



**GROUND
PENETRATING
RADAR
SYSTEMS, INC.**

8534 W. Central Ave., Sylvania, Ohio 43560

A Safe, Non-Destructive Method for Detecting Hidden Elements in Concrete

In June 2003, Fort Defiance Construction, of Defiance, OH, called Ground Penetrating Radar Systems with a unique problem.

Fort Defiance was working on two bridges in Defiance and their project involved applying advanced composite material to rehabilitate 11 existing pre-stressed box beams. The strengthening



system used to re-stress the beams had never been attempted, in this configuration, to an existing structure in the United States.

The precast concrete beams were mostly styrofoam filled, however, at three points in each beam, there was a concrete diaphragm that

acts as an anchoring point for the pre-stressing cables. It was imperative on this project that the new stressing system be anchored at the diaphragm location.

Fort Defiance was urged to use a non-destructive method to locate the hidden elements in the existing beams, prior to anchoring the new stressing system to the underside of these beams. The hidden elements of concern were the concrete diaphragms and the pre-stressing strands.

Tom O'Brien of Fort Defiance had this to say about the work performed by Matt Aston of Ground Penetrating Radar Systems, "Due to the extremely small tolerances involved with this one of a kind project, we contracted GPRS to perform this key task, namely the locating of 33 diaphragms on different beams. GPRS worked around

This technology allows the contractor to precisely locate reinforcing, electrical conduit, water and sewer lines and voids in and below a concrete slab. The radar is much safer than x-rays and can be done in structures without disturbing the occupants.



The mechanical contractor is able to drill the hole by staying away from marks which represent cables.

our schedule which often required them to start very early or late in the normal work day. All of the diaphragms were located within the tolerances required and to the satisfaction of the owner. Fort Defiance would not hesitate to use GPRS for any of our future projects, no matter how complicated they may be."



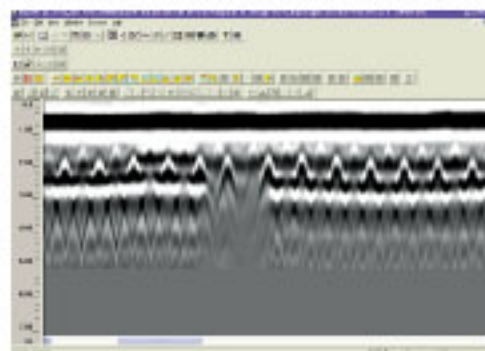
This image shows the deteriorated concrete on the beams and the corroded pre-stressing steel. This is where the composite was to be added.



GPRS was able to clearly differentiate the diaphragm section from the remainder of the beams in real time, using our GPR technology and our processing software. We are often called to respond quickly on a highly sensitive job sites. We routinely locate reinforcing steel and electrical conduit prior to saw cutting or core drilling. We also do scanning for the location of bridge deck beams, voids under floor slabs, and underground utilities. There are various other applications that we are occasionally called for.

Using the latest GPR technology, we have the capability to process results in real time, resulting in immediate answers for GPRS customers.

This image is one of the scans that were taken on the bridge beams. The diaphragm is the solid grey portion in the center of the raw data. The continuous grey indicates the constant presence of concrete. The black and white line on both sides of the diaphragm indicates a significant change in the material structure.



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Ground Penetrating Radar is a Valuable Tool in Commercial Construction

Structures Commonly Scanned

- **Floors** —Looks for voids under slabs
- **Industry** —Looks for exact location of existing electrical and mechanical systems
- **Structural slabs** —Looks for location of reinforcing rods, corrosion, etc.

Common Locations

- **Airports**
- **Manufacturing plants**
- **Parking garages**

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