

Osmose®

Steel Resiliency Solutions



Analytics



Corrosion
Mitigation



Structure
Assessment



Engineered
Designs



Engineering
Analysis



Structural
Restorations

Understanding and Addressing the Risks of Aging Steel T&D Assets

Steel transmission towers and poles were once thought to be permanent structures free from reliability concerns, but history has revealed that steel structures can substantially degrade at the groundline after only 40 years or sooner in some cases. Many structures that were erected from the 1950s through the 1970s are now approaching the end of their useful service life. Life extension measures, including coatings, cathodic protection, and restoration, can be taken to significantly extend the useful service life of these assets.

The increasing occurrence and intensity of storm events has led to more stringent code regulations and has shown that steel structures are vulnerable when exposed to environmental loading in excess of their original design capacity. Preventative measures can be taken to proactively prevent failure and ensure that structures will withstand higher loading conditions.

Osmose Turnkey Solutions

Steel utility assets - such as steel poles or lattice towers - are complex systems comprised of interconnected structural components. In turn, each of those assets are part of a larger system of interconnected structures stretching across the landscape. The failure of just one component could lead a structure to failure, potentially placing additional structures at risk of progressive failure.

Corrosion, storms, wildlife, and pollution are a few of the many elements that assail the integrity of steel structures. A complete structure, systemic approach is essential to maintaining grid strength, safety, reliability, and resiliency.

Osmose's Steel Resiliency Solution is the only service for steel structures that gives utilities a complete assessment of the health of their steel structures from the top of the tower to the components below grade. This service delivers fast, analytics-driven, cost effective life extension and restoration solutions in one turnkey, capital program. Our complete structure approach can save over 80% of the cost of new structures and avoids expensive outages that can reach \$1 million per day.



In the U.S., the average age of a steel tower in service is more than 60 years old. Clearly, steel transmission structures are now showing their age.

