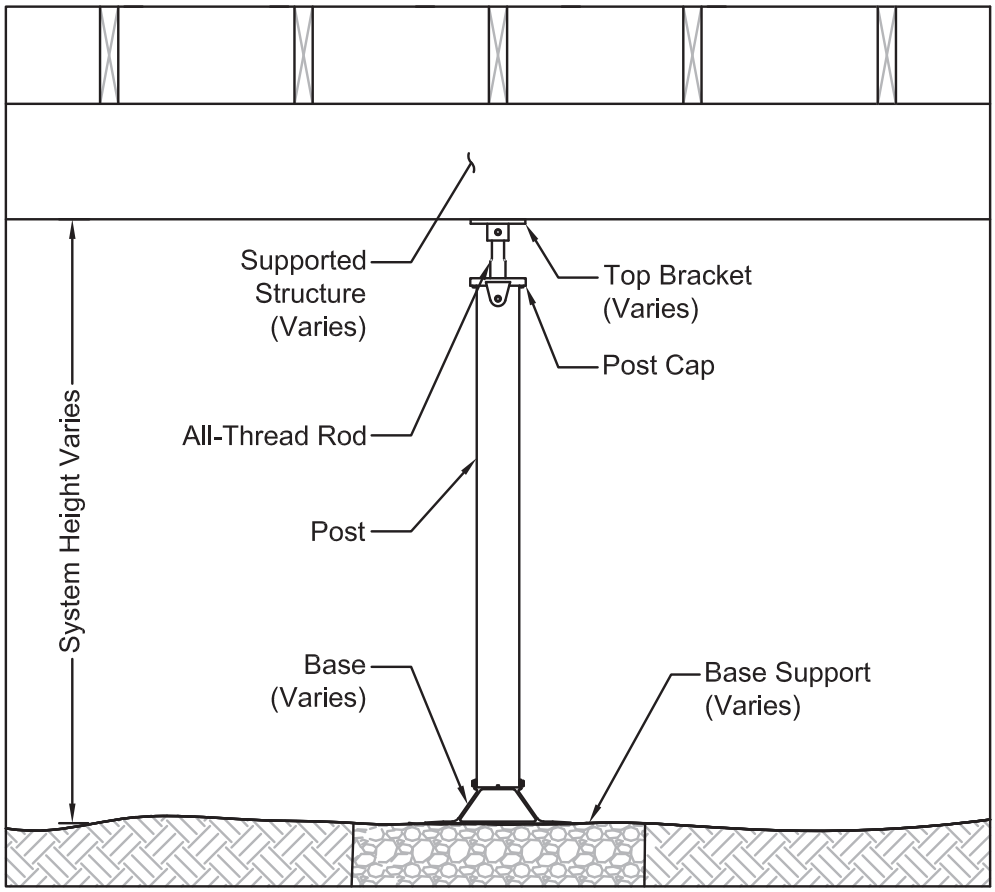
MODEL 350 SMARTJACK® SYSTEM

General Arrangement



Allowable Capacity

The allowable system compression capacity of the assembled SmartJack system is limited to the least value of the component capacities used in the system assembly. The component capacities are listed in the *Technical Specifications* section.

The allowable load applied to the SmartJack system may be limited by the bearing capacity of the existing soil. The well-compacted crushed stone or recycled concrete base is a proven method to increase support for the higher bearing pressure condition immediately below the aluminum base, and then to absorb and distribute lower pressures to the existing soils. Should settlement of the SmartJack system occur, adjustments are made easily by extending the all-thread rod.

The SmartJack is designed to support axial compression loads only. The SmartJack does not provide resistance to tension or lateral loads.

