

NATF Redacted Operating Experience Report

Improper Guy Anchor Installations

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North American Transmission Forum (NATF) operating experience reports highlight positive or negative transmission (reliability or resiliency) experiences worth sharing for learning opportunities or potential trending. The overall goal is to help each other learn without experiencing the same issues first-hand. This sharing originates confidentially within the NATF membership.

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Topic

Improper Guy Anchor Installations

Description

Reporting entity has identified numerous instances of improper contractor-performed guy anchor installations involving various equipment configurations. Most structures implicated are associated with distribution system installations. Non-conforming installations were performed by multiple contractors over multiple years and throughout the service territory, indicating a widespread problem and practice among ground crews.

The types of non-conforming installations identified so far include the following:

- 2', 3', and 6' rod extensions installed without being attached to 10' anchors/plate anchors
- Modified/cut 10' anchors and/or baseplates
- Power-installed screw anchors (PISA) installed without using the appropriate equipment or installed using an attached baseplate instead of a properly connected helix
- Defacement of anchor rod identification stamps, precluding accurate visual identification of anchor type
- Anchor rods installed/modified using unapproved attachments of various configurations

Note: Reporting entity has observed, in many cases, non-conforming installations are correlated to locations with difficult installation conditions, such as rock, hard soil types, and/or steep terrain.

Reporting entity has established a project management team to work with identified contractors to assess the scope of potentially impacted facilities and develop/implement inspection and mitigation plans to correct the issue. Installation dates range as far back as 2014 with most non-conformances having been installed during the 2018 to 2021 timeframe. To date, nearly 2,200 non-conforming anchor installations of varying types have been remediated across several project phases.

Long-term mitigation is ongoing. The project team continues to work with contractors to identify personnel associated with non-conforming installations. This information is used to cross-reference work records to identify other potentially impacted structures. Additionally, reporting entity has incorporated several metrics to assist in identifying high-risk structures for further assessment, including:

- Location of structures in high-risk (triggers or consequence of failure) regions (extreme weather corridors)
- Soil analysis to determine potential pull-out factors for those structures located within high-risk regions

Lessons Learned

1. The material inventory controls used for applicable equipment types did not sufficiently allow reporting entity to quickly identifying increasing usage trends for specific material types. This would have potentially alerted entity to unusual work practices.

2. Absence of a clearly defined work-confirmation process by which contractors provide evidence of the proper installation of below-grade field equipment—specifically by using digital tools such as geolocation applications and photographic evidence of conforming installations—allowed below-ground material alterations/modifications to go undetected.
3. Work-record structure is inconsistent from contractor to contractor, making it difficult to identify associated personnel for specific structures for instances in which work on multiple structures is captured on single work orders, or where work is performed on time and expense/emergent basis.

Corrective Actions

1. All contractor-installed anchors have been inspected for improper anchor extension installation and remediated, as needed, for all applicable installations dating back to January of 2018.
2. All PISA installations performed by contractor/subcontractor personnel known to have been performed without the proper equipment have been replaced. Additional non-conforming installations in which PISAs were utilized in lieu of standard 10' anchors have been remediated on a case-by-case basis.
3. Reporting entity continues internal inspections of high-risk structures with 10' anchors based on analysis of various metrics.

Extent of Condition

This issue has the potential to impact all guyed structures throughout an impacted entities' service territory, including distribution and transmission assets. Given the prevalence and range of non-conforming installations, and the fact that such improper installation techniques were used by 100+ personnel across multiple contractor companies, it is possible that this practice has been used widely across the industry. Additionally, it should be noted that, in some cases, inspection and remediation efforts may need to be coordinated with local telecommunication entities contingent upon pole structure ownership/maintenance agreements.

Photos

See below for examples of non-conforming installations that have been observed.



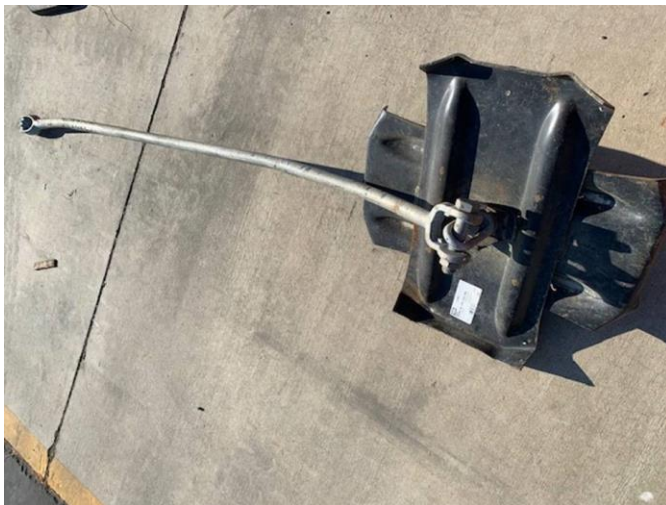
2' extension rod connected directly to a plate anchor utilizing an I-bolt



3' extension rod connected directly to a plate anchor utilizing an I-bolt



Two 3' extensions daisy chained and connected directly to a plate anchor utilizing an I-bolt



A 6' extension rod connected directly to a plate anchor utilizing an I-bolt



A 6' extension rod connected to plate anchor



6' extension attached to modified rock anchor



PISA with helix removed and partially threaded directly into plate anchor



Close-up highlighting the partial threading exhibited in several of the non-conforming PISA installations



Excavation of PISA anchor directly connected to plate anchor with helix removed



10' x 1 1/4" rod utilizing insulator clamp tops to secure plate anchor in place



10' rod with modified plate anchor (fins cut to fit in the hole)



10' x 1" rod that has been cut to 79" and re-threaded



Anchor equipment with stamp ground off



Anchor equipment with stamp ground off



Anchor equipment with stamp ground off



Anchor equipment with stamp ground off