13 Preventable Busway Failures You Never Want to See

Jul 10, 2015

John A. Weber, Hartford Steam Boiler Inspection & Insurance Co. | *Electrical Construction and Maintenance*

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This 800A vertical busway section was installed in a multi-story apartment complex. A very distressed "face" was melted into the enclosure after this and other sections were involved in a major arcing ground fault event.

If you are like most facilities managers, you probably think busway is maintenance-free. There are no moving parts, so what could go wrong?

Check out these 13 photos, view the video online, and watch for the upcoming article in *EC&M* magazine on "Understanding Electrical Busway Vulnerabilities," written by John A. Weber of Hartford Steam Boiler Inspection & Insurance Co., to prevent your system components from becoming the 14th example (or more) in this photo gallery.

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An 800A aluminum busbar is shown after the effects of an arcing ground fault. You can see the melting pattern of the ¼-in. aluminum bar. The arcing event destroyed multiple 10-ft sections that were vertically installed.

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This busway failed due to the corrosive effects present in a parking garage. The road salt and poorly maintained floor joints allowed corrosive liquids to penetrate the busway enclosure. Busway joints are extremely vulnerable to arcing ground faults and shorts when salt water leaks into the splice joints. This type of damage can occur over many years of slow dripping onto the busway. Flat-wise busway runs are especially vulnerable due to the large exposed surface area. It is very hard to view and inspect this surface without the use of ladders.

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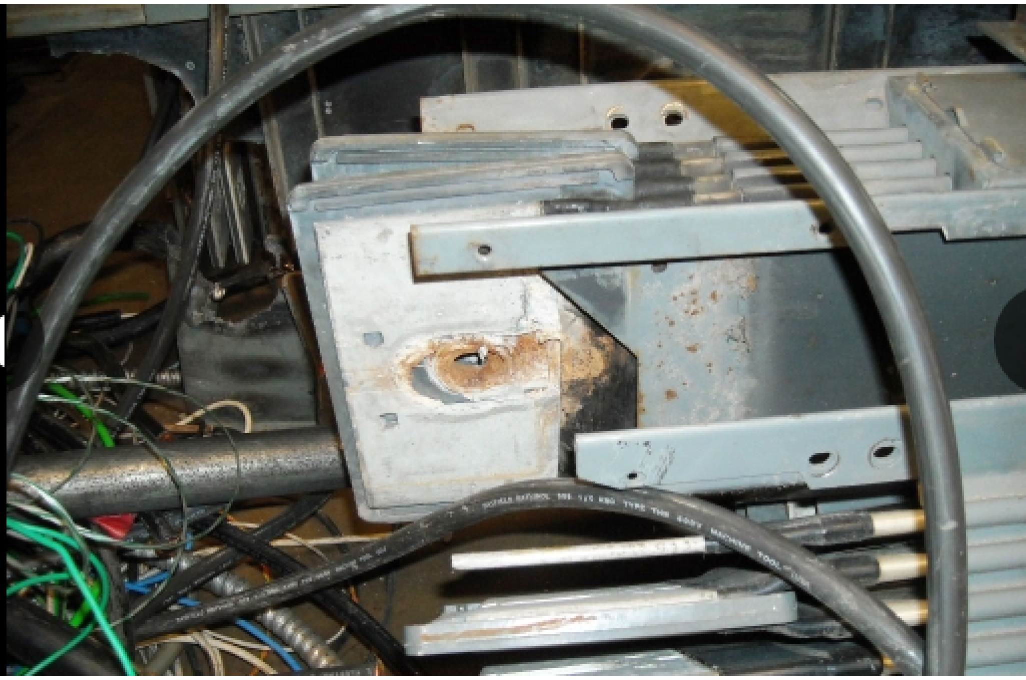

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Liquids that enter the splice joints of the busway are especially prone to corrosion damage and joint failure. Although the busway eventually dried out after being contaminated, the corrosive effects continued.

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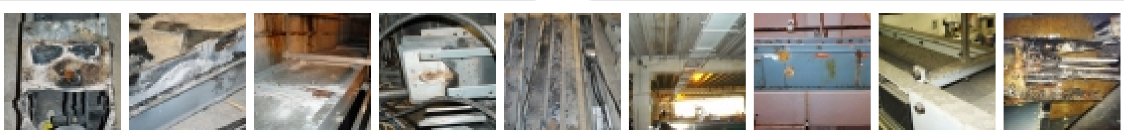
Multiple 10-ft sections of 800A busway were damaged after a catastrophic arcing ground fault event. Due to the age of the installation, the busway was no longer readily available. The failure of older busway sections sometimes requires replacement of the entire run due to product obsolescence.



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Poorly maintained parking garage floor joints will subject flat-wise busway installations to severe corrosion damage and failure. The busway often looks like new when viewed from the floor. When viewed on top while standing on a ladder, the extent of the corrosion damage is quickly evident. Does the routine maintenance for the busway include inspection of the top side of the busway enclosure?