Top Bracket Variations

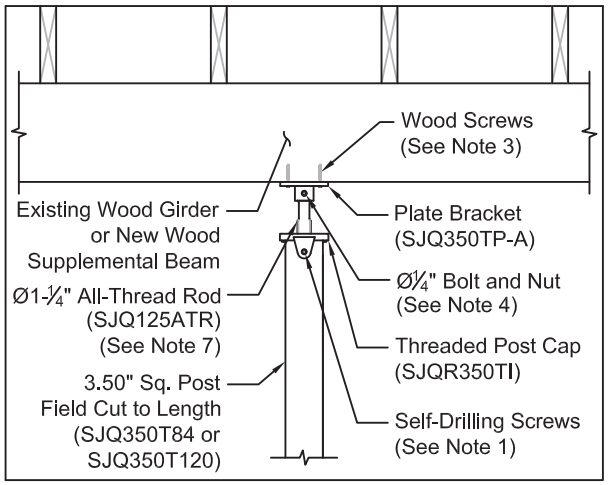


Plate bracket with new or existing wood girder

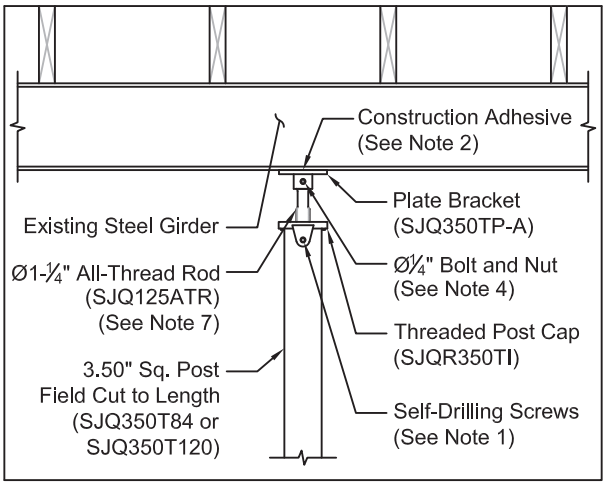
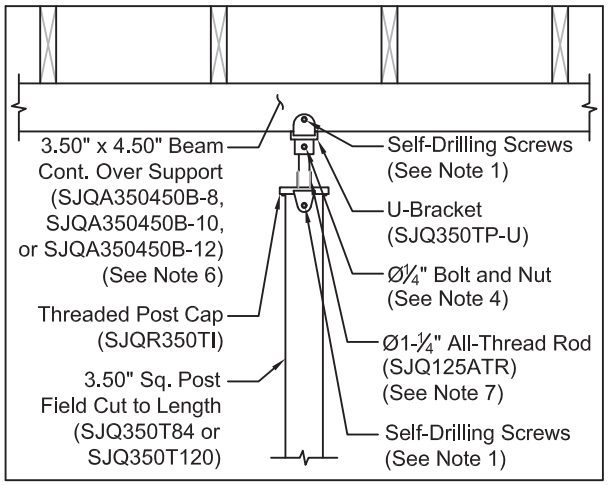
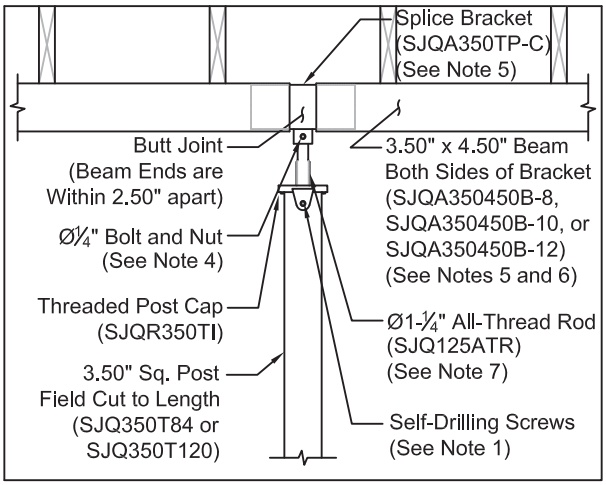


Plate bracket with existing steel girder



U-bracket with new 3.5" x 4.5" supplemental SmartJack® beam



Splice bracket with new 3.5" x 4.5" supplemental SmartJack beam

(1) #14 or ¼" self-drilling screws may be used as an optional feature to maintain positive attachment between components.

(2) Construction adhesive should be used in interior *basement* applications to maintain positive attachment to a supported steel beam.

(3) Wood screws may be used as an optional feature to maintain positive attachment to a supported wood beam.

