

## OVERVIEW

These installation instructions are to provide the specification for installing the Intech Resistance Underpinning System. Part numbers include: 2875 Bracket & Top Pier Platform: IAN278RP-UB-G & IAN278RP-TPP-G; 3500 Bracket & Top Pier Platform: IAN350RP-UB-G & IAN350RP-TPP-G

**WARNING: Thoroughly investigate the presence and location of all underground utilities situated at or near the area of work before proceeding. Serious injury may result from failure to locate and avoid contact with underground utilities.**

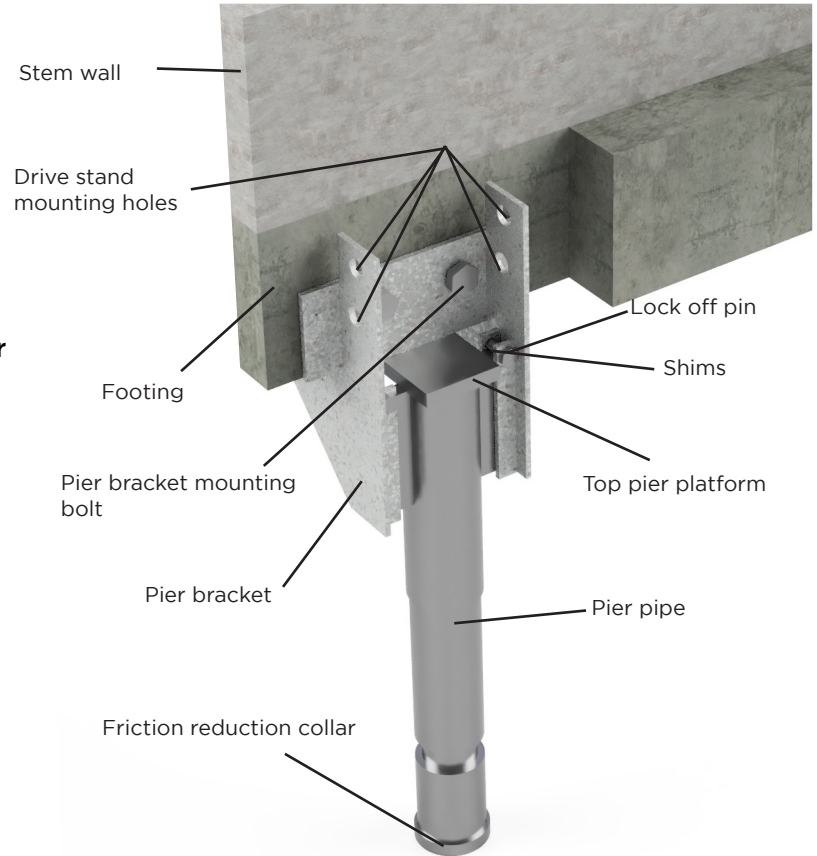
**Collapse of soil can cause very serious injury. Do not enter any excavation if there are any questions about the stability of the soil mass. Contact the engineer of record or carefully follow osha requirements and/or local regulations.**

The drive stand and drive cylinder are very heavy. Use proper lifting and handling techniques. Be constantly aware of the drive cylinder's position in the drive stand and the alignment of the pier system components. Do not let the cylinder work its way out of position. Monitor the footing and structure closely for cracks. Do not exceed the hydraulic cylinder manufacturer's working pressure when driving the pier sections. Beware of hot, high-pressure hydraulic oil. Serious injury may result from not following proper safety techniques.

## INSTALLING THE PIERING SYSTEM

### 1. EXPOSURE OF THE FOOTING

An area shall be excavated immediately adjacent to the building foundation to expose the footing, to a width of at least 36" and at least 15" beneath the proposed elevation of the base of the pier bracket. A chipping hammer shall be used to smooth and prepare the foundation for mounting of the pier bracket. The vertical and bottom face of the footing shall, to the extent possible, be smooth and at right angles to each other for mounting the bracket. The spread footing, if present, shall be notched to allow the bracket to mount directly under the bearing load of the stem wall. DO NOT cut any reinforcing steel in the footing element without approval from the engineer.



The surfaces shall be smooth, free of all dirt, debris, and loose concrete so as to provide firm bearing surfaces for the pier bracket.

### 2. INSTALLATION OF THE BRACKET

**WARNING: Carefully space the pier brackets along the footing so that the structure is not over-spanned. Excessive pier spacing can cause damage to the concrete footing, stem wall and/or slab from structural overload. Ensure that the necessary existing structural considerations have been addressed before attempting to lift or stabilize a structure.**

The pier bracket shall be temporarily mounted to the drive stand assembly using 1" diameter pins and retaining clips. The assembly is lowered into the excavation adjacent to the foundation. The pier bracket shall then be positioned and seated flush against the face and bottom of the footing using a hydraulic actuator or ram. The pier bracket is then fastened to the footing with two expansion anchor bolts.

