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**PARK COUNTY, COLORADO**

**Ordinance No. 06- 01**

**An ordinance of Park County, Colorado adopting the 2006 edition of the International Building Code, the 2006 edition of the International Residential Code, the 2006 edition of the International Mechanical Code, the 2006 edition of the Fuel Gas Code, and the 2001 edition of the NFPA 58 Liquefied Petroleum Gas Code with the fifth edition, 1998 of the LP-GAS Code Handbook regulating and governing the conditions and maintenance of all property, buildings and structures; by providing the standards for supplied utilities and facilities and other physical things and conditions essential to ensure that structures are safe, sanitary and fit for occupation and use; and the condemnation of buildings and structures unfit for human occupancy and use and the demolition of such structures in the unincorporated areas of Park County, Colorado and any jurisdiction as allowed by Intergovernmental agreement; providing for the issuance of permits and collection of fees therefore; repealing Ordinance No. 00-3 of the unincorporated areas of Park County and all other ordinances and parts of the ordinances in conflict therewith.**

**WHEREAS**, Park County, Colorado possesses the authority pursuant to C.R.S. § 30-28-201, et seq. to adopt a building code in order to regulate the erection, construction, enlargement, alteration, repair, moving, removal, demolition, conversion, occupancy, equipment, use, height, area and maintenance of all building or structures in the unincorporated areas of Park County, Colorado; and

**WHEREAS**, copies of the 2006 International Building Code, 2006 International Residential Code, 2006 International Mechanical Code, 2006 International Fuel Gas Code, the NFPA 58 Liquefied Petroleum Gas Code, and LP-Gas Code Handbook are available for public inspection and review in the Park County Building Department; and

**WHEREAS**, the Board of County Commissioners wishes to adopt the 2006 edition of the International Building Code, the 2006 edition of the International Residential Code, the 2006 edition of the International Mechanical Code, the 2006 edition of the International Fuel Gas Code, the NFPA 58 Liquefied Petroleum Gas Code, and LP-Gas Code Handbook as amended herein.

**NOW, THEREFORE, BE IT ORDAINED BY THE BOARD OF COUNTY COMMISSIONERS FOR PARK COUNTY:**

**Section 1.** There is hereby adopted by reference as the Building Code for Park County the International Building Code, the International Residential Code, the International Mechanical Code, the International Fuel Gas Code, 2006 Edition, as published by the International Code Council, the NFPA 58 Liquefied Petroleum Gas Code 2001 edition as published by the National Fire Protection Association, LP-Gas Code Handbook fifth edition, 1998 as published by the National Fire Protection Association, Exhibit A of Ordinance No. 00-3, Exhibit B of Ordinance No. 00-3, and Exhibit C of Ordinance No. 00-3, adopted by Park County; and subject to the following amendments:

## AMENDMENTS FOR 2006 INTERNATIONAL BUILDING CODE

1. **DELETION AND SUBSTITUTION (APPLICABILITY) Sec. 102.6 Existing structures.**  
Delete Sec. 102.6 in its entirety and substitute the following: The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change unless the use or the type of occupancy of the structure is changed. If the use or occupancy changes, the building will only be required to meet the minimum requirements of the new occupancy class.
2. **DELETION (DEPARTMENT OF BUILDING SAFETY) Sec. 103.3 Deputies.**  
Delete Sec. 103.3 the following: For the maintenance of existing properties, see the International Property Maintenance Code.
3. **DELETION AND SUBSTITUTION (PERMITS) Sec. 105.1.1 Annual permit.**  
Delete Sec. 105.1.1 in its entirety and substitute the following: **3-Year Permit.** A new construction-building permit issued under this code shall expire 3 years from the date of issue. After such time if the construction has not been completed and certificate of occupancy has not been issued the permit may be renewed before expiration date for an additional year of time.
4. **DELETION AND SUBSTITUTION (PERMITS) Sec. 105.1.2 Annual permit records.**  
Delete Sec. 105.1.2 in its entirety and substitute the following: **Annual permits.** Exemptions from the 3-year permit are issued for repair and alteration. Those types of permit are the following:
  1. Mechanical
  2. Roofing
  3. Remodel
  4. Decks
  5. Alteration
  6. Foundation
  7. Demolition
  8. Basement Finish
  9. Excavation
5. **DELETION AND SUBSTITUTION (FEES) Sec. 108.2 Schedule of permit fees.**  
Delete Sec. 108.2 in its entirety and substitute the following: On buildings, structures, structural remodels, or alterations requiring a permit, a fee for each permit shall be paid as required and shall be based on the square footage construction cost table as illustrated in the BUILDING SAFETY JOURNAL August 2005 edition (to be updated as necessary for market cost fluctuation), attached hereto and the 2006 International Residential Code Appendix L - Permit Fees, attached hereto. Annual permit fees are established by the building official.
6. **DELETION AND SUBSTITUTION (FEES) Sec. 108.3 Building permit valuations.**  
Delete Sec. 108.3 in its entirety and substitute the following: The valuation for the permit is established in accordance with the BUILDING SAFETY JOURNAL August 2005 edition – Square Foot Construction Costs Table (to be updated as necessary for market cost variation), attached hereto.

7. **DELETION AND SUBSTITUTION (INSPECTIONS) Section 109.**

Delete Sec. 109 in its entirety and substitute the following: **109.1 General.** All construction or work for which a permit is required shall be subject to inspection by the building official and all such construction or work shall remain accessible and exposed for inspection purposes until approved by the building official. In addition, certain types of construction shall have continuous inspection.

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 jurisdiction shall be liable for expense entailed in the removal or replacement of any material require to allow inspection.

A survey of the lot may be required by the building official to verify that the structure is located in accordance with the approved plans.

**109.2 Inspection Record Card.** Work requiring a permit shall not be commenced until the permit holder or an agent of the permit holder shall have posted or otherwise made available an inspection record card such as to allow the building official to conveniently make the required entries thereon regarding inspection of the work. This card shall be maintained available by the permit holder until final approval has been granted by the building official.

**109.3 Inspection Requests.** It shall be the duty of the person doing the work authorized by a permit to notify the building official that such work is ready for inspection. The building official may require that every request for inspection be filed at least two working days before such inspection is desired. Such request may be in writing or by telephone at the option of the building official.

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.

**109.4 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 that portion of the construction 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.

There shall be a final inspection and approval of all buildings and structures when completed and ready for occupancy and use.

## **109.5 Required Inspections.**

**109.5.1 General.** Reinforcing and 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 building official.

Protection of joints and penetrations in fire-resistive assemblies shall not be concealed from view until inspected and approved.

