

CASE HISTORY ECP PPB-350-WM Steel Piers™
AND HMI-RR401 POLYURETHANE FOAM



2.2 Million Pounds of Rail Inspection Pit Sections Were Raised with ECP Steel Piers™ and Voids Filled With High Density Polyurethane Foam

Earth Contact Products' Steel Piers™ were used to raise 49 precast concrete inspection pit sections that weighed 41,000 pounds

and measured 12-1/2 feet long and 16 inches thick. The sections were not installed exactly as specified in the original construction documents and following completion of the job differential settlements occurred between pit sections. The owner determined that the entire inspection pit was useless unless all pit sections could be properly lifted, stabilized and aligned within 1/16 inch.

ECP PPB 350-WM Steel Piers™ were recommended for installation opposite to each other on the outer walls of the concrete inspection pit sections. The wall mounted ECP Steel Pier™ system was selected because it provides ease of installation with the bracket being bolted to the outside walls of the "U" shaped pit. Each pier was advanced through the soil until the pier encountered firm load bearing. Once firm bearing was reached, each ECP Steel Pier™ was field load tested to a proof load, or test force, between 38,000 and 41,500 pounds. The proof test insured sufficient capacity to safely lift each concrete pit section to the proper elevation.



Project Summary	
Project:	Union Station Inspection Pit Restoration
Installer:	Concrete Jack - Williamsburg, Virginia
Product Installed:	ECP PPB-350-WM Steel Pier™
Number of Placements:	116
Depth to Bearing:	14 to 20 feet
Ultimate Limit Capacity:	86,000 lb
Average Test Load:	39,750 lb
Average Lifting Load:	20,500 lb
Void Fill Material:	HMI RR401 high density polyurethane foam
Quantity of Foam Used:	14,000 lb



ECP Steel Piers™ were chosen as the best product for this restoration because ECP Steel Piers™ are rapidly installed using quiet, vibration free hydraulics. This allowed the repair process to progress quickly with minimal down time or loss of use of train rails.

Because there were voids created below the inspection pit sections once the design elevation was restored by the steel piers, the voids were injected with HMI RR401 high density polyurethane foam. Not only did the urethane fill the voids, the designers wanted the foam to provide uniform long term support along the entire 58 inspection pit sections. 14,000 pounds of polyurethane was injected under the pit sections. There were no delays to the train service during the steel pier installation or the polyurethane injection process.



The entire length of the inspection pit sections had to be aligned to a tolerance of 1/16 inch so that the tracks for the rail cars would be even and level. After the lifting and alignment of the pit sections and the polyurethane cured, the steel piers were no longer required for support. The entire inspection pit was supported uniformly by the earth and industrial polyurethane foam injected below the "U" shaped pit section. The total support provided under the 58 pit sections was 2.2 million pounds!



Photographs: At the top and middle left are views showing the installation of the ECP PPB-350-WM Steel Piers™. The pier bracket is mounted to the side wall of the inspection pit section and the three inch diameter steel pier pipe is driven to suitable end bearing and load tested with the yellow hydraulic cylinder shown. The installer monitors the force on the pipe by observing the hydraulic gauge shown in the middle photo.



Photographs: Above left shows how the industrial polyurethane was injected into the void. Directly above shows the magnitude of misalignment that was causing problems with the rails. The upper right photo was taken after the pit sections were raised and aligned.

The photograph at right shows the inspection pits after the 116 ECP Steel Piers™ were installed, the lost elevations were recovered, the sections aligned and the polyurethane injected into the voids below the sections of inspection pits. Notice that the rail is being installed on the right side.

Concrete Jack of Williamsburg, Virginia was able to complete the project quickly, accurately and with no disruption to rail service. The project was constantly inspected and the finished job was approved.