If the pier bracket does not have continuous bearing support on either the vertical or horizontal face, then non-shrink grout shall be used to provide proper bearing prior to driving the pier. Care should be exercised to ensure that the drive stand assembly frame is plumb prior to driving each pier section. A carpenter's level may be used to verify vertical alignment in both planes.

**WARNING: Incorrect preparation of the footing, or equipment during pier installation, or broken bolts may allow the pier bracket to rotate and shear the mounting bolts. Rotation of the pier bracket can damage the footing, pier, and installation equipment. In addition, serious injury may occur from falling equipment during pier installation from broken bolts.**

### 3. DRIVING AND TESTING PIER SECTIONS

**WARNING: Ensure that the hydraulic hoses are properly connected to the remote control valve. Be sure that the remote control valve and the control valve on the pump are placed in the neutral (center) position before starting pump. Operate the system with the pump control valve in the "b" position only. Equipment damage and/or serious personal injury may result from improper hose connections or failure to position valves properly.**

All pier sections shall be continuously driven by use of the drive stand and hydraulic drive cylinder assembly. The initial pier section shall have the friction reduction collar on the bottom end. Additional pier sections shall be added as the pier driving operation continues. Driving of the pier sections will continue until rock or a suitable bearing stratum is reached as defined by a force equal to 1.65 times the working load specified by the engineer or until lift of the structure is achieved, whichever occurs first.

**WARNING: Check tightness of pier bracket mounting bolts often during pier section and sleeve installation. Serious injury may result from loose bolts. Do not exceed the hydraulic cylinder manufacturer's working pressure when driving the pier sections, especially with the ram fully extended. Serious injury may result.**

If the maximum hydraulic cylinder operating pressure is reached prior to bearing stratum verification, remove the drive cylinder from the drive stand assembly and replace it with a 2" x 4" x 7-1/8" supplemental block. Install a 25 or 50 ton hydraulic ram (depending upon Proof Load force required) between the last pier section and the supplemental block. The hydraulic ram shall be actuated with a hand pump until bearing strata is verified as defined by a maximum installation force of 1.65 times the designed working load. The installation force shall not exceed:

TYPE	PART NUMBER	MAX. DRIVING LOAD
2875	IAN278RP-UB-G	49,500 lbs
3500	IAN350RP-UB-G	70,950 lbs

### 4. OPTIONAL PROOF LOAD TESTING

To accomplish field load testing of the installed pier, it is recommended bearing capacity confirmation of 1.5 times the designed working load. This operation verifies a Factor of Safety of 1.5:1 on the field installation.

Proof Loading the pier may be accomplished by either installing a 2" x 4" x 7-1/8" supplemental block in place of the hydraulic drive cylinder on the drive stand or mounting a lift head on the pier bracket of existing work. Install a 25 or 50 ton hydraulic ram (depending upon Proof Load force required) between the pier and the supplemental block or lift head. The hydraulic ram shall be actuated with a hand pump until bearing strata is verified as defined by a maximum installation force of 1.5 times the designed working load not to exceed 1.5 times the maximum published working capacity. Do not exceed these maximum Proof Loads:

TYPE	PART NUMBER	MAX. PROOF LOAD
2875	IAN278RP-UB-G	45,000 lbs
3500	IAN350RP-UB-G	63,750 lbs

### 5. CUTTING THE FINAL PIER SECTION

It is likely that the final installed pier section will have to be removed from the hole and cut to a length suitable to provide space for installing the top pier platform. Mark and cut the pier section to the proper length using a metal cutting saw capable of a smooth cut at 90 degrees to the length of the pier section. Piers get cut of 1" below the bottom of the pin holes. After cutting to length, the final pier section is replaced.

### 6. DRIVE EQUIPMENT REMOVAL

The drive stand assembly is then removed from the pier bracket by removing the 1" diameter locking pins.

### 7. OPTIONAL INSTALLING PIPE GROUT

When the pier is installed to load bearing stratum, proof load tested and cut to the proper elevation, a flowable neat cement grout may be installed to the pier pipe. The grout will increase the moment of inertia (stiffness) and corrosion resistance of the pier. The grout shall be introduced to the bottom of the pier by means of a tube inserted into the pier pipe.

As the grout is pumped into the pier pipe the grouting tube shall be raised as the elevation of the grout increases. The process shall be executed carefully so that air is not entrapped in the grout.