The building official, upon notification, shall make the inspections set forth in the following sections.

**109.5.2 Footing/Monolithic and Structural pad inspection.** To be made after excavations for footings and pads are complete and any required reinforcing steel is in place and before placement of concrete.

**109.5.3 Foundation wall inspection.** For concrete foundations, any required forms and required reinforcing steel shall be in place prior to inspection. All materials for the foundation shall be on the job, except where concrete is ready mixed in accordance with approved nationally recognized standards, the concrete need not be on the job. Where the foundation wall is to be constructed of approved treated wood, additional inspections may be required by the building official.

**109.5.4 Concrete slab or under-floor inspection.** To be made after all in-slab or under-floor building service equipment, conduit, piping accessories and other ancillary equipment items are in place, but before any concrete is placed or floor sheathing installed, including the sub floor.

**109.5.5 Sheathing inspection.** To be made after exterior walls and roof has been sheathed and before any covering is placed over the nail patterns.

**109.5.6 Frame inspection.** To be made after the roof, all framing, fire blocking and bracing are in place and all pipes, chimneys and vents are complete and the rough electrical, plumbing, and heating wires, pipes and ducts are approved.

**109.5.7 Lath or gypsum board inspection.** To be made after all lathing and gypsum board, interior and exterior, is in place, but before any plastering is applied or before gypsum board joints and fasteners are taped and finished.

**109.5.8 Mid-roof inspection.** To be made after ice and water shield, valley underlayment, and flashing placement, but before any shingles or metal roof material installment.

**109.5.9 Fire Rated Drywall inspection.** To be made after the 5/8" drywall for fire protection has been installed, but before any taping or plaster application.

**109.5.10 Final inspection.** To be made after finish grading and the building is completed and ready for occupancy.

**109.6 Other inspections.** In addition to the called inspections specified above, the building official may make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws, which are enforced by the code enforcement agency.

**8. ADDITION (INSPECTIONS) Sec. 109.7 Reinspections.**

Add Sec. 109.7 Reinspections. A reinspection fee may be assessed for each inspection or reinspection when such portion of work for which inspection is called is not complete or when corrections called for are not made.

This section is not to be interpreted as requiring reinspection fees the first time a job is rejected for failure to comply with the requirements of this code, but as controlling the practice of calling for inspections before the job is ready for such inspection or reinspection.

Reinspection fees may be assessed when the inspection record card is not posted or otherwise available on the work site, the approved plans are not readily available to the inspector, for failure to provide access on the date for which inspection is requested, or for deviating from plans requiring the approval of the building official.

To obtain a reinspection, the applicant shall file an application therefore in writing on a form furnished for that purpose and pay the reinspection fee in accordance with the fee established by the building official.

In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

**9. DELETION AND SUBSTITUTION (BOARD OF APPEALS) Sec. 112.1 General.**

Delete Sec. 112.1 the following: There shall be and is hereby created a board of appeals. And substitute the following: There shall be a board of appeals created when necessary.

**10. ADDITION (CONTRACTORS) Sec. 116 Licensing/Registration of Contractors.**

Add Sec. 116 See Resolution 96-59

**11. DELETION AND SUBSTITUTION (DEFINITIONS) Sec. 502.1 HEIGHT, BUILDING.**

Delete Sec. 502.1 HEIGHT, BUILDING in its entirety and substitute the following: The vertical distance above a reference datum measured to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the average height of the highest gable of a pitched or hipped roof. The reference datum shall be selected by either of the following, whichever yields a greater height of building:

1. The elevation of the highest adjoining sidewalk or ground surface within a 5-foot (1524 mm) horizontal distance of the exterior wall of the building when such sidewalk or ground surface is not more than 10 feet (3048 mm) above lowest grade.
2. An elevation 10 feet (3048) higher than the lowest grade when the sidewalk or ground surface described in Item 1 is more than 10 feet (3048 mm) above lowest grade.

The height of a stepped or terraced building is the maximum height of any segment of the building.

## AMENDMENTS FOR 2006 INTERNATIONAL RESIDENTIAL CODE

1. **DELETION AND SUBSTITUTION (APPLICABILITY) Sec. R102.7 Existing structures.**  
Delete Sec. R102.7 in its entirety and substitute the following: The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change unless the use or the type of occupancy of the structure is changed. If the use or occupancy changes, the building will only be required to meet the minimum requirements of the new occupancy class.
2. **ADDITION (BUILDING PLANNING) Sec. R103.2.1 Wind limitations.**  
Add Sec. R103.2.1 the following: the basic wind speed for Park County residential structures is 110 m.p.h.
3. **DELETION (PERMITS) Sec. R105.5 Expiration.**  
Delete Sec. R105.5 the following: for periods not more than 180 days each.
4. **ADDITION (PERMITS) Sec. R105.9 Schedule of permit fees.**  
Add Sec. R105.9 Schedule of permit fees. On buildings, structures, structural remodels, or alterations requiring a permit, a fee for each permit shall be paid as required and shall be based on the square footage construction cost table as illustrated in the BUILDING SAFETY JOURNAL August 2005 edition (to be updated as necessary for market cost fluctuation), attached hereto and the 2006 International Residential Code Appendix L - Permit Fees, attached hereto. Annual permit fees are established by the building official.
5. **ADDITION (PERMITS) Sec. R105.10 Building permit valuations.**  
Add Sec. R105.10 Building permit valuations. The valuation for the permit is established in accordance with the BUILDING SAFETY JOURNAL August 2005 edition – Square Foot Construction Costs Table (to be updated as necessary for market cost variation), attached hereto.
6. **DELETION AND SUBSTITUTION (INSPECTIONS) Section R109.**  
Delete Sec. R109 in its entirety and substitute the following: **R109.1 General.** All construction or work for which a permit is required shall be subject to inspection by the building official and all such construction or work shall remain accessible and exposed for inspection purposes until approved by the building official. In addition, certain types of construction shall have continuous inspection.

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 jurisdiction shall be liable for expense entailed in the removal or replacement of any material require to allow inspection.

A survey of the lot may be required by the building official to verify that the structure is located in accordance with the approved plans.

**R109.2 Inspection Record Card.** Work requiring a permit shall not be commenced until the permit holder or an agent of the permit holder shall have posted or otherwise made available an inspection record card such as to allow the building official to conveniently make the required entries thereon regarding inspection of the work. This card shall be maintained available by the permit holder until final approval has been granted by the building official.

**R109.3 Inspection Requests.** It shall be the duty of the person doing the work authorized by a permit to notify the building official that such work is ready for inspection. The building official may require that every request for inspection be filed at least two working days before such inspection is desired. Such request may be in writing or by telephone at the option of the building official.

