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To Those Seeking Information About Foundation Repair Methods:

The following pages contain an objective comparison of the two most widely used foundation repair methods available in the Houston area. These two methods are the Bell Bottom Pier method (also known as the Drilled and Poured Pier), and the Hydraulically Driven Piling method (also known as the Friction Piling, Pressed Piling, or Segmented Piling), the latter using high strength, pre-cast, reinforced concrete cylinders, usually 6 inches in diameter and 12 inches in height.

Other methods, such as helical piers, square block pilings, steel pilings, foundation watering and lawn drain systems, root barriers, and others, are not within the scope of this comparison. These are specialty techniques which only have very limited usage parameters, and are not part of the main line of foundation repair techniques, and are not typically FHA, VA, or Conventional Loan approved methods of foundation repair. They have mainly preventative benefits, not corrective benefits.

This comparison is based upon this Professional Engineer's years of experience, encompassing thousands of foundation repair projects, in all of the more than 30 types of soils in the Houston area and surrounding counties. It is the intention of this comparison to clearly and concisely state the relevant facts, in a purely objective manner, leaving it to the reader to draw their own conclusions based upon the facts. MY hope is that the reader will gain a better understanding of these two foundation repair methods, thereby having enough information to make the right choice for their own situation.



17 October 2017

Sincerely:

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OBJECTIVE COMPARISON OF FOUNDATION REPAIR METHODS

Bell Bottom Piers

Vs.

Hydraulically Driven Pilings

1) HISTORY

BELLS: Developed over 70 years ago to temporarily stabilize residential foundation movement in select soils and for most loads. Mainly used today in new home construction.

PILINGS: Pile driving technology was developed over a thousand years ago in Europe to build, level, and stabilize any number of structures, from bridges to great cathedrals and castles.

About 35 years ago, Structural Engineers at The University of Houston, among others, developed, thoroughly tested, and secured FHA and VA approval for a residential foundation repair application.

Today, reinforced, aligned, and connected cylindrical concrete pilings are the industry standard.

2) REGULATION

Both methods are approved by FHA, VA, and Conventional lenders, and by all City Codes.

Maximum spacing of 8 feet on center for one story homes; 6 feet on center for two story homes.

3) WARRANTY

BELLS: Lifetime Transferable Service Agreement. Charges apply to adjust or access piers. Usually transferable one time for a fee, and with a 30 day time limit restriction. Voiding clauses apply.

PILINGS: Lifetime Transferable Warranty – Usually no charges to adjust pilings, transferable any number of times. Some types can be voided for certain reasons, or have transfer fees, time limits.

4) ENGINEERING REQUIREMENTS

BELLS: Pier depth and bell diameter are CRITICAL to performance. Extensive soil testing and load evaluation MUST be performed by Registered Professional Engineer, PRIOR to calculating the exact pier size. Before pouring concrete, pier holes MUST be inspected by the Engineer of Record to ensure that specifications for depth, shaft and bell size, and steel reinforcements have been strictly adhered to. Approximate additional job cost for soil testing, inspections and certifications: \$1,500.

PILINGS: No soil test is required as pilings are Pre-engineered to test the soil load capacity as the properly aligned and reinforced piling is hydraulically driven into the ground, creating a 3:1 or 4:1 Safety Factor. Piling depths and final hydraulic pressure readings should be logged on the final completion drawing and then certified by a Registered Professional Engineer.

5) LIFE EXPECTANCY

BELLS: If soil tested, designed, inspected and installed correctly, adjustments will usually be needed within 5 years or less, and have a failure rate of approximately 24% within 10 years – (Industry average).

PILINGS: Standard 6000 PSI (6 X 12) unconnected cylinders, driven to depth of refusal, will have virtually no failure rate, but will have an adjustment rate of about 40% within the first 10 years. Locking piling varieties, which incorporate steel cables or 5/8" bolts to securely align, tension, and connect the pilings often have no need for re-adjustment for 20 years or more.

6) **COST COMPARISON**

BELLS: In addition to the afore mentioned up-front costs for soil testing by independent soil engineers, Base line, small **TYPE A** Piers (9inch shaft, 10ft deep, 24 inch bell), exterior piers: \$550. to \$675 each. 2nd tier, medium size **TYPE B** Piers (12 inch diameter shaft, 12 feet deep, 36 inch bell) Exterior: \$875.00 Top tier, large size **TYPE C** Piers (14 inch shaft, 14 feet deep, 42 inch bell) Exterior approximately \$1,500.

PILINGS: No soil testing required. Pilings test soil as they are driven into the ground. Base line, solid, unconnected pilings \$350 - \$400. each exterior. Top tier pilings - Locked, connected, tensioned and properly aligned pilings \$400. - \$500. each exterior. For interior, add about \$100 to either method for interior cleanup.

7) **JOB TIME**

BELLS: Usually 4 – 7 weeks to complete the job due to long concrete curing times of up to 28 days, per A.C.I. STANDARDS. Weather delays can fill the pier shaft holes with water and can collapse pier shafts forcing new shafts to be drilled at a later date. A huge amount of dirt must be moved, creating challenges.

PILINGS: Usually 1 to 5 days total job time. Concrete cylinders are pre-cured prior to arrival at job site, and strengthened to 6,000 P.S.I. at the factory, compared to bell concrete strength of 3,000 P.S.I. Weather delays are minimal with pilings, Cleanup is much easier and usually without loss of plants.

8) **LANDSCAPING**

BELLS: Longer job time, heavy equipment, and the sheer amount of dirt involved usually destroys lawns and landscaping.

PILINGS: Much shorter job time and no heavy equipment required drastically reduces re-landscaping problems and costs, Fewer plants need to be removed, grass rarely dies.

9) **REMEDIAL REPAIRS**

BELLS: Recommend waiting a minimum of 4 – 6 months after job completion before any repairs or remodeling is done. Initial load transfer to new piers will require time to adjust to the new support piers. Mud pumping can reduce the wait time, but often leads to heaving problems iafter a short interval.

PILINGS: Recommend waiting a maximum of 4 – 6 weeks after job completion before any repairs or remodeling is done. There are no load transfer problems, as the load was used to determine the piling depths, and there should already be a 3:1 or 4:1 safety factor build in. No mud pumping is usually needed, reducing the possibility of heaving. The wait time with pilings is due to allowing time for nails behind the walls to go back together again. Some companies speed this up by manually adjusting door frames, etc..

10) **OVERALL CONSIDERATIONS**

BELLS: The most important consideration if choosing bell bottom piers is to consider the type of soil your structure resides on, and the depth of load bearing clay. Having an independent engineer test the soil and design the correct size and depth, while expensive, is extremely critical to the longevity of the repair. The warranty provisions, overall higher construction costs, and the ancillary costs in time, landscaping, and extra remedial repairs are also important factors. Bells usually have service agreements, not warranties.

PILINGS: The most important consideration if choosing a piling system is to find out how the concrete cylinders are connected. Un-connected cylinders typically won't last as long as connected cylinders, and that leads to continuing costs for remedial repairs. Make sure that company engineer will certify how deep the pilings were driven, and that the hydraulic pressures held. Warranty provisions have changed drastically in the recent past. Some are voidable for a variety of reasons, and some have time limits before extra charges apply. Read warranties and contract documents carefully for either foundation repair method.

In addition, checking references, Texas Workman's Compensation certificates, and if the company is a Certified Foundation Repair Specialist (CFRS) will help you find an experienced contractor.