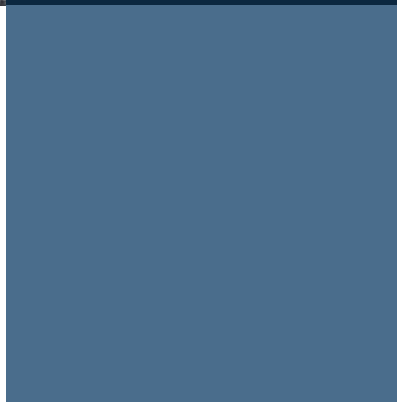
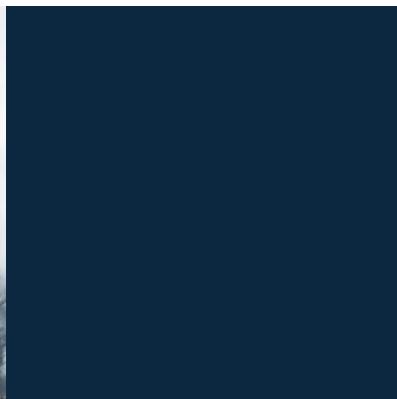
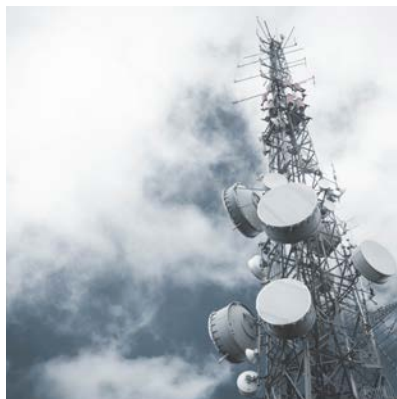
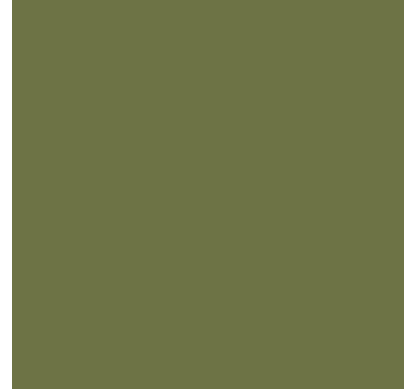
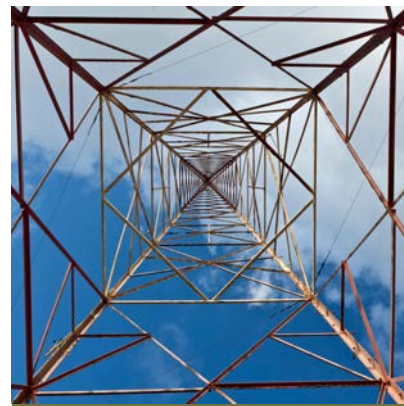


Five Challenges Facing Aging Tower Infrastructure

Insights from Varcon's engineering team on the structural, operational, and financial risks threatening legacy tower assets—and **how forward-thinking asset owners can take action.**



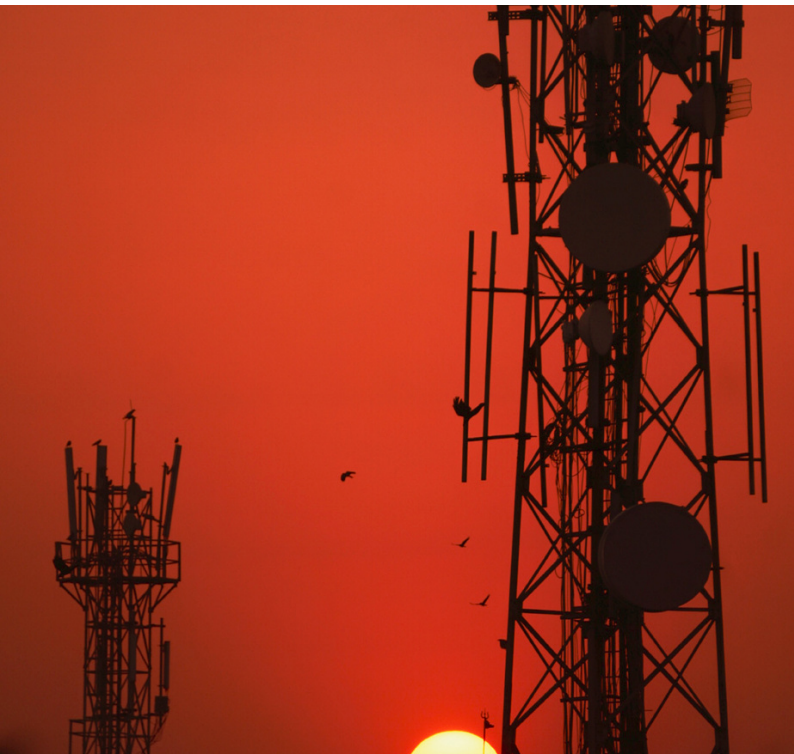


ACROSS NORTH AMERICA, TOWER STRUCTURES ARE AGING.