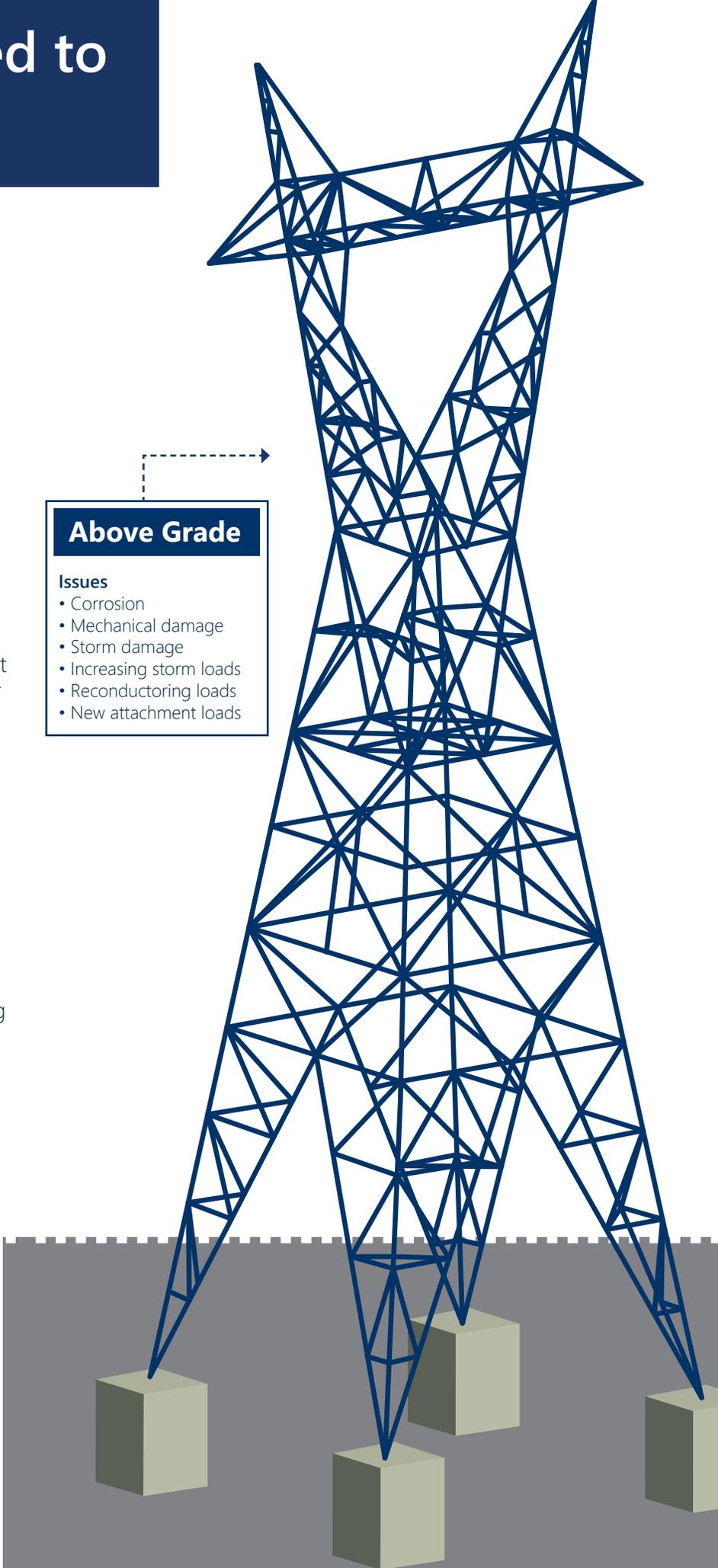
Solutions Designed to Ensure Resiliency

Faced with an aging steel network and an ever-increasing number and severity of weather incidents, how can a provider hope to achieve steel structure safety, reliability, and resiliency within the budgetary confines of the current regulatory landscape?

As a response to this challenge, Osmose's Steel Resiliency Solution includes assessment, life extending protection, engineering, restorations, upgrades, and financial advisory services – all enhanced by the latest innovative digital tools.

In the field, Osmose has applied the collective experience of evaluating hundreds of thousands of steel structures in developing a best-in-class approach to structural assessment. Using current drone and LiDAR scanning technology, together with excavation, structural measurements, and foundation assessments, Osmose engineers examine steel structures at two zones – groundline and above grade.

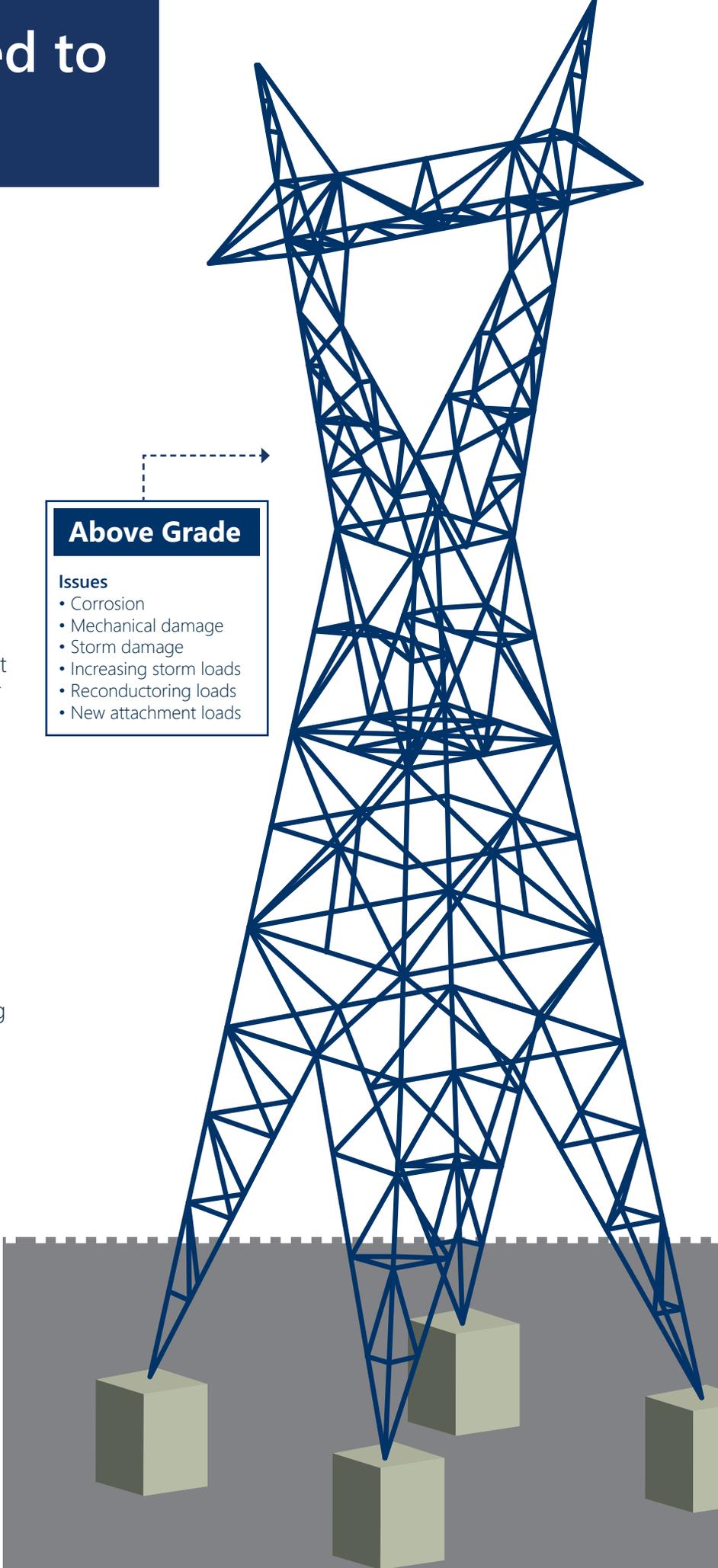
Combining almost a century of transmission and distribution engineering experience with digital models created from the collected data, the Osmose team can implement solutions that range from simple corrosion mitigation to structural restoration and upgrades, extending the service life of a steel asset or even increasing its capacity. These restorations, which can be capitalized to avoid unnecessary O&M spend, improve reliability and value to the customer. The Osmose team can also provide financial strategies to support the funding and ongoing performance of mission-critical steel assets.



