ORDINANCE NO. 2001-05

An Ordinance Amending Ordinance No. 95-3-2 the Building Code, to require watertight septic systems to be installed in all new installations and any replacements, declaring an emergency, and for other purposes

WHEREAS, the City Council of the City of Elm Springs and the Planning Commission of Elm Springs have evaluated the various options available for managing the community's wastewater collection and treatment needs, and

WHEREAS, the City Council has determined that the Preliminary Engineering Report prepared for Elm Springs by PMC Engineering offers reasonable solutions for managing wastewater within the City of Elm Springs in a cost effective, responsible and environmentally acceptable manner, and

WHEREAS, the City Council has directed PMC Engineering to submit said report to the appropriate authorities for consideration and funding, and

WHEREAS, certain types of septic tanks fitted, designed, constructed and properly installed offer special benefits of environmental integrity and cost effectiveness related to compatibility with the planned wastewater management system.

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

1. That Ordinance No. 95-3-2, adopting the Building Code for Elm Springs, be modified to add the Specifications attached hereto to the Building Code for construction within the City of Elm Springs, which Specifications are hereby incorporated into the Building Code of the City of Elm Springs; and

2. That from the date of the adoption of this ordinance, all persons, corporations, agencies, contractors, sole proprietorships, and other entities seeking to install or replace a septic system within the corporate limits of the City of Elm Springs shall be required to install only those septic tanks which fully comply with the provisions of the Specifications identified as Attachment A ("the Specifications"); and

3. That any such installation of septic systems shall include all water tight tanks as per the Specifications which shall be installed in accordance with the practices and procedures detailed therein; and

4. That the City Inspector is instructed to enforce the provisions of this Ordinance, and to assess the fines and penalties for non-compliance as are set forth in the Building Code for violation of the plumbing code; and

5. That the public health, safety and welfare of the citizens of the City of Elm Springs is protected by the enactment of this Ordinance, and therefore an emergency exists requiring the provisions of this ordinance be enacted immediately upon its adoption; and

6. That the Mayor is hereby authorized to issue such letters, memorandums or other communications as deemed necessary to officially notify the intent of the City of Elm Springs to enact these requirements and to enlist the cooperation of the Washington County Sanitarian and the Arkansas Department of Health and the Arkansas Department of Environmental Quality in assuring compliance with these provisions.

PASSED AND APPROVED BY the City Council of Elm Springs, Arkansas on the 1st day of October, 2001.

APPROVED:

Ed Thiesse

ED THIESSE, MAYOR

ATTEST:

Wenda Pettus

CITY CLERK

A. ONSITE SEPTIC/INTERCEPTOR TANKS

1. General:

a. The manufacturer shall provide the structural design and certification to the City for review on request. The design shall be in accordance with accepted engineering practice. Precast concrete or fiberglass tanks shall have been approved by state or local regulatory agencies or authorities. To achieve effective performance and minimize pump-out occurrences, residential interceptor tanks shall have a nominal liquid capacity of 1000 gallons for up to 2 bedrooms, 1500 gallons for 3 bedrooms, 2000 gallons for 4 bedrooms, and, for more than 4 bedrooms, the sizing shall be determined based on an occupancy assessment and shall be in accord with Figure 1.