Built for simpler loading and shorter lifespans, many now carry heavier equipment, face harsher weather, and must meet stricter compliance standards.

TOWER OWNERS ARE FACING RISKS

Risks for asset owners are escalating and include corrosion, foundation movement, overloading, and inspection gaps.



SMARTER, SAFER ASSET MANAGEMENT

The Varcon engineering team's insights draw on the thousands of inspections our team conducts annually. Understanding these risks is the first step toward smarter, safer asset management.



Here are the five
challenges Varcon's
engineers see every day
in aging tower assets.

1. CORROSION

CORROSION IS THE MOST WIDESPREAD AND VISIBLE FORM OF STRUCTURAL DECAY.

Steel elements exposed to weather are prone to surface oxidation, internal rust, and eventual section loss. We encounter towers with compromised coatings, failing galvanized surfaces, and unchecked water ingress accelerating decay. Steel elements below grade are especially concerning, as they're often not visible and could be decaying unchecked and unmonitored.

Corrosion can affect legs, bracing, anchor bolts, and grounding systems with major safety and service implications.

Owners should align maintenance schedules with local climate and ensure the application of high-durability coatings at proper intervals. Regular inspection of interior cavities and connection points is essential to catch corrosion before it compromises the structure.



What causes corrosion?

Most metals corrode because they are not chemically stable in the environments we use them in.

Unlike copper and a few precious metals like gold, silver, and platinum, common structural metals such as iron are refined from ore. Once processed, they exist in a high-energy state that naturally tends to revert, making them more susceptible to corrosion.

2. FOUNDATION FATIGUE

PROBLEMS WITH TOWER ASSETS OFTEN BEGIN UNDERGROUND WITH SUBSURFACE MOVEMENT

We've seen towers with cracked footings, tilted structures, and anchor displacement due to frost heave, expansive clays, or subsiding soils.

These issues are especially prevalent in flood-prone or freeze-thaw regions. Because foundations are out of sight, they're often also out of mind: frequently overlooked until visible damage appears.

Non-destructive testing (NDT) and geotechnical assessments are crucial in vulnerable zones, helping detect hidden structural compromise. Remote tilt and displacement sensors offer real-time monitoring to identify movement early and guide remediation.



The best laid foundations fail

Even well-designed foundations can underperform if the surrounding soils shift or settle.

Understanding the interaction between materials and ground conditions is key to long-term structural stability.

3. LOAD STRESS

CO-LOCATION AND RETROFITTING HAVE INCREASED LOAD STRESS ON TOWERS

Legacy towers weren't designed for today's heavy, complex loads: 5G gear, multi-tenant arrays, aviation systems, or dynamic microwave installations. Add-ons can create non-uniform loading, wind effects, and stress concentrations. Improper retrofits like welding or bolting in the wrong places can disrupt load paths or cause vibration.

Climate change is another major factor contributing to load stress. Fatigue compounds over time worsening risks.

Each major equipment change should prompt a reassessment of tower capacity, ideally with finite element modeling (FEM) to understand dynamic behavior. In some cases, vibration control devices like tuned mass dampers may be required to preserve structural integrity.



Equipment is getting heavier

Telecom equipment has steadily increased in weight over the past few decades due to the expansion of networks and the need for greater capacity and redundancy.

Towers originally built for lighter 2G or 3G gear are now supporting larger arrays of antennas, radios, and cables—often beyond their original design intent.

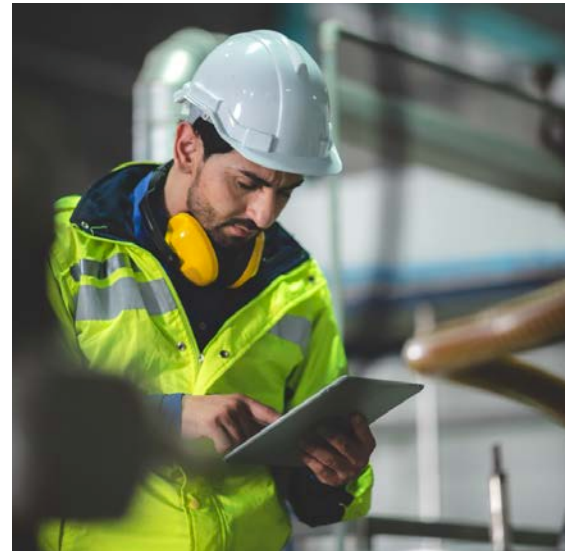
4. INADEQUATE INSPECTION

MANY INSPECTIONS ARE MISSING CRITICAL ISSUES AND PUTTING OWNERS AT RISK

Too many inspections are visual-only, infrequent, and not engineer-led. As a result, signs of early fatigue, subtle cracking, or foundational movement go unnoticed and become compounding issues.

