

### A CASE HISTORY

### Foundation "Back in the Game"

#### Job Description:

In Salt Lake City, UT, the sports star owner of this extremely heavy structure noticed settlement and open fractures in the one-foot thick foundation stem walls adjacent to "Great Room." As the structure settled, some of the round river rock veneer began to fall from the exterior walls, which was of great concern.

#### Background Information:

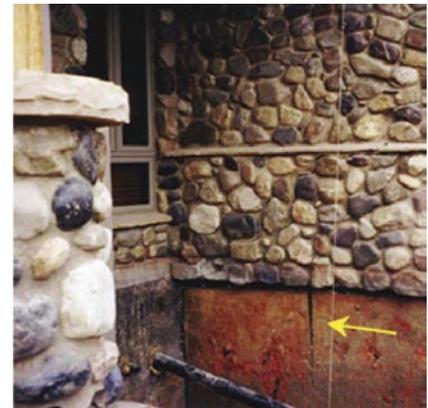
The two-story rock veneer, frame structure was built upon a 12-foot tall, reinforced concrete stem wall. The stem wall measures 12 inches thick and is supported by a reinforced concrete footing approximately 24 inches wide by 18 inches thick. There was limited access in several areas due to the narrow and deep window wells. Two concrete porch columns also required additional support and stabilization during the restoration.

#### Visible Signs of Distress:

The 12-foot tall foundation wall



developed open fractures at several locations. The photo at right shows one of these fractures and the distress to the rock veneer above it. The floor in the great room developed a slope as indicated on the sketch next page. The differential settlement across the room was approximately 1-1/2 inches. When considering the attached window wells, foundation



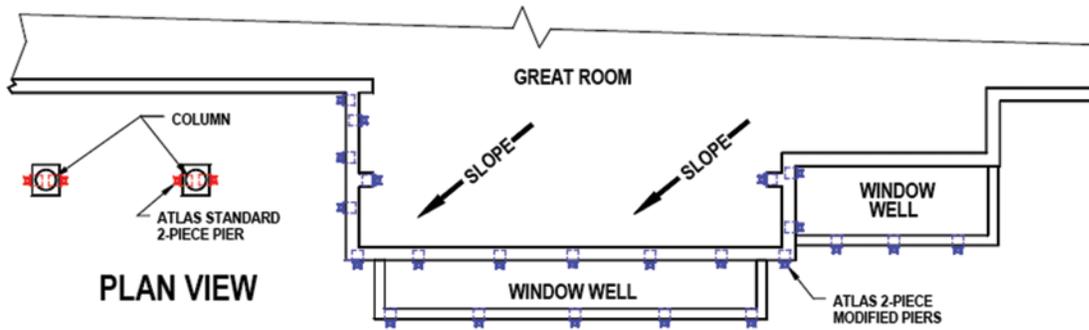
### PROJECT SUMMARY

Number of Piers:	4 - 2-Piece Piers 23 - Modified Piers
Part Numbers:	AP-2-UF-3500.165 (2-Piece Pier) AP-2-UP-3500.165 (Modified Pier)
Avg. Pier Depth:	54 feet
Avg. Pier Load:	36,300 Pounds (structure) 4,100 Pounds (columns)
Avg. Driving Force:	59,500 Pounds (structure) 12,200 Pounds (columns)
Factor of Safety:	1.6 : 1 (60% above load) 2.5 : 1 (150% above load)

#### Quickly Installed:

Each Atlas Resistance® Pier was driven to a suitable bearing stratum and tested to a load greater than required for support of the structure. After each pier was load tested, the structural load was gently and evenly transferred to the piers. The foundation was restored to as close to the original elevation as the construction would allow.

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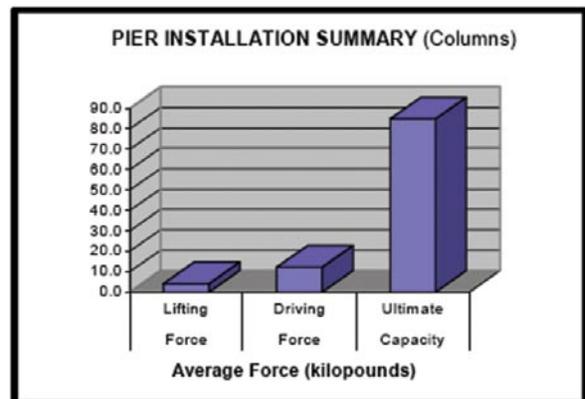
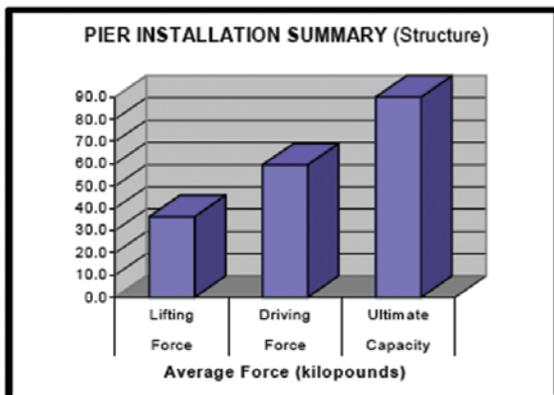


Photograph at left shows the excavation to expose the footing. Notice the installer mounted five Atlas Resistance® Piers to the stem wall for the window wells near the great room.