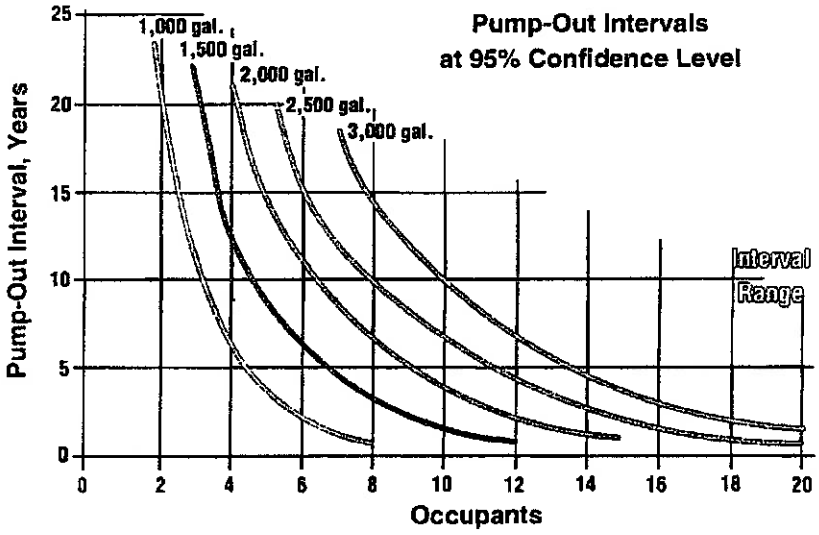

Figure 1. Interceptor Tank Pump-Out Intervals

Average flow (Q_a) is based upon typical weekly discharges. Wastewater flows for single-family dwellings typically range from *40 to 60 gallons per capita per day (gpcd)*; **50 gpcd** is a commonly used design parameter and is the value used in calculations herein. The number of individuals (capita) is assumed to average three per dwelling.

b. Loading Criteria:

- There shall be 140 lbs./cu.ft. for minimum weight of saturated backfill, or 127 lbs./cu.ft. for unsaturated backfill (500 lbs./sq.ft.minimum).
- Minimum lateral loading shall be 62.4 lbs./cu.ft. Lateral loading shall be determined from ground surface.
- The tank shall also support a concentrated wheel load of 2500 lbs.

There are four (4) typical loading conditions that must be considered:

1) 4 ft. Bury + Full Exterior Hydrostatic Load
2) 4 ft. Bury + Full Exterior Hydrostatic Load + 2500 lb. Wheel Load.
3) 1 ft. Bury + 2500 lb. Wheel Load.
4) Tank Full, Interior Hydrostatic Load and Unsupported by Soil.
   Load Case 4 represents the tank full of liquid at 62.4 lbs/cu.ft. This condition addresses seam and haunch stress-strain relationships that occur during watertightness testing, as well as poor soil bedding conditions that provide inadequate support.

c. Tanks requiring deep burial (>48") or subject to truck or heavy traffic loading require special consideration. (A minimum soil cover of 12" shall be used, unless specified otherwise by manufacturer.)

d. *All tanks shall be structurally sound and watertight* and shall be guaranteed in writing by the tank manufacturer for a period of two years from the date of final acceptance. Manufacturer's signed guarantee shall accompany bids. The tank guarantee/warranty shall be furnished at the time of submittal. Tank warranty shall not be limited liability to replacement cost of the tanks. The septic tank shall be capable of withstanding long-term hydrostatic loading, in addition to the soil loading, due to a water table maintained at ground surface.

e. Tanks shall be manufactured and furnished with access openings 20" in diameter. Modification of completed tanks will not be permitted.

f. Inlet plumbing shall include an inlet tee that penetrates 18" into the liquid from the inlet flow line. (The depth may vary depending on the tank's height; in all cases, though, the inlet should extend to a level below the bottom of the maximum scum depth.) The inlet plumbing shall allow for natural ventilation back through the building sewer and vent stack.

g. Tanks shall be capable of successfully withstanding an aboveground static hydraulic test and shall be individually tested.

h. All tanks shall be installed in strict accordance with the manufacturer's recommended installation instructions.

2. **Concrete Tanks:**

   a. Walls, bottom and top of reinforced concrete tanks shall be designed across the shortest dimension using one-way slab analysis. Stresses in each face of monolithically constructed tanks may be determined by analyzing the tank cross-section as a continuous fixed frame.

   b. The walls and bottom slab shall be poured monolithically; alternatively, water stops may be provided.

   c. Reinforcing steel shall be ASTM A-615 Grade 60, fy = 60,000 psi. Details and placement shall be in accordance with ACI 315 and ACI 318.

   d. Concrete shall be ready-mix with cement conforming to ASTM CI50, Type II. It shall have a cement content of not less than six (6) sacks per cubic yard and maximum aggregate size of 3/4". Water/cement ratio shall be kept low (0.35±), and concrete shall achieve a minimum compressive strength of 4000 psi in 28 days. The Contractor shall submit a concrete mix design to the City for review and approval upon request. At the request of the City, three (3) concrete sample cylinders shall be taken and tested for each tank manufactured until the manufacturer and City are satisfied that the minimum compression strength is being obtained. To ensure compliance, the manufacturer shall then make and set three (3) sample cylinders for a minimum of 20% of the remaining tanks at the discretion of the City. If the minimum compressive strength is not being obtained, the manufacturer shall be required to make and test sample cylinders for each tank manufactured. Calcium chloride will not be allowed in the mix design. The cost of testing cylinders shall be the tank manufacturer's responsibility. The City may request the manufacturer to supply and utilize a Swiss Hammer to demonstrate any areas of non-uniformity.