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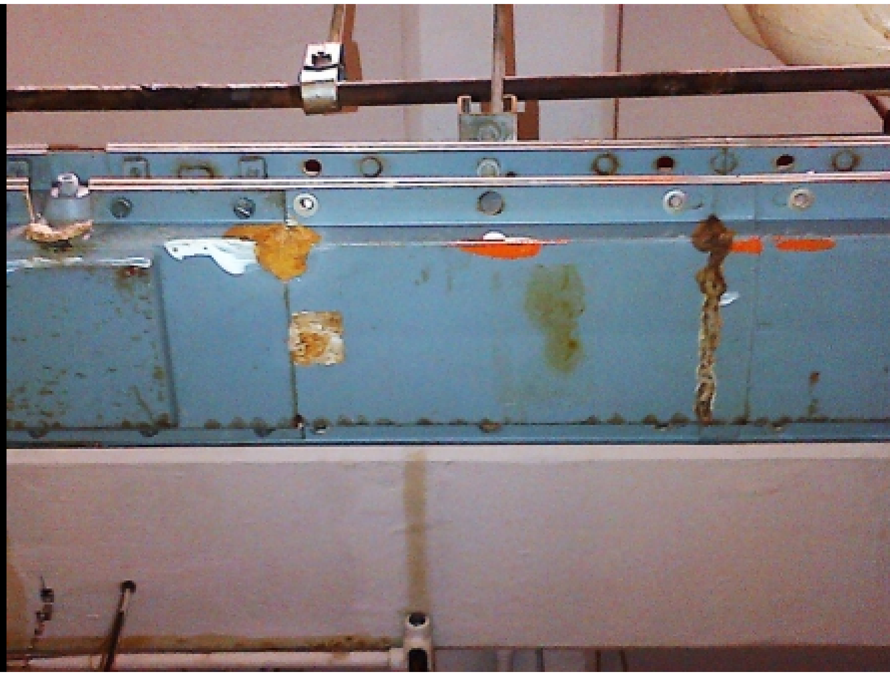

7 of 13 **Share Image**

Slowly leaking overhead pipes or drains can contaminate busway over long periods of time. The drain above this emergency power busway has caused visible, severe corrosion of the busway enclosure. This busway is only energized during emergency power conditions. With this corrosion present, it is very likely that this busway will trip the overcurrent protective device at the moment it is critically needed.

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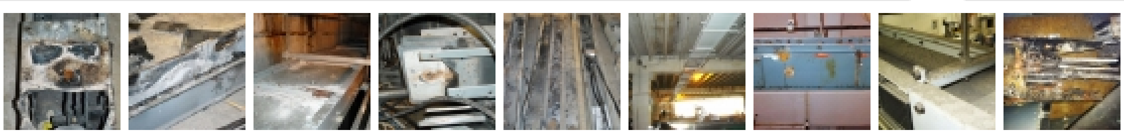
Failure to keep the busway enclosure clean can cause issues with overheating. Proper busway cleaning involves the use of vacuum cleaners and not compressed air. Compressed air can force particles into the enclosure/conductive busbar joints and cause internal damage.



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Busway is an NEC-defined raceway. Busway typically has conductor splice joints every 10 ft. Conduit and wire raceway systems typically run much longer lengths before splices occur. When designing high-reliability electrical distribution systems, consideration should be given to the difference in the number of the splice points along the raceway path. Each splice represents a higher probability raceway failure location.

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Arcing ground faults on busway are likely to be an amperage magnitude that is less than the trip-points of the overcurrent protective devices. Large amperage ratings of the busway OCPDs allow the fault to continue for significance lengths of time before the fault clears itself. Complete failure of the busway can occur, especially when no equipment ground fault protection devices are installed.

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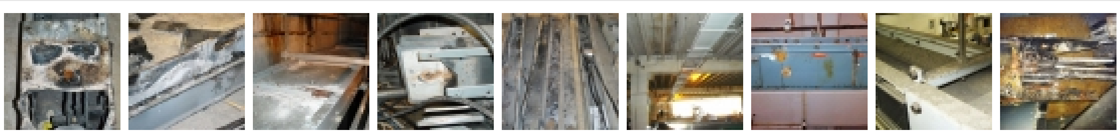
Leaking water with road-salt contamination in a parking garage floor entered this busway joint. The subsequent fault melted a hole completely through this busway. The hole is large enough to pass your hand through. All phases and the grounded enclosure were involved in this event. Periodic inspection of the parking garage floor joints and the busway would have prevented this disaster.



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Arcing between the plate surfaces can occur due to loose connections or after water or other liquids enter the interstitial spaces. Although the liquids may eventually evaporate, the damage has already been done to the plate surfaces. This type of damage can increase the contact resistance of the joints and eventually cause overheating.

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Although these connections are located behind the busway switch, infrared thermography might have seen this impending failure before this damage caused a building outage. A possible loose connection screw could have been repaired before any heat damage occurred to the electrically conductive parts.

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