additional plan review fee shall be charged at the hourly as set forth in the fee schedule adopted by the City.

In lieu of assessing the plan review fees set forth in the fee schedule established by the City, the building official may calculate and charge a fee equal to the actual cost of providing the inspection and associated services in accordance with the hourly rate set forth in the fee schedule.

109.5 Other Fees. The City may adopt other fees for services to be charged in connection with the issuance of a building permit or the delivery of said services.

109.6 Related fees. The payment of the fee for the construction, alteration, removal or demolition for work done in connection with or concurrently with the work authorized by a building permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law or adopted by the City.

109.7 Penalty fee; Work commencing before permit issuance. Any person who commences grading work or work requiring a permit on a building, structure, electrical, gas, mechanical or plumbing system before obtaining the necessary permits shall be subject to a penalty fee in addition to the required permit fees that is equal to one hundred percent (100%) of all permit inspection fees applicable to the work and adopted by the City. The penalty fee shall be imposed under this section to defray the costs incurred by the City in connection with its duties to monitor, review, investigate, and enforce violations of the permit requirements under this Chapter, which arise out of the performance of work by the applicant without obtaining the proper permits and to deter the future performance of such acts.

109.8 Refunds. The building official may establish a refund policy and may authorize refunding of a fee paid hereunder which was erroneously paid or collected and for which services were not or were partially rendered.

109.9 Building permit valuations. The applicant for a permit shall provide an estimated value of the work at time of application. The estimated value of the work shall include the total value of all work, including materials and labor, for which the permit is being issued. The building official shall establish the permit valuation based on published valuation data as updated from time to time. If, in the opinion of the building official, the valuation multipliers published in the valuation data are over or underestimated based on the actual work of the project, the building official may utilize any other appropriate means of determining the permit valuation, including, but not limited to, obtaining detailed and complete cost estimates provided by the applicant or by other reasonable means. Final building permit valuation shall be determined and set by the building official.

SECTION 110 INSPECTION

110.1 General. Construction or work for which a permit is required shall be subject to inspection by the building official and such construction or work shall remain accessible and exposed for inspection purposes until approved. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the building official nor the City shall be liable for expense entailed in the removal or replacement of any material required to allow inspection. For on-site construction, from time to time the building official or his/her designee, upon notification from the permit holder or his agent, shall make or cause to be made any necessary inspections and shall either approve that portion of the construction as completed or shall notify the permit holder or his/her agent wherein the same fails to comply with this code.

110.1.1 Preliminary inspection. Before issuing a permit, the building official is authorized to examine or cause to be examined buildings, structures and sites for which an application has been filed.

110.2 Required inspections. The building official or his/her designee, upon reasonable notification, shall make the inspections set forth herein.

Note: Reinforcing steel or structural framework of any part of any building or structure shall not be covered or concealed without first obtaining the approval of the enforcing agency.

110.2.1 Foundation inspection. Inspection of the foundation and footings shall be made after poles or piers are set or trenches or basement areas are excavated and any required forms erected and any required reinforcing steel is in place and supported prior to the placing of concrete. The foundation or footing inspection shall include excavations for thickened slabs intended for the support of bearing walls, partitions, structural supports, or equipment and special requirements for wood foundations. Materials for the foundation shall be on the job site except where concrete is ready-mixed in accordance with ASTM C 94. Under this circumstance concrete is not required to be at the job site.

110.2.2 Concrete slab and under-floor inspection. Concrete slab and under-floor inspections shall be made after in-slab or under-floor reinforcing steel and building service equipment, conduits, piping or other ancillary building trade products or

equipment are installed, but before any concrete is placed or floor sheathing is installed, including the subfloor.

110.2.3 Plumbing, mechanical, gas and electrical systems inspection. Rough inspection of plumbing, mechanical, gas and electrical systems shall be made prior to covering or concealment, before fixtures or appliances are set or installed, and prior to framing inspection.

110.2.4 Floodplain inspections. For construction in areas prone to flooding as established by the flood damage prevention regulations of the City, upon placement of the lowest floor, including basement, and prior to further vertical construction, the building official shall require submission of documentation, prepared and sealed by a registered design professional, of the elevation of the lowest floor, including basement, as required by the flood damage prevention regulations of the City.

110.2.5 Frame inspection. Framing inspections shall be made after the roof deck or sheathing, all framing, fireblocking and bracing are in place and pipes, chimneys and vents to be concealed are complete and the rough electrical, plumbing, heating wires, pipes and ducts are approved.

110.2.6 Masonry inspection. Inspection of masonry construction, including reinforcing steel, shall be made prior to grouting cells.

110.2.7 Lath and gypsum board inspection. Lath and gypsum board inspections shall be made after lathing and gypsum board, interior and exterior, is in place, but before any plastering is applied or gypsum board joints and fasteners are taped and finished.

Exception: Gypsum board that is not part of a fire-resistance-rated assembly or a shear assembly.

110.2.8 Fire- and smoke-resistant penetrations and fire-resistance-rated construction inspection. Where fire-resistance-rated construction is required between dwelling units or due to location on property, the building official shall require an inspection of such construction after all lathing and/or wallboard is in place, but before any plaster is applied, or before wallboard joints and fasteners are taped and finished. Protection of joints and penetrations in fire-resistance-rated assemblies, smoke barriers and smoke partitions shall not be concealed from view until inspected and approved.

110.2.9 Energy efficiency. Inspections shall be made to determine compliance with the California Energy Code and shall include, but not be limited to, inspections for: envelope insulation R- and U-values, fenestration U-value, duct system R-value, and HVAC and water-heating equipment efficiency.

110.2.10 Other inspections. In addition to the called inspections above, the building official may make or require any other inspections to ascertain compliance with this code and other laws enforced by the building official.

110.2.10.1 Special Inspections. For special inspections, see California Building Code, Chapter 17.

110.2.10.2 Green building inspections. Green building inspections shall be made to determine compliance with the California Green Building Code. Said inspections shall be made by a special inspector, hired by the permit holder and approved by the building official. The building official shall have the authority to utilize written documentation to verify compliance with the California Green Building Code in lieu of inspections. The building official

may waive inspections for minor work or elements or may cause the work, or a portion thereof, to be inspected by the building official or his/her designee.

110.2.11 Final inspection. Final inspection shall be made after the permitted work is complete and prior to occupancy.

110.3 Inspection agencies. The building official is authorized to accept reports of approved agencies, provided such agencies satisfy the requirements as to qualifications and reliability, as determined by the building official.

110.4 Inspection requests. It shall be the duty of the permit holder or their agent to notify the building official that such work is ready for inspection. It shall be the duty of the person requesting any inspections required by this code to provide access to and means for inspection of such work.

110.5 Approval required. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the building official. The building official, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or shall notify the permit holder or an agent of the permit holder wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the building official.

SECTION 111 CERTIFICATE OF OCCUPANCY

111.1 Use and occupancy. No building or structure shall be used or occupied, and no change in the existing occupancy classification of a building or structure or portion thereof shall be made, until the building official has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the City. Certificates presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid.

Exceptions: Certificates of occupancy are not required for work exempt from a permit.

111.2 Change in use. Changes in the character or use of an existing structure shall not be made except as specified in Chapter 34 of the California Building Code.

111.3 Certificate issued. After the building official inspects the building or structure and finds no violations of the provisions of this code or other laws that are enforced by the department of building safety, the building official shall issue a certificate of occupancy which shall contain the following:

1. The building permit number.
2. The address of the structure.
3. The name of the building official approving the certificate.
4. Any special stipulations and conditions of the building permit.

111.4 Temporary occupancy. The building official is authorized to issue a temporary certificate of occupancy before the completion of the entire work covered by the permit, provided that such portion or portions shall be occupied safely. The building official shall set a time period during which the temporary certificate of occupancy is valid.

111.5 Revocation. The building official shall, in writing, suspend or revoke a certificate of occupancy issued under the provisions of this code wherever the certificate is issued in error or on the basis of incorrect information or when it is determined by the building official that

the building or structure or portion thereof is in violation of the provisions of this code or the technical codes adopted by the City.

SECTION 112 SERVICE UTILITIES

112.1 Connection of service utilities. No person shall make connections from a utility, source of energy, fuel or power to any building or system that is regulated by this code for which a permit is required, until approved by the building official.

112.2 Temporary connection. The building official shall have the authority to authorize and approve the temporary connection of the building or system to the utility, source of energy, fuel or power.

112.3 Authority to disconnect service utilities. The building official shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without the approval required by Section 112.1 or 112.2 herein. The building official shall notify the serving utility and whenever possible the owner and occupant of the building, structure or service system of the decision to disconnect prior to taking such action. If not notified prior to disconnection, the owner or occupant of the building, structure or service system shall be notified in writing as soon as practical thereafter.

SECTION 113 BOARD OF APPEALS

113.1 General. In order to hear and decide appeals of orders, decisions or determinations made by the building official relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The building official shall be an ex officio member of said board but shall have no vote on any matter before the board. The board of appeals shall be appointed by the City and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the building official.

113.2 Limitations on authority. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.

SECTION 114 VIOLATIONS

114.1 Unlawful acts. It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, repair, move, remove, demolish or occupy any building, structure or equipment regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this Section 14.10.010 or any other section of Chapter 14.10 of the Sonoma Municipal Code.

114.2 Notice of violation. The building official is authorized to serve a notice of violation or order on the person responsible for the erection, construction, alteration, extension, repair, moving, removal, demolition or occupancy of a building or structure in violation of the provisions of this code, or in violation of a detail statement or a plan approved thereunder, or in violation of a permit or certificate issued under the provisions of this code. Such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

114.3 Prosecution of violation. If the notice of violation is not complied with in the time prescribed by such notice, the building official is authorized to request the legal counsel of the jurisdiction to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal or termination of the unlawful occupancy of the building or structure in violation of the provisions of this code or of the order or direction made pursuant thereto.

114.4 Violation penalties. Any person, firm or corporation who violates a provision of this Section 14.10.010 or any other section of Chapter 14.10 of the Sonoma Municipal Code, or fails to comply with any of the requirements thereof, or allows a violation to continue without taking reasonable means to cure or abate the same after having been ordered to do so, or who erects, constructs, alters or repairs a building or structure in violation of the approved construction documents or directive of the building official, or of a permit or certificate issued under the provisions of this code, is punishable as provided by Section 1.12.010 of the Sonoma Municipal Code. Each violation shall constitute a separate offense for each and every day such person, firm or corporation violates or allows a violation to continue without taking reasonable means to cure or abate the same after having been ordered to do so. A violation of this Section 14.10.110 or any other section of Chapter 14.10 of the Sonoma Municipal Code shall be deemed a public nuisance and is subject to nuisance abatement proceedings as provided by Section 1.12.010.