   e. Tanks may be protected by applying a heavy cement-base waterproof coating (Thoroseal® or approved equal), on both inside and outside surfaces, in compliance with Council of American Building Officials (CABO) report #NRB-168; 6181; however, the tank should be watertight without the addition of seal coatings.

   f. Form release used on tank molds shall be Nox Crete™ or approved equal. Diesel or other petroleum products are not acceptable.

   g. Tanks shall not be moved from the manufacturing site to the job site until the tank has cured for seven (7) days or has reached two-thirds of the design strength.

   h. Tanks shall be manufactured and furnished with access openings of the size and configuration to accommodate individual packaged pump systems. For 24" diameter access risers, the tank manufacturer shall cast in place a flanged tank adapter to facilitate the bonding of a 24" diameter access riser. The flanged tank adapter shall be made of 1/4" thick ABS and shall have an outside

diameter of 27" and an inside diameter of 22-3/4". The flanged adapter shall be Orenco Systems®, Inc. Model PRTA24 or City-approved equal. The adapter must have an overall height of no less than 3" to allow 1-1/2" exposed for sufficient bonding area once the adapter is installed in the tank. For 21" and 30" diameter access risers, either a grooved tank adapter plate (Model RRFTA or RRFTA30) or a flanged tank adapter (Model FRTA30) may be installed in the tank. The adapter shall be manufactured of fiberglass or ABS and shall accommodate either a 21" or 30" diameter access riser.

i. The septic tank and the top slab shall be sealed with a preformed flexible plastic gasket. The flexible plastic gasket shall be equal to the flexible butyl resin sealant congeal CS-102 or CS-202 as manufactured by Concrete Sealants, Inc. of New Carlisle, Ohio, and shall conform to federal specification SS-S-00210(2iOA) and AASHTO M-198.

j. In order to demonstrate watertightness, tanks shall be tested twice prior to acceptance. Inlets to the septic tank will be watertight pipe seal Cast-A-Seal™ (Manufactured by Press-Seal Gasket Corporation) or approved equal. Each tank shall be tested at the factory, prior to shipping, by filling with water to the soffit and letting stand. After 24 hours, the tank shall be refilled to the soffit and the exfiltration rate shall be determined by measuring the water loss during the next two (2) hours. Any leakage shall be cause for rejection. After installation is completed, each tank shall be filled with water to a point 2" into the access riser and retested as previously described (the field test period may be reduced to not less than two (2) hours). Backfill of a depth equal to the water height in the riser must be in place over the tank to prevent damage due to hydrostatic uplift. No tank will be accepted if there is any leakage over the two (2) hour period.

3. Fiberglass Tanks:

a. Method of Calculations:

1) Fiberglass tanks shall be analyzed using finite element analysis for buried structures.

2) Calculations shall address the following:

- strength
- buckling
- deflection of 5% of the tank diameter, based on service load (including long-term deflection lag)
- buoyancy

3) Performance testing

Material Properties and Laminates

The laminates considered in this analysis shall be of general-purpose ortho-polyester resin with E-type fiberglass reinforcement or higher grade. The thicknesses for different regions of the tanks shall be described and shown in shop drawings for each individual tank.

The laminate properties listed here, along with the minimum thicknesses as described herein, are considered typical design values that must be maintained during the manufacturing of the tanks.

Typical primary strength properties are listed below:

Tensile Modulus (psi)	1,000,000
Ultimate Tensile strength (psi)	10,000
Ultimate Compressive strength (psi)	21,000
Ultimate Flexural strength (psi)	18,000
Ultimate Shear In-Plane (psi)	7,800

b. In lieu of calculations for fiberglass tanks, the supplier may elect in-situ performance testing.

c. In-situ testing of each tank model shall include use of strain gauge and deflection gauge. The tank shall be subjected to external forces equal to twice the actual load.

d. Maximum initial deflection based on test loading shall not exceed 3% of the tank diameter.

e. Performance testing will be evaluated by a Registered Professional Engineer (P.E.). The Engineer will have the sole responsibility to determine the maximum external loading on any of the tank models.

f. The tank shall be constructed with a glass fiber and resin content specified by the manufacturer and with no exposed glass fibers. Any permanent metal part shall be 300 series stainless steel.