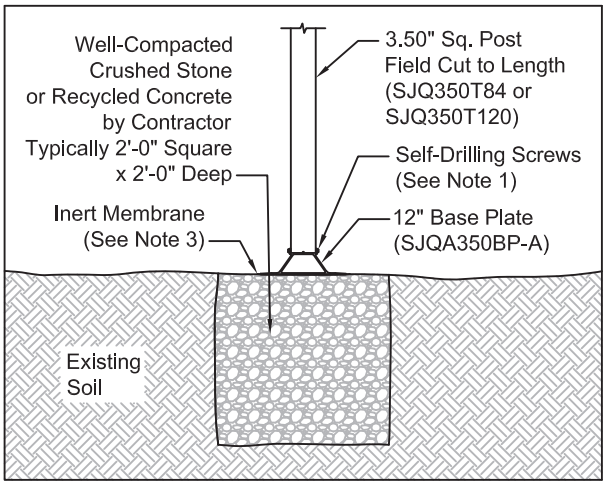
(4) ¼" bolt and nut should be used when disabling of the height adjustment mechanism is required. This bolt and nut may also be used as an optional feature to maintain positive attachment to the all-thread rod.

(5) Splice bracket should only be used at interior supports when supporting beams of similar length on both sides. Splice brackets shall not be used to support cantilevered beams.

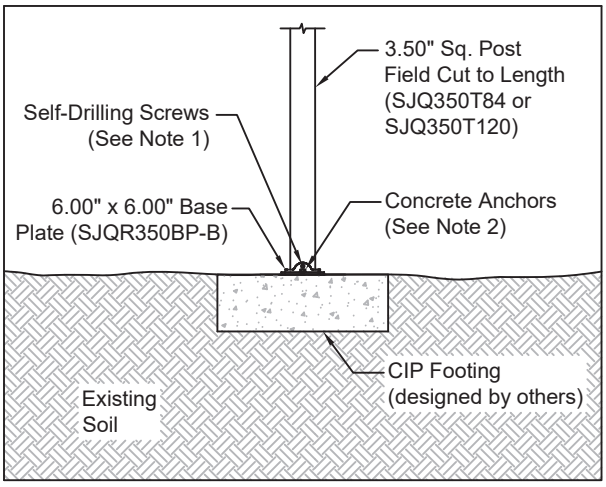
(6) Additional requirements for the support of cantilevered beams can be found within the design example later in this appendix.

(7) All-thread rod must be fully engaged through the thickness of the threaded post cap.

