

4.1 Summary Description

The SmartJack® System is installed within a crawl space to provide supplemental vertical support for the structure's floor system. SmartJacks are installed adjacent to existing settling columns, along the span of floor joists, and along the span of primary and secondary beams and girders. The SmartJack may be considered as supplemental column support where an existing column and pier foundation has settled, or as supplemental support to the structure's wood framing. The wood framework of the floor system may yield or sag over time as a result of:

- the unsupported length of joists, beams or girders being greater than the spanning capability of the members,
- exceeding design floor load values after construction, and
- weakening of members due to high moisture conditions typical in crawl space environments.

The SmartJack may also be used as supplemental column support where an existing column and pier foundation has settled.

The system often consists of a two-foot square by two-foot deep excavation backfilled with crushed stone or recycled concrete, a steel or aluminum base, round or square steel tube, all-thread rod, and a top bracket (*Figure 4.1*).



Figure 4.1 Rendering of Model 350 SmartJacks providing supplemental support for joists in a crawl space

Technical specifications for both the Model 288 (2.875-inch O.D. tube) and Model 350 (3.50-inch square tube) SmartJack systems are included in Appendix 4A. Each system offers multiple top bracket and base options. Top brackets are available to support existing beams and new supplemental wood beams, to capture and support commonly considered structural steel shapes used as supplemental beams, and to splice steel supplemental beams over a SmartJack post for a continuous beam installation (*Figure 4.2*). Base options are sized for bearing on poured concrete footings, a cube of compacted crushed stone, and existing soil determined to be of adequate strength.

The 288 and 350 systems function similarly and follow similar installation steps, even with the details of the components being different throughout. The 288 SmartJack utilizes a 2.875-inch O.D. round steel tube as the post and generally slip-fit connections between components.

The 350 SmartJack was designed with a 3.5-inch square steel post and component details that allow positive connections to be made between all components of the system, from the supplemental beam down to the post base. These connections are generally made with self-drilling screws. Another feature/benefit of the 350 system is that the adjustable all-thread rod can be “locked” in position following installation, while also allowing future adjustability, if necessary. This is accomplished by lining up the drilled holes in the all-thread rod and top bracket and installing a ¼-inch diameter bolt and nut. These screwed and bolted connections do not affect the capacity of the system and should be considered optional and at the discretion of the contractor, project engineer, or building official. If positive connections are not required, simply leave the pre-made holes open and without fasteners.

A poured concrete footing may be considered in lieu of, or as a partial replacement for, the cube of crushed stone. The crushed stone, however, is an important feature to the SmartJack system and offers several benefits. First, the crushed stone replaces potentially weak and moisture sensitive soils near the surface to minimize potential SmartJack movement due to changes in the bearing soil's moisture content or density. Well-compacted crushed stone also effectively supports the higher bearing pressure conditions immediately below the base and then transfers lower pressures to the surrounding soils. Lastly, use of compacted crushed stone versus a poured concrete footing allows for SmartJack installations to most often be completed in one day.

Foundation Supportworks also offers a large (16 inches by 36 inches) aluminum plate footing for applications where the floor movement is caused by sagging beams or joists, and NOT weak soil conditions. Surficial loose, soft, wet or dry soil is removed down to adequate bearing, a sand or cement-sand leveling course is placed (as needed), and the plate footing is set. The plate footing distributes load to the soil similarly as a 2-foot square poured concrete footing, while also allowing for an expedited system installation versus waiting days for concrete to cure. The plate footing was designed for use with the 350 SmartJack System, but is also compatible with the 288 SmartJack post.



Figure 4.2 Optional Model 350 bracket details for connecting to and splicing wood and steel beams (Left to right; plate bracket, u-bracket, splice bracket).

4.1.1 Advantages

- Installs in tight conditions where height or access is limited
- Crushed stone footing “system” effectively transfers load to existing soils
- All-thread rod allows for fine vertical adjustments
- Immediate stabilization and results
- Steel components are galvanized and electrozinc plated for corrosion resistance
- Usually installed in less than one day
- Can be installed in conjunction with a crawl space liner
- Positive, secure connections can be made between all components - *350 SmartJack System*
- All-thread rod can be locked in position, but still allow future adjustability, if needed - *350 SmartJack System*

4.2 Installation Steps

The following steps provide a broad overview of a typical SmartJack system installation. Intermediate steps, installation equipment and tools used, and considerations for unusual conditions or applications are not addressed. Optional base and footing details as well as top connection details to the beams, girders and floor joists may also be considered.

Step 1

Two-foot cube of soil is excavated and the hole is backfilled with compacted crushed stone (*Figure 4.3*).



Figure 4.3

Step 2

Post Base is placed on the crushed stone, centered under the beam, and leveled to accept the SmartJack post (*Figure 4.4*).



Figure 4.4

Step 3

Galvanized steel tube is cut to the appropriate post length (*Figure 4.5*).



Figure 4.5

Step 4

Steel post and other components are assembled, plumbed, and connected to the beam (*Figure 4.6*).



Figure 4.6

Step 5

SmartJack System is tightened in place, stabilizing the joists, beams, or girders and potentially lifting the above floors and walls back toward level (*Figure 4.7*).



Figure 4.7

Step 6

Completed 350 SmartJack installation in conjunction with a crawl space liner (*Figure 4.8*). 350 SmartJack with top U-bracket, 12" base and secure connections throughout (*Figure 4.9*). 350 SmartJack with large plate footing, no fasteners (*Figure 4.10*).



Figure 4.8



Figure 4.9



Figure 4.10

4.3 SmartJacks with Push Piers

A popular system variation involves installation of 288/350 SmartJacks on installed push piers. Refer back to Section 2.11.1 for a detailed description and installation guidelines.



Figure 4.11 Graphic of push pier/SmartJack installation. Backfill around base of SmartJack not shown for clarity. Backfill is required.