ORDINANCE NO. 562

AN ORDINANCE ESTABLISHING MINIMUM REQUIREMENTS FOR THE CONSTRUCTION OF FALLOUT AND BLAST SHELTERS.

(NOTE: No representation is made that these minimum requirements provide protection against fallout and blast under any and all circumstances)

The Board of Supervisors of the County of Solano do ordain, as follows:

PART 1. DEFINITIONS: BUILDING PERMIT REQUIRED; APPLICATION FOR PERMIT, FEES; APPLICABILITY OF OTHER REGULATIONS; SALE OF SHELTERS, REPRESENTATION; LOCATION;

SECTION A. Definitions. As used in this Chapter, the following words shall have the meanings given in this section:

1. Protection Factor: The relative amount of fallout gamma radiation that would be received by a person in a shelter, compared to the amount he would receive if unprotected. For example, an unprotected person would be exposed to 100 times more radiation than a person in a shelter with a protection factor of 100.

2. Fallout Shelter: A structure, room or space designed to protect its occupants from fallout gamma radiation and offer a protection factor of at least 100.

3. Limited Blast-resistant Shelter: A fallout shelter designed to protect its occupants against the effects of blast and associated initial nuclear and thermal radiation for a design overpressure of at least 5 pounds per square inch.

4. Blast-resistant Shelter: A fallout shelter designed to protect its occupants against the effects of blast and associated initial nuclear and thermal radiation for a design overpressure of at least 30 pounds per square inch.

5. Dual-purpose Shelter: A structure designed to include non-shelter uses which would not interfere with its use as a shelter.

6. Single-purpose Shelter: A structure designed to shelter persons only during and subsequent to a war-caused disaster (extreme emergency).

7. Family Shelter: A shelter designed for use of a family.

8. Group Shelter: A shelter designed for use by ten or more persons.

SECTION B. Zoning-Building Permit Required. No person shall construct a fall-out, blast-resistant or limited blast-resistant family shelter without first having obtained a permit from the Solano County Planning Department.

SECTION C. Application for Permit, Fee.

1. An applicant for a zoning-building permit under this Chapter shall submit plans which shall include the following:

   (a) A plot plan showing the location of the proposed shelter, sewer, gas, and water lines, drainage channels, easements, and other buildings on the property.

   (b) A statement of the protection factor in the space to be occupied in the shelter, expressed as a whole number.

   (c) A statement of the design overpressure loads.

   (d) A statement of the design occupant capacity of the shelter.

   (e) Computations, stress diagrams, and other data sufficient to show the correctness of the plans, shall be submitted to the Solano County Planning Department.

2. The application shall be accompanied by a permit fee, determined in accordance with the schedule of fees of the County Building Code.

SECTION D. Applicability of Other Regulations. A family shelter designed for single-purpose use only will be considered Group J occupancy under the Uniform Building Code provided that it does not exceed two hundred and fifty (250) square feet in gross floor area in the portion of the shelter to be occupied. A shelter designed for dual-purpose use shall conform to the occupancy standards set forth for use of the structure other than as a shelter.
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SECTION E. Sale of Shelters; Representations.
1. No person offering for sale a shelter or any structure purporting to be a shelter, and no person offering to construct or install a shelter shall represent or advertise such shelter as an approved shelter unless he shall have obtained a certificate of acceptance from the Solano County Planning Department.

Every person offering to sell or construct a shelter shall include the following information in all plans, brochures, and other advertising:
(a) A statement of the radiation attenuation factor in the occupiable portion of the shelter expressed as a number.
(b) A statement of the design overpressure loads determined from review of the advertised plans submitted to the Solano County Planning Department.
(c) A certificate of a registered civil engineer that the plans are structurally adequate for all necessary live and dead loads and earth or fluid pressures, and that the design conforms to structural requirements of the Uniform Building Code (1961 Edition) requirements for loads, stresses, and materials and in addition the design overpressures for blast shelters.
(d) A statement of the design occupant capacity of the shelter.