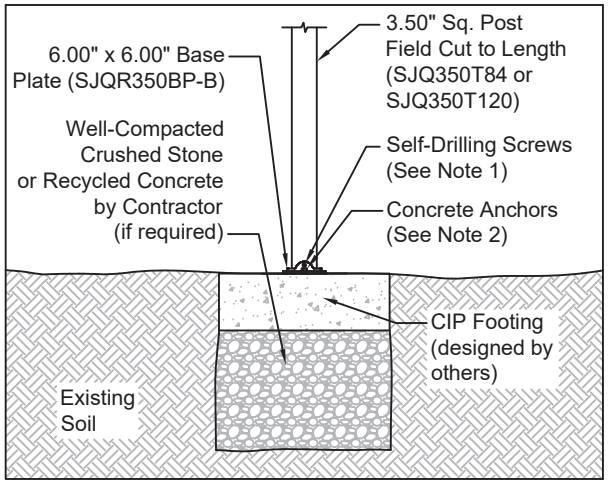
Base Plate Variations



Base plate with crushed stone footing



Base plate with CIP footing



Base plate with CIP footing over crushed stone

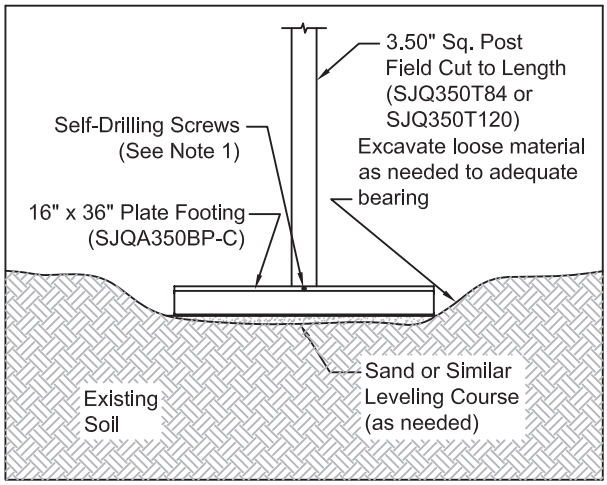


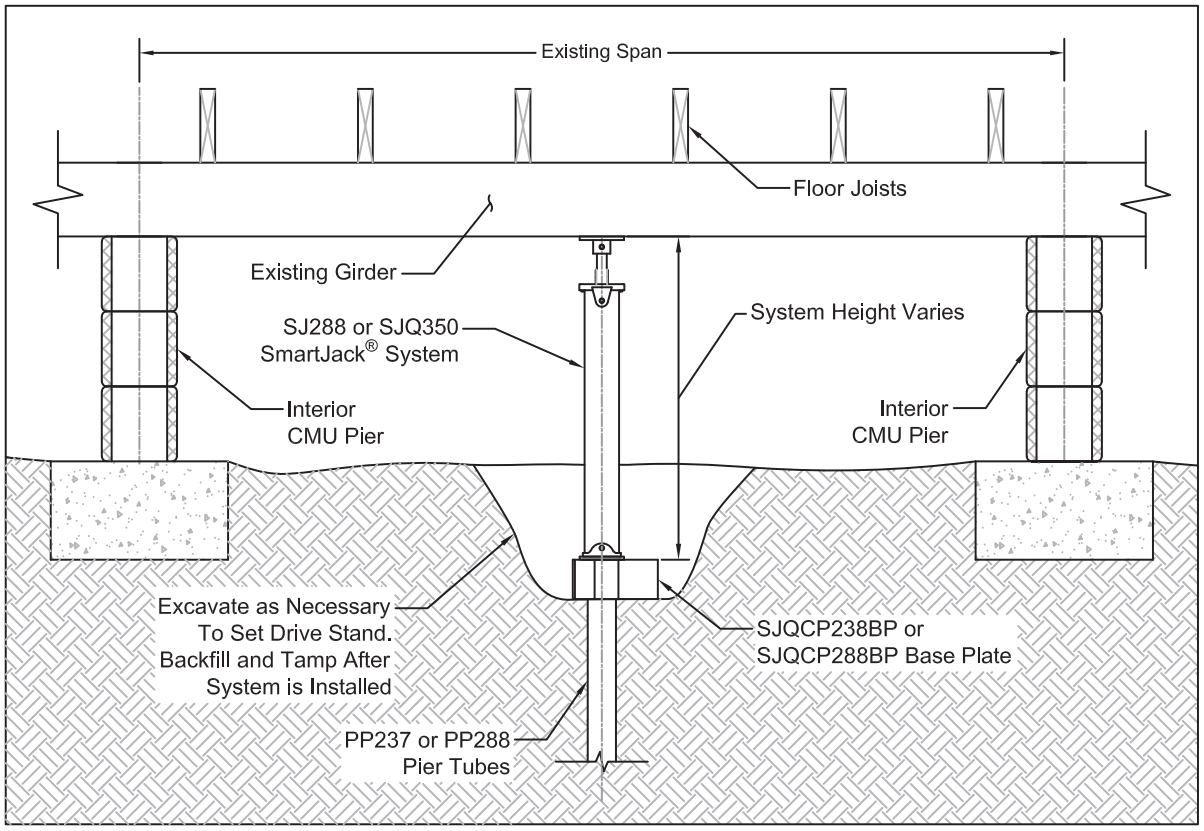
Plate footing with leveling course

(1) #14 or ¼" Self-drilling screws may be used as an optional feature to maintain positive attachment between components.

(2) ⅜" concrete screw anchors may be used as an optional feature to maintain positive attachment to a cast-in-place concrete footing.

(3) An inert membrane is recommended beneath the aluminum base to separate it from recycled concrete fill or poured concrete.

SJ288/SJQ350 to PP237/PP288



(1) Angular variance between the centerlines of the SmartJack post and concentric pier tube should not exceed 2.5 degrees.

(2) Soil shall be adequately compacted around entire bracket.

SJQ350TP-A (Flat Plate Bracket):
3/8" x 4.50" square ASTM A36 plate
Ø1.75" x 0.219" wall x 1.38" long CDS or DOM confining ring
Allowable compression with sawn lumber = 10.0 kips
Allowable compression with structural steel girder = (will not govern)

SJQ350TP-U (U-Bracket):
For use in combination with SJQA350450B beams
3/4" x 2.50" x 3.63" ASTM A572 Grade 50 plate
Ø1.75" x 0.219" wall x 1.38" long CDS or DOM confining ring and 0.12" thick ASTM A36 capture tabs
Allowable compression = 17.8 kips

