



RESIDENTIAL DESIGN USING FP278

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Introduction

95% or more of Fuller Pile foundation designs for residential structures use the FP278 pile and take advantage of the strength, stiffness, and installation benefits associated with this pile. The FP278 has been optimized for residential structures and special modifications are available for structures with abnormally high lateral load demands or when desired by the engineer of record. As shown in Figure 1(a), the standard FP278 pile can structurally resist ultimate (i.e., LRFD) demands at the pile head of 100 k compression, 40 k tension, 120 k-in flexure, and 41 k shear. In most cases, these values exceed demands determined by the engineer of record or residential designer. Practically speaking, it should be noted that geotechnical resistance usually limits the ultimate shear applied at the pile head to 5 k per pile. Higher values typically result in bending moments that exceed the ultimate flexural strength of the standard FP278 pile.

Special Modifications or a Larger Pile?

FP350, FP450, FP550, and custom Fuller Piles are available for residential projects but these commercial piles are usually significantly stronger than needed for residential foundation projects. To address special cases where the engineer of record desires pile strengths greater than those presented above, Fuller Pile engineers and researchers have developed cost effective FP278 modifications that provide significantly increased strength and stiffness with only a nominal increase in pile cost. The reason for the success of the special modifications is that parametric studies of Fuller Piles has shown that the upper 5-10 ft of the piles resist the majority of the lateral demands applied to the pile head. Therefore, strength and stiffness modifications are typically only required in the upper pile extension.

Special Modification Options

In some cases, the optimal solution for the pile modification is to use a custom pile splice between the upper two pile extensions that allows for the top pile extension to be an FP350 section. This option is shown as Figure 1(b). However, in most cases, a stronger, stiffer, and more economical solution is to use Fuller Pile's custom 16 in. x 3 ft augered pile connection to the pile cap. The augered 3 ft deep section at the pile head is filled with grout to increase the pile stiffness, and reinforcement is often added to provide additional strength as well. This simple patent pending connection detail only applies in the upper 3 ft of the pile such that the cost of the pile per ft is not significantly increased above that of the standard FP278 residential pile. The reinforcement shown in Figure 1(c) is example reinforcement and the actual amount required is project specific.

Increased Strength Associated with 3 ft Augered Connection Details

Fuller Pile researchers have determined that the special modification auger detail described above and shown in Figure 1(c) substantially increases the geotechnical and structural resistance of the FP278 pile. For example, the practical limitation of 5k per pile at the pile head described above for the standard FP278 pile is doubled to 10 k per pile when the augered connection is added.

Conclusions

As discussed in this technical note, the standard FP278 Fuller Pile is the best option for most residential projects. When the ultimate lateral load at the pile head exceeds 5 k, designers should strongly consider the FP278 pile with our patent pending augered connection detail that can resist an ultimate lateral load of up to 10 k per pile.

Fuller Pile™ Technical Note 5-22

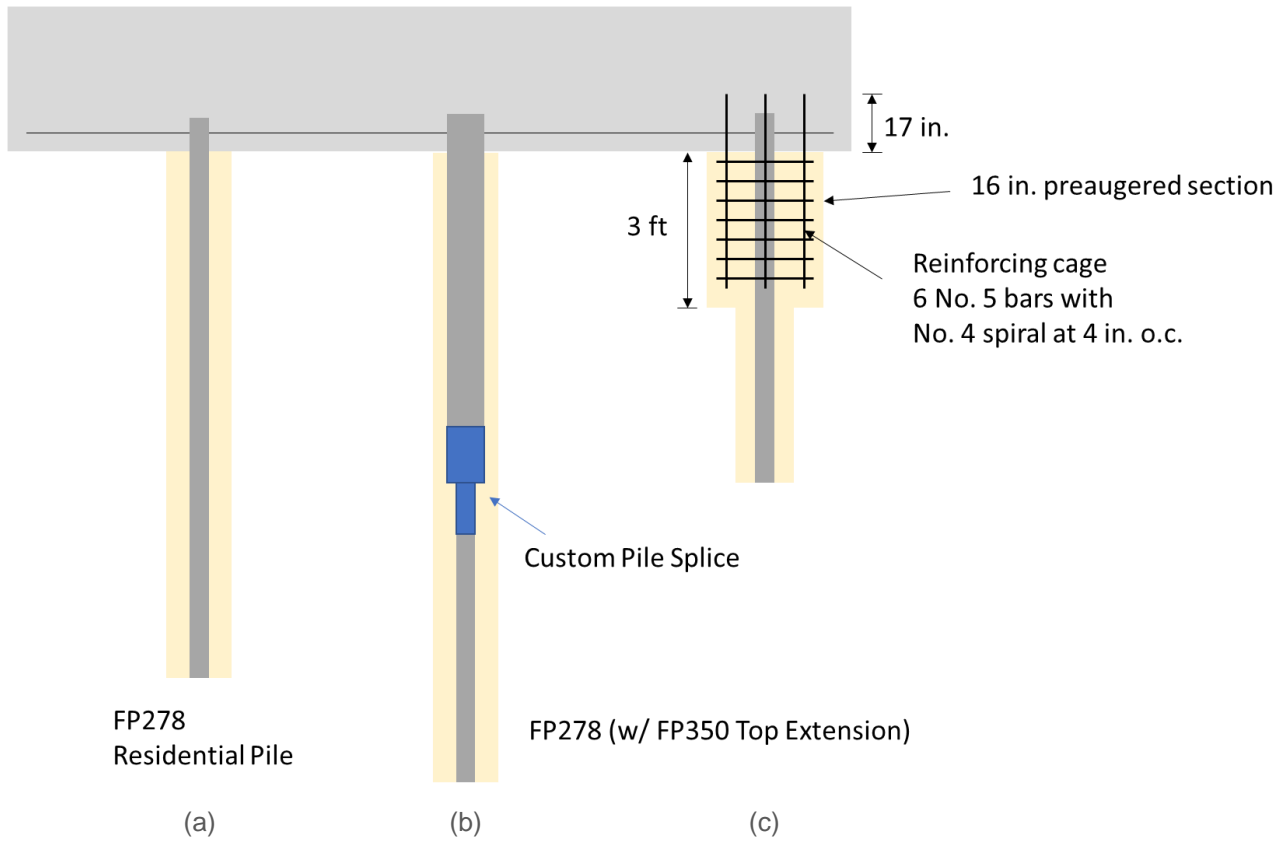


Figure 1. Optimal Fuller Pile residential design details for FP278 piles.