2. The Federal Trade Commission "Guides for Advertising Fallout Shelters" as adopted by the Federal Trade Commission in December of 1961, are hereby adopted and made a part of this Ordinance by reference.

SECTION F. Location
1. Underground portions of a shelter, subject to structural requirements, may be located anywhere on a parcel of property. Mound cover or entrances or exits above ground shall not be located within any required side yard if the aggregate width of the side yard is fifteen (15) feet or less. Mound cover or accessory portions located in any required setback (front yard) shall not exceed thirty-six (36) inches in height.

2. Above-ground shelters shall be subject to the zoning requirements for accessory structures, as set forth in the County Zoning Ordinances in addition to the requirements of this ordinance.

PART II. FAMILY SHELTERS:
1. Structural:
   (a) Load. All shelters shall be strong enough to withstand all necessary dead loads and superimposed live loads, including earth and fluid pressures in accordance with the appropriate requirements of the Uniform Building Code (1961 Edition).
   (b) Type of Construction. The structure, main and secondary members, shall be of incombustible materials. Combustible material is limited to furniture, shelving, cabinets and non-bearing partitions.
   (c) Stress. The stresses to be used in the material for limit load conditions and the design procedures to be used, shall be as approved by the Department of Defense, Office of Civil Defense in pamphlet TR-11, dated May 1961 and entitled "Recommended OCDM Specifications for Blast-resistant Structural Design". The concepts of "ultimate design", "limit design", and "plastic design" and the procedures of design which are used in TR-11 are hereby adopted and made a part of this Ordinance by reference as they apply to single-purpose shelters and as they apply to dual-use shelters so long as the resultant design complies with the Code requirements for non-shelter use. Shelters offering resistance to blast shall be capable of withstanding the design over-pressure without structural collapse. The equipment associated with the shelter such as vent pipes, doors, etc., shall be designed to perform satisfactorily at the same overpressure range.
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2. Ventilation.

(a) All shelters shall be provided with a ventilation system capable of manual operation which will under service conditions maintain the effective temperature at or below eighty-five degrees Fahrenheit (85°F) effective temperature and the carbon dioxide (CO₂) buildup at or below three percent (3%). Intake and exhaust systems shall be at opposite ends of the shelter with the intake opening 12 inches above the floor and the exhaust opening not more than 12 inches below the ceiling. Each ventilation intake system shall be provided with a dust filter capable of screening out at least 90% of 50 micron particles or larger. Filters shall be placed or shielded so that the radiation contribution from the filter will not exceed the design shielding of the entire shelter.

(b) Ventilation intake and exhaust pipe shall have a minimum diameter of three (3) inches, protrude a minimum of 2'0" above the ground surface and be hooded in such a manner as to preclude direct entry of particles. Intake and exhaust shall have direct access to the atmosphere outside of any building.

(c) (Special Requirements for Blast-resistant Shelters).

In shelters offering resistance to blast, openings to the atmosphere shall be provided with appropriate devices to prevent a buildup of pressure within the shelter to no greater than 5 pounds per square inch. The intake and exhaust shall be capable of manual retraction to a protected position at or below the external surface of the shelter or be otherwise adequately protected against flying objects incident to nuclear detonations. Intake and exhaust shall be so located as to make it unlikely that they will be covered with rubble.

3. Shielding:

(a) Fallout shelters shall have a protection factor of at least 100 in the portion of the shelter to be occupied. In the calculation of the protection factor, the radiation dose contribution to the shelter occupants coming from the entranceways, ventilation ducts or other openings in the shelter's barriers shall be considered. Entrances shall be adequately offset or baffled.

(b) (Special Requirements for Blast-resistant Shelters).

Blast-resistant shelters and limited blast-resistant shelters, in addition to the above, shall have a protection factor of at least 1000 in the portion of the shelter to be occupied.

4. Water-proofing and Drainage. All shelters shall be adequately protected against seepage of ground water or flow of surface water into the structure. Shelter covers shall be graded, drained, or otherwise arranged so that the water will not drain onto adjacent property or cause erosion.