SECTION 115 STOP WORK ORDER

115.1 Notice to owner. Upon notice from the building official that work on any building or structure is being prosecuted contrary to the provisions of this code or in an unsafe and dangerous manner, such work shall be immediately stopped. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's agent or to the person doing the work and shall state the conditions under which work will be permitted to resume.

115.2 Unlawful continuance. Any person who shall continue any work in or about the structure after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to penalties as prescribed by Section 1.12.010 of the Sonoma Municipal Code. Further, any violation of this section is deemed a public nuisance and may be subject to nuisance abatement proceedings as provided by Section 1.12.010.

SECTION 116 DANGEROUS BUILDINGS AND EQUIPMENT

116.1 General. Structures or existing equipment that are or hereafter become unsafe, insanitary or deficient because of inadequate means of egress facilities, inadequate light and ventilation, or which constitute a fire hazard, or are otherwise dangerous to human life or the public welfare, or that involve illegal or improper occupancy or inadequate maintenance, shall be deemed a public nuisance and a dangerous building and shall be made safe by demolition, repair, rehabilitation or removal, in accordance with the procedures of the 1997 Uniform Code for the Abatement of Dangerous Buildings, as amended and adopted by the City. As an alternative, the building official or other employee or official of the City may institute other appropriate action to prevent, restrain, correct or abate the violation.

116.2 Investigation Report. The building official shall cause a report to be filed on conditions found to be dangerous. The report shall state the occupancy of the structure and the nature of the dangerous condition.

116.3 Notice and method of service. If a dangerous building is found, the building official shall follow the noticing and method of service procedures set forth in the 1997 Uniform Code for the Abatement of Dangerous Buildings.

116.4 Restoration. The structure or equipment determined to be dangerous by the building official is permitted to be restored to a safe condition. To the extent that repairs, alterations or additions are made or a change of occupancy occurs during the restoration of the structure, such repairs, alterations, additions or change of occupancy shall comply with the applicable requirements of the technical codes.

Table 1-A Building Inspection Fees

TOTAL VALUATION	FEE
\$1.00 to \$500.00	\$23.50
\$501.00 to \$2,000.00	\$23.50 for the first \$500.00 plus \$3.05 for each additional \$100.00, or fraction thereof, to and including \$2,000.00
\$2,001.00 to \$25,000.00	\$69.25 for the first \$2,000.00 plus \$14.00 for each additional \$1,000.00, or fraction thereof, to and including \$25,000.00
\$25,001.00 to \$50,000.00	\$391.25 for the first \$25,000.00 plus \$10.10 for each additional \$1,000.00, or fraction thereof, to and including \$50,000.00
\$50,001.00 to \$100,000.00	\$643.75 for the first \$50,000.00 plus \$7.00 for each additional \$1,000.00, or fraction thereof, to and including \$100,000.00
\$100,001.00 to \$500,000.00	\$993.75 for the first \$100,000.00 plus \$5.60 for each additional \$1,000.00, or fraction thereof, to and including \$500,000.00
\$500,001.00 to \$1,000,000.00	\$3,233.75 for the first \$500,000.00 plus \$4.75 for each additional \$1,000.00, or fraction thereof, to and including \$1,000,000.00
\$1,000,001.00 and up	\$5,608.75 for the first \$1,000,000.00 plus \$3.65 for each additional \$1,000.00, or fraction thereof
Other Inspections and Fees:	
1. Inspections outside of normal business hours (minimum charge—two hours)	\$47.00 per hour*
2. Reinspection fees assessed under provisions of Section 305.8	\$47.00 per hour*
3. Inspections for which no fee is specifically indicated (minimum charge—one-half hour)	\$47.00 per hour*
4. Additional plan review required by changes, additions or revisions to plans (minimum charge—one-half hour)	\$47.00 per hour*
5. For use of outside consultants for plan checking and inspections, or both	Actual costs**

*Or the total hourly cost to the jurisdiction, whichever is the greatest. This cost shall include supervision, overhead, equipment, hourly wages and fringe benefits of the employees involved.

**Actual costs include administrative and overhead costs.

Table 1-B Electrical Inspection Fees

Permit Issuance

- 1. For the issuance of each electrical permit \$23.50
- 2. For the issuing of each supplemental permit for which the original permit has not expired, been canceled, or finalized \$7.25

System Fee Schedule

(Note: The following do not include permit-issuing fee.)

1. New Residential Buildings

The following fees shall include all wiring and electrical equipment in or on each building, or other electrical equipment on the same premises constructed at the same time.

Multifamily. For new multifamily buildings (apartments and condominiums) having three or more dwelling units constructed at the same time, not including the area of garages, carports and accessory buildings, per square foot (0.09 m²) 0.050

Single- and two-family. For new single- and two-family residential buildings constructed at the same time and not including the area of garages, carports and accessory buildings, per square foot (0.09 m²) 0.056

For other types of residential occupancies and for alterations, additions and modifications to existing residential buildings, use the Unit Fee Schedule.

2. Private Swimming Pools

For new private, in-ground swimming pools for single-family and multifamily occupancies, including a complete system of necessary branch circuit wiring, bonding, grounding, underwater lighting, water pumping and other similar electrical equipment directly related to the operation of a swimming pool, each pool 49.50

3. Carnivals and Circuses

Carnivals, circuses, or other traveling shows or exhibitions utilizing transportable-type rides, booths, displays and attractions.

For electrical generators and electrically driven rides, each 23.50

For mechanically driven rides and walk-through attractions or displays having electric lighting, each 7.25

For a system of area and booth lighting, each 7.25

For permanently installed rides, booths, displays and attractions, use the Unit Fee Schedule.

4. Temporary Power Service

For a temporary service pole or pedestal, including all pole or pedestal-mounted receptacle outlets and appurtenances, each 23.50

For a temporary distribution system and temporary lighting and receptacle outlets for construction sites, decorative lights, Christmas tree sales lots, fireworks stands, etc., each 12.30

Unit Fee Schedule

(Note: The following do not include permit-issuing fee.)

1. Receptacle, Switch and Light Outlets

For receptacle, switch, light or other outlets at which current is used or controlled, except services, feeders and meters:

First 20 fixtures, each 1.10

Additional fixtures, each 0.73

Note: For multioutlet assemblies, each 5 feet (1524 mm) or fraction thereof may be considered as one outlet.

2. Lighting Fixtures

For lighting fixtures, sockets or other lamp-holding devices:

First 20 fixtures, each 1.10

Additional fixtures, each \$ 0.73

Table 1-B Electrical Inspection Fees (cont.)

For pole or platform-mounted lighting fixtures, each	1.10
For theatrical-type lighting fixtures or assemblies, each	1.10
3. Residential Appliances	
For fixed residential appliances or receptacle outlets for same, including wall-mounted electric ovens; counter-mounted cooking tops; electric ranges; self-contained room, console or through-wall air conditioners; space heaters; food waste grinders; dishwashers; washing machines; water heaters; clothes dryers; or other motor-operated appliances not exceeding 1 horsepower (HP) (746 W) in rating, each	4.75
Note: For other types of air conditioners and other motor-driven appliances having larger electrical ratings, see Power Apparatus.	
4. Nonresidential Appliances	
For nonresidential appliances and self-contained factory-wired, nonresidential appliances not exceeding 1 horsepower (HP), kilowatt (kW) or kilovolt-ampere (kVA), in rating, including medical and dental devices; food, beverage and ice cream cabinets; illuminated show cases; drinking fountains; vending machines; laundry machines; or other similar types of equipment, each	4.75
Note: For other types of air conditioners and other motor-driven appliances having larger electrical ratings, see Power Apparatus.	
5. Power Apparatus	
For motors, generators, transformers, rectifiers, synchronous converters, capacitors, industrial heating, air conditioners and heat pumps, cooking or baking equipment and other apparatus, as follows:	
Rating in horsepower (HP), kilowatts (kW), kilovolt-amperes (kVA) or kilovolt-amperes-reactive (kVAR):	
Up to and including 1, each	4.75
Over 1 and not over 10, each	12.30
Over 10 and not over 50, each	24.60
Over 50 and not over 100, each	49.50
Over 100, each	74.50
Notes:	
1. For equipment or appliances having more than one motor, transformer, heater, etc., the sum of the combined ratings may be used.	
2. These fees include all switches, circuit breakers, contactors, thermostats, relays and other directly related control equipment.	
6. Busways	
For trolley and plug-in-type busways, each 100 feet (30 480 mm) or fraction thereof	7.25
Note: An additional fee is required for lighting fixtures, motors and other appliances that are connected to trolley and plug-in-type busways. A fee is not required for portable tools.	
7. Signs, Outline Lighting and Marquees	
For signs, outline lighting systems or marquees supplied from one branch circuit, each	24.60
For additional branch circuits within the same sign, outline lighting system or marquee, each	4.75
8. Services	
For services of 600 volts or less and not over 200 amperes in rating, each	30.50
For services of 600 volts or less and over 200 amperes to 1,000 amperes, each	62.15
For services over 600 volts or over 1,000 amperes in rating, each	124.30
9. Miscellaneous Apparatus, Conduits and Conductors	
For electrical apparatus, conduits and conductors for which a permit is required but for which no fee is herein set forth	18.20
Note: This fee is not applicable when a fee is paid for one or more services, outlets, fixtures, appliances, power apparatus, busways, signs or other equipment.	
Other Inspections and Fees:	
1. Inspections outside of normal business hours, per hour (minimum charge—two hours)	\$49.50*
2. Reinspection fees assessed under provisions of Section 305.8, per inspection	\$49.50*
3. Inspections for which no fee is specifically indicated, per hour (minimum charge—one-half hour)	\$49.50*
4. Additional plan review required by changes, additions or revisions to plans or to plans for which an initial review has been completed (minimum charge—one-half hour)	\$49.50*

*Or the total hourly cost to the jurisdiction, whichever is the greatest. This cost shall include supervision, overhead, equipment, hourly wages and fringe benefits of the employees involved.

Table 1-C Mechanical Inspection Fees

Permit Issuance and Heaters

- 1. For the issuance of each mechanical permit \$23.50
- 2. For issuing each supplemental permit for which the original permit has not expired, been canceled or finalized 7.25

Unit Fee Schedule

(Note: The following do not include permit-issuing fee.)