Above Grade

Issues

- Corrosion
- Mechanical damage
- Storm damage
- Increasing storm loads
- Reconductoring loads
- New attachment loads

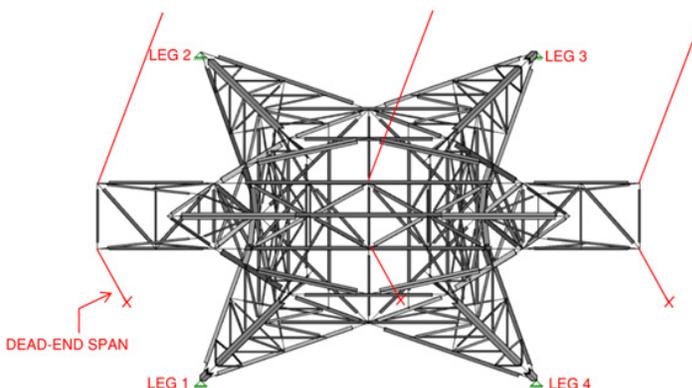
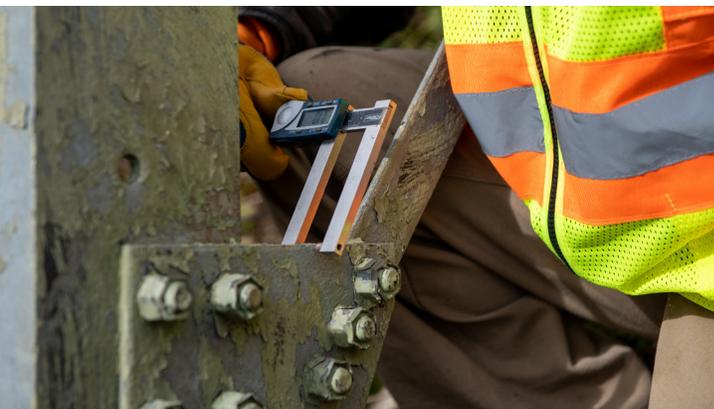


Groundline

Issues

- Corrosion
- Concrete foundation deterioration
- Mechanical damage
- Drainage issues

Osmoste delivers grid Structural Resiliency™ as a Service through superior:



Prediction

Predictive analytics help understand and prioritize the resiliency and capacity of grid structures.

Osmostyics®

A predictive analytics platform that leverages empirical data, circuit data, environmental information, and proprietary analysis to provide solutions with greater foresight and certainty to aid utilities in targeting higher risk structures and circuits.

Evaluation

Field Data Collection

Industry certified field technicians trained to assess the structures, their foundations and soil environmental conditions, assigning structural condition ratings and identifying areas of focus.

OsmostDrone - Aerial Assessment

Aerial assessment collected by unmanned vehicles operated by FAA certified pilots and assessed by the specialized Osmoste technical team.

OsmostVision® - Precision Modeling

Ultra-accurate LiDAR structural scans are used to generate precise structural analysis models.

Analysis

SteelCalc™

SteelCalc uses proprietary condition rating calculations factoring in specific geographical and physical characteristics of the structures to provide a focused groundline engineering assessment.

