



## *TEMPORARY AND PERMANENT FULLER PILE™ RETAINING WALLS*

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### **Introduction**

Temporary retaining walls are often needed on construction projects to stabilize soil adjacent to an excavation or to help perform other site modifications. Permanent retaining walls are often desired to retain soil in a manner that is aesthetically pleasing to the owner. Fuller Pile™ Retaining Walls can be economic and efficient solutions to many retaining wall projects. There are various types of retaining walls used in practice including gravity walls, reinforced concrete walls, sheet pile walls, soil nail walls, MSE walls, and retaining walls constructed using soldier piles with lagging. Fuller Pile™ Retaining Walls are classified as soldier pile with lagging walls (Figure 1). Soldier pile and lagging details are designed by Fuller Pile™ delegated designers for the design life of the project or as otherwise specified by the owner or owner's agent.

### **Cantilevered and Tied Retaining Walls**

Fuller Pile™ Retaining Walls can be designed and detailed as cantilevered or tied retaining walls. From an overall cost perspective, soldier pile size is minimized and spacing is maximized where projects have less soil height retained or where ties are used near the top of the wall. Traditional FP450 and FP550 piles are commonly used as soldier piles, but larger Fuller Pile™ sections are available where ties at the top of the wall are not an option due to site, or other, constraint. Fuller Pile™ tiebacks are smaller, ungrouted, Fuller Pile™ sections that have custom bearing plates that allow for simple installation into the resisting soil zone and connection details that ensure efficient and tight installation to the Fuller Pile™ provided waler.

### **Delegated Design of Fuller Pile Retaining Walls**

As with all Fuller Pile™ products, Fuller Pile™ Retaining Walls are designed by our team of engineers working as delegated designers. Where applicable, shop drawings and calculations are submitted to the engineer of record for each project.

### **Preliminary Design Aids for Fuller Pile Retaining Walls**

To aid contractors and engineers considering Fuller Pile™ Retaining Walls, Table 1 (cantilevered) and Table 2 (tied) present preliminary maximum spacing requirements of typical Fuller Pile™ soldier piles that may be appropriate for many projects. Note that the tables assume a factored 50 psf/ft active pressure and a maximum moment (Table 1), or full lateral restraint (Table 2), 4 ft below excavated grade. Actual soil conditions may vary significantly from those assumed in these tables and final delegated design performed by the Fuller Pile™ engineering team will consider the actual soil conditions and fully modeled structural response as applicable to the project. Where tied retaining walls are used, Table 3 presents minimum preliminary tie forces associated with the walls defined in Table 2. Note that soldier pile deflection along the pile length is not provided in the preliminary design tables of this Technical Note but they will be calculated during final design. Where  $h$  exceeds 10 ft, an additional mid-height waler can be used so that the Fuller Pile size and spacing indicated in Table 2 can be modified to a more economical design in some cases.