1. Furnaces

- For the installation or relocation of each forced-air or gravity-type furnace or burner, including ducts and vents attached to such appliance, up to and including 100,000 Btu/h (29.3 kW) 14.80
- For the installation or relocation of each forced-air or gravity-type furnace or burner, including ducts and vents attached to such appliance over 100,000 Btu/h (29.3 kW) 18.20
- For the installation or relocation of each floor furnace, including vent 14.80
- For the installation or relocation of each suspended heater, recessed wall heater or floor-mounted unit heater 14.80

2. Appliance Vents

- For the installation, relocation or replacement of each appliance vent installed and not included in an appliance permit 7.25

3. Repairs or Additions

- For the repair of, alteration of, or addition to each heating appliance, refrigeration unit, cooling unit, absorption unit, or each heating, cooling, absorption or evaporative cooling system, including installation of controls regulated by the Mechanical Code 13.70

4. Boilers, Compressors and Absorption Systems

- For the installation or relocation of each boiler or compressor to and including 3 horsepower (10.6 kW), or each absorption system to and including 100,000 Btu/h (29.3 kW) 14.70
- For the installation or relocation of each boiler or compressor over 3 horsepower (10.6 kW) to and including 15 horsepower (52.7 kW), or each absorption system over 100,000 Btu/h (29.3 kW) to and including 500,000 Btu/h (146.6 kW) 27.15
- For the installation or relocation of each boiler or compressor over 15 horsepower (52.7 kW) to and including 30 horsepower (105.5 kW), or each absorption system over 500,000 Btu/h (146.6 kW) to and including 1,000,000 Btu/h (293.1 kW) 37.25
- For the installation or relocation of each boiler or compressor over 30 horsepower (105.5 kW) to and including 50 horsepower (176 kW), or each absorption system over 1,000,000 Btu/h (293.1 kW) to and including 1,750,000 Btu/h (512.9 kW) 55.45
- For the installation or relocation of each boiler or compressor over 50 horsepower (176 kW), or each absorption system over 1,750,000 Btu/h (512.9 kW) 92.65

5. Air Handlers

- For each air-handling unit to and including 10,000 cubic feet per minute (cfm) (4719 L/s), including ducts attached thereto 10.65
- Note: This fee does not apply to an air-handling unit which is a portion of a factory-assembled appliance, cooling unit, evaporative cooler or absorption unit for which a permit is required elsewhere in the Mechanical Code.
- For each air-handling unit over 10,000 cfm (4719 L/s) 18.10

6. Evaporative Coolers

- For each evaporative cooler other than portable type 10.65

7. Ventilation and Exhaust

- For each ventilation fan connected to a single duct 7.25
- For each ventilation system which is not a portion of any heating or air-conditioning system authorized by a permit 10.65
- For the installation of each hood which is served by mechanical exhaust, including the ducts for such hood 10.65

8. Incinerators

- For the installation or relocation of each domestic-type incinerator 18.20
- For the installation or relocation of each commercial or industrial-type incinerator 14.50

9. Miscellaneous

- For each appliance or piece of equipment regulated by the Mechanical Code but not classed in other appliance categories, or for which the fee is listed in the table 10.65

Other Inspections and Fees:

- 1. Inspections outside of normal business hours, per hour (minimum charge—two hours) \$49.50*
- 2. Reinspection fees assessed under provisions of Section 305.8, per inspection \$49.50*
- 3. Inspections for which no fee is specifically indicated, per hour (minimum charge—one-half hour) \$49.50*
- 4. Additional plan review required by changes, additions or revisions to plans or to plans for which an initial review has been completed (minimum charge—one-half hour) \$49.50*

*Or the total hourly cost to the jurisdiction, whichever is the greatest. This cost shall include supervision, overhead, equipment, hourly wages and fringe benefits of the employees involved.

Table 1-D Plumbing Inspection Fees

Permit Issuance	
1. For the issuance of each plumbing permit	\$23.50
2. For issuing each supplemental permit for which the original permit has not expired, been canceled or finalized	7.25
Unit Fee Schedule	
<i>(Note: The following do not include permit-issuing fee.)</i>	
1. Fixtures and Vents	
For each plumbing fixture or trap or set of fixtures on one trap (including water, drainage piping and backflow protection thereof)	9.80
For repair or alteration of drainage or vent piping, each fixture	4.75
2. Sewers, Disposal Systems and Interceptors	
For each building sewer and each trailer park sewer	24.65
For each cesspool	37.25
For each private sewage disposal system	74.50
For each industrial waste pretreatment interceptor, including its trap and vent, excepting kitchen-type grease interceptors functioning as fixture traps	19.90
Rainwater systems—per drain (inside building)	9.80
3. Water Piping and Water Heaters	
For installation, alteration, or repair of water piping or water-treating equipment, or both, each	4.75
For each water heater including vent	12.30
For vents only, see Table 3-C.	
4. Gas Piping Systems	
For each gas piping system of one to five outlets	6.15
For each additional outlet over five, each	1.10
5. Lawn Sprinklers, Vacuum Breakers and Backflow Protection Devices	
For each lawn sprinkler system on any one meter, including backflow protection devices thereof	14.80
For atmospheric-type vacuum breakers or backflow protection devices not included in Item 1:	
1 to 5 devices	12.30
Over 5 devices, each	2.25
For each backflow-protection device other than atmospheric-type vacuum breakers:	
2 inches (50.8 mm) and smaller	12.30
Over 2 inches (50.8 mm)	24.65
6. Swimming Pools	
For each swimming pool or spa:	
Public pool	91.25
Public spa	60.75
Private pool	60.75
Private spa	30.25
7. Miscellaneous	
For each appliance or piece of equipment regulated by the Plumbing Code but not classed in other appliance categories, or for which no other fee is listed in this code	9.80
Other Inspections and Fees:	
1. Inspections outside of normal business hours, per hour (minimum charge—two hours)	\$49.50*
2. Reinspection fees assessed under provisions of Section 305.8, per inspection	\$49.50*
3. Inspections for which no fee is specifically indicated, per hour (minimum charge—one-half hour)	\$49.50*
4. Additional plan review required by changes, additions or revisions to plans or to plans for which an initial review has been completed (minimum charge—one-half hour)	\$49.50*

*Or the total hourly cost to the jurisdiction, whichever is the greatest. This cost shall include supervision, overhead, equipment, hourly wages and fringe benefits of the employees involved.

Table 1-E Grading Inspection Fees

50 cubic yards (38.2 m ³) or less	\$23.50
51 to 100 cubic yards (40 to 76.5 m ³)	37.00
101 to 1,000 cubic yards (77.2 to 764.6 m ³)— \$37.00 for the first 100 cubic yards (76.5 m ³) plus \$17.50 for each additional 100 cubic yards (76.5 m ³) or fraction thereof.	
1,001 to 10,000 cubic yards (765.3 to 7645.5 m ³)— \$194.50 for the first 1,000 cubic yards (764.6 m ³), plus \$14.50 for each additional 1,000 cubic yards (764.6 m ³) or fraction thereof.	
10,001 to 100,000 cubic yards (7646.3 to 76 455 m ³)— \$325.00 for the first 10,000 cubic yards (7645.5 m ³), plus \$66.00 for each additional 10,000 cubic yards (7645.5 m ³) or fraction thereof.	
100,001 cubic yards (76 456 m ³) or more— \$919.00 for the first 100,000 cubic yards (76 455 m ³), plus \$36.50 for each additional 10,000 cubic yards (7645.5 m ³) or fraction thereof.	

Other Inspections and Fees:	
1. Inspection outside of normal business hours, per hour (minimum charge—two hours)	\$50.50 ²
2. Reinspections fees assessed under provisions of Section 305.8, per inspection	\$50.50 ²
3. Inspections for which no fee is specifically indicated, per hour (minimum charge—one-half hour)	\$50.50 ²

¹The fee for a grading permit authorizing additional work to that under a valid permit shall be the difference between the fee paid for the original permit and the fee shown for the entire project.

²Or the total hourly cost to the jurisdiction, whichever is the greatest. This cost shall include supervision, overhead, equipment, hourly wages and fringe benefits of the employees involved.

14.10.015 Technical Codes Adopted.

Pursuant to Section 50022.2 of the California Government Code, the following technical codes are adopted by reference as described herein and as amended by the following sections of this Chapter:

- A. 2010 California Building Code Volumes 1 and 2, based on the 2009 International Building Code published by the International Code Council;
- B. 2010 California Residential Code, based on the 2009 International Residential Code published by the International Code Council;
- C. 2008 California Electrical Code, based on the 2008 National Electrical Code published by the National Fire Protection Association and BNi Publications;
- D. 2010 California Mechanical Code California Building Standards Code, based on the 2009 Uniform Mechanical Code published by the International Association of Plumbing and Mechanical Officials;
- E. 2010 California Plumbing Code, based on the 2009 Uniform Plumbing Code published by the International Association of Plumbing and Mechanical Officials;
- F. 2010 California Energy Code published by the California Building Standards Commission;
- G. 2010 California Historical Building Code, published by the California Building Standards Commission;
- H. 2010 California Fire Code, based on the 2009 International Fire Code published by the International Code Council;
- I. 2010 California Existing Building Code, together with its appendices and referenced standards and based on the 2009 International Existing Building Code published by International Code Council;
- J. 2010 California Green Building Standards Code published by the California Building Standards Commission;
- K. 2010 California Referenced Standards published by the California Building Standards Commission;
- L. 1997 Uniform Code for the Abatement of Dangerous Buildings published by the International Conference of Building Officials;

14.10.020 2010 California Building Code Amendments.

A. The administrative regulations of Part 2 of the 2010 California Building Standards Code, known as the California Building Code, as adopted by Section 14.10.015, are amended as follows:

Delete Chapter 1, Division II (Scope and Administration) in its entirety and replace with a new Chapter 1, Division II (Administrative Code) as provided in Section 14.10.010 herein:

B. Based upon the express findings of necessity #1 and #2 set forth in Section 14.10.005, Part 2 of the 2010 Edition of the California Building Standards Code, known as the California Building Code, as adopted by Section 14.10.015, is amended as follows:

Adopt by reference and add the following 2010 California Building Code appendices:

- a. Appendix Chapter H – Signs
- b. Appendix Chapter I - Patio Covers.

Add a new Section 1511 to read as follows:

**SECTION 1511
SOLAR PHOTOVOLTAIC PANELS/MODULES**

1511.1 Solar photovoltaic panels/modules. Solar photovoltaic panels/modules installed upon a roof or as an integral part of a roof assembly shall comply with the requirements of this code and the California Fire Code.

1511.1.1 Structural fire-resistance. The structural frame and roof construction supporting the load imposed upon the roof by the photovoltaic panels/modules shall comply with the requirements of Table 601.

C. Based upon the express finding of necessity #1 set forth in Section 14.10.005, Part 2 of the 2010 Edition of the California Building Standards Code, known as the California Building Code, as adopted by Section 14.10.015, is amended as follows:

Delete Section 3109 in its entirety and replace to read as follows:

**SECTION 3109
SWIMMING POOL ENCLOSURES AND SAFETY DEVICES**

3109.1 General. Swimming pools and spas shall comply with the requirements of this section and other applicable sections of this code.