Photographs at right show how the Atlas Resistance® Piers were installed inside of the window well. In order to gain access to the footing, the gravel fill at the window well was removed. Access holes were cut through the wall at the window well to gain access as shown in the lower right photograph.

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**Uniform Load Transfer:**

After all of the Atlas Resistance® Piers were installed and driven to a verified bearing stratum, the piers were all loaded at the same time using hydraulic rams connected to manifolds that directed equal pressure to each pier. As the load was transferred

from the footing and to the pier, the structure was restored to the original elevation. The force applied to each Atlas Resistance® Pier was recorded during restoration. Later, the actual installed depth and the factor of safety was calculated for each pier.



The photographs above show Atlas Resistance® Piers with hydraulic rams attached during the restoration of the structure. Notice the photo at right shows a lift of over 2 inches at the window well.

**Success:**

After each Atlas Resistance® Pier was loaded and the structure restored, Pier Pins and Shims were installed at each pier location to maintain the desired eleva-

tion after the hydraulic rams were removed. The structure was successfully restored and the owner was extremely pleased with the results.



Atlas Resistance® Piers were quickly and easily installed from inside and outside of the structure. The photograph at left shows how the existing footing was notched to allow an Atlas Resistance® Pier to be installed against the stem wall. The Pier Bracket, Driving Stand, Hydraulic Cylinder and Pier Pipe were all carefully aligned during installation to insure a vertical support for the structure.



The two silver color Pier Pins located on either side of the yellow hydraulic cylinder. These hardened pins are loaded in double shear. The desired elevation was maintained by the installation of small zinc plated Shims between the Top Pier Platform (located below the yellow ram) and the Pier Pins. After the installation of the Shims and Pier Pins, the galvanized Lift Head and Hydraulic Ram were removed.

The right photograph shows one of the Atlas Resistance® 2-Piece Modified Piers that were installed from the inside of the structure. Notice that this Pier installation required only a small opening in the concrete floor.

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**Atlas Resistance® Pier Products:**

The columns were restored with Atlas Resistance® Standard 2-Piece Piers. The Piers on the perimeter of the structure were supported with Atlas Resistance® 2-Piece Modified Piers. These two products are nearly identical; the major difference is that the segmented joints of the 3-1/2 inch diameter Pier Pipe were strengthened with the installation of a 4-inch diameter sleeve over the Pier Pipe. This creates a "modified

pier". Not only does sleeving increase the stiffness of the Pier Pipe through poor soils, the sleeving increases the ultimate strength of the Pier System.

On this project the entire Pier Pipe had a triple coat corrosion protection of zinc chromate and flow coat galvanizing. The Pier Bracket and Modified Pier Sleeving were supplied mill finish steel.

<b>PIER LOG AND PROJECT SUMMARY</b>						
<b>Atlas Resistance® 2-Piece Modified Piers (STRUCTURE)</b>						
<b>Pier No.</b>	<b>Depth (ft)</b>	<b>Lift (in)</b>	<b>Lifting Force (lb)</b>	<b>Driving Force (lb)</b>	<b>Ultimate Capacity (lb)</b>	<b>Factor Of Safety</b>
1	56	3/8	21,115	61,346	90,000	2.9 :1
2	58	3/4	30,900	61,346	90,000	2.0 :1
3	59	1-1/8	30,900	61,346	90,000	2.0 :1
4	68	1-7/8	30,900	59,688	90,000	1.9 :1
5	62	1-3/4	30,900	59,688	90,000	1.9 :1
6	54	1-3/4	30,900	59,688	90,000	1.9 :1
7	60	1-3/4	30,900	59,688	90,000	1.9 :1
8	56	1-3/4	30,900	59,688	90,000	1.9 :1
9	60	1-3/4	30,900	59,688	90,000	1.9 :1
10	69	1-3/4	30,900	59,688	90,000	1.9 :1
11	46	3/4	20,600	59,688	90,000	2.9 :1
12	42	1/2	20,600	58,030	90,000	2.8 :1
13	69	2-5/8	38,625	58,030	90,000	1.5 :1
14	57	2-3/8	38,625	59,688	90,000	1.5 :1
15	57	2-3/8	35,020	59,688	90,000	1.7 :1
16	47	2-1/4	38,110	58,030	90,000	1.5 :1
17	63	2-1/8	38,110	58,030	90,000	1.5 :1
18	57	1-3/8	30,900	59,688	90,000	1.9 :1
19	47	1	30,900	59,688	90,000	1.9 :1
20	49	5/8	30,900	59,688	90,000	1.9 :1
21	56	0	20,600	59,688	90,000	2.9 :1
22	62	1	25,750	61,346	90,000	2.4 :1
23	49	1/4	20,600	59,688	90,000	2.9 :1

<b>Atlas Resistance® Standard 2-Piece Piers (COLUMNS)</b>						
1	13	9/16	4,120	17,409	85,000	4.2 :1
2	13	1-1/2	5,150	9,948	85,000	1.9 :1
3	20	7/8	6,180	13,264	85,000	2.1 :1
4	14	0	1,030	8,290	85,000	8.0 :1