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.

**R109.4 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 that portion of the construction 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.

There shall be a final inspection and approval of all buildings and structures when completed and ready for occupancy and use.

**R109.5 Required Inspections.**

**R109.5.1 General.** Reinforcing and 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 building official.

Protection of joints and penetrations in fire-resistive assemblies shall not be concealed from view until inspected and approved.

The building official, upon notification, shall make the inspections set forth in the following sections.

**R109.5.2 Footing/Monolithic and Structural pad inspection.** To be made after excavations for footings and pads are complete and any required reinforcing steel is in place and before placement of concrete.

**R109.5.3 Foundation wall inspection.** For concrete foundations, any required forms and required reinforcing steel shall be in place prior to inspection. All materials for the foundation shall be on the job, except where concrete is ready mixed in accordance with approved nationally recognized standards, the concrete need not be on the job. Where the foundation wall is to be constructed of approved treated wood, additional inspections may be required by the building official.

**R109.5.4 Concrete slab or under-floor inspection.** To be made after all in-slab or under-floor building service equipment, conduit, piping accessories and other ancillary equipment items are in place, but before any concrete is placed or floor sheathing installed, including the sub floor.

**R109.5.5 Sheathing inspection.** To be made after exterior walls and roof has been sheathed and before any covering is placed over the nail patterns.

**R109.5.6 Frame inspection.** To be made after the roof, all framing, fire blocking and bracing are in place and all pipes, chimneys and vents are complete and the rough electrical, plumbing, and heating wires, pipes and ducts are approved.

**R109.5.7 Lath or gypsum board inspection.** To be made after all lathing and gypsum board, interior and exterior, is in place, but before any plastering is applied or before gypsum board joints and fasteners are taped and finished.

**R109.5.8 Mid-roof inspection.** To be made after ice and water shield, valley underlayment, and flashing placement, but before any shingles or metal roof material installment.

**R109.5.9 Fire Rated Drywall inspection.** To be made after the 5/8" drywall for fire protection has been installed, but before any taping or plaster application.

**R109.5.10 Final inspection.** To be made after finish grading and the building is completed and ready for occupancy.

**R109.6 Other inspections.** In addition to the called inspections specified above, the building official may make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws, which are enforced by the code enforcement agency.

**7. ADDITION (INSPECTIONS) Sec. R109.7 Reinspections.**

Add Sec. R109.7 Reinspections. A reinspection fee may be assessed for each inspection or reinspection when such portion of work for which inspection is called is not complete or when corrections called for are not made.

This section is not to be interpreted as requiring reinspection fees the first time a job is rejected for failure to comply with the requirements of this code, but as controlling the practice of calling for inspections before the job is ready for such inspection or reinspection.

Reinspection fees may be assessed when the inspection record card is not posted or otherwise available on the work site, the approved plans are not readily available to the inspector, for failure to provide access on the date for which inspection is requested, or for deviating from plans without obtaining a change order on the original plans.

To obtain a reinspection, the applicant shall file an application therefore in writing on a form furnished for that purpose and pay the reinspection fee in accordance with the fee established by the building official.

In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.



**8. DELETION AND SUBSTITUTION (BOARD OF APPEALS) Sec. R112.1 General.**

Delete Sec. R112.1 General. the following: there shall be and is hereby created a board of appeals. And substitute A board of appeals shall be created when needed.

**9. DELETION AND SUBSTITUTION (DEFINITIONS) Sec. R202 HEIGHT, BUILDING.**

Delete Sec. R202 HEIGHT, BUILDING in its entirety and substitute the following: The vertical distance above a reference datum measured to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the average height of the highest gable of a pitched or hipped roof. The reference datum shall be selected by either of the following, whichever yields a greater height of building:

1. The elevation of the highest adjoining sidewalk or ground surface within a 5-foot (1524 mm) horizontal distance of the exterior wall of the building when such sidewalk or ground surface is not more than 10 feet (3048 mm) above lowest grade.
2. An elevation 10 feet (3048 mm) higher than the lowest grade when the sidewalk or ground surface described in Item 1 is more than 10 feet (3048 mm) above lowest grade.

The height of a stepped or terraced building is the maximum height of any segment of the building.

**10. DELETION (DEFINITIONS) Sec. R202 MANUFACTURED HOME.**

Delete Sec. R202 MANUFACTURED HOME in its entirety.

**11. ADDITION (GLAZING) Sec. R308.4 Hazardous locations.**

Add Sec. R308.4 Hazardous locations #12. Glazing within 60 inches above the plane of any window or bench seat.

**12. DELETION (GARAGES AND CARPORTS) Sec. R309.3 Floor Surface.**

Delete Sec. R309.3 the following: to a drain or

**13. DELETION (GARAGES AND CARPORTS) Sec. R309.4 Carports.**

Delete Sec. R309.4 the following: to a drain or

**14. DELETION (PROTECTION AGAINST DECAY) Sec. R319.1.4 Wood columns. Exceptions:**

Delete Sec. R319.1.4 Exceptions 1. and 2. the following: and the earth is covered by an approved impervious moisture barrier.

**15. DELETION AND SUBSTITUTION (FOOTINGS) Sec. R403.1.3.1 Foundations with stem walls.**

Delete Sec. R403.1.3.1 in its entirety and substitute Foundations with stem walls shall have installed a minimum of two No. 4 rebar 60 grade or two No. 5 rebar 40 grade within 12 (305mm) of the top of the wall and two No. 4 rebar 60 grade or two No. 5 rebar 40 grade located 3 inches (76mm) to 4 inches (102mm) from the bottom of the footing Figure R403.1.3.1 Suggested Foundation Design Attached hereto.

**16. ADDITION (FOOTINGS) Figure R403.1(1) Basement or crawl space with foundation wall bearing directly on soil.**

Add Figure R403.1(1) A soils report and engineered foundation design will be required if the basement or crawl space wall is bearing directly on soil and no footing is present.