3109.1.1 This section does not apply to any facility regulated by the State Department of Social Services even if the facility is also used as the private residence of the operator. Pool safety in those facilities shall be regulated pursuant to regulations adopted therefor by the State Department of Social Services.

3109.2 Definitions. As used in this section, the following terms shall have the following meanings:

APPROVED SAFETY POOL COVER means a manually- or power-operated safety pool cover that meets all of the performance standards of the American Society for Testing and Materials (ASTM), in compliance with standard F1346-91.

ENCLOSURE means a fence, wall, or other barrier that isolates a swimming pool from access to the home.

PUBLIC SWIMMING POOL means a swimming pool operated for the use of the general public with or without charge, or for the use of the members and guests of a

private club. Public swimming pool does not include a swimming pool located on the grounds of a private single-family home.

SWIMMING POOL or **POOL** means any structure intended for swimming or recreational bathing that contains water over 18 inches deep. "Swimming pool" includes in-ground and above-ground structures and includes, but is not limited to, hot tubs, spas, portable spas, and nonportable wading pools.

EXIT ALARMS means devices that make audible, continuous alarm sounds when any door or window that permits access from the residence to the pool area that is without any intervening enclosure, is opened or is left ajar. Exit alarms may be battery operated or may be connected to the electrical wiring of the building.

3109.3 Public swimming pools. Public swimming pools shall comply with the requirements of Chapter 31B and the requirements set forth herein.

3109.4 Construction permit. Except as provided in Sections 3109.1.1, a building permit shall be required for construction of a new swimming pool or spa and for alteration of an existing swimming pool or spa.

3109.5 Safety features required. The swimming pool shall be separated from adjacent properties by a fence or other approved barrier complying with Section 3109.5.1 and shall be equipped with at least one of the following additional safety features to separate the pool from habitable or occupiable spaces:

Exception. Hot tubs or spas with locking safety covers that comply with the American society for Testing Materials Emergency Performance Specification (ASTM ES 13-89)

3109.5.1 The pool shall be isolated from access to habitable or occupiable spaces by an enclosure that meets the requirements of this subsection. The enclosure shall have all of the following characteristics:

3109.5.1.1 Gates. Any pedestrian access gates through the enclosure shall open away from the swimming pool, and be self-closing with a self-latching device and release mechanism placed no lower than 60 inches above the ground. All access gates shall comply with the requirements of Sections 3109.5.1.2 through 3109.5.1.5 and shall be equipped to accommodate a locking device or other mechanical mechanism to prevent access a child below the age of five years.

3109.5.1.2 Height. A minimum height of 60 inches measured on the side of the barrier or enclosure that faces away from the swimming pool.

3109.5.1.3 A maximum vertical clearance from the ground to the bottom of the enclosure of 2 inches.

3109.5.1.4 Gaps or voids, if any, do not allow passage of a sphere equal to or greater than 4 inches in diameter.

3109.5.1.5 An outside surface free of protrusions, cavities, or other physical characteristics that would serve as handholds or footholds that could enable a child below the age of five years to climb over. For the purposes of this subsection, the following fencing materials shall be considered free of protrusions, cavities, or other physical characteristics that would serve as handholds or footholds that could enable a child below the age of five years to climb over:

- 1. Solid barrier surfaces.** Solid barriers which do not have openings, indentations or protrusions except for normal construction tolerances and tooled masonry joints.
- 2. Removable mesh pool fencing.** Removable mesh pool fencing that meets American Society for Testing and Materials (ASTM) specifications F2286 standards.
- 3. Closely spaced horizontal members.** Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is less than 45 inches, the horizontal members shall be located on the swimming pool side of the fence. Spacing between vertical members shall not exceed 1.75 inches in width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1.75 inches in width.
- 4. Widely spaced horizontal members.** Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches) or more, spacing between vertical members shall not exceed 4 inches. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1.75 inches in width.
- 5. Chain link and other wire fence dimensions.** Maximum mesh size for chain link fences shall be a 1.75 inch square unless the fence is provided with slats fastened at the top or the bottom which reduce the openings to no more than 1.75 inches (44 mm). The maximum horizontal width of openings in other wire fencing shall be 1.75 inches (44 mm). Wire fencing other than chain link shall be welded at each cross wire unless otherwise approved by the building official.
- 6. Diagonal members.** Where the barrier is composed of diagonal members, the maximum opening formed by the diagonal members shall be no more than 1.75 inches (44 mm).
- 7. Pool structure as barrier.** Where an above-ground pool structure is used as a barrier or where the barrier is mounted on top of the pool structure, and the means of access is a ladder or steps, then the ladder or steps either shall be capable of being secured, locked or removed to prevent access, or the pool shall meet one of the safety feature requirements set forth in section 3109.5. When the ladder or steps are secured, locked or removed, any opening created shall not allow the passage of a 4-inch-diameter sphere.
- 8. Other physical barriers.** The building official may approve other permanent physical barriers that will prevent a child below the age of five years to access the pool.

3109.5.2 The pool shall be equipped with an approved safety pool cover that meets all requirements of the ASTM Specifications F 1346. Hot tubs or spas shall be equipped with locking safety covers that comply with the American Society for Testing Materials-Emergency Performance Specification (ASTM-ES 13-89).

3109.5.3 Where a wall of a habitable or occupiable building serves as part of the enclosure or barrier for a pool, doors with direct access to the pool through that wall shall be equipped with an exit alarm that produces an audible warning when the door and/or its

screen, if present, are opened. The exit alarm shall be listed in accordance with UL 2017. The audible alarm shall activate within 7 seconds and sound continuously for a minimum of 30 seconds after the door and/or its screen, if present, are opened and be capable of being heard throughout the house during normal household activities. The alarm shall automatically reset under all conditions. The alarm shall be equipped with a manual means, such as touchpad or switch, to temporarily deactivate the alarm for a single opening. Such deactivation shall last for not more than 15 seconds. In dwellings not required to be accessible to disabled individuals, the deactivation switch shall be located 54 inches or more above the threshold of the door. In dwellings required to be accessible to disabled individuals, the deactivation switch(es) shall be located at 54 inches maximum and 48 inches minimum above the threshold of the door.

3109.5.4 All doors providing direct access from the home to the swimming pool or spa shall be equipped with a self-closing, self-latching device with a release mechanism placed no lower than 54 inches above the floor.

3109.5.5 Other approved means of protection, if the degree of protection afforded is equal to or greater than that afforded by any of the devices set forth in items 3109.5.1 through 3109.5.4, inclusive, as determined by the building official of the jurisdiction issuing the applicable building permit.

3109.5.6 Prohibited locations. Enclosures and pool barriers shall be located so as to prohibit permanent structures, equipment or similar objects from being used to climb the barriers.

3109.6 Any person entering into an agreement to build a swimming pool or spa, or to engage in permitted work on a pool or spa covered by this subsection, shall give the consumer notice of the requirements of Section 3109.5.

3109.7 Entrapment avoidance. Suction outlets shall be designed and installed in accordance with ANSI/APSP-7 and the following:

3109.7.1 The suction outlet of a new pool or new spa for which a permit is issued shall be equipped to provide circulation throughout the pool or spa by installing at least two circulation drains per pump that shall be hydraulically balanced and symmetrically plumbed through one or more "T" fittings, and that are separated by a distance of at least three feet in any dimension between the drains. Suction outlets that are less than 12 inches across shall be covered with anti-entrapment grates, as specified in the ASME/ANSI Standard A 112.19.8, that cannot be removed except with the use of tools. Slots of openings in the grates or similar protective devices shall be of a shape, area and arrangement that would prevent physical entrapment and would pose any suction hazard to bathers.

3109.7.2 Any backup safety system that an owner of a new swimming pools or spa may choose to install in addition to the requirements set forth in subdivisions (1) and (2) shall meet the standards as published in the document, "Guidelines for Entrapment Hazards: Making Pools and Spas Safer," Publication Number 363, March 2005, United States Consumer Products Safety Commission.

3109.7.3 Whenever a building permit is issued for the remodel or modification of any existing swimming pool or spa, the permit shall require that the suction outlet of the existing swimming pool or spa be upgraded so as to be equipped with an anti-entrapment cover meeting current standards of the American Society for Testing and Materials (ASTM) or the American Society of Mechanical Engineers (ASME).

14.10.025 2010 California Residential Code Amendments.

A. The administrative regulations of Part 2.5 of the 2010 California Building Standards Code, known as the California Residential Code, as adopted by Section 14.10.015, is amended as follows:

Delete Chapter 1, Division II (Scope and Administration) in its entirety and replace with a new Chapter 1, Division II (Administrative Code) as provided in Section 14.10.010 herein:

B. Based upon the express findings of necessity #1 set forth in Section 14.10.005, Part 2.5 of the 2010 Edition of the California Building Standards Code, known as the California Residential Code, as adopted by Section 14.10.015, is further amended as follows:

Adopt by reference and add Appendix Chapter H (Patio Covers) of the 2010 California Residential Code appendices:

Add a new Section R908 to read as follows:

**SECTION R908
SOLAR PHOTOVOLTAIC PANELS/MODULES**

R908.1 Solar photovoltaic panels/modules. Solar photovoltaic panels/modules installed upon a roof or as an integral part of a roof assembly shall comply with the requirements of this code and the California Fire Code.

14.10.030 2010 California Electrical Code Amendments.

A. Part 3 of the 2010 California Building Standards Code, known as the California Electrical Code, as adopted by Section 14.10.015, is amended as follows:

Delete Annex H (Administration and Enforcement) of the electrical code in its entirety and add and adopt a new Annex H (Administrative Code) in its place as provided in Section 14.10.010 herein.

14.10.035 2010 California Mechanical Code Amendments.

A. The administrative regulations of Part 4 of the 2010 California Building Standards Code, known as the California Mechanical Code, as adopted by Section 14.10.015, is amended as follows:

Delete Chapter 1, Division II (Administration) in its entirety and replace with a new Chapter 1, Division II (Administrative Code) as provided in Section 14.10.010 herein:

B. Based upon the express findings of necessity #1 and #2 set forth in Section 14.10.005, Part 4 of the 2010 California Building Standards Code, known as the California Mechanical Code, as adopted by Section 14.10.015, is amended as follows:

Adopt by reference and add the following 2010 California Mechanical Code appendices:

- a. Appendix A (Standard for Metal Ducts).
- b. Appendix B (Procedures to be Followed to Place Gas Equipment into Operation)

14.10.040 2010 California Plumbing Code Amendments.

