Keeping the Lights On: Tower Repairs Without Outages

An Ampjack® Case Study

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Executive Summary

Repairing aging transmission infrastructure has always come with a steep price: not just in materials or labor, but in outages. De-energizing a high-voltage line disrupts power delivery, can trigger cascading delays in broader grid maintenance schedules, and often requires outages that cost utilities thousands of dollars per hour of downtime[1]. For decades, this trade-off has been accepted as the only viable option for structural upgrades and critical tower repairs.

But what if that no longer had to be the case?

This paper explores the successful structural repairs and upgrades of two lattice towers on a 500kV line owned by a major utility on the West Coast of the United States. The project involved replacing damaged and corroded steel members and restoring the integrity of the tower base — all completed in just 8 days. Crucially, the work was done without taking the line out of service, without using suspended loads, and without exposing workers to the elevated risks typical of traditional repair methods[2].

The result wasn't just faster and more cost-effective — it was safer.

By leveraging its patented bracing and lifting technology, Ampjack® continues to challenge the assumption that outages are a necessary part of tower repairs[4]. Could this energized, non-suspended method be the breakthrough the power industry has been waiting for?

The Problem

Many transmission towers in use today were built decades ago, requiring upgrades to meet current load and resilience requirements[3]. Like many aging transmission towers across North America, the two structures in question—designated **M15-T3** and **M36-T2**—had suffered corrosion and structural deterioration over time. Due to damage, M36-T2 was being held up with a repurposed wooden utility pole **(see Fig. 1, Fig. 2, & Fig. 3)**. The M15-T3 tower showed significant wear at its base, specifically at the concrete foundations, which had compromised bolted panel connections, and also featured bent beams in the mid-span section **(see Fig. 4 & Fig. 5)**. The situation called for urgent intervention to prevent potential failure or further degradation.

Traditionally, repairs of this nature require taking the line out of service. That means not only scheduling outages, but rerouting power, coordinating with load dispatch, and absorbing the associated costs of service interruptions. Additionally, many repair crews still rely on suspended-load methods — hoisting tower legs or structural sections into the air with cranes or rigging systems, which potentially creates dangerous overhead work environments and stability risks.

For this utility, however, outages were not a viable option. The transmission line remained critical to regional distribution, and prolonged de-energization would create downstream reliability issues. They also wanted to minimize risks to the crews performing the repairs.

Ideally, they required a solution that avoided both outage scheduling and suspended loads, while restoring the towers to their original engineering specifications and improving long-term structural performance.

Fig. 1: Tower M36-T2 leg held up with wooden pole

Fig. 2 & Fig. 3: Tower M36-T2 leg damage

Fig. 4 & Fig. 5: Tower M15-T3 foundation and lattice tower damage

The Legacy Approach

Up until today, utility companies have relied on a standard approach to repairing transmission towers: de-energize the line, mobilize cranes or rigging systems, and suspend critical sections of the tower structure while corroded or damaged members are removed and replaced **(see Fig. 6)**. This method often involves multiple crews, specialized access equipment, and long lead times — not to mention the planning required to take a line out of service without disrupting power delivery to customers.

Suspending parts of the structure introduces new points of failure, especially when relying on cranes or cable rigging in areas with limited anchoring options. Workers are often required to perform complex tasks while operating under a partially disassembled structure, increasing exposure to injury. From a cost perspective, taking a line out of service — even temporarily — can trigger penalties, limit redundancy across the grid, and create scheduling conflicts with other necessary maintenance.

Utilities tolerated these trade-offs because the industry lacked a scalable, energized alternative. Structural issues were addressed when outages became available — not necessarily when the structure needed attention.

The result? Delayed maintenance, increased risk, and spiraling costs. The "old way" persists because most utilities still aren't aware there's now a better one.

Fig. 6: Traditional tower repair with required outages and heavy equipment

The Ampjack® Approach

Ampjack's proprietary method makes it possible to stabilize, lift, and repair transmission towers while they remain fully energized. At the heart of this approach is the patented AMPJACK® system — a hydraulic lift and brace assembly that supports the entire structure safely from below, eliminating the need for cranes or cable suspension. By reinforcing the tower during the repair, not only are risks minimized, but the structure often emerges stronger than before.

Tower M15-T3 Plan: Structural Repair & Reinforcement

Tower M15-T3 presented two critical challenges: a corroded lower leg section and associated lattice members requiring replacement, and a damaged footing that had to be partially reconstructed **(see Fig. 7)**. Traditionally, addressing these types of failures would require taking the tower out of service, using cranes to suspend and stabilize the structure, and often constructing temporary access infrastructure. These methods introduce significant worker exposure to suspended loads and result in costly service interruptions.

Tower M36-T2 Plan : Lifting the Tower and Rebuilding the Base

Tower M36-T2 presented a different challenge. One tower leg and stub angle were bent and misaligned, and several lattice members were compromised **(see Fig. 8)**. Legacy repair methods would have required de-energizing the line, mobilizing cranes to support the tower, and carefully dismantling affected members while the structure was suspended. This process exposes workers to additional hazards and often takes weeks to complete.