5. Access Opening.

(a) One access to the shelter shall open to the outside without passing through a dwelling or other structure; be at least twenty-four (24) inches in its minimum dimension; and shall be openable from inside the shelter without the use of a key.

(b) (Special Requirements for Blast-resistant Shelters).

Access openings in blast or limited blast-resistant shelters shall have an attached over-lapping closure properly constructed to withstand the design overpressure. A secure latching device shall be provided to sustain the negative pressures incident to the detonation. Shelters offering resistance to blast with access ways to existing buildings shall be provided with closures which will heat-isolate the shelter chamber from the associated building.
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SECTION G. Occupancy Standards.

1. Capacity. Every shelter shall provide a minimum of ten (10) square feet of floor area and sixty-five (65) cubic feet net of volume per person sheltered. Ceiling heights shall be a minimum of six and one-half (6½) feet for rectangular construction or at the crown of arched construction. In addition to the above, one and one-half (1½) cubic feet of space per person shall be provided for storage of basic shelter supplies.

2. Services.
   (a) Movable equipment and supplies should be provided as recommended by the local Civil Defense Director. Water storage containers shall be non-frangible unless special provision is made to minimize the possibility of breakage. In fallout shelters, water may be stored in the shelter itself. In shelters offering resistance to blast, water shall be either (1) stored in suitable containers within the protected area; or (2) stored in buried tanks outside the shelter, in which case storage tanks and associated piping shall be able to sustain the design overpressure without leakage.
   (b) Provision shall be made for the collection and disposal of garbage, trash, and human waste in such a way as to preclude the creation of unsanitary conditions or offensive odors. In all shelters this system shall be self-contained and not connected with any public sewer system.
   (c) Battery operated lights and radios may be used.
   (d) No light source or heating appliance capable of depleting the oxygen content of air shall be installed or used in a shelter.

PART III. GROUP SHELTERS

SECTION H. Design Standards.

1. Structural:
   (a) Load. All shelters shall be strong enough to withstand all necessary dead loads and superimposed live loads, including earth and fluid pressures in accordance with the appropriate requirements of the Uniform Building Code (1961 Edition).
   (b) Type of Construction. The structure, main and secondary members, shall be of incombustible materials. Combustible materials are limited to furniture, shelving, cabinets and non-bearing partitions.
   (c) Stress: The stresses to be used in the material for limit load conditions and the design procedures to be used, shall be as approved by the Department of Defense, Office of Civil Defense in a pamphlet TR-11, dated May 1961 and entitled "Recommended OCDM specifications for Blast-Resistant Structural Design". The concepts of "ultimate design", "limit design", and "plastic design" and the procedures of design which are used in TR-11 are hereby adopted and made a part of this Ordinance by reference as they apply to single-purpose shelters and as they apply to dual-use shelters so long as the resultant design complies with the Code requirements, for their use.
   (d) Special Requirements for Blast-Resistant Shelters. Shelters offering resistance to blast shall be capable of withstanding the design overpressure without structural collapse. Vent pipes, doors, and other equipment associated with the shelter shall be designed to perform satisfactorily at the same overpressure range.

2. Ventilation:
   (a) Provision shall be made to prevent the buildup of vitiated air to a level hazardous to its occupants; build-up of carbon dioxide (CO₂) shall not exceed 3%.
   (b) Ventilation intake and exhaust shall be designed in such a manner as to preclude direct entry of particles, and shall have direct access to the atmosphere outside of any building at a minimum height of two (2) feet above the surface.
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(c) Filters shall be provided in air intake capable of removing at least 90% of fifty (.50) micron particles. Filters shall be placed or shielded so that the radiation contribution from the filter will not exceed the design shielding of the entire shelter.

(d) The ventilation system shall be so designed that the effective temperature in the shelter when fully occupied shall not exceed 85°F nor shall it be maintained for periods longer than 4 hours during the 24-hour design period.

(e) The design shall be based on the following criteria:

(i) A twenty-four hour "steady state" heat transfer condition, whereby the net input does not exceed the output, is assumed.