17. **ADDITION (FOOTINGS) Figure R403.1(2) Permanent wood foundation basement wall section.**  
Add Figure R403.1(2) All wood foundations will bear an engineer stamp on footing or gravel.
18. **ADDITION (FOOTINGS) Figure R403.1(3) Permanent wood foundation crawl space section.**  
Add Figure R403.1(3) All wood foundations will bear an engineer stamp on footing or gravel.
19. **DELETION (FOOTINGS) Sec R403.1.5 Slope.**  
Delete Sec. R403.1.5 the following The bottom surface of footings shall not have a slope exceeding one unit vertical in 10 units horizontal (10-percent slope).
20. **DELETION (FOUNDATION DRAINAGE) Sec R405.1 Concrete or masonry foundations.**  
Delete Sec. R405.1 Exception: A drainage system is not required when the foundation is installed on well-drained ground or sand-gravel mixture soils according to the Unified Soils Classification System, Group I Soils, as detailed in Table R405.1.
21. **ADDITION (UNDER-FLOOR SPACE) Sec R408.1 Ventilation.**  
Add Sec R408.1 the following: Reduce venting to 10% (percent) of this requirement if 6 mil plastic is used to cover soil and added as a vapor barrier.
22. **DELETION AND ADDITION (WALL CONSTRUCTION) Table Sec. R602.3(1) Fastener Schedule for Structural Members.**  
Delete Table Sec. R602.3(1) the following: all references to staples and add Note j. Staples are not allowed as a fastener for any structural components.
23. **DELETION AND ADDITION (WALL CONSTRUCTION) Table Sec. R602.3(2) Alternate Attachments.**  
Delete Table Sec. R602.3(2) the following: all references to staples and add Note g. Staples are not allowed as a alternate attachment.
24. **DELETION (WOOD WALL FRAMING) Sec. R602.7.1 Wood structural panel box headers.**  
Delete Sec. R602.7.1 in its entirety.
25. **DELETION (WOOD WALL FRAMING) Table R602.7.2 Maximum spans for wood structural panel box headers.**  
Delete Table R602.7.2 in its entirety.
26. **DELETION (WOOD WALL FRAMING) Figure R602.7.2 Typical wood structural panel box header construction.**  
Delete Figure R602.7.2 in its entirety.
27. **DELETION AND ADDITION (REQUIREMENTS FOR ROOF COVERINGS) Sec. R905.2.7 Underlayment application.**  
All references to starting at the eaves, and substitute starting at the edge of ice barrier.
28. **DELETION (FACTORY-BUILT FIREPLACES) Sec. R1004.4 Unvented gas log heaters.**  
Delete Sec. R1004.4 in its entirety.



**29. DELETION AND SUBSTITUTION (APPLIANCE ACCESS) Sec. M1305.1.4 Appliances under floors.**

Delete Sec. M1305.1.4 in its entirety and Substitute Park County Building Department 1994 Edition Uniform Mechanical Code Interpretation dated 8/11/1999. Attached hereto.

**Section 2. - Penalties.** It shall be unlawful for any person, firm or corporation to erect, construct, enlarge, alter, repair, move, improve, remove, convert or demolish, equip, use, occupy or maintain any building or structure or cause or permit the same to be done in violation of this Code. A person or entity who violates this Code may be fined in an amount not to exceed one hundred dollars, or imprisoned for not more than ten (10) days, or suffer both fine and imprisonment, in addition to other sanctions set forth in C.R.S. §§ 30-28-209 and 210, as amended.

**Section 3.** That Park County Ordinance No. 00-3 adopting the 1997 *Uniform Building Code* and all other ordinances and resolutions or parts of ordinances and resolution in conflict herewith are hereby repealed.

**Section 4.** That if any section, sentence, clause or phrase of this ordinance is, for any reason, held to be invalid or unconstitutional, such decision shall not affect the validity or constitutionality of the remaining portions of this ordinance. The Board of County Commissioners hereby declares that it would have passed this ordinance, and each section, clause or phrase hereof, irrespective of the fact that any one or more of the sections, sentences, clauses and phrases be declared unconstitutional.

**Section 5.** Pursuant to C.R.S. § 30-15-405, this ordinance shall be published in full following its initial introduction and reading and published by title only following final adoption by the Board of County Commissioners and shall be effective thirty (30) days following such publication by title only.

SIGNED this 16<sup>th</sup> day of August 2006.


PARK COUNTY BOARD OF COMMISSIONERS

  
\_\_\_\_\_  
Leni Walker, Chairman



ATTEST:  
  
\_\_\_\_\_  
County Clerk

I certify that this ordinance was introduced and read at the July 26, 2006 public hearing of the Board of County Commissioners and published *The Flume* on 16 August, 2006.

  
\_\_\_\_\_  
County Clerk

## Exhibit A

### Park County Snow Load Chart

	Platte Canyon	Mosquito Range	South Park			Platte Canyon	Mosquito Range	South Park
Elevation	K-5	K-6	K-8		Elevation	K-5	K-6	K-8
6000	50	50	50		8800	73	63	50
6100	50	50	50		8900	76	66	50
6200	50	50	50		9000	79	69	50
6300	50	50	50		9100	82	71	50
6400	50	50	50		9200	85	73	50
6500	50	50	50		9300	89	74	50
6600	50	50	50		9400	92	76	50
6700	50	50	50		9500	95	78	50
6800	50	50	50		9600	99	81	52
6900	50	50	50		9700	103	85	55
7000	50	50	50		9800	106	88	57
7100	50	50	50		9900	110	92	60
7200	50	50	50		10000	114	95	62
7300	50	50	50		10100	116	97	64
7400	50	50	50		10200	118	99	65
7500	50	50	50		10300	119	101	67
7600	50	50	50		10400	121	103	68
7700	50	50	50		10500	123	105	70
7800	52	50	50		10600	126	107	71
7900	53	50	50		10700	130	109	73
8000	55	50	50		10800	133	111	74
8100	57	50	50		10900	137	113	76
8200	59	51	50		11000	140	115	77
8300	61	51	50		11100		117	80
8400	63	52	50		11200		119	82
8500	65	53	50		11300		121	85
8600	68	56	50		11400		123	87
8700	71	59	50		11500		125	90

## EXHIBIT B

### APPENDIX TO CHAPTER 35 STRAW-BALE STRUCTURES

#### SECTION 3505- PURPOSE

The purpose of this appendix chapter is to establish minimum prescriptive standards of safety for the construction of structures, which use baled straw as a load bearing or non-load bearing material.

#### SECTION 3506- SCOPE

The provisions of this chapter shall apply to all structures utilizing straw bales in the construction of wall systems.

#### SECTION 3507- DEFINITIONS

For the purpose of this chapter, certain terms are defined as follows:

**STRAW** is the dry stems of cereal grains left after the seed heads have been removed.

**BALES** are rectangular compressed blocks of straw, bound by strings or wire.

**FLAKES** are slabs of straw removed from an untied bale. Flakes are used to fill small gaps between the ends of stacked bales.

**LAI D FLAT** refers to stacking bales so that the sides with the largest cross-sectional area are horizontal and the longest dimension of this area is parallel with the wall plane.

