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Evaluation of Standard Right-Of-Way Fence Post Anchors Versus Drive Anchors

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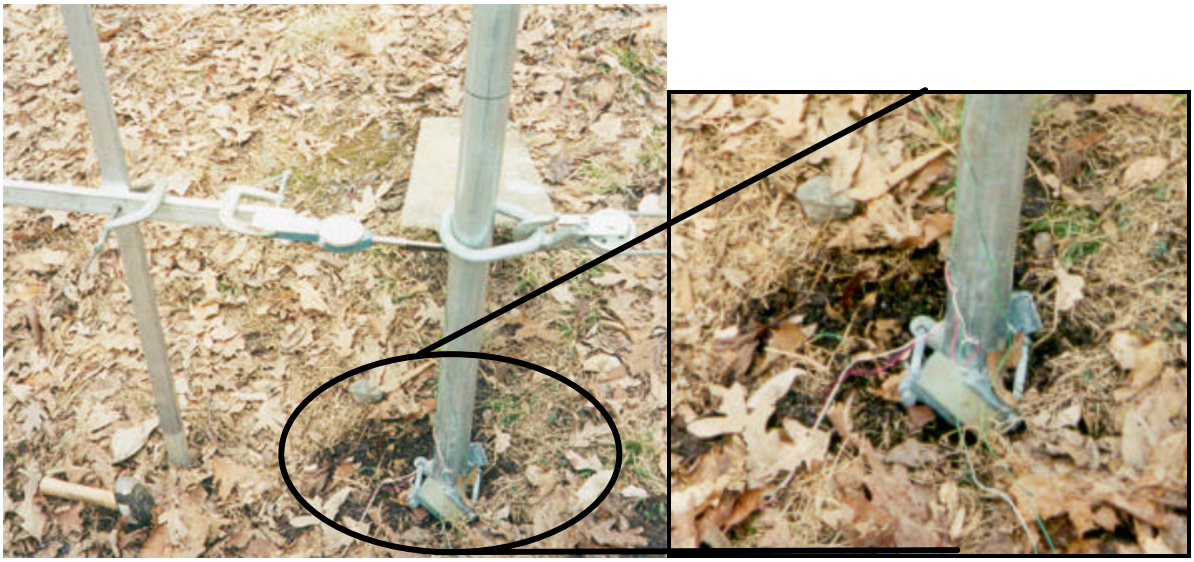
HERE IS THE PROBLEM…

Right-of-way fence installation has not received a great deal of literary attention in past years. Traditionally, common construction practice utilized concrete for fence post footings. In areas that are difficult to access, such as wetlands, steep roadway cuts, and wooded terrain, commonly associated with locations that require right-of-way fencing, alternative simple system footings are sometimes used. Recent roadside field installations have demonstrated a potential for satisfactory performance of these simple systems. The main objective of this research is to compare the viability of drive anchors with that of concrete foundations.



BACKGROUND INFORMATION…

Typical installation of fence posts would follow a set procedure. A hole would be dug on the side of the road, a post would be inserted into the hole, and then a concrete truck would come alongside the road and pour concrete into the hole. The workers would move on down the line installing post after post in this manner for the length of the fence. After the concrete has cured (an average of seven days), the workers would come back and stretch and install the fabric. This was an excellent procedure for roadways in places where a concrete truck could come up and pour the concrete. However, this installation process is problematic in hard to access areas.

In difficult to reach areas, another method of installation was used, where "drive anchors" grip the soil around the post. The anchor method was more labor intensive, but there is a time benefit since you do not have to wait for the concrete to cure.

These two options have been available in the New Jersey Department of Transportation (NJDOT) fence installation guidelines for contractors, but there had never been a comparison done to determine which was a better method.

Based on installation times for this project and estimates given by contractors, both methods can install roughly 100 posts per day.

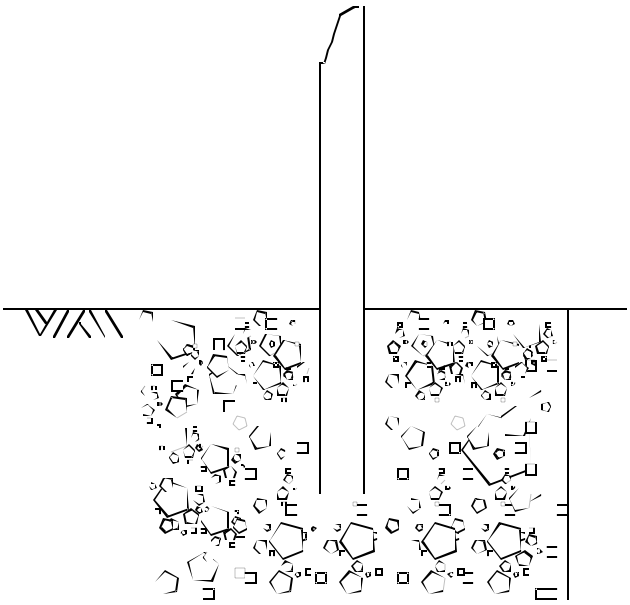
HERE IS WHAT WE DID…

The posts were loaded using a standard ratchet attached to a data acquisition unit. The other end was attached to a standard track bulldozer that was considered a fixed point. A deflectometer was installed to measure the amount of deflection in the pole at a fixed height of 2' above grade. The ratchet was used to incrementally load the post system. Manual readings of the deflectometer were recorded along with the load value at that point.