The SteelCalc algorithms provide a more precise understanding of the structural health at groundline level, where corrosion and mechanical damage risk exposure are critical, comparing the actual member capacity to industry-wide load cases and design codes. This process ultimately allows for improved risk mitigation at the structure and circuit level.

Modeling

O-CAP

Structure models are subjected to a rigorous structural analysis via Osmose's proprietary O-CAP application, capable of modeling structural performance at different levels of deterioration and environmental loading with an advanced non-linear algorithm. The results of this analysis drive action towards proactively preventing structural failure through restoration and upgrade solutions.

Life Extension

Protective Coatings

Specialized coatings are applied to mitigate corrosion and extend the useful service life of your steel structures.

Cathodic Protection

Cathodic protection can be used as an additional mitigation method targeting structures in highly corrosive environments. Remote monitoring units are available for installation in difficult-to-access areas or conservation lands, to regularly transmit cathodic protection information back to utilities.

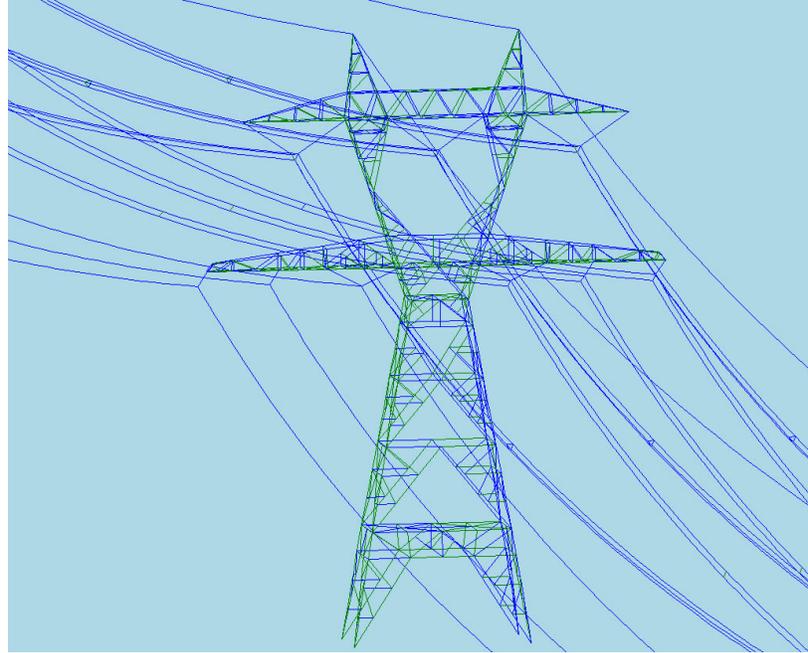
Structural Restoration

Through extensive research and implementation experience, the Osmose engineering team will design restorations based on the actual structural demand. Osmose's proprietary restoration solutions range from temporary support systems for lattice towers with extensive post leg damage to restorations accommodating varying steel pole flat widths for proper fit.

Advisory Support

Osmose provides business and regulatory case planning to support use of **capital spending** rather than O&M to fund steel asset life extension initiatives.

Capital budget optimization is achieved by proactively managing transmission assets in lieu of reactively replacing structures at time of failure. An Osmose coating and rehabilitation program significantly extends the useful life of steel towers and poles. Many utilities are capitalizing all or part of their program.





Osmose is an active member, participant, and/or complies with the following organizations and their standards:

ACI

American Concrete Institute

AISC

American Institute of Steel Construction

AMPP

Association for Materials Protection and Performance

ANSI

American National Standards Institute

ASCE

American Society of Civil Engineers

ASTM

American Society for Testing and Materials

AWS

American Welding Society

DOT/OPS

Department of Transportation/Office of Pipeline Safety

ICRI

International Concrete Repair Institute

IEEE

Institute of Electrical & Electronics Engineers

NESC

National Electrical Safety Code

Next Steps

[Steel Asset Management Workshop](#)

An Asset Management Workshop, provided by Osmose at no cost to utilities, assists steel transmission asset owners in determining the best assessment methodologies to optimize both structural and financial performance of their respective asset class. The objective of the workshop is to develop a steel management program that is financially beneficial to the utility, the rate payer, and the shareholder. Additionally, this workshop uses industry best practices to develop an asset management program that extends the performance life of the assets, mitigates risk, and optimizes future financial outcomes.

Osmose[®]

Resilient Grids. Strong Networks. Safe Energy.

For more information:

Call: 770.631.6995

Email: steel@osmose.com