SJQA350TP-C (Beam Splice Bracket):
For use in combination with SJQA350450B beams
5/16" x 2.95" x 4.15" x 9.75" bent ASTM A572 Grade 50 plate
Ø1.75" x 0.25" wall x 1.38" long CDS or DOM confining ring
Allowable compression = 17.5 kips

SJQ125ATR (All-Thread Rod):
Ø1-1/4" x 10.00" long ASTM F1554 Grade 55 all-thread rod with machined flats
Yield Strength = 55 ksi (min.)
Tensile Strength = 75 ksi (min.)
Allowable compression = 26.5 kips

SJQR350TI (Threaded Post Cap):
3/4" x 3.58" x 4.56" ASTM A572 Grade 50 plate with tapped threads and 0.13" thick ASTM A36 capture tabs
Allowable compression = 23.3 kips

SJQ350T84, SJQ350T120 (Post):
HSS 3.50" square tube x 0.095" wall x 84" or 120" long, field cut to length, ASTM A500 Grade C, triple-coated in-line galvanized, hot-dip galvanized (ASTM A123), or electrozinc plated (ASTM B633)
Yield strength = 50 ksi (min.)
Tensile strength = 62 ksi (min.)
Allowable compression varies by system height - see table on the next page

SJQA350BP-A (Bottom Plate):
For use with crushed stone support
3.00" tall x 12.00" square 6005A-T61 or 6061-T6 extruded aluminum with 0.10" and 0.16" thick capture tabs
Allowable compression = 9.5 kips

SJQR350BP-B (Bottom Plate):
For use with cast-in-place footing
5/16" x 6.00" square ASTM A572 Grade 50 plate with 0.12" thick ASTM A36 bent capture plates
Allowable compression = 23.8 kips

SJQA350BP-C (Plate Footing):
For use when placed directly against soil
3.50" tall x 15.80" x 36.50" 6005A-T61 or 6061-T6 extruded aluminum with 0.10" thick capture tabs
Allowable compression = 8.0 kips

SJQA350450B-8, SJQA350450B-10, SJQA350450B-12 (Beams):
Tube 4.50" x 3.50" x 0.135" wall x 8', 10', or 12' long, field cut to length, ASTM A500 Grade C, triple-coated in-line galvanized, hot-dip galvanized (ASTM A123), or electrozinc plated (ASTM B633)
Yield Strength = 50 ksi (min.)
Tensile Strength = 62 ksi (min.)
Allowable load varies by length of span – see table in Design Example section

SJQCP238BP/SJQCP288BP (SmartJack to Push Pier Base Plate):
For use with PP237 (SJQCP238BP)
Ø2.75" x 0.156 wall x 4.00" long ASTM A513 Type 5 pipe
¼" x 4.00" x 4.00" and 5/16" x 4.50 x 4.50 ASTM A36 bearing plate
¼" ASTM A36 bent capture plate
For use with PP288 (SJQCP288BP)
Ø3.38" x 0.188" wall x 4.00" long ASTM A53 Grade B pipe
¼" x 4.00" x 4.00" and 5/16" x 4.50 x 4.50 ASTM A36 bearing plate
¼" ASTM A36 bent capture plate
Allowable compression = (will not govern)

Corrosion Protection
Unless noted otherwise, all components are provided as electrozinc plated per ASTM B633.

SJQ350T84 and SJQ350T120 Posts[1]		
Post Length (ft)	**Maximum System Height (ft)**	**Allowable Axial Compression $P_c = P_n/\Omega$ (kips)[1]**
1 to 5	5.75	29.5
6	6.75	27.6
7	7.75	25.5
8	8.75	23.3
9	9.75	21.0
10	10.75	18.8