g. Inspections may be made by the City's representative in the supplier's yard, within the plant, upon delivery and again after installation. The minimum wall thickness shall be 3/16". If the wall thickness is suspected to be less than 3/16" or if delamination is suspected within any portion of the tank, the representative may drill a 1/4" diameter hole through the tank wall for inspection purposes. If the required minimum 3/16" thickness is not found and the tank is not rejected by the City, repair if feasible shall be the responsibility of the contractor. If repair is judged not feasible, the tank shall be rejected. If twenty percent (20%) or more of the tanks are rejected for any of the aforementioned reasons, each tank under this bid will become suspect of substandard quality and subject to rejection by the City. If the required minimum 3/16" thickness

is found and no delamination is present, the repair of the inspection holes shall be the responsibility of the City.

h. The City may specify the minimum weight of each tank model that will be allowed. The manufacturer shall permanently mark the weight of each tank on the top near the access hole.

i. The minimum tank weight shall be indicated by the manufacturer.

j. Holes specified for the tank shall be provided by the manufacturer. Resin or other appropriate sealant shall be properly applied to all cut or ground edges so that no glass fibers are exposed and all voids are filled.

k. Orenco Systems' EPDM gaskets, or approved equal, shall be used at the inlet to join the tank wall and the inlet piping. Schedule 40 PVC pipe and fittings shall be used at the inlets.

l. Inlet plumbing shall include an inlet tee that penetrates 18" into the liquid from the inlet flow line. (The depth may vary depending on the tank's height; in all cases, though, the inlet should extend to a level below the bottom of the maximum scum depth). The inlet plumbing shall allow for natural ventilation back through the building sewer and vent stack.

m. Water testing shall be performed on each tank and shall be witnessed by the City's representative. Every tank shall be assembled by the manufacturer and filled with water to the brim of the access opening for a minimum of two (2) hours. The tank shall show no leakage from section seams, pinholes or other imperfections. Any leakage is cause for rejection.

n. When leakage occurs, if the tank is not rejected by the City, an additional water test shall be made on the tank after repairs have been completed. The manufacturer shall be responsible for making all corrective measures in production or assembly necessary to ensure a completely watertight tank.

o. After installation of tank with riser is completed, each tank shall be filled with water to a point 2" into the access riser and the water loss measured after a two-hour period. Every tank test shall be witnessed by the City's representative. Any leakage shall be cause for rejection. Backfill of a depth equal to the water height in the riser must be in place over the tank to prevent damage due to hydrostatic uplift.

p. Each tank shall be marked in the uppermost surface above or near the outlet and include a permit or identification number, weight of tank, type of tank, and date of manufacture.

q. Installation shall be in accordance with the manufacturer's recommendations, or as shown on the Contract Plans, whichever is more stringent--no variations.

B. RISERS & LIDS:

1. Risers:

Risers shall be required for access to internal vaults and access into the septic tanks for septage pumping. All risers shall be constructed watertight. The risers shall be attached to the tanks such that a watertight seal is provided. Risers shall extend 3" above original grade to allow for settlement and to ensure positive drainage away from the access. Risers for inspection ports shall be a minimum of 18" in nominal diameter. Risers containing pumping assemblies or electrical splice boxes shall be a minimum of 24" in diameter and shall be of sufficient diameter to allow removal of internal vaults without removing splice boxes, etc. Risers shall be a minimum of 30" in nominal diameter when the depth of bury is 36" or greater. All other risers shall be a minimum of 24" in nominal diameter and shall vary in height depending on the depth of bury on the various tanks. Adhesive required to adhere the PVC or fiberglass risers to either fiberglass or ABS tank adapter shall be either a two-part epoxy, Model MA320 or approved equal, or a single component adhesive Model ADH100 or approved equal. To ensure product compatibility, risers, lids, and attachment components shall be supplied by a single manufacturer.

2. Inlet Risers:

Inlet risers (required only on two-compartment tanks and tanks with greater than 1500-gallon capacity) shall be ribbed PVC as manufactured by Orenco Systems®, Inc. or City-approved equal. The material shall be PVC as per ASTM D-1784 and tested in accordance with AASHTO M304M-89. The risers shall be constructed of non-corrosive material and designed to be buried in soil. Risers shall have a minimum stiffness of 10 psi, when tested according to ASTM D2412. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2". Risers shall extend to 2" above the ground surface to allow for settlement and shall have a minimum nominal diameter of 18".