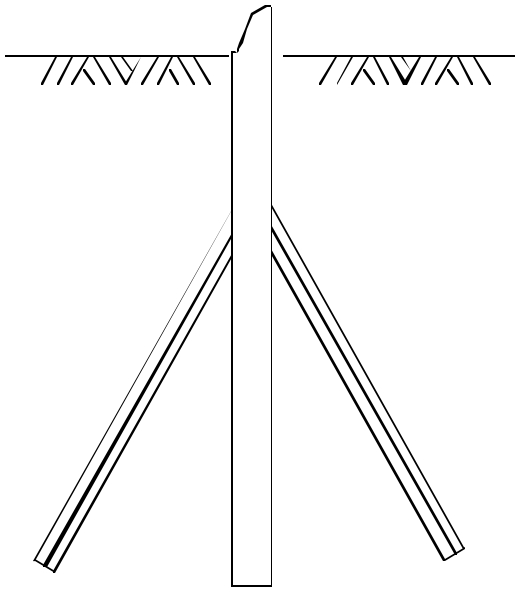
The goal of the analytical simulation and field experimentation was to both quantitatively and qualitatively compare the performance of the concrete fence footing system versus the drive anchor fence footing system under static loading. The focus of the experiment was to compare and evaluate the viability of the two fence post systems by comparing performance and cost of materials. Field testing and an FEM analysis were conducted to evaluate the deflection performance when a static load was applied to each post system at two feet above grade on the posts installed in "concrete" versus "drive anchors."

The two post types had different mechanisms of failure. When the post in concrete failed, the plastic strains caused an above grade material failure of the post. When the drive anchor post failed, the plastic strains caused a below grade deformation failure of the soil. The FEM analysis predicted that most of the deformation of the drive anchor system would be a result of soil deformation, rather than post deformation. This

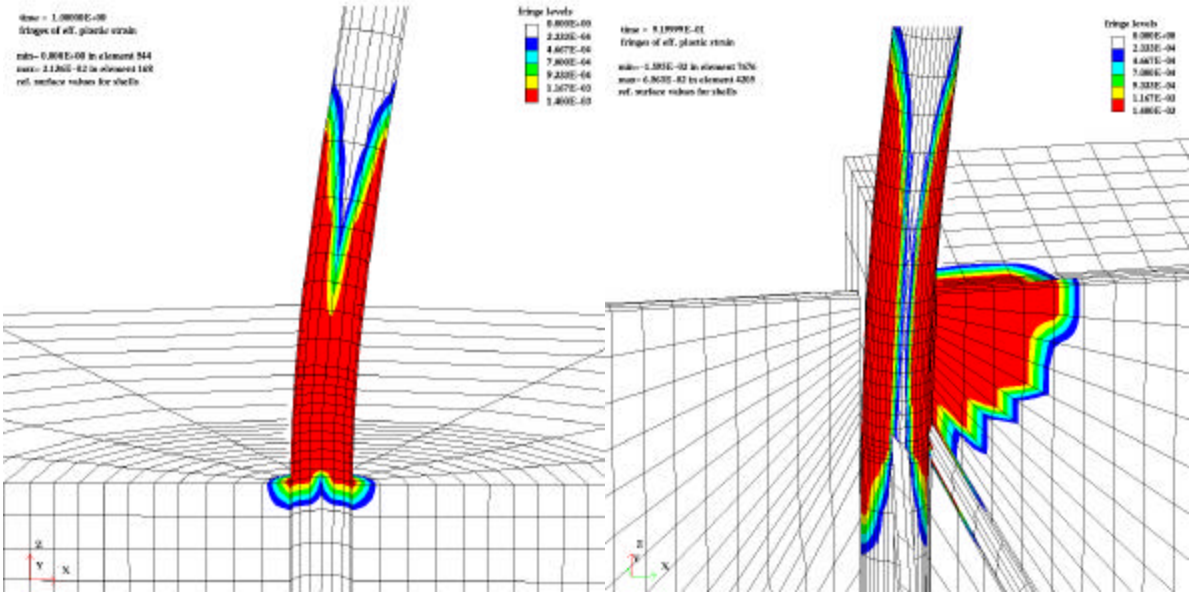
hypothesis was confirmed by the experimental tests. The tests revealed that the drive anchor system posts tilted with little to no failure in the post material, indicating that the majority of the failure occurred in the soil. The drive anchor system is capable of distributing the lateral loads better throughout the post, anchors, and soil.



Concrete Footing



Anchor System



Based on the field-testing results for the 2.5-inch diameter fence post installation, the experiment revealed that all of the posts experienced roughly the same deflection versus loading. Thus, these systems can be considered roughly equivalent.

For the 3-inch diameter systems, a failure criteria based upon mesh failure, was established at 1,688 pounds for the experiment's specific testing setup. All of the post installations were able to withstand the test loading. However, the results did reveal that the concrete posts obtain a significantly higher loading with less deflection than the drive anchors. Nonetheless, since they both performed within tolerable limits, it appears that these systems can be used interchangeably.

CONCLUSION…

From the field tests and the FEM analysis, the drive anchors and the concrete systems both performed within tolerable limits established in this study. In regards to the financial viability in areas where only manual means of installation could be used there was a significant cost savings in favor of the drive anchors. Hence, the results indicate that the drive anchor and the concrete systems can be used interchangeably.

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A final report is available online at http://www.state.nj.us/transportation/research/research.html

If you would like a copy of the full report, please FAX the NJDOT, Bureau of Research, Technology Transfer Group at (609) 530-3722 or send an e-mail to Research.Bureau@dot.state.nj.us and ask for:

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