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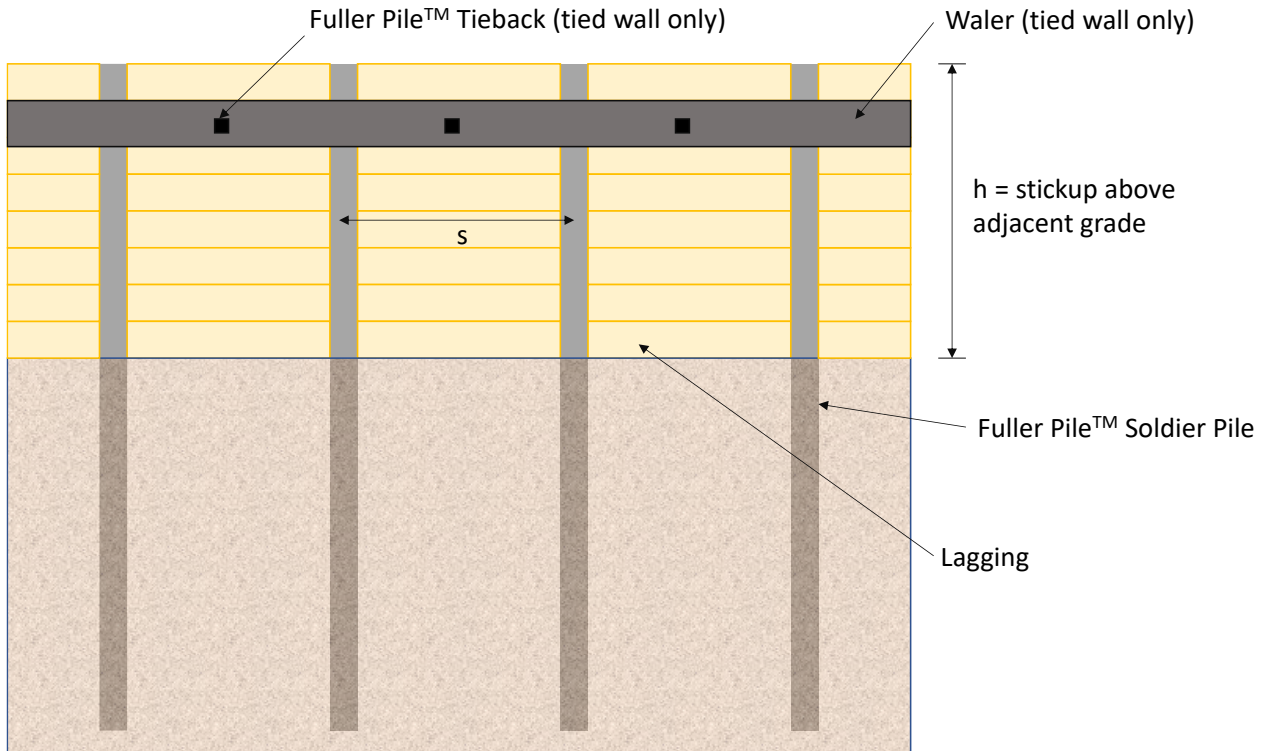


Figure 1. Typical Fuller Pile™ Retaining Wall details.

Table 1. Minimum required Fuller Pile™ soldier pile size for cantilevered retaining wall.

h (ft)	s = 3 ft	s = 4 ft	s = 5 ft
2	FP350	FP350	FP350
3	FP350	FP350	FP350
4	FP350	FP450	FP450
5	FP450	FP450	FP550
6	FP450	FP550	FP550
7	FP550	FP550	NA*
8	FP550	NA*	NA*

\*Larger custom size Fuller Pile™ section is available

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Table 2. Minimum required Fuller Pile™ soldier pile size for tied retaining wall.

h (ft)	s = 3 ft	s = 4 ft	s = 5 ft
2	FP350	FP350	FP350
3	FP350	FP350	FP350
4	FP350	FP350	FP350
5	FP350	FP350	FP350
6	FP350	FP350	FP450
7	FP350	FP450	FP450
8	FP450	FP450	FP450
9	FP450	FP450	FP550
10	FP450	FP550	FP550
11	FP550	FP550	NA*
12	FP550	FP550	NA*
13	FP550	NA*	NA*
14	NA*	NA*	NA*

\*Larger custom size Fuller Pile™ section is available

Table 3. Minimum required Fuller Pile™ factored tie force (k) for tied retaining wall.

h (ft)	s = 3 ft	s = 4 ft	s = 5 ft
2	0.90	1.20	1.50
3	1.23	1.63	2.04
4	1.60	2.13	2.67
5	2.03	2.70	3.38
6	2.50	3.33	4.17
7	3.03	4.03	5.04
8	3.60	4.80	6.00
9	4.23	5.63	7.04
10	4.90	6.53	8.17
11	5.63	7.50	NA
12	6.40	8.53	NA
13	7.23	NA	NA
14	NA	NA	NA