(ii) Static conditions for the twenty-four hour design period:

a. Outside dry-bulb (DB) and wet-bulb (WB) temperatures in degrees Fahrenheit shall be taken at the 10% level of temperature design data which are included in Table 1.

<table>
<thead>
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<th>Location</th>
<th>DB</th>
<th>WB</th>
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<tbody>
<tr>
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<tr>
<td>Sunnyvale</td>
<td>84</td>
<td>65</td>
</tr>
</tbody>
</table>

b. Heat transfer rate for underground shelters shall be taken nominally as 5 BTU/hr per square foot of surface of the occupied enclosure immediately adjacent to soil of normal thermal state. This figure does not preclude the use of higher or lower values known for the specific construction site.

c. Heat transfer rate for above-ground shelters shall be taken from American Society of Heating and Refrigeration Engineers (ASHRAE) Guide.

d. Heat input per person at 85°F (ET) is assumed as 180 BTU/hr sensible, 220 BTU/hr latent.

e. Miscellaneous Heat Input may be determined from ASHRAE Guide or computed for actual conditions.

(f) In the event the ventilating conditions cannot be met, the designer shall present air treatment plans suitable for the shelter in the construction site proposed.

(g) (Special Requirements for Blast-Resistant Shelters).

In shelters offering resistance to blast, openings to the atmosphere shall be provided with appropriate devices to prevent an increase of pressure within the shelter of no greater than five (5) pounds per square inch. The intake and exhaust shall be constructed for manual retraction or automatic with auxiliary manual retraction to a protected position at or below the external surface of the shelter or be otherwise adequately protected against flying objects incident to nuclear detonations. Intake and exhaust shall be so located as to make it unlikely that they will be covered with rubble.

3. Shielding:

(a) Fallout shelters shall have a protection factor of at least 100 in the portion of the shelter to be occupied. In the calculation of the protection factor, the radiation dose contribution to the shelter occupants coming from the entranceways, ventilation ducts or other openings in the shelter's barriers shall be considered. Entrances shall be adequately offset or baffled.

(b) (Special Requirements for Blast-Resistant Shelters).

Blast-resistant shelters and limited blast-resistant shelters, in addition to the above, shall have a protection factor of at least 1,000 in the portion of the shelter to be occupied.
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4. Water-proofing and Drainage: All shelters shall be adequately protected against seepage of ground water or flow of surface water into the structure. Shelter covers shall be graded, drained, or otherwise arranged so that the water will not drain onto adjacent property or cause erosion.

5. Access and Egress Openings:
   (a) Access to group shelters shall be designed so that, as a minimum, the total number of persons constituting the designed capacity of the shelter may enter in approximately five minutes using sideways based on a 22-inch width, the space required for free travel of one file of persons. In no case shall a single file access or egress width be less than 24 inches; nor shall there be less than two widely separated means of egress. Emergency-type hatchways may be used as a means of egress. Egress openings shall be openable from inside without the use of a key or special knowledge or effort.

   (b) (Special Requirements for Blast-Resistant Shelters). Access openings in blast or limited blast-resistant shelters shall have an attached overlapping closure properly constructed to withstand the design overpressure. A secure latching device shall be provided to sustain the negative pressures incident to the detonation. Shelters offering resistance to blast with access ways to existing buildings shall be provided with closures which will heat-isolate the shelter chamber from the associated building.

SECTION J. Occupancy Standards.

1. Capacity: Every shelter shall provide a minimum of ten (10) square feet of floor area and sixty-five (65) cubic feet net of volume per person sheltered. Ceiling heights shall be a minimum of six and one-half (6½) feet for rectangular construction or at the crown of arched construction. In addition to the above, one and one-half (1½) cubic feet of space per person shall be provided for storage of basic shelter supplies.

2. Services:
   (a) Movable equipment and supplies should be provided as recommended by the local Civil Defense Director. Water storage containers shall be non-frangible unless special provision is made to minimize the possibility of breakage. In fallout shelters, water may be stored in the shelter itself.