A. The administrative regulations of Part 5 of the 2010 California Building Standards Code, known as the California Plumbing Code, as adopted by Section 14.10.015, is amended as follows:

Delete Appendix Chapter 1, Division II (Administration) in its entirety and replace and adopt a new Appendix Chapter 1 (Administrative Code) as provided in Section 14.10.010 herein:

B. Based upon the express findings of necessity #3 set forth in Section 14.10.005, Part 5 of the 2010 California Building Standards Code, known as the California Plumbing Code, as adopted by Section 14.10.015, is amended as follows:

Amend Section 1601A.0(D) by deleting the Exception.

Amend Section 1603A.0 by deleting the Exception.

Delete subsection 1603A.1.1 in its entirety and replace with a new subsection 1603A.1.1 to read as follows:

1603A.1 System Requirements.

1603A.1.1 Clothes Washer System. A clothes washer system shall comply with all the following:

1. The design shall allow the user to direct the flow to the irrigation or disposal field or the building sewer. The direction control of the graywater shall be clearly labeled and readily accessible to the user.
2. The installation, change, alteration, or repair of the clothes washer system does not include a potable water connection or a pump and does not affect other building, plumbing, electrical, or mechanical components including structural features, egress, fire-life safety, sanitation, potable water supply piping, or accessibility.

Note: The pump in a clothes washer shall not be considered part of the clothes washer system.

3. Graywater shall be contained on the site where it is generated.
4. Graywater shall be directed to and contained within an irrigation or disposal field.
5. Ponding or runoff is prohibited and shall be considered a nuisance.
6. Graywater may be released above the ground surface provided at least two (2) inches (51 mm) of mulch, rock, or soil, or a solid shield covers the release point. Other methods which provide equivalent separation are also acceptable.
7. Clothes washer systems shall be designed to minimize contact with humans and domestic pets.
8. Water used to wash diapers or similarly soiled or infectious garments shall not be used and shall be diverted to the building sewer.
9. Graywater shall not contain hazardous chemicals derived from activities such as cleaning car parts, washing greasy or oily rags, or disposing of waste solutions from home photo labs or similar hobbyist or home occupational activities.

10. An operation and maintenance manual shall be provided. Directions shall indicate the manual is to remain with the building throughout the life of the system and indicate that upon change of ownership or occupancy, the new owner or tenant shall be notified the structure contains a clothes washer system.

C. Based upon the express findings of necessity #1, #2 and #3 set forth in Section 14.10.005, Part 5 of the 2010 California Building Standards Code, known as the California Plumbing Code, as adopted by Section 14.10.015, is amended as follows:

Adopt by reference and add the following 2010 California Plumbing Code appendices:

- a. Appendix A (Recommended Rules for Sizing the Water Supply System).
- b. Appendix D (Sizing Storm Water Drainage Systems)
- c. Appendix E (Manufactured/Mobile Home Parks and Recreational Vehicle Parks)
- d. Appendix G (Graywater Systems)
- e. Appendix I (Installation Standards)
- f. Appendix K (Private Sewage Disposal Systems)
- g. Appendix L (Alternate Plumbing Systems)

14.10.045 2010 California Fire Code Amendments.

A. Based upon the express findings of necessity #1, #2 and #3 set forth in Section 14.10.005, Part 9 of the 2010 California Building Standards Code, known as the California Fire Code, as adopted by Section 14.10.015, is amended by adopting by reference and adding the following appendices:

Appendix Chapters, 4, B, BB, C, CC, D, E, F and H of the 2010 California Fire Code.

B. Based upon the express findings of necessity #1, #2 and #3 set forth in Section 14.10.005, Part 9 of the 2010 California Building Standards Code, known as the California Fire Code, as adopted by Section 14.10.015 and as further amended by the adoption of certain appendices, is amended to read as follows:

Amend subsection 105.6.47 to read as follows:

105.6.47 Additional permits. In addition to the permits required by Section 105.6, the following permits shall be obtained from the Bureau of Fire Prevention prior to engaging in the following activities, operations, practices or functions:

1. **Production facilities.** To change use or occupancy, or allow the attendance of a live audience, or for wrap parties.
2. **Pyrotechnics and special effects.** To use pyrotechnic special effects, open flame, use of flammable or combustible liquids or gases, welding, and the parking of motor vehicles in any building or location used for the purpose of motion picture, television and commercial productions.
3. **Live Audiences.** To install seating arrangements for live audiences in approved production facilities, production studios and sound stages. See Chapter 48.
4. **Apartment, hotel, motel.** An operational permit is required to operate an apartment house, hotel, or motel.

5. **Bonfires or rubbish fires.** An operational permit is required to kindle or authorize the kindling or maintenance of bonfires or rubbish fires.
6. **Change of occupancy.** An operational permit is required for any change in the occupancy, business or tenancy of any building, facility, or structure.
7. **Day Care.** An operational permit is required to operate a day care occupancy with an occupant load over eight (8) persons.
8. **Emergency Responder Radio Coverage System.** An operational permit is required for buildings and/or facilities with emergency responder radio coverage systems and related equipment.
9. **Fire protection systems.** An operational permit is required for buildings and/or facilities with fire protection systems and related equipment such as fire pumps, fire hydrant systems, fire suppression systems, fire alarm systems, smoke management systems, and similar systems governed by this code.
10. **High-rise building.** An operational permit is required to operate a high rise building as defined in the Building Code.
11. **Institutional or residential occupancy (6 or less persons).** An operational permit is required to operate an institutional or residential occupancy for 6 or less persons, except day care and residential care facilities for the elderly.
12. **Institutional or residential occupancy (more than 6 persons).** An operational permit is required to operate an institutional or residential occupancy for more than 6 persons. Exception: A permit is not required for large family day care providing care for less than 9 children.
13. **Medical Gas Systems.** An operational permit is required for buildings and/or facilities with medical gas systems and related equipment, and similar systems governed by this code.
14. **Oil or natural gas well.** An operational permit is required to own, operate or maintain an oil or natural gas well.
15. **Organized Camps.** An operational permit is required to operate an organized camp (Group-C Occupancy).
16. **Public Christmas Tree Lot or Pumpkin Patch.** An operational permit is required to operate a Christmas tree lot or pumpkin patch, haunted house, or similar facility that is open to the public.
17. **Special Event Permit** An operational permit is required for any organized procession or assemblage of 50 or more people, which could significantly impact vehicular traffic or create a safety problem. Examples include but are not limited to: music festivals, outdoor markets, circus, walkathons, runs, marathons, trail rides, bicycle races, celebrations, parades and other similar activities.
18. **Winery Caves – Public Accessible.** An operational permit is required to operate a Type-2 or Type-3 winery cave that is accessible to the public.

Add a new subsection 105.7.15 to read as follows:

105.7.15 Additional Construction Permits. In addition to the permits required by Section 105.7, the following construction permits shall be obtained from the Bureau of Fire Prevention prior to starting construction:

1. **Emergency vehicle access facilities.** A construction permit is required for installation or modification of roadways and roadway structures used for emergency vehicle access.
2. **Emergency responder radio systems.** A construction permit is required for the installation, modification or improvements to emergency responder radio systems.
3. **Excavation near flammable or combustible liquid pipeline.** A construction permit is required to excavate or do any work below grade within ten (10) feet of any pipeline for the transportation of flammable or combustible liquid.
4. **Fire-line underground utility piping.** A construction permit is required to install, alter, or make improvements to fire-line underground utility piping. A separate utility permit from the building official is required prior to installing any private underground fire protection water piping and associated appliances.
5. **Gates.** A construction permit is required for the installation of security gates across a fire apparatus access road.
6. **Hazardous materials site disclosure (aboveground facility & underground tank).** A construction permit is required to permanently remove hazardous materials storage or use premises from service, including the permanent removal of a hazardous materials tank.
7. **LP-gas.** A construction permit is required for the installation of or modification to an LP gas tank in excess of 250 gallon capacity.
8. **Medical gas system.** A construction permit is required to install a medical gas system.
9. **Oil or natural gas well.** A construction permit is required to drill an oil or natural gas well.
10. **Roof mounted solar photovoltaic power systems.** A construction permit is required to install or modify a roof mounted solar photovoltaic power system.

Amend subsection 109.3 to read as follows:

109.3 Violation penalties. Any person, firm or corporation who violates a provision of this code, or any other section of Chapter 14.10 of the Sonoma Municipal Code, or fails to comply with any of the requirements thereof, or allows a violation to continue without taking reasonable means to cure or abate the same after having been ordered to do so, or who erects, constructs, alters or repairs a building or structure in violation of the approved construction documents or directive of the fire chief, or of a permit or certificate issued under the provisions of this code, is punishable as provided by Section 1.12.010 of the Sonoma Municipal Code. Each violation shall constitute a separate offense for each and every day such person, firm or corporation violates or allows a violation to continue without taking reasonable means to cure or abate the same after having been ordered to do so. A violation of this Section or any other section of Chapter 14.10 of the Sonoma Municipal Code shall be deemed a public nuisance and is subject to nuisance abatement proceedings as provided by Section 1.12.010.

Amend subsection 111.4 to read as follows:

111.4 Failure to comply. . Any person who shall continue any work in or about the structure after having been served with a stop work order, except such work as that person is directed

to perform to remove a violation or unsafe condition, shall be subject to penalties as prescribed by Section 1.12.010 of the Sonoma Municipal Code. Further, any violation of this section is deemed a public nuisance and may be subject to nuisance abatement proceedings as provided by Section 1.12.010.

Amend Section 202 to add the following definition of "ADDITION" between "ACCESSIBLE MEANS OF EGRESS" and "AEROSOL":

ADDITION is the increase of area of an existing structure, for which a building permit has been issued, where the increase in floor area is not made exclusively for the provision of accessibility for the physically disabled.

Amend Section 202 to add the following definition of "REMODELED" between "RELIGIOUS WORSHIP, PLACE OF" and "REMOTE EMERGENCY SHUTOFF DEVICE" to read as follows:

REMODELED is work requiring a building permit including, but not limited to, cosmetic or structural repairs, renovations, restorations, alterations or additions to a structure, the total valuation of which, as determined by the Building Official, exceeds \$100,000 for buildings containing residential uses or occupancies and \$150,000 for all other occupancies over any 36 month period.

Amend Section 202 to add the following definition of "STRUCTURE" between "STORY ABOVE GRADE PLANE" and "SUITE" to read as follows:

STRUCTURE is that which is built or constructed, an edifice or building of any kind or any piece of work artificially built up or composed of parts joined together in some definite manner, regardless of property lines.

Amend subsection 304.1.2 by adding subsection 304.1.2.1 to read as follows:

304.1.2.1 Combustible Vegetation. The Chief shall notify a property owner by U. S. Postal mail when it is determined that a property is or may become a fire hazard due to combustible vegetation. The property owner may be given the choice of performing hazard abatement work on their own behalf, or authorizing the chief to have the work performed. In the event that the property owner does not reply, fails to complete the abatement, or authorizes the Chief to perform the work on the owner's behalf, the Chief may cause the work to be performed, then bill the property owner for the cost of such work plus an appropriate administrative fee. Upon the request of the property owner, or in the event that a property owner fails to reply to a bill for weed abatement services, the chief shall request the City Clerk to report the cost of such services to the County Tax Assessor, so that the balance due can be added to the property tax of that parcel of land.