3. Outlet Risers:

Outlet risers shall be ribbed PVC as manufactured by Orenco Systems®, Inc. or City-approved equal. The material shall be PVC as per ASTM D-1784 and tested in accordance with AASHTO M304M-89. The risers shall be constructed of non-corrosive material and designed to be buried in soil. Risers shall have a minimum stiffness of 10 psi, when tested according to ASTM D2412. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a

maximum vertical deflection of 1/2". Risers shall be at least 12" high, shall have a minimum nominal diameter of 24" for simplex pumping applications or 30" when used in a duplex pumping application and shall be factory-equipped with the following:

a. Electrical and Discharge Grommets: when applicable, Orenco Systems' EPDM grommets shall be installed by the manufacturer for discharge piping, vent piping, and/or the electrical conduit to assure a watertight seal. The grommets shall be installed at the factory by the manufacturer of the access risers.

b. Adhesive: When bonding to concrete or fiberglass grooves, a two-part epoxy, one pint required per 18" or 24" diameter riser and one quart required per 30" diameter riser, Model ADHP10 or ADHQ10, or approved equal shall be used. When bonding to a flanged riser tank adapter, either a two-part epoxy, Model MA320 or approved equal, or a single component adhesive Model ADH100 or approved equal shall be used.

4. Riser-To-Tank Attachment:

Risers shall be attached to tanks with one of the following attachment systems, or approved equal: (1) Orenco Systems®, Inc. Model RUBDKIT attachment kit; (2) Orenco Systems®, Inc. Model PRTA24 tank adapter used with Model PRTA24BDKIT bolt down kit, and Model MA320 or ADH100 adhesives; (3) Orenco Systems®, Inc. Model RRFTA tank adapter used with Model RRFTABDKIT bolt down kit and Model ADHP10 adhesive; (4) Orenco Systems®, Inc. Model FRTA30 tank adapter used with Model FRTA30BDKIT bolt down kit and Model ADH100 adhesive. All attachment components shall be constructed of waterproof, non-corrosive materials, such as PVC, ABS, fiberglass, or stainless steel. Adhesives and sealants shall be waterproof, corrosion resistant and approved for the intended application. The riser-to-tank connection shall be watertight and structurally sound. The riser-to-tank connection shall be capable of withstanding a vertical uplift of 5000 pounds to prevent riser separation due to tank settlement, frost heave, or accidental vehicle traffic over the tank.

5. Lids:

One lid shall be furnished with each access riser. Lids shall be Orenco Systems®, Inc. Model FL18G-4BU, FL21G, FL24-4B, FL24G-4BU, or FL30G or City-approved equal, as appropriate, fiberglass with green non-skid finish, and provided with stainless steel bolts, and wrench. Manufacturer shall provide evidence that lids have been used successfully in continuous field service for a minimum of five years to demonstrate long-term integrity and suitability for the application. Lids shall be waterproof, corrosion resistant and UV resistant. Lids shall be flat, with no noticeable upward dome.

A crown or dome of no more than 1/8" is allowable. Lids shall not allow water to pond on them. Lids shall have a green non-skid finish. Self-lubricating plastics, such as polyethylene, shall not be considered non-skid without addition of a non-skid coating. Lids shall form a watertight seal with the top of riser. Lids shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1-1/2". Lids shall be provided with tamper-resistant stainless steel fasteners and a tool for fastener removal. Tamper-resistant fasteners include recessed drives, such as hex, Torx, and square. Fasteners that can be removed with common screwdrivers, such as slotted and Phillips, or fasteners that can be removed with standard tools, such as pliers or crescent wrenches, are not considered tamper-resistant. To prevent a tripping hazard, fasteners shall not extend above the surface of the lid.

Traffic bearing lid: The traffic bearing lid shall be a cast iron frame and cover, part number 6024, 3060, 4036, as manufactured by Sather Manufacturing Co., Inc., or approved equal, which will fit over a standard lid. The cover shall have the word SEWER cast into it.

6. **Insulation (*if required*):**

Rigid closed-cell foam insulation of 2" or 4" thickness shall be mechanically attached to the underside of the lid. All fasteners shall be made of corrosion resistant stainless steel. The insulation shall have an R-value of no less than 10 per 2" increment.

7. **Riser Installation:**

Riser installation shall be accomplished according to the manufacturer's instructions.