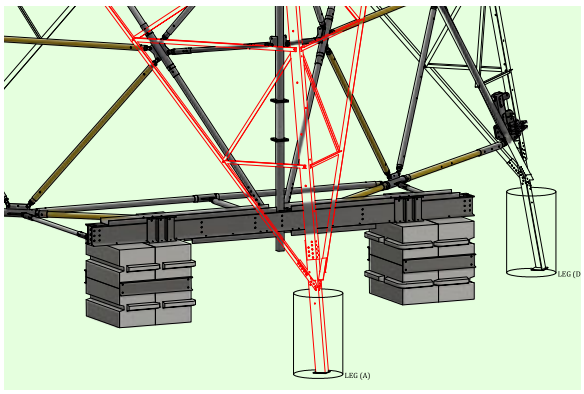

Fig. 7: M15-T3 drawing for replacing the lattice leg extension and stub angle of the tower leg

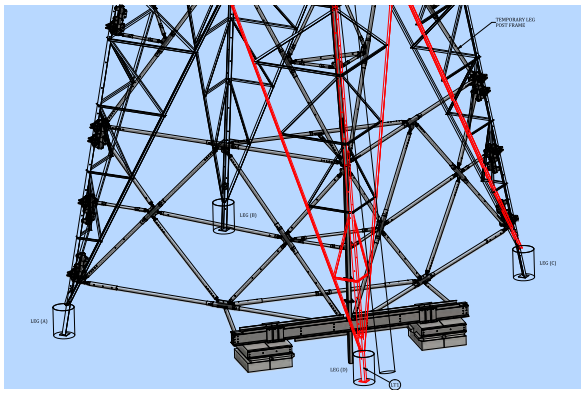

Fig. 8: M36-T2 plan for temporary bracing and support brackets to enable repair

Fig. 9 & 10: Ampjack crew working on the towers

The Ampjack® Approach (continued)

M15-T3: How the repair was performed

Instead of suspending the tower with cranes, Ampjack used its patented high-capacity clamp assembly supports and hydraulic load transfer system to offload stresses from the damaged leg, creating a secure and stable work environment while the line remained energized.

- **Temporary stabilization:** Crews mobilized pre-assembled patented high-capacity clamp assembly supports and temporary leg bracing to the tower. This system is specifically designed to "grip" the tower legs and foundation without damaging them, transferring structural loads safely and securely.
- **Steel replacement:** With the tower stabilized, corroded lattice members and the damaged stub angle were replaced with new steel sections, all performed without the need for overhead cranes.
- **Foundation reconstruction:** The top section of the concrete footing was excavated and rebuilt using high-strength concrete and epoxy bonding agents, restoring the footing's integrity.
- **Reassembly and curing:** Once new steel and concrete were in place, Ampjack's support system remained until the concrete had cured to its specified strength. Temporary bracing was then removed, and the tower returned to full structural capacity.

By controlling tower loads entirely from the ground and avoiding suspended lifts, Ampjack delivered a safer, more efficient solution. The entire repair was completed under energized conditions, avoiding an outage and eliminating the need for road-building or crane access. The result was a tower structurally stronger than when it was first built, completed faster and with lower risk compared to legacy methods.

Fig. 11 & 12: Deconstruction and cleanup

Fig. 13 & 14: New foundation concrete being poured

Fig. 15 & 16: Finished foundation upgrades enabling tower work

The Ampjack® Approach (continued)

M36-T2: How the repair was performed

Ampjack again used its proprietary bracing and patented high-capacity clamp assembly technology to stabilize the structure without relying on suspended loads. This allowed crews to transfer the tower's weight off the damaged leg safely while performing the necessary structural replacements under energized conditions.

- **Load transfer and stabilization:** Patented high-capacity clamp assembly and temporary bracing assemblies were installed on multiple tower faces, distributing loads evenly and supporting the tower independently of the damaged leg.
- **Leg and footing reconstruction:** Crews removed the bent stub angle and excavated the upper portion of the footing. A new stub angle was installed, and the footing cap was reconstructed using high-strength concrete, restoring full load capacity.
- **Member replacement:** Redundant members and tension bracing on the A-B and C-D faces were replaced sequentially. The Ampjack system allowed bracing to be reconfigured safely as work progressed, maintaining structural integrity at every stage.
- **System removal and restoration:** After the concrete cured, Ampjack's bracing was removed, and the work area was regraded.

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Fig. 17 & 18: Temporary stablization, deconstruction

Fig. 19 & 20: Repaired leg ready for new foundation

Fig. 21 & 22: New foundation poured and finalized

Key Outcomes

The project demonstrates how Ampjack's innovative engineering and alternative repair methodology provide utilities with a safer, faster, and more cost-effective solution. By repairing two structurally compromised towers under fully energized conditions, Ampjack eliminated the need for outages, cranes, or suspended loads — all while restoring full structural integrity and extending the service life of critical infrastructure.

Every step of the process emphasized safety, stability, and efficiency, resulting in a controlled work environment and a faster project timeline than traditional repair methods could achieve. This approach is not just a one-off solution, but a repeatable, scalable way forward for utilities facing aging infrastructure challenges.

1

Energized Repairs, Zero Outages

Both towers were repaired while fully energized, avoiding costly service interruptions and customer impact.

2

No Suspended Loads or Cranes

The patented Ampjack® bracing and patented high-capacity clamp assembly system stabilized the structures without lifting them into the air, eliminating a major safety risk.

3

Faster Completion Timeline

Critical structural and foundation repairs were completed in significantly fewer days than traditional outage-based methods.

4

Improved Safety

Crews worked from stable, grounded bracing systems instead of handling suspended tower loads, reducing worker exposure and risk.

5

Long-Term Structural Strength

Replacement members and new foundation components strengthened both towers beyond their original specifications, ensuring reliability for decades to come.

Conclusion

The legacy approach wasn't built for today's challenges.

AMPJACK® is.

This project serves as a clear demonstration of what's possible when traditional tower repair methods are reimagined.

The structure is never suspended in the air. Instead, a stable platform of bracing and hydraulic lift system carries the load safely and allows precision repairs to take place without compromising tower integrity or endangering workers.

Repairs don't have to mean outages. Keep the lights on. Choose Ampjack.

References

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