**LAI D ON-EDGE** refers to stacking bales so that the sides with the largest cross-sectional area are vertical and the longest dimension of this area is horizontal and parallel with the wall plane.

#### SECTION 3508- MATERIALS

##### 3508.1 Specifications for Bales

**3508.1.1 Type of Straw.** Bales of various types of straw, including, but not limited to, wheat, rice, rye, barely, oats and similar plants, shall be acceptable if they meet the minimum requirements for density, shape, moisture content, and ties.

**3508.1.2 Shape.** Bales shall be rectangular in shape.

**3508.1.3 Dimensions.** Bales used within a continuous wall shall be of consistent height and width to ensure even distribution of loads within wall systems.

**3508.1.4 Ties.** Bales shall be bound with ties of either polypropylene string or baling wire. Structural bales shall require three (3) ties. Nonstructural bales shall require two (2) ties. Bales with broken or loose ties shall not be used unless the broken or loose ties are replaced with ties restoring the original degree of compaction of the bale as computed by a moisture and density test.

**3508.1.5 Moisture Content.** Moisture content of bales, at time of installation, shall not exceed 20% of the total weight of the bale. Moisture content of bales shall be determined by one of the following:

**3508.1.5.1 Field Method.** A suitable moisture meter, designed for use with baled straw or hay, and equipped with a probe of sufficient length to reach the center of the bale, shall be used to determine the average moisture content of five (5) bales randomly selected from the bales to be used.

**3508.1.5.2 Laboratory Method.** A total of five (5) samples, taken from the center of each five (5) bales randomly selected from the bales to be used, shall be tested for moisture content by a recognized testing lab.

**3508.1.6 Density.** Bales in load-bearing structures shall have minimum calculated dry density of 7.0 pounds per cubic foot. The calculated dry density shall be determined after reducing the actual bale weight by the weight of the moisture content, as determined in section 3504.1.5. The calculated dry density shall be determined by dividing the calculated dry weight of the bale by the volume of the bale.

**3508.1.7 Custom Size Bales.** Where custom-made partial bales are used, they shall be of the same density, same string or wire tension, and, where possible, use the same number of ties as the standard size bales.

## **SECTION 3509- CONSTRUCTION AND GENERAL REQUIREMENTS**

**3509.1 General.** Bale walls, when covered with plaster, drywall or stucco shall be deemed to have the equivalent fire resistive rating as wood frame construction with the same wall-finishing system.

**3509.2 Wall Thickness.** Nominal minimum bale wall thickness shall be fourteen (14) inches.

**3509.3 Wall Height.** Bale walls shall not exceed one story in height and the bale portion shall not exceed a height to width ratio of 5.6:1 (for example, the maximum height for the bale portion of a twenty-three (23) inch thick wall would be 10 feet-8 inches), unless the structure is designed by an engineer or architect licensed by the State of Colorado and approved by the Building Official.

**Exception:** In the non-load bearing exterior end walls of structures with gable or shed roofs, an approved continuous assembly shall be required at the roof bearing assembly level.

**3509.4 Unsupported Wall Length.** The ratio of unsupported wall length to thickness, for load bearing bale walls, shall not exceed 15.7:1 (for a 23 inch thick wall, the maximum unsupported length allowed is 30 feet), unless the structure is designed by an engineer or architect licensed by the State of Colorado and approved by the Building Official.

**3509.5 Allowable Loads.** The allowable vertical load (live and dead load) on the top of load-bearing bale walls shall not exceed 400 pounds per square foot (psf) and the resultant load shall act at the center of the wall. Bale structures shall be designed to withstand all vertical and horizontal loads as specified in Uniform Building Code Chapter 16.

**3509.6 Foundations.** Foundations shall be of concrete or filled masonry sized to accommodate the thickness of the bale wall and the load created by the wall and roof live and dead loads. Foundation (stem) walls which support bale walls shall extend to an elevation of not less than eight (8) inches above adjacent ground at all points. The minimum width of the footing shall be the width of the bale it supports, except that the bales may overhang the exterior edge of the foundation by not more than three (3) inches to accommodate rigid perimeter insulation. Footing shall extend a minimum of twelve (12) inches below natural, undisturbed soil, or to frost line, whichever is lower.

**3509.6.1 Foundation Investigation.** Foundation investigation may be required by the building official and shall be in accordance with the provisions of Section 1804.

**3509.7 Wall and Roof Bearing Assembly Anchorage.**

**3509.7.1 General.** Vertical reinforcing bars with a minimum diameter of ½" shall be embedded in the foundation a minimum depth of seven (7) inches, and shall extend above foundation a minimum of ½ the depth of the bale. These vertical bars shall be located along the centerline of the bale wall, spaced two (2) per bale but not closer than six (6) inches from the bale end. A vertical bar shall also be located within 1 foot of any opening or corner, except at locations occupied by anchor bolts.

**3509.7.2 ANCHOR METHOD.**

**3509.7.2.1 Anchor Bolts.** Anchor bolts may be substituted for reinforcing bar. Load bearing bale walls shall be anchored to the foundation by ½" diameter steel anchor bolts embedded at least seven (7) inches in the foundation at intervals of six (6) feet or less. A minimum of two anchor bolts per wall shall be provided with one bolt located within thirty-six (36) inches of each end of each wall. Sections of ½" diameter threaded rod shall be connected to the anchor bolts, and to each other, by means of threaded coupling

nuts and shall extend through the roof bearing assembly and be fastened with a properly sized steel washer and nut. Bale walls and roof bearing assemblies may be anchored to the foundation by means of other methods which are adequate to resist uplift forces resulting from the design wind load. There shall be a minimum of two points of anchorage per wall, spaced not more than six (6) feet apart, with one located within thirty-six (36) inches of each end of each wall.

3509.7.2.2 Cable and Turnbuckle. Load bearing walls shall be anchored to the foundation by a minimum 1/4 inch galvanized hardware quality braided cable with turnbuckles. Cables shall have the same spacing as the anchor bolt method. The cable shall extend through the concrete footing/stem wall a minimum of three (3) inches below the top surface. The concrete shall be protected from damage by the tensioned cable by a sleeve inserted in the stem wall. The sleeve shall have flared ends to prevent cable breakage. The cable shall pass up and over the 2" x 12" concrete or framed bond beam down to the turnbuckle.

3509.7.2.3 Tensioning. Regardless of the method of anchorage, tension shall be applied to the bale wall until fully compressed. Walls shall be re-tensioned after the walls have been allowed to stand a minimum of twenty-four (24) hours. The dead load of the roof and ceiling systems will produce vertical compression of the bales. Regardless of the anchoring system used to attach the roof bearing assembly to the foundation, prior to installation of wall finish materials, bolts or straps shall be re-tightened to compensate for this compression.