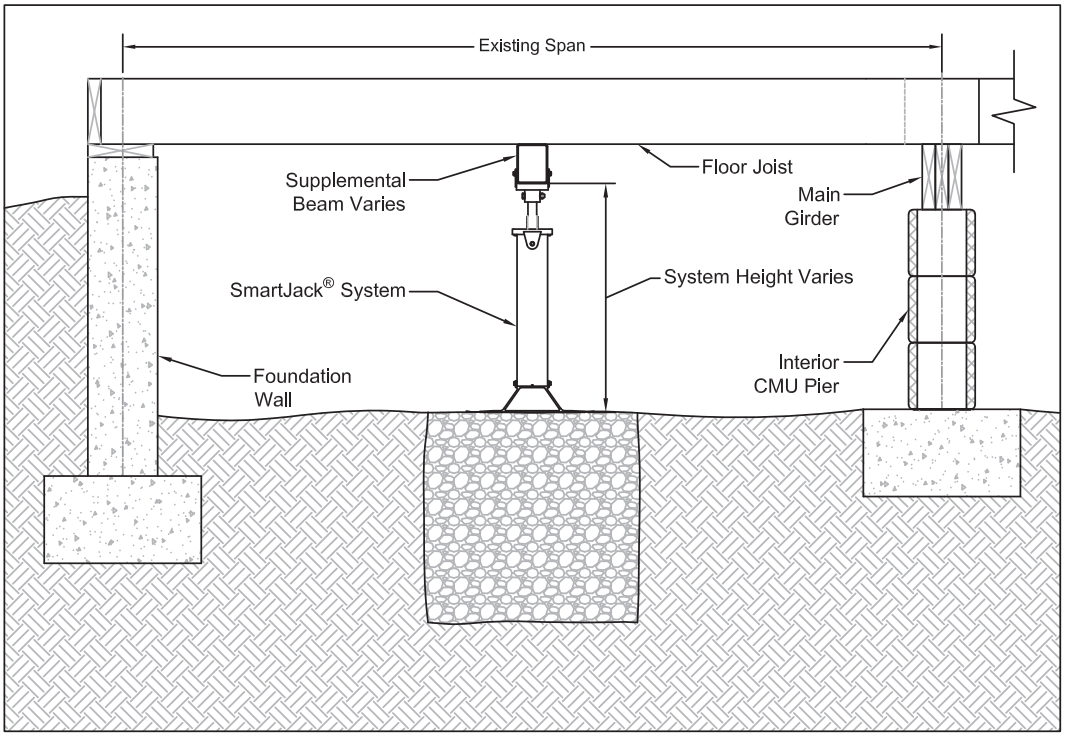
(1) The SJQA350450B beams may be used as an alternate for the SJQ350T posts. The allowable axial compression capacity of the SJQA350450B tube is greater than the allowable axial compression capacity of the SJQ350T tube and will not govern.

Design Example

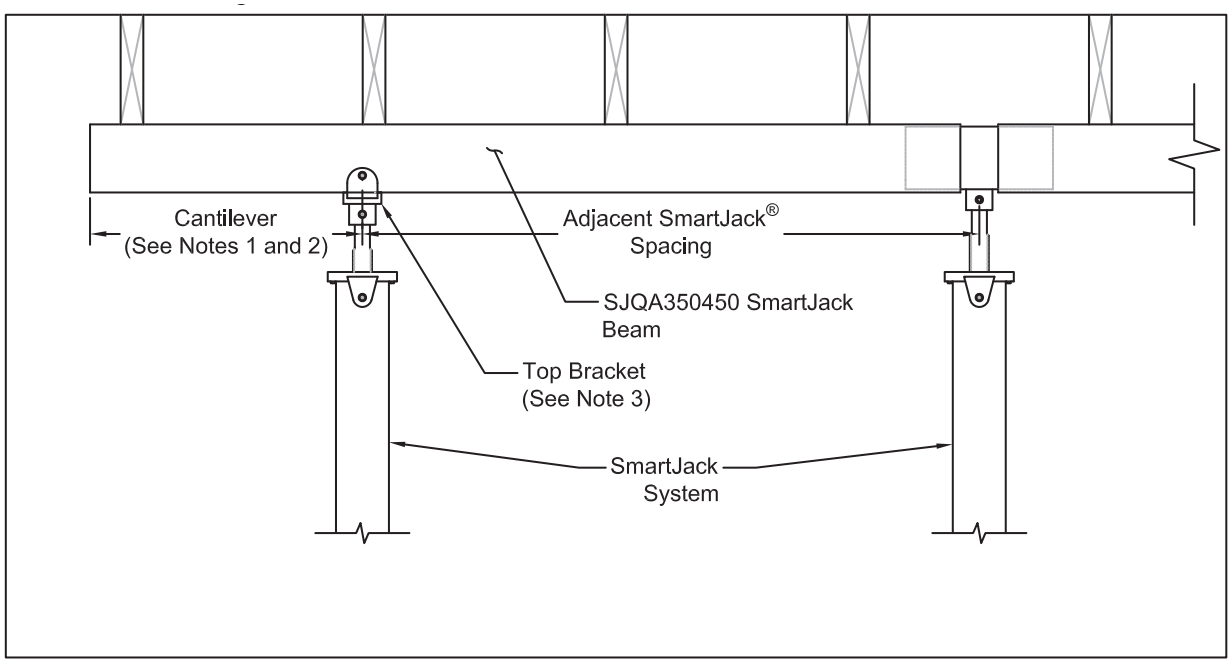
The aluminum base is far less susceptible to corrosion than the steel components that surround it. However, there are chlorides in some concrete that can be reactive with aluminum. It is recommended that an inert membrane be placed under the aluminum base to separate it from recycled or poured concrete. Crushed limestone or other crushed stone alternatives do not have similar considerations.