Add subsection 304.1.4 to read as follows:

304.1.4 Defensible space - neighboring property

Persons owning, leasing, or controlling property within areas requiring defensible spaces are responsible for maintaining a defensible space on the property owned, leased or controlled by said person, within a distance of not less than 30 feet (91 467 mm) from any neighboring building

or structure. Distances may be modified by the code official because of a site-specific analysis based on local conditions.

Amend subsection 501.1 to read as follows:

501.1 Scope. Fire service features for buildings, structures and premises shall comply with this chapter. Design and construction shall be in accordance with the following sections unless otherwise authorized by the fire code official in accordance with 104.9 Alternative Materials and Methods.

Amend subsection 503.2.6 to read as follows:

503.2.6 Bridges and Elevated Surfaces. Where a bridge or an elevated surface is part of a fire apparatus access road, the bridge shall be constructed and maintained in accordance with AASHTO Standard Specifications. Bridges and elevated surfaces shall be designed for a live load sufficient to carry the imposed loads of fire apparatus. Vehicle load limits shall be posted at both entrances to bridges when required by the fire code official. Where elevated surfaces designed for emergency vehicle use are adjacent to surfaces which are not designed for such use, approved barriers, approved signs or both shall be installed and maintained when required by the fire code official.

Amend subsection 505.1 by adding the following sentences to the end of the paragraph:

Posted address numbers shall be those assigned by the City of Sonoma. Lot numbers, model numbers or similar designations shall not be considered to meet this requirement.

Amend subsection 508.5 to read as follows:

507.5 Fire hydrant systems. Fire hydrant systems shall comply with Sections 507.5.1 through 507.5.6.

Amend subsection 507.5.1 by deleting the subsection and exception and replacing it to read as follows:

507.5.1 Where required. Where a portion of the facility or building hereafter constructed or moved into or within the jurisdiction is more than 150 feet (45.179 m) from a hydrant on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains shall be provided where required by the fire code official.

Amend subsection 510.1 to read as follows:

510.1 Emergency responder radio coverage in buildings. All buildings, Type-2 winery caves and Type-3 winery caves shall have approved radio coverage for emergency responders within the building or winery cave based upon the existing coverage levels of the public safety communication systems of the jurisdiction, at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.

Exceptions:

1. Where approved by the building official and the fire code official, a wired communication system in accordance with Section 907.2.13.2 may be permitted to be installed in lieu of an approved radio coverage system.
2. Where it is determined by the fire code official that the radio coverage system is not necessary.

Add a new subsection 605.11 to read as follows:

605.11 Solar Photovoltaic Power Systems. Solar photovoltaic power systems shall be installed in accordance with this code, the California Building Code and California Electric Code.

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

605.11.1 Marking. Marking is required on all interior and exterior dc conduit, enclosures, raceways, cable assemblies, junction boxes, combiner boxes, and disconnects.

605.11.1.1 Materials. The materials used for marking shall be reflective, weather resistant and suitable for the environment. Marking as required in sections 605.11.1.1 through 605.11.1.4 shall have all letters capitalized with a minimum height of 3/8 inch (9.5 mm) white on red background.

605.11.1.2 Marking content. The marking shall contain the words “WARNING: PHOTOVOLTAIC POWER SOURCE”

605.11.1.3 Main service disconnect. The marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the disconnect is operated.

605.11.1.4 Location of Marking. Marking shall be placed on all interior and exterior dc conduit, raceways, enclosures and cable assemblies every 10 feet (3048 mm) within 1 foot (305 mm) of all turns or bends and within 1 foot (305 mm) above and below all penetrations of roof/ceiling assemblies and all walls and /or barriers.

605.11.2 Locations of DC conductors. Conduit, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities. Conduit runs between sub arrays and to DC combiner boxes shall be installed in a manner that minimizes total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The DC combiner boxes shall be located such that conduit runs are minimized in the pathways between arrays. DC wiring shall be run in metallic conduit or raceways when located within enclosed spaces in a building. Conduit shall run along the bottom of load bearing members.

605.11.3 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in order to ensure access to the roof; provide pathways to specific areas of the roof; provide for smoke ventilation operations; and to provide emergency egress from the roof.

Exceptions:

1. Requirements relating to ridge, hip, and valleys do not apply to roofs slopes of two units vertical in twelve units horizontal (2:12) or less.

2. Residential structures shall be designed so that each array is no greater than 150 feet by 150 feet in either axis.

3. The fire chief may allow panels/modules to be located up to the ridge when an alternative ventilation method acceptable to the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.

605.11.3.1 Roof access points. Roof access points shall be defined as an area that does not place ground ladders over openings such as windows or doors, and are located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

605.11.3.2 Residential systems for one- and two-family residential dwellings. Access shall be provided in accordance with Sections 605.11.3.2.1 through 605.11.3.2.4

605.11.3.2.1 Residential buildings with hip roof layouts. Panels /modules shall be located in a manner that provides a 3 foot wide clear access pathway from the eave to the ridge on each roof slope where panels/modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

605.11.3.2.2 Residential buildings with a single ridge. Panels/modules shall be located in a manner that provides two 3 foot wide access pathways from the eave to the ridge on each roof slope where panels/modules are located.

605.11.3.2.3 Hips and Valleys: Panels/modules shall be located no closer than 18 inches) to a hip or a valley if panels/modules are to be placed on both sides of a hip or valley. If the panels are to be located on only one side of a hip or valley that is of equal length then the panels shall be permitted to be placed directly adjacent to the hip or valley.

605.11.3.2.4 Smoke Ventilation. Panels/modules shall be located no higher than 3 feet below the ridge in order to allow for fire department smoke ventilation operations.

605.11.3.3 All other occupancies. Access shall be provided in accordance with Sections 605.11.3.3.1 through 605.11.3.3.3.

Exception: Where it is determined by the fire code official that the roof configuration is similar to a one- or two-family dwelling, the fire code official may approve the residential access and ventilation requirements provided in 605.11.3.2.1 through 605.11.3.2.4.

605.11.3.3.1 Access. There shall be a minimum 6 foot wide clear perimeter around the edges of the roof.

Exception: If either axis of the building is 250 feet or less, there shall be a minimum 4 foot wide clear perimeter around the edges of the roof.

605.11.3.3.2 Pathways. The solar installation shall be designed to provide designated pathways. The pathways shall meet the following requirements:

1. The pathway shall be over areas capable of supporting the live load of fire fighters accessing the roof;

2. The center line axis pathways shall be provided in both axis of the roof. Center line axis pathways shall run where the roof structure is capable of supporting the live load of firefighters accessing the roof;
3. Shall be straight line not less than 4 feet clear to skylights and/or ventilation hatches;
4. Shall be straight line not less than 4 feet clear to roof standpipes;
5. Shall provide a pathway not less than 4 feet width around roof access hatches with at least one not less than 4 feet clear to parapet or roof edge;

605.11.3.3.3 Smoke Ventilation. The solar installation shall be designed to meet the following requirements:

1. Arrays shall be no greater than 150 feet by 150 feet in distance in either axis in order to create opportunities for smoke ventilation operations.
2. Smoke ventilation options between array sections shall be one of the following:
 - 2.1. A pathway 8 feet or greater in width;
 - 2.2 A 4 feet or greater in width pathway and bordering roof skylights or smoke and heat vents;
 - 2.3 A 4 feet or greater in width pathway and bordering 4 foot x 8 foot “venting cutouts” every 20 feet on alternating sides of the pathway

605.11.4 Ground mounted photovoltaic arrays. Ground mounted photovoltaic arrays shall comply with Sections 605.11 through 605.11.2 and this section. Setback requirements do not apply to ground-mounted, free standing photovoltaic arrays. A clear brush area of 10 feet is required for ground mounted photovoltaic arrays.

Amend subsection 901.4.1 by adding subsection 901.4.1.1 to read as follow:

901.4.1.1 Owner Responsibilities. Where such systems and appliances are required by this or any other code, it shall be the responsibility of the owner that a person or persons familiar with the function and proper operation of such devices be in attendance whenever the premises is occupied.

Amend subsection 901.6.1 by modifying the first paragraph to read as follows:

901.6.1 Standards. Fire protection systems shall comply with Standards set forth by the National Fire Protection Association.

Add subsection 901.7.7 to read as follows :

901.7.7.1 Notice of Nuisance Alarm. The officer in charge of fire units responding to a fire alarm signal shall determine whether a true emergency exists. If the officer determines that an emergency does not exist, the chief of the local fire agency or his/her authorized

representative may issue a written notice of nuisance alarm to the owner or person in charge or control of the facility where the alarm signal originated.

Add subsection 901.7.7.1 to read as follows :

901.7.7 Unreliable Fire Alarm Systems. The chief of the local fire agency or his/her authorized representative may determine that a fire alarm system is unreliable upon receipt of more than four (4) nuisance alarms within a twelve (12) month period. Upon finding that an alarm system is unreliable, the chief of the local fire agency or his/her authorized representative may order the following:

1. For any nuisance alarm where the system is not restored, the chief may require the system owner to provide standby personnel as defined by Section 901.7 or take such other measures, as the chief deems appropriate. Persons or activities required by the chief shall remain in place until a fire department approved fire alarm maintenance firm certifies in writing to the chief that the alarm system has been restored to a reliable condition. The chief may require such tests, as he deems necessary to demonstrate the adequacy of the system.
2. Upon the fifth (5th) and sixth (6th) nuisance alarms from the alarm system within a twelve (12) month period, the system owner shall pay a mitigation fee to the fire department of \$150.00, plus the cost of fire engine response, for each occurrence.
3. 2. Upon the seventh (7th) and eighth (8th) nuisance alarms from the alarm system within a twelve (12) month period, the system owner shall pay a mitigation fee to the fire department of \$300.00, plus the cost of fire engine response for each occurrence.
4. 3. Upon the ninth (9th) and following nuisance alarms from the alarm system within a twelve (12) month period, the system owner shall pay a mitigation fee to the fire department of \$500.00, plus the cost of fire engine response, for each occurrence.

Amend subsection 903.2 by deleting subsections 903.2 through 903.2.11.3 and replacing to read as follows:

903.2 Where required. An automatic fire sprinkler system shall be installed in all new buildings for which a building permit is required and in existing buildings upon a remodel or addition to a building.