At Varcon, every inspection is guided by licensed engineers and backed by technical documentation. We combine drone imaging, sensor data, and visual inspections into actionable reports tailored to each tower's condition and risk profile.

Inspections should be CSA S37 compliant, at a minimum. High risk areas and key infrastructure should be prioritized taking into account age, exposure, load, and known history.



Older towers present challenges

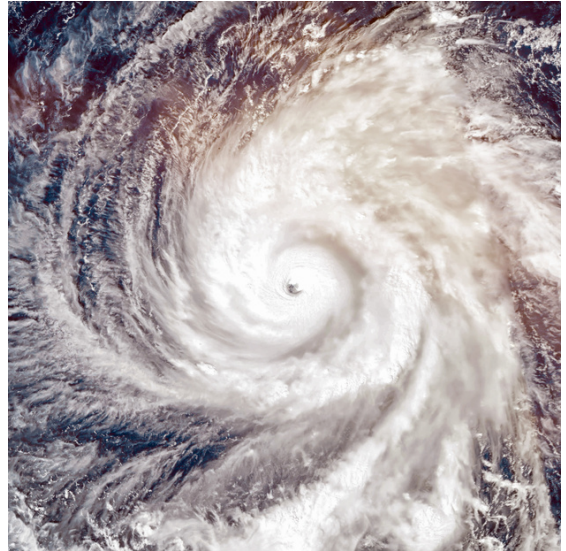
Towers built in the 1990s or earlier often lack comprehensive documentation. We encounter structures with no existing design drawings, foundation details, inspection records, or maintenance logs. Many older towers operate with little to no supporting documentation from their original construction posing a serious challenge for asset owners and engineers alike.

5. CLIMATE AND WEATHER

MANY TOWERS WERE NOT DESIGNED TO OPERATE IN CURRENT WEATHER CONDITIONS

Climate change is intensifying tower deterioration. From coastal corrosion to thermal expansion cracking, weather is a growing contributor to structural failure. Permafrost is disappearing, and water table levels are changing. Salt spray, ice loading, wind shear, and frequent storms now demand engineering foresight and climate-resilient designs.

Asset owners should model wind and ice loads specific to each site, using current and projected climate data. Climate-appropriate materials and detailing like protective coatings and anchoring systems can help mitigate exposure. Over the long term, asset lifecycle plans should consider evolving weather risks as a factor in inspection and replacement strategy.



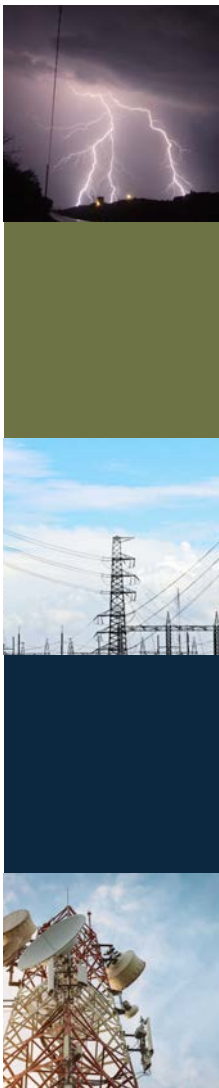
Weather intensity

The last 30 years have seen storm frequency and intensity increase notably across North America. High wind, tornadoes, hurricanes, and ice storms are threatening towers and guy wires more than ever before.

On the ground, flooding and soil saturation are threatening foundations. Temperature extremes are the new normal.

Take action to extend the lifespan of tower assets

The challenges facing tower assets and owners are greater than ever before, especially with so many towers reaching the end of their designed lifespans. But, there are tangible steps owners can take to mitigate risks and costs:



01 AUDIT

Audit your portfolio. Review age, loading history, past inspections, and known defects. Ensure your asset management system is up to date.

02 INSPECT

Target structures over 15 years old or with signs of corrosion. The right inspection cadence can identify issues before they become mission critical.

03 PRIORITIZE

Prioritize high-risk sites. Focus on co-located, coastal, and remote towers. Review assets in flood plains and those facing extreme weather.

04 MONITOR

Implement remote monitoring. Track tilt, vibration, corrosion, and weather loads in real time. Varcon's remote monitoring systems can help.

05 PARTNER

Engage qualified engineering partners. Choose teams with licensed professionals and tower-specific expertise. Proactive partnerships can help to de-risk your asset management system.

About **varcon**

VARCON IS CANADA'S LEADING TOWER ENGINEERING CONSULTANCY.

Varcon is Canada's leading tower engineering consultancy. We inspect thousands of structures each year, providing insight, analysis, and guidance for tower owners in telecom, utility, energy, aviation, and defence.

Our team includes licensed engineers, PhDs, and specialists in modeling, damper design, and monitoring systems. We're active contributors to CSA tower standards and safety frameworks.

Whether your portfolio includes five or five thousand towers, Varcon is here to help you operate safer, smarter, and longer.

Learn more at **varcon.ca** or contact us to schedule a consultation.

Get In Touch

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