City of Elm Springs - Water Quality & Fire Protection Plan
A financial analysis

No sewer, same inadequate fire protection & fire insurance rates
Do Nothing and cease to be a City thru Act 779 deannexations

Option 1 - Do Nothing		**??????????**
Wastewater Collection System - Septic Tank Effluent Pumping & Treatment System		
Option 2 - Complete System	**$**	**3,226,274.72**
Hooks up all residents		
Option 3 - Phased Construction	**$**	**1,445,153.49**
Hooks up 20% of residences but installs complete collection & treatment facilities		

Approximate Cost per new Fire Hydrant & Lines	**$**	**3,500.00**
Includes $2,500 per hydrant plus $1,000 for each related excavation, R.O.W., design & inspection cost		
Number of Fire Hydrants needed (approximate)		**50**
Total Cost - Fire Protection Improvements	**$**	**175,000.00**
Total Project Cost - All sewer & all water now	**$**	**3,401,274.72**
Total Project Cost - Phased Sewer & all water	**$**	**1,620,153.49**

The complete system alternative has been studied and found to be too expensive to undertake with the existing population and rate base available. The following alternatives are provided based upon best available engineering estimates. Interest rates and loan fees were provided by the Arkansas Soil & Water Conservation Commission on 9/17/2001. The estimated number of total residences as determined by the Preliminary Engineering Study was 400. Springdale Water currently serves 373 customers. Approximately 27 other residences use wells. For purposes of analysis, the 400 residences will be used as the rate base. It is assumed that all residents will pay the monthly service charges, but only 20% will initially be hooked up to sewer. All residents will benefit from improved fire protection ratings and reduced property insurance rates. As part of the program, a periodic inspection and installation program for septic systems would be implemented, first targeting failing systems.

Bond money is available from the following sources:

Soil & Water Commission General Obligation Bonds	**Rate 5.5% Term 30 yrs**
Pollution Control Revolving Funds	**Rate 3.25% Term 20 yrs**
RDA Bonds	**Rate 5.16% Term 40 yrs**

The City Council and the study committee chose the Revolving Fund loans for the rate and term.

Calculations below assume the costs of the water system are rolled into loan. City is anticipating capital contributions of $250,000 plus $50,000 yr

ITEM		Estimated Costs
Total Project Cost incl. Origination		$ 1,620,153.49
Net + 3% Origination Fee		$ 1,668,758.09
6 months debt service reserve		$ 50,000.00
Less Capital Contributions from City General Fund		$ (250,000.00)
Loan Amt (PV)		$ 1,468,758.09
Interest Rate (i)		3.25%
Term in years (n)		20
Loan Points		3%
Market Interest Rate		0.00%

Effective Loan Amount after Points	**$**	**1,424,695.35**
Monthly Payment	**$**	**8,330.73**
Number of Residences		**400**
Monthly Debt service per customer	**$**	**20.83**
Operations & Maintenance Costs (Annual)	**$**	**25,000.00**
Continuing Installation & Administration	**$**	**25,000.00**
City Contribution to cover O & M, Installation & Administration	**$**	**50,000.00**
Base Monthly Fee - All residences	**$**	**20.83**
User surcharge	**$**	**5.17**
Monthly User Fee for Normal Useage	**$**	**26.00**
Connection Fee	**$**	**1,000.00**
Low & Moderate Income Reduction (< $20,000 annual)		**(800.00)**
Connection Fee after first year	**$**	**1,500.00**

PROOF OF POSTING OF ORDINANCE

STATE OF ARKANSAS

COUNTY OF Washington

We, Ed Thiesse and Glenda Pettus do solemnly swear that as Mayor and City Clerk, respectively, of and for the City of Elm Springs, Washington County, Arkansas, that a certified copy of Ordinance No. 2007-05 (the "Septic System Ordinance") was, on the 13th day of May, 2007, duly posted in five (5) separate and distinct places inside the corporate limits of the City in accordance with Ordinance No. 01-10, and that the Ordinance remained posted for thirty (30) days.

DATED this 13th day of May, 2007.

Edward Thiesse
Mayor

Glenda Pettus
City Clerk

(SEAL)

SUBSCRIBED AND SWORN to before me, a Notary Public, on this 13th day of May, 2007.

Linda L. McVittie
Notary Public

My Commission Expires:

8-24-2008

LINDA L. McVITTIE
NOTARY PUBLIC STATE OF ARKANSAS
BENTON COUNTY
My Comm. Expires 8-24-2008