Exceptions:

1. Spaces or areas in telecommunications buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided those spaces or areas are equipped throughout with an automatic fire alarm system and are separated from the remainder of the building by fire barriers consisting of not less than 1-hour fire-resistance-rated walls and 2-hour fire-resistance-rated floor/ceiling assemblies.
2. Detached structures used exclusively as a Group U Occupancy.
3. Shipping containers used as a Group S, Division 2 Occupancy.
4. Unless otherwise required in by other sections of the code, a sprinkler system shall not be required when all of the following are met:

- a. The addition of floor area to a building results in a total floor area for the building of less than 4,000 square feet or the addition is less than ten percent of the existing floor area of the building; and
 - b. The cumulative total building permit valuation for all building permits issued for the subject building within any 36 month period, as determined by the Building Official, is equal to or less than \$100,000 for buildings containing residential uses or occupancies and equal to or less than \$150,000 for all other occupancies.
5. In an existing multiple-tenant building that requires a fire sprinkler system, the Fire Chief has the authority to modify the fire sprinkler requirements when the intended use does not create any increase in fire danger and the cost of installing a complete fire sprinkler system throughout the entire building creates an unreasonable financial hardship, as determined by the Fire Chief.

Amend subsection 903.4.2 to read as follows:

903.4.2 Alarms. At least one exterior approved audible device activated by the water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system shall be connected to every automatic fire alarm system in an approved location, and approved audible devices shall be connected to every automatic sprinkler system for the purpose of occupant notification. Actuation of the automatic sprinkler system shall actuate the building fire alarm system in all normally occupied areas for the purpose of occupant notification. If the building contains sleeping rooms, the interior alarm shall be located in or adjacent to one or more of these rooms. Otherwise, the interior alarm should be placed at a constantly attended location, or as a secondary alternative, the alarm shall be located where people are likely to be present whenever the building is occupied.

Amend subsection 903.3.7 to read as follows:

903.3.7 Fire department connections. The location of fire department connections shall be approved by the fire code official. Fire department hose connections for fire suppression systems and standpipes shall be provided with approved vandal-resistant caps.

Amend subsection 905.3.1 to read as follows:

905.3.1 Height. In other than R-3 and R-3.1 occupancies, Class III standpipe systems shall be installed throughout at each floor level where any of the following occur:

1. Buildings where the floor level of the highest story is located more than 30 feet above the lowest level of fire department vehicle access.
2. Buildings that are three or more stories in height.
3. Buildings where the floor level of the lowest story is located more than 30 feet below the highest level of fire department vehicle access.
4. Buildings that are two or more stories below the highest level of fire department vehicle access.
5. On the roof of buildings three or more stories in height.

Exceptions:

1. Class I standpipes are allowed in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Class I manual standpipes are allowed in open parking garages where the highest floor is located not more than 150 feet (45 720 mm) above the lowest level of fire department vehicle access.
3. Class I manual dry standpipes are allowed in open parking garages that are subject to freezing temperatures, provided that the hose connections are located as required for Class II standpipes in accordance with Section 905.5.
4. Class I standpipes are allowed in basements equipped throughout with an automatic sprinkler system.
5. In determining the lowest level of fire department vehicle access, it shall not be required to consider:
 - 5.1 Recessed loading docks for four vehicles or less, and
 - 5.2 Conditions where topography makes access from the fire department vehicle to the building impractical or impossible.

Amend subsection 907.2.8.1 Exception 2 to read as follows:

907.2.8.1 Manual fire alarm system for R-1 Occupancies

2. Manual fire alarm boxes are not required throughout the building when the following conditions are met.
 - 1.1 The building is equipped throughout with an automatic fire sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
 - 1.2 Notification devices will activate within each residential unit upon sprinkler water flow.
 - 1.3 At least one manual fire alarm box is installed in an approved location.

Add subsection 1414.3 to read as follows:

1414.3 Buildings under construction. In buildings four or more stories in height required to have sprinklers, such sprinklers shall be installed and extended as construction progresses to within one floor of the highest point of construction having secured decking or flooring.

Add subsection 1414.4 to read as follows:

1414.4 Buildings being demolished. Where a building is being demolished and a sprinkler system exists within such a building, such sprinkler system shall be maintained in an operable condition so as to be available for use by the fire department. Such sprinkler system may be demolished with the building but shall not be demolished more than one floor below the floor being demolished.

Add subsection 2701.5.3 to read as follows:

2701.5.3 Electronic Reporting. All hazardous Material Management Plans (HMMP) and Hazardous Material Inventory Statements (HMIS) shall be submitted electronically as approved by the fire code official.

Add subsection 3404.1.1 to read as follows:

3404.1.1 Tanks Storage prohibited. No existing aboveground tanks for the storage of Class I and Class II liquids outside of buildings (except LPG-Propane) shall be permitted on mercantile, residential, and other congested parcels. Existing tanks on such parcels shall be removed within one (1) year after written notice from the fire code official.

Add subsection 3404.1.2 to read as follows:

3404.1.2 Tank Storage - Other locations. New aboveground tanks for storage of Class I and II liquids on parcels not covered under Section 3404.1.2 shall be enclosed in a flammable liquid storage vault constructed in accordance with the standards of the fire department. Existing tanks on such parcels shall conform to new within one (1) year after written notice from the fire code official.

Add subsection 3404.1.3 to read as follows:

3404.1.3 Existing Tank Storage. Existing Tank storage shall meet the requirements of new tank installations with in one year of notice from the fire code official.

Add subsection 3807.5 to read as follows:

3807.5 Seismic Anchoring. An approved seismic anchoring system shall be installed on all permanently installed propane/LPG gas containers.

Amend Appendix B, subsection B101.1 to read as follows:

B101.1 Scope. The procedure for determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix. This appendix does not apply to structures other than buildings. Design and construction shall be in accordance with the following sections unless otherwise authorized by the fire code official in accordance with 104.9 Alternative Materials and methods.

Amend the definition of FIRE-FLOW in Appendix B, subsection B102.1 to read as follows:

FIRE-FLOW. The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residual pressure, measured in the water main in the vicinity of the flowing hydrant, that is available for fire fighting.

Amend the definition of FIRE-FLOW CALCULATION AREA in Appendix B, subsection B102.1 to read as follows:

FIRE-FLOW CALCULATION AREA. The floor area, in square feet, used to determine the required fire flow. The fire-flow calculation area or floor area shall be the total floor area of all floor levels within the exterior walls that are under the horizontal projection of the roof, except as modified in Section B 104.3.

Amend Appendix B, subsection B105.1 to read as follows:*

B105.1 One-and two-family dwellings. The minimum fire-flow requirements for one- and two-family dwellings having a fire-flow calculation area which does not exceed 3,600 square feet (344.5 m²) shall be 1500 gallons per minute (3785.4 L/min). Fire-flow and flow duration for dwellings having a fire-flow calculation area in excess of 3,600 square feet (344.5 m²) shall not be less than that specified in Table B 105.1.

Exception: A reduction in required fire-flow of up to 50 percent, as approved, may be allowed when the building is provided with an approved automatic sprinkler system

Amend Appendix B, subsection B105.2 to read as follows:

B105.2 Buildings other than one-and two-family dwellings. The minimum fire-flow and flow duration for buildings other than one-and two-family dwellings shall be as specified in Table B105.1.

Exception: A reduction in required fire-flow of up to 50 percent, as approved, may be allowed when the building is provided with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. The resulting fire-flow shall not be less than 2,000 gallons per minute (5678 l/min) for the prescribed duration as specified in Table B 105.1.

Amend Appendix B, Table B105.1 by deleting footnote a).

Amend Appendix C, subsection C102 to read as follows:

C102.1 Fire Hydrant Locations. Where fire hydrants are required, fire hydrants shall be provided along required fire apparatus access roads and adjacent public streets, and a fire hydrant shall be located within 50 feet of the Fire Department Connection (FDC), or as approved by the Fire Code Official.

Amend Appendix D, Section D101 to read as follows:

D101.1 Scope. Fire apparatus access roads shall be in accordance with this appendix as amended and all other applicable requirements of the International Fire Code. This section applies to residential and commercial developments. Design and construction shall be in accordance with the following sections unless otherwise authorized by the fire code official in accordance with 104.9 Alternative Materials and methods.

Amend Appendix D, subsection D103.1 to read as follows:

D103.1 Access road width with a hydrant. Where a fire hydrant is located on a fire apparatus access road, the minimum road width shall be determined by the fire code official.

Amend Appendix D, subsection D103.2 to read as follows:

D103.2 Grade. The grade of fire apparatus access roads shall be in accordance with the local agency requirement for public streets or as approved by the fire code official.

Amend Appendix D, subsection D103.3 to read as follows:

D103.3 Turning radius. The minimum turning radius shall be determined by the fire code official.

Amend Appendix D, subsection D103.4 to read as follows:

D103.4 Dead ends. Dead-end fire apparatus access roads in excess of 150 feet (45 720 mm) shall be provided with width and turnaround provisions in accordance with the local agency requirements for public streets or as approved by the fire code official.

Amend Appendix D, subsection D103.4 by deleting Table D103.4:

Amend Appendix D, subsection D103.6 to read as follows:

D103.6 Signs. Where required by the fire code official, fire apparatus access roads shall be marked with permanent NO PARKING-FIRE LANE signs complying with C.V.C. (California Vehicle Code).

Amend Appendix D, subsection D104.2 to read as follows:

(The exception to D104.2 is deleted)

Amend Appendix D, subsection D106.1 to read as follows:

D106.1 Projects having more than 50 dwelling units. Multiple-family residential projects having more than 50 dwelling units shall be provided with two separate and approved fire apparatus access roads.

(The exception to D106.1 is deleted)

Amend subsection D106 by deleting subsection D106.2:

Add subsection D106.3 to read as follows:

Multi-residential projects having more than 50 dwelling units. Hotels, motels, condominiums, apartments, townhouses and similar multi-residential projects having more than 50 dwelling units shall be provided with two separate and approved fire apparatus access roads.

Amend Appendix D, subsection D107.1 to read as follows:

D107.1 One-or two-family dwelling residential developments. Developments of one- and two-family dwellings where the number of dwelling units exceeds 50 shall be provided with two separate and approved fire apparatus access roads and shall meet the requirements of section D104.3.

(The exceptions to D107.1 are deleted.)

14.10.050 2010 California Green Building Standards Code Amendments.

A. Based upon the express finding of necessity #1 set forth in Section 14.10.005, Part 11 of the 2010 California Building Standards Code, known as the California Green Building Standards Code, as adopted by Section 14.10.015, is further amended as follows:

Adopt by reference and add Appendix Chapter A4 (Residential Voluntary Measures) and Appendix Chapter A5 (Nonresidential Voluntary Measures) of the 2010 California Green Building Standards Code appendices.