3509.7.2 Intersecting Walls. Walls of other materials intersecting bale walls shall be attached to the bale wall by means of one or more of the following methods or an acceptable equivalent:

1. Number four (4) rebar or wooden dowels at least 5/8" in diameter of sufficient length to provide twelve (12) inches of penetration into the bale, driven through holes bored in the abutting stud, and spaced to provide one dowel connection per bale.
2. Pointed wooden stakes, at least twelve (12) inches in length and 1 1/2" by 3-1/2" at the exposed end, fully driven into each course of bales, as anchorage points.
3. Bolted or threaded rod connection of the abutting wall, through the bale wall, to a steel nut and steel or plywood plate washer a minimum of six (6) inches square and a minimum thickness of 3/16" for steel and 1/2" for plywood, in at least three locations.

3509.7.4 Moisture Barrier. A moisture barrier shall be used between the top of the foundation and the bottom of the bale wall to prevent moisture from migrating through the foundation into the bottom course bales. This barrier shall consist of one of the following:

1. cementitious waterproof coating;
2. type 30 asphalt felt over an asphalt emulsion;
3. sheet metal flashing, sealed at the joints;
4. 6 mil poly-vinyl sheeting



## SECTION 3510 LOAD BEARING WALLS

3510.1 Stacking and Pinning. Bales in load-bearing walls shall be laid flat and stacked in running bond where possible, with each bale overlapping the two bales beneath it. Overlaps shall be a minimum of twelve (12) inches. Gaps between the ends of bales, which are less than six (6) inches in width, can be filled by an untied flake inserted snugly into the gap. Gaps greater than six (6) inches in width shall be filled with properly sized, compressed bales.

The first course of bales shall be laid by impaling the bales on the vertical bars or threaded rods, extending from the foundation. When the fourth course has been laid, #4 rebar pins, or an acceptable equivalent, long enough to extend through all four (4) courses, shall be driven down through the bales, two (2) in each bale, located so that they do not pass within six (6) inches of, or through the space between the ends of any two (2) bales. The layout of these pins shall approximate the layout of the vertical bars extending from the foundation. As each subsequent course is laid, two (2) pins, long enough to extend through the course being laid and the three (3) courses immediately below it, shall be driven down through each bale. This pinning method shall be continued to the top of the wall.

Only full-length bales shall be used at corners of load bearing walls, unless designed by an engineer or architect licensed by the State of Colorado, and approved by the Building Official.

Vertical #4 rebar pins, or an acceptable alternative, shall be located within one (1) foot of all corners, window and door openings. An additional pin shall be added if the layout of pins does not fall within twelve (12) inches of openings or corners.

Staples, made of #3 or larger rebar formed into a "U" shape, at least eighteen (18) inches long with two six (6) inch legs, shall be used at all corners of every course, driven with one leg into the top of each abutting corner bale. In lieu of staples, corner bales may be tied together by a method approved by the building official.

3510.2 Alternate pinning method. When the third course has been laid, vertical #4 rebar pins, or an acceptable equivalent, long enough to extend through all three (3) courses, shall be driven down through the bales, two in each bale, located so that they do not pass within six (6) inches of, or through, the space between the ends of any two bales. The layout of these rebar pins shall approximate the layout of the rebar pins extending from the foundation. As each subsequent course is laid, two (2) such pins, long enough to extend through that course and the two (2) courses immediately below, shall be driven down through each bale. This pinning method shall be continued to the top of the wall.

## SECTION 3511 NON-LOAD BEARING WALLS

**3511.1 Stacking and Pinning.** Bales in non-load bearing walls may be laid either flat or on-edge and stacked in running bond where possible. For non-load bearing walls, bales may be laid either flat or on-edge. Overlaps shall be a minimum of twelve (12) inches. Gaps between the ends of bales, which are less than six (6) inches in width, can be filled by an untied flake inserted snugly into the gap. Gaps greater than six (6) inches in width shall be filled with properly sized, compressed bales.

The first course of bales shall be laid by impaling the bales on the vertical bars or threaded rods, if any, extending from the foundation. When the fourth course has been laid, #4 rebar pins, or an acceptable equivalent, long enough to extend through all four (4) courses, shall be driven down through the bales, two (2) in each bale, located so that they do not pass within six (6) inches of, or through the space between the ends of any two (2) bales. The layout of these pins shall approximate the layout of the vertical bars extending from the foundation. As each subsequent course is laid, two (2) pins, long enough to extend through the course being laid and the three (3) courses immediately below it, shall be driven down through each bale. This pinning method shall be continued to the top of the wall.

Vertical #4 rebar pins, or an acceptable alternative, shall be located within one (1) foot of all window and door openings. An additional pin shall be added if the layout of pins does not fall within twelve (12) inches of openings.

**3511.2 Alternate pinning method.** When the third course has been laid, vertical #4 rebar pins, or an acceptable equivalent, long enough to extend through all three (3) courses, shall be driven down through the bales, two (2) in each bale, located so that they do not pass within six (6) inches of, or through, the space between the ends of any two (2) bales. The layout of these rebar pins shall be approximate the layout of the rebar pins extending from the foundation. As each subsequent course is laid, two (2) such pins, long enough to extend through that course and the two (2) courses immediately below it, shall be driven down through each bale. This pinning method shall be continued to the top of the wall.

## **SECTION 3512 ROOF BEARING ASSEMBLY.**

**3512.1 General.** Load bearing bale walls shall have a roof bearing assembly at the top of the wall to bear the roof load and to provide a means of connecting the roof structure to the foundation. The roof bearing assembly shall be continuous along the tops of exterior and structural walls.

**3512.2 Wood Frame Assembly.** The roof bearing assembly shall consist of a minimum of two double 2"x 6", or larger, horizontal top plates, one located at the inner edge of the wall and the other at the outer edge. Connecting the two doubled top plates and located horizontally and perpendicular to the length of the wall shall be 2"x 6" cross members spaced no more than seventy-two (72) inches center to center, and as required to align with the threaded rods extending from the anchor bolts in the foundation. The double 2"x 6" top plates shall be face nailed with four (4) 16d nails staggered at sixteen (16)

inches on center. End joints in double top plates shall be offset a minimum of forty-eight (48) inches. The cross members shall be face nailed to the top plates with four (4) 16d nails at each end. Corner connections shall include overlaps nailed with four (4) 16d nails or may be tied together with a minimum 5" x 6" 20 gage galvanized steel plate. The steel connector shall be nailed to each top plate with six (6) 8d nails. The connection of roof framing members to the roof bearing assembly shall comply with the appropriate sections of the Uniform Building Code.