## 8. INSTALLATION OF THE TOP PIER PLATFORM

The top pier platform shall be installed over the last installed pier section. Align the vertical stabilizers of the top pier platform within the channels on the legs of the pier bracket and tap the top pier platform until it contacts the top of the final pier section. A small port is provided between the cap cylinder and the platform to verify contact.

## 9. INSTALLATION OF THE TWO PIECE LIFT HEAD ASSEMBLY

The two piece lift head assembly is temporarily attached to the pier bracket by aligning the holes in each piece. One inch diameter pins and clips are used to align and temporarily hold the two pieces together.

## 10. LIFTING AND HOLDING

**WARNING: When transferring the structural load to the underpinning piers, monitor the footing and structure closely for cracks and for movement in any direction. Watch all pier assemblies and rams to be sure that they stay in proper position and alignment. Beware of high pressure hydraulic oil, do not use damaged or eaking hoses and/or hydraulic equipment.**

**Crushing hazard: do not place hands or other parts of the body into voids under the foundation that were created during lifting and restoration.**

**CAUTION: The maximum height of the stack of shims should not exceed 4" to ensure full pier system load transfer capacity as stated in this manual. Remove any mortar and caulk used to fill gaps created as a result of foundation movement prior to attempting to lift the structure. Failure to permit clearance for masonry movement could result in limited restoration, broken windows and/or damage to the exterior of the structure.**

The lifting and holding operation is designed to raise the structure and to restore it to as close to the original elevation as the construction will allow. Normally this lifting and holding operation is accomplished with several simultaneous pier placements. Install a 25 to 50 ton hydraulic ram as required between the two piece lift head assembly and the top pier platform on each pier.

Install 3-1/2" square by 3/4" pier shims, or equivalent, to reduce excess space between the ram and the two piece lift head assembly. This increases the effective ram strokes. The rams shall be actuated simultaneously to raise the structure. Lifting shall continue until the structure is restored to its approximate original elevation or to design specifications. When restored, the lifting forces and amount of lift is documented.

Install the lift shims above the vertical stabilizer plates of the top pier platform. The maximum allowable height of shims that will maintain published ratings of the pier system is 4". The 7 gauge shims shall always be stacked to provide the required height. The 16 gauge shims are only used for fine adjustments between the stack of 7 gauge shims and the bottom of the taper pier pins. Install the taper pier pins into the holes in the pier bracket by tapping the taper pier pins into place. There must be a snug fit of the taper pier pins and the lift shims. The taper pier pins shall be installed fully until the head contacts the bracket. The load shall then be transferred to the pier system by removing the pressure from the hydraulic rams. Remove the ram and then remove the 1" locking pins and the two piece lift head assembly from the pier bracket.

## 12. DOCUMENTATION

The installer shall carefully monitor the driving force applied to the pier sections as the pier is installed. It is recommended that the driving force be recorded at 3-1/2 foot intervals unless directed otherwise by the engineer. The form of the data may be as directed by the customer or the engineer.

The lifting force, lift, and pier depth shall also be recorded and presented in a tabular form. In addition, the installer shall know and have calculated the desired terminal pressure that will create the desired Proof Load Test force approved by the engineer prior to beginning the pier installation.

## 13. OPTIONAL VOID FILLING

*Depends on soil characteristics, structure, and amount of lift*

**CAUTION: When filling a void under a slab on grade, it should be noted that the process introduces moisture under the slab that can cause upheaval several days after the injection work is complete. This is most likely to occur in areas with highly expansive soils and during dry periods of the year. The contractor should exercise extreme caution not to inject too much grout into void areas.**

**A performance test of the plumbing system shall be performed before, during and after the void filling operation. This will prevent injected grout from damaging plumbing lines under the slab.**

After raising operations are complete, voids created between the foundation and underlying soil shall be filled using a low pressure injection of grout slurry. Injection shall be through holes through the foundation. The contractor shall inject the grout in such a manner as to completely fill the void without trapping pockets of air. When the operation is complete, the contractor shall repair the injection holes by filling the holes with high strength non-shrinking grout and finishing to reasonably match the existing surface textures and elevations.

#### 14. CLEAN UP

**CAUTION: Proper drainage is required! Any drainage correction and/or improvement should be in place concurrent with the foundation restoration. Failure to maintain proper drainage could lead to seasonal instability. Standing water adjacent to the structure may cause areas of upheaval.**

When all of the equipment has been removed, the area shall be backfilled using the previously excavated soil. The excavations shall be backfilled by placing no more than 8" of loose material in a lift and compacting that soil prior to placement of the next 8" lift. Sufficient lifts shall be used to restore the ground to its original elevation and density. Slope the soil contour around the perimeter of the structure for drainage away from the foundation. Dispose of all waste in a legal manner.