Amend the definition of “Newly Constructed” in Section 202 to read as follows:

NEWLY CONSTRUCTED (or NEW CONSTRUCTION). A newly constructed building (or new construction) does not include additions, alterations or repairs unless more than seventy-five percent (75%) of all existing walls of an existing structure, measured in lineal feet, are demolished or deconstructed, in which case the structure shall be treated as a new building.

Amend Section 301 to read as follows:

301.1 Scope. New buildings shall be designed to include the green building measures specified as mandatory in the application checklists contained in this code. New buildings shall also be designed to include the prerequisite and applicable elective measures to achieve Tier 1 status as prescribed in Appendix A4 and A5 of this code. Voluntary green building measures are also included in the application checklists and may be included in the design and construction of structures covered by this code. All buildings subject to the requirements of this code shall meet all applicable requirements of the California Energy Code (California Code of Regulations, Title 24, Part 6).

Amend the title and explanatory note of Appendix A4 to read as follows:

Appendix A4

Supplementary Residential Mandatory and Elective Measures

The measures contained herein that are necessary to achieve Tier 1 status shall be mandatory pursuant Section 301.1 of this code.

Amend Appendix Section A4.203.1 to read as follows:

A4.203.1 Energy performance. Using an Alternative Calculation Method (ACM) approved by the California Energy Commission, calculate each residential building's energy and compare it to the standard or "budget" building to achieve the following:

Tier 1. Use at least 15 percent less Time-Dependent Valuation (TDV) Energy than the 2008 Title 24 Building Energy Efficiency Standards "budget" building. No calculations are required to demonstrate any specified reduction in CO2 emissions.

Tier 2. Use at least 30 percent less Time-Dependent Valuation (TDV) Energy than the 2008 Title 24 Building Energy Efficiency Standards "budget" building. No calculations are required to demonstrate any specified reduction in CO2 emissions.

Field verify and document the measures and calculations used to reach the desired level of efficiency following the requirements specified in the Title 24 Reference Appendices.

Amend Appendix Section A4.601.4.2 to read as follows:

In addition to the mandatory measures, compliance with the following prerequisite and elective measures from Appendix A4 is also required to achieve Tier 1 status:

1. From Division A4.1, Planning and Design.
 - 1.1. Comply with the topsoil protection requirements in Section A4.106.2.3.
 - 1.2. Comply with the 20 percent permeable paving requirements in Section A4.106.4.
 - 1.3. Comply with the cool roof requirements in Section A4.106.5.
 - 1.4. Comply with at least two elective measures selected from Division A4.1.
2. From Division A4.2, Energy Efficiency.
 - 2.1. Use at least 15 percent less Time-Dependent Valuation (TDV) energy as defined by the California Energy Code than the 2008 Title 24 Building Energy Efficiency Standards "budget" building.

- 2.2. Comply with at least four elective measures selected from Division A4.2.
3. From Division A4.3, Water Efficiency and Conservation.
 - 3.1. Comply with the reduced flow rate for kitchen sink faucets in Section A4.303.1
 - 3.2. Comply with the Tier 1 potable water use reduction for landscape irrigation design in Section A4.304.4.
 - 3.3. Comply with at least one elective measure selected from Division A4.3.
4. From Division A4.4, Material Conservation and Resource Efficiency.
 - 4.1. Comply with the 20 percent cement reduction requirements in Section A4.403.2.
 - 4.2. Comply with the 10 percent recycled content requirements in Section A4.405.3.
 - 4.3. Comply with the 65 percent reduction in construction waste in Section A4.408.1.
 - 4.4. Comply with at least two elective measures selected from Division A4.4.
5. From Division A4.5, Environmental Quality.
 - 5.1. Comply with the 80 percent resilient flooring systems requirements in Section A4.504.2.
 - 5.2. Comply with the thermal insulation requirements for Tier 1 in Section A4.504.3.
 - 5.3. Comply with at least one elective measure selected from Division A4.5.

Note: The Residential Occupancies Application Checklist contained in Section A4.602 may be used to show which elective measures are selected.

Amend Appendix Section A4.210.1 to read as follows:

A4.210.1 Appliance rating. Each appliance provided by the builder meets ENERGY STAR if an ENERGY STAR designation is applicable for that appliance. No appliance efficiency requirement referenced in this ordinance shall violate the current version of the National Appliance Energy Conservation Act (NAECA).

Delete Appendix Division A4.7 (Residential Model Ordinance) in its entirety.

Amend the title and explanatory note of Appendix A5 to read as follows:

Appendix A5

Supplementary Nonresidential Mandatory and Elective Measures

The measures contained herein that are necessary to achieve Tier 1 status shall be mandatory pursuant Section 301.1 of this code.

Amend Appendix Section A5.203.1 to read as follows:

A5.203.1 Energy performance. For the purposes of energy efficiency standards in this code the California Energy Commission will continue to adopt mandatory building standards. It is the intent of this code to encourage green buildings to achieve exemplary performance in the area of energy efficiency. Specifically, a green building should achieve more than a 15 percent reduction in energy usage when compared to the State's mandatory energy efficiency standards.

Using an Alternative Calculation Method (ACM) approved by the California Energy Commission, calculate each nonresidential building's TDV energy and compare it to the standard or "budget" building to achieve the following:

Tier 1. Use at least 15 percent less Time-Dependent Valuation (TDV) Energy than the 2008 Title 24 Building Energy Efficiency Standards "budget" building. For the purposes of meeting this requirement, the TDV energy of the Process and Receptacle energy use components may be omitted in both the proposed and "budget" designs. For high-rise residential projects, the TDV energy of the Process, Receptacle energy use components, and Lighting energy use in residential spaces, may be omitted in both the proposed and "budget" designs. No calculations are required to demonstrate any specified reduction in CO2 emissions.

Tier 2. Use at least 30 percent less Time-Dependent Valuation (TDV) Energy than the 2008 Title 24 Building Energy Efficiency Standards "budget" building. For high-rise residential projects, the TDV energy of the Process, Receptacle energy use components, and Lighting energy use in residential spaces, may be omitted in both the proposed and "budget" designs. No calculations are required to demonstrate any specified reduction in CO2 emissions.

Field verify and document the measures and calculations used to reach the desired level of efficiency following the requirements specified in the Title 24 Reference Appendices.

14.10.055 1997 Uniform Code For The Abatement Of Dangerous Buildings Amendments.

A. The 1997 Uniform Code for the Abatement of Dangerous Buildings, as adopted by Section 14.10.015, is amended as follows:

Amend section 202 to read as follows:

SECTION 202 — ABATEMENT OF DANGEROUS BULDNGS

All buildings or portions thereof which are determined after inspection by the building official to be dangerous as defined in this code are hereby declared to be public nuisances and shall be abated by repair, rehabilitation, demolition or removal in accordance with the procedure specified in Section 401 of this code or other procedures adopted by the governing body.

Amend section 301 to read as follows:

SECTION 301 — GENERAL

For the purpose of this code, certain terms, phrases, words and their derivatives shall be construed as specified in either this chapter or as specified in the Building Code or the Housing Code. Where terms are not defined, they shall have their ordinary accepted meanings within the context with which they are used. Webster's Third New International Dictionary of the English Language, Unabridged copyright 1986, shall be construed as providing ordinary accepted meanings. Words used in the singular include the plural and the plural the singular. Words used

in the masculine gender include the feminine and the feminine the masculine.

BUILDING CODE is the building code adopted by this jurisdiction.

DANGEROUS BUILDING is any building or structure deemed to be dangerous under the provisions of Section 302 of this code.

HOUSING CODE is the housing code adopted by this jurisdiction or otherwise mandated by state law.

Amend subsection 401.1 to read as follows:

404.1 Posting. Every notice to vacate shall, in addition to being served as provided in Section 401.3, be posted at or upon each exit of the building in a form approved by the building official.

14.10.060 Board of Appeals.

The City Council is designated as the board of appeals in order to hear and decide appeals of orders, decisions or determinations made by the building official or the fire chief relative to the application and interpretation of the construction codes adopted by the city council. The procedure for appeals shall be that established in the applicable provisions of the construction codes adopted by the City Council.

14.10.065 Modification of Fee Schedules.

The construction codes adopted in this chapter are modified by the suspension of the operation of any fee schedules contained therein whenever the City Council has by ordinance or resolution adopted a different schedule or schedules. It is the intention of the City Council that it shall, for administrative convenience, adopt from time to time resolutions containing fee schedules for the granting of permits under the codes adopted in this chapter and for the administration thereof.

14.10.070 Enforcement Authority.

Unless otherwise provided by ordinance or resolution of the City Council, the building official of the City is the enforcement officer for all provisions of the codes adopted herein except that the fire chief of the City shall be the enforcement officer for all provisions of the California Fire Code and amendments thereto and the provisions of Chapters 7A (Materials and Construction Methods for Exterior Wildfire Protection), 9 (Fire Protection Systems) and 31E (Tents and Membrane Structures) of the California Building Code.

SECTION 3. SEVERABILITY.

If any section, subsection, clause, sentence, word or phrase of this title is for any reason held to be invalid and/or unconstitutional by a court of competent jurisdiction, such decision shall not affect the remaining portions of this title. The City Council declares that it would have passed and adopted this ordinance and each of the provisions thereof irrespective of the fact that any one or more such provisions be declared invalid and/or unconstitutional.

SECTION 4. EFFECTIVE DATE.

These construction codes, including the appendices thereto and secondary codes mentioned therein, except as otherwise excluded, are in full force and effect as ordinances of the City of Sonoma, thirty (30) days after the adoption of this ordinance by the City Council or on January 1, 2011, whichever is later.

PASSED, APPROVED AND ADOPTED by the City Council of the City of Sonoma this _____ day of _____, 2010.

Steve Barbose, Mayor

ATTEST:

Gay Johann, City Clerk

State of California)
County of Sonoma)
City of Sonoma)

I, Gay Johann, City Clerk of the City of Sonoma, do hereby certify that the foregoing ordinance was adopted on _____, 2010 by the following vote:

AYES:
NOES:
ABSENT:

Gay Johann, City Clerk

Codes and Standards Title 24 Energy-Efficient Local Ordinances

Title: Climate Zone 2 Energy Cost-Effectiveness Study

Prepared for:

Pat Eilert
Codes and Standards Program
Pacific Gas and Electric Company

Maril Pitcock
Government Partnership Program
Pacific Gas and Electric Company

Prepared by:

Gabel Associates, LLC

Last Modified: September 30, 2010



Climate Zone 2 Energy Cost-Effectiveness Study

September 30, 2010

Report prepared by:

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LEGAL NOTICE

This report was prepared by Pacific Gas and Electric Company and funded by the California utility customers under the auspices of the California Public Utilities Commission.

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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.