The following design example illustrates an application which utilizes the SmartJack® system to provide supplemental support of an existing span of floor joists which are not supporting any load bearing walls or columns. The SmartJack system may also be used to provide supplemental support of existing beams and girders, but the evaluation of the loads involved is more complex than can be addressed in this design example.

Design Example



Cantilever Arrangement



(1) Beam should extend past the centerline of the SmartJack system at least as far as the edge of the top bracket.

(2) The new supplemental beam may be cantilevered over the end support by a distance of 30 inches or by a distance of approximately 50% of the adjacent SmartJack spacing, whichever is less. Each beam segment must be supported by at least two SmartJack posts.

(3) Support of cantilevers requires use of top brackets that allow the supplemental beam to be continuous over the support. Splice brackets shall not be used to support cantilevered beams.

Step 1

Determine the load which will be supported by the new supplemental beam in pounds per linear foot:

Supplemental Beam Load (plf) = Existing Span (ft) × Total Floor Load (psf) ÷ 2

Note: Typical residential wood-framed construction may have an approximate floor load (15 psf dead load + 40 psf live load) = 55 psf total floor load.

Step 2

Determine the load on the interior SmartJack posts by multiplying the calculated supplemental beam load (plf) by the spacing of the SmartJack posts:

SmartJack Load (lb) = Supplemental Beam Load (plf) × SmartJack Spacing (ft)

Step 3

Verify that the calculated SmartJack load is less than the allowable capacity provided by the various system components, as well as the well-compacted crushed stone base and the bearing soils.

Note: Without a detailed soil investigation, typical installations should assume no more than 1,500 psf allowable soil bearing pressure. This would equate to an allowable soil capacity of 6,000 lb for a 2' square cast-in-place concrete footing, a 2' cube of well-compacted crushed stone, or the 16" x 36" plate footing. Extremely soft soils may prohibit the use of a crushed stone base or plate footing and require that a larger concrete footing be utilized.

Step 4

Size the new supplemental beam by using the following table with both the SmartJack post spacing (ft) and the calculated supplemental beam load (plf). Choose a beam size that has an allowable load (plf) greater than the calculated supplemental beam load (plf) in step 1.

	Supplemental Beam Size	Supplemental Beam Allowable Load (plf)[1,2,3,4]					SmartJack Post Spacing
		4 ft	5 ft	6 ft	7 ft	8 ft	
Sawn Lumber[5]	(3) – 2 x 8	1,170	750	520	380	290	
	(3) – 2 x 10	1,760	1,120	780	570	440	
	(3) – 2 x 12	2,360	1,510	1,050	770	590	
	(1) – 4 x 6	850	550	380	280	210	
	(1) – 6 x 6	1,030	660	460	330	250	
SmartJack Beams	Tube 4.50 x 3.50 x 0.135	3,700	2,360	1,530	960	640	

(1) This table makes no evaluation of the components of the existing structure.

(2) Allowable loads in this table assume the supplemental beam is sufficiently restrained against lateral torsional buckling at an interval equal to or less than the SmartJack post spacing.

(3) This table assumes serviceability deflection limits of l/360 and l/240 for live and total load respectively. It assumes a LL/TL ratio equal to 40/55. Other serviceability limits may need to be considered based on project requirements.

(4) The new supplemental beam may be cantilevered over the end support by a distance of 30 inches or by a distance of approximately 50% of the adjacent SmartJack spacing, whichever is less. Each beam segment must be supported by at least two SmartJack posts.

(5) Sawn lumber is assumed to be Douglas Fir Larch - No. 2 or better.

Step 5

If the required supplemental beam size is undesirable, adjust spacing of the SmartJack posts and return to Step 2.