**3512.3 Concrete Assembly.** A concrete roof bearing assembly shall consist of a permanent concrete form of pressure treated lumber. The bottom plate shall be a minimum 2" x 12" with minimum 2" x 8" sides and top. The 2" x 12" shall be held in place by the #4 rebar pins used to anchor the bales and shall extend into the concrete bond beam a minimum of five (5) inches. The top 2" X 8" may be held in place by driving 16d galvanized nails part way into the 2" x 8" and placing the 2" x 8" nails down into the concrete. Concrete bond beam shall be a minimum 2500-psi compressive strength with a minimum of two (2) #4 horizontal rebar. Rebar shall be continuous at the corners with lap splices of at least twenty-four (24) inches.

## **SECTION 3513 OPENINGS AND LINTELS**

**3513.1 Openings.** All openings in bale walls shall be a minimum of one full bale length from any outside corner. Openings in exterior bale walls shall not exceed fifty (50) percent of the total wall area, based on interior dimensions.

**3513.2 Lintels.** Wall and/or roof load present above any opening shall be carried, or transferred to the bales below by one of the following:

1. For openings two (2) feet in width or less: a structural frame, consisting of double 2" x 12" trimmers supporting double 2" x 12" laid flat. Trimmers shall extend to the footing.
2. For openings greater than two (2) feet in width: a lintel (such as an angle-iron cradle, wooden beam, wooden box beam) shall be provided. Lintels shall be at least twice as long as the opening is wide with a minimum bearing surface of 5 1/2 inches and extend twenty-four (24) inches beyond either side of the opening. Lintels bearing surface shall be centered in the width of the bale over openings and shall extend a minimum of one (1) full bale length on each side. Lintels shall not exceed the load limitations of section 3505.5.

## **SECTION 3514 MOISTURE PROTECTION**

**3514 Moisture Protection.** All weather-exposed bale walls shall be protected from water damage. An approved building moisture barrier shall be used to protect at least the bottom course of bales, but not more than the lower one-third of the vertical exterior wall surface, in order to allow natural transpiration of moisture from the bales. The moisture barrier shall have its upper edge inserted at least six (6) inches in to the horizontal joint between two (2) courses of bales, and shall extend at least three (3) inches below the top

of the foundation. Bale walls shall have special moisture protection provided at all windowsills. Exposed windowsills shall provide positive drainage to prevent moisture accumulation. A moisture barrier shall be provided on the exterior top bale for not less than  $\frac{1}{2}$  the height of the bale and not more than the full bale height. Straw bale structures shall have a minimum roof overhang of twenty-four (24) inches measured from the exterior wall surface. Moisture protection shall consist of a waterproof membrane, such as asphalt-impregnated felt paper, 6-mil polyethylene sheeting, or other acceptable moisture barrier, installed in such manner as to prevent water from entering the wall system at window sills or at the top of walls.

### **SECTION 3515 WALL FINISHES**

**3515 Wall Finishes.** Interior and exterior surfaces of bale walls shall be protected from mechanical damage, flame, animals, and prolonged exposure to water. A moisture barrier shall protect bale walls adjacent to bath and shower enclosures.

Cement stucco shall be reinforced with galvanized woven wire stucco netting or an acceptable equivalent. Such reinforcement shall be secured by attachment through the wall at a maximum spacing of twenty-four (24) inches horizontally and sixteen (16) inches vertically. Fasteners shall be staples of #8 wire gage a minimum of twelve (12) inches long inserted at alternating angles to prevent pullout.

Where bales abut other materials the plaster/stucco shall be reinforced with galvanized expanded metal lath, or an acceptable equivalent, extending a minimum of six (6) inches onto the bales.

Earthen and lime-based plasters may be applied directly onto the exterior and interior surface of bale walls without reinforcement, except where applied over materials other than straw. Weather-exposed earthen plasters shall be stabilized using a method approved by the building official.

Exhibit C  
Appendix to Chapter 35

EARTHSHIP STRUCTURES

**SECTION 3514 PURPOSE**

The purpose of this appendix is to establish standards of safety for special construction of structures made of rammed earth tire walls, or "earthship structures". This appendix is to be used in conjunction with the adopted building codes applicable to conventional construction practices.

**SECTION 3514.1 SCOPE**

The provisions of this appendix shall apply to all bearing, partition, freestanding and retaining walls constructed of rammed earth tires. Footings for walls constructed of concrete with aluminum cans are also addressed.

**SECTION 3514.2 TIRE SIZES USED IN BEARING AND RETAINING WALLS**

As referenced in this appendix, permissible automobile tires used in bearing or retaining walls shall be no less than 13-inch radius, as specified herein.

**SECTION 3514.3 TIRE WALLS FOUNDATION**

A properly constructed tire wall is considered a monolith foundation provided it meets the following criteria:

1. The first course of tires of any tire wall must be leveled and dug one foot (1') into undisturbed soil free of organic surface matter such as plants, tree roots or other biodegradable substances.
2. The first course of tires must be as large in diameter or larger in diameter than any other tire in the wall. No tire may appear in a wall that is larger in diameter than the tires on the ground course of that wall.

**SECTION 3514.4 COURSING**

1. All tire walls must use staggered running bond coursing.
2. Joints between tires on any given course must be aligned with the central area of all tires on courses above and below. No joint between tires on any given course may align with any joint on the courses above or below.
3. Half-tire techniques as outlined in Section 3514.6 must be used to maintain running bond coursing.

## SECTION 3514.5 CONCRETE HALF-TIRE TECHNIQUES

1. Concrete half-tires must use a mix of 3 parts cement, 4 parts sand, 5 parts gravel with engineering fibers. All tires adjacent to concrete half blocks must be porcupined with 16d galvanized nails to lock concrete to tires.
2. All two story tire wall applications must use concrete half-tires and be designed by a Colorado licensed architect or structural engineer.

## SECTION 3514.6 RAMMED EARTH HALF-TIRES

1. Rammed earth half-tires are made by cutting a piece of wire lath or mesh, approximately the width of the tire tread, in half and leaving tabs on the sides to screw into the adjacent tire. This half-tire is then pounded like a regular tire. Rammed earth half-tires may be used only in tire walls five courses high or less.
2. Rammed earth half-tires shall not be used at the end of a building wall or at the end of any type of bearing wall.