   (b) Provision shall be made for the collection and disposal of garbage, trash, and human waste in such a way as to preclude the creation of unsanitary conditions or offensive odors within the shelter.

   (c) Emergency power shall be provided to operate at least the following systems for a period of 14 days of continuous operation: (1) required ventilation demand; (2) required lighting; (3) emergency water supply, when well is provided; and (4) emergency sewage ejection, when provided. Engine generator set for emergency power shall have separate vents to outside air and be heat-isolated from the main shelter chamber. Proper consideration must be given to the installation of engine generator sets and fuel tank to minimize hazards from exhaust gases and fire. A fourteen (14) day supply of fuel shall be provided. Minimum repair parts for the engine generator set shall be provided.

   (d) Emergency lighting shall be provided at the following minimum levels:
   (1) sleeping areas, two (2) foot-candles; (2) activity areas (floor level), five (5) foot-candles; (3) administrative and medical areas (desk level), twenty (20) foot-candles.

   (e) No light source or hearing appliance capable of depleting the oxygen content of air shall be installed or used in a shelter.

   (f) The electrical system may be connected to standard commercial power sources.
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(g) (Special Requirements for Blast-Resistant Shelters).

(1) In shelters offering resistance to blast, water shall be either:
   (a) stored in approved containers within the protected area; or
   (2) stored in buried tanks outside the shelter, in which case storage tanks and associated piping shall be able to sustain the design overpressure without leakage; or
   (3) provided by a properly protected well and associated piping and storage tanks, so designed as to permit drawing water inside the shelter.

(2) Shelter sewage systems connected to public sewage lines shall contain appropriate check valves capable of withstanding the design overpressure.

SECTION N. Penalties for Violation:

It shall be unlawful for any person, firm, or corporation to erect, construct, enlarge, alter, repair, move, remove or demolish, convert, equip, use, occupy, or maintain any building and/or structure or any portion thereof in the unincorporated territory of said County, contrary to, or in violation of any provision of this Ordinance or to cause, permit or suffer the same to be done. Any person, firm or corporation violating, or causing or permitting to be violated, any of the provisions of said code as so amended, shall be deemed guilty of a misdemeanor, and each such person, firm or corporation shall be deemed guilty of a separate offense for each and every day, or portion thereof, during which any violation of any such provision of said code is committed, continued or permitted, and upon conviction thereof shall be punishable by a fine of not more than Five Hundred Dollars ($500) or by imprisonment in the county jail, for not more than six (6) months or by both such fine and imprisonment.

SECTION M. Reference:

This ordinance may be cited as the Fallout and Blast Shelter Ordinance of Solano County.

SECTION N. Validity:

If any section, subsection, sentence, clause and/or phase of this ordinance is, for any reason held to be unconstitutional or invalid, such decision, shall not affect the validity of the remaining portions of this ordinance. The Board of Supervisors of the County of Solano hereby declares that it would have passed this ordinance, and each section, subsection, clause or phase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses and/or phrases be declared unconstitutional.

SECTION O. Enactment and Publication:

This Ordinance shall take effect and be in full force and effect from and after thirty (30) days after its passage, and shall be published once before the expiration of fifteen (15) days after its passage in the Vallejo Times Herald, a newspaper of general circulation printed, published and circulated in the County of Solano.

ATTORNEY: LARRY BALL
County Clerk and Ex-officio Clerk of said Board of Supervisors

I, Larry Ball, County Clerk and Ex-officio Clerk of the Board of Supervisors of the County of Solano, State of California, hereby certify that the above and foregoing ordinance was regularly introduced, passed and adopted at a meeting of said Board held on the 24 day of September, 1963, by the following votes:

AYES: Supervisors Bradley, Brazelton, Church, Godfrey and Kilby

NOES: Supervisors None

ABSENT: Supervisors None

WITNESS my hand and official Seal as such Clerk this 24 day of September, 1963.

LARRY BALL
Clerk