## SECTION 3514.7 BEARING WALLS

1. Bearing walls built from rammed earth automobile tire casings shall conform to the following specifications:
  - (a) All bearing walls built from rammed earth automobile tire casings must have a continuous bond beam of wood or concrete as specified in Section 3514.11.
  - (b) All bearing walls eight courses or higher, built from rammed earth automobile tire casings, must have a continuous bond beam that connects to a continuous bond beam on adjacent non-bearing tire walls. See Section 3514.11 for bond beam specifications. Height requirements are specified in Section 3514.14.

## SECTION 3514.8 RETAINING WALLS built with rammed earth automobile tires shall be constructed to meet the requirements of this Section as well as Section 3514.7.

1. All retaining walls built from rammed earth automobile tire casings must be stepped back (battered; i.e., lean into the earth they are retaining) 2" per course minimum.
2. All retaining walls more than ten (10) feet in height must be designed by a Colorado registered architect or structural engineer.

## SECTION 3514.9 FREESTANDING WALLS

Any wall not tied into the roof structure of a building is considered a freestanding wall which shall be constructed in conformance with the requirements of this Section.

1. All freestanding walls over 2 courses high built from rammed earth automobile tire casings must have continuous arcs built into the design of the wall. Freestanding walls cannot be straight for any distance.
2. Freestanding walls built of rammed earth automobile tire casings shall not exceed 5 courses in height unless specifications and construction drawings for such wall, designed and certified by a Colorado licensed architect or engineer are provided to and approved by the Building Official.

## SECTION 3514.10 CAN WALLS

Can walls are walls constructed of aluminum cans and concrete. Aluminum cans are placed in the wall in a vertical position with the top and bottom of the cans facing the face of the wall. The cans act as spacers and as insulation in the wall. Footings below single can walls shall extend 3" either side of the wall width. Footings below double can walls shall extend 3" either side of the wall width. Footings must rest one foot (1') below undisturbed soil.

## SECTION 3514.11 PLATES AND BOND BEAMS

1. All tire walls that are an integral part of a roofed building shall have a continuous wood or concrete bond beam. A wooden bond beam shall be anchored to the tire wall with  $\frac{1}{2}$ " anchor bolts set 7" minimum depth in concrete every other tire or  $\frac{1}{2}$ " rebar driven down through three courses of tires and bent over the top of the wood plate or set in the concrete bond beam.
2. Wood bond beam plates shall be no less than (2) 2"x12" dimensional lumber. Wood bond beam plates can be made up of (2) 2" x 12" s with 6-mil plastic between the rammed earth tire wall and the wood bond beam plate. The bottom bond beam plate must be treated lumber. Joints in the lower layer of lumber shall never be closer than four feet (4') from joints in the upper layer of lumber. Upper and lower layers of lumber shall be laminated with (6) 16d nails per running foot (On Center 12").
3. Concrete bond beams shall be a minimum of 8" deep x 8" wide and have two pieces of  $\frac{1}{2}$ " rebar continuous. The concrete bond beam shall be thickened to sixteen inches (16") at every tire stack, with 8" for the beam and 8" into the tire stack. The thickened part of the bond beam shall extend a minimum of 2" under the bead of tire:

#### SECTION 3514.12 OPENING IN WALLS

1. All openings in walls made of rammed earth automobile tires shall have concrete half blocks on either side of the openings.
2. The wood or concrete bond beam spanning the opening shall be increased in thickness by a minimum of eight inches (8"). This additional thickness shall extend on either side of the opening a minimum of four (4) feet and shall be anchored to a concrete bearing block equivalent in thickness to the tire coursing height.

#### SECTION 3514.13 MULTI-STORY

1. No multi-story earth rammed tire structure shall be constructed unless specifications and construction drawings, designed and certified by a Colorado licensed architect or structural engineer are provided to and approved by the Building Official.

#### SECTION 3514.14 HEIGHT OF TIRE WALLS

1. The maximum height for a straight earth rammed tire wall is ten (10) feet. Straight tire walls shall be bermed to the top of the top course of tires for support. The use of a straight tire wall for any distance is not recommended they are not stable.
2. The maximum height for a curved (arched) rammed earth tire wall is twelve (12) feet.
3. The maximum height for a non-structural, freestanding wall (e.g., courtyard wall) that is not curved or battered is six (6) feet.

#### SECTION 3514.15 LOADING OF WALLS

1. Loading on earth rammed tire walls must be distributed loading only from joists, beams or rafters resting on a continuous wood or concrete bond beam.
2. No point or collected loading is permitted on earth rammed tire walls unless special engineering, as approved by the Building Official, is provided by a Colorado licensed engineer or architect.

#### SECTION 3514.16 FILL OF WALLS

1. All tire casings must be packed with at least 90% earth materials. Soft spongy tire packing is not acceptable. Properly compacted tires should have a domed bulge to the tire wall.



### SECTION 3514.17 VOID FILLING

1. All voids between tires in earth rammed tire interior walls must be packed solid with mud in a four coat procedure, using mud mixed half and half with coarse sand and thickened with chopped straw. Each layer of mud must be allowed to dry before adding the next coat of mud. The surface of the dried layer of mud must be wetted before adding the next coat of mud. Two aluminum cans may be used as spacers in each coat of mud. The voids must be filled until they are even with the surface of the tire tread. In certain conditions, as approved by the Building Official, including but not limited to instances in which a rammed earth tire wall is unstable, filling voids between earth rammed tires may be accomplished with concrete. Concrete packing might be employed if the stability of the wall were in question, whether it be from imposed loads or for any other type of structural deficit.

### SECTION 3514.18 EARTH CLIFFS

1. Where rammed earth tire walls are constructed on a "stepped" or multi-level surface (thereby creating earth "cliffs"), a soil investigation and structural engineering report(s), acceptable to the Building Official, shall be submitted along with the application for permit. Such soil investigation and structural engineering report(s) shall indicate that the soil underlying and supporting the rammed earth tire wall that is resting on the earth "cliff", is capable of supporting the tire wall.
2. Subject to compliance with subsection (1) of Section 3514.18 (above), earth cliffs shall be permitted only under non-bearing rammed earth tire walls or walls only loaded from one side such as east or west end walls.

### SECTION 3514.19 JOINTS

1. All joints and connections in rammed earth tire walls must be designed and assembled in such a way so that no voids occur within the rammed earth tire wall. These voids must be filled with concrete or 90% compacted earth contained in a double layer of metal lath or a rubber tire casing.
2. All joints and connections in rammed earth tire walls must employ overlapped tires and joining methods so as not to result in stacked joints occurring over each other.

### SECTION 3514.20 ROOF SHEATHING

1. Roof sheathing will be a minimum of 5/8".