An ASI Success Story

Demolition of the Thunder Bay GS Chimney

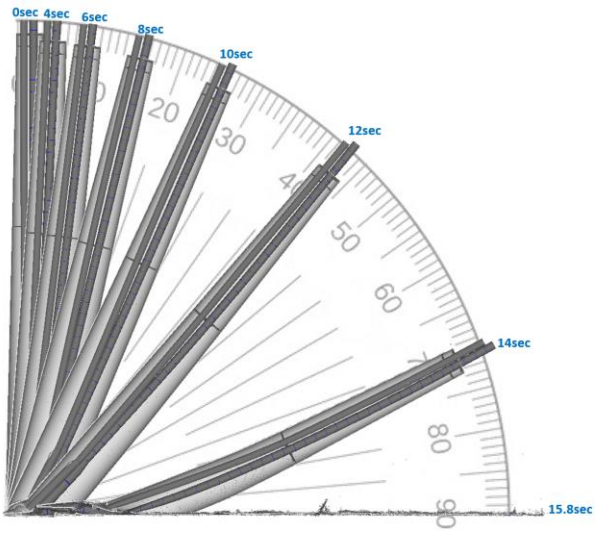
Thunder Bay, Ontario, Canada, September 2021

On September 9th, 2021, Thunder Bay Generating Station Plant witnessed the controlled demolition of its 650-foot chimney, marking a pivotal moment in structural engineering. Budget Demolition Corp (now known as YORK1), in collaboration with Applied Science International (ASI), meticulously planned and executed an implosion that saw the chimney collapse gracefully within 16 seconds. ASI's expertise in dynamic structural analysis, using their Extreme Loading® for Structure (ELS) software based on the Applied Element Method (AEM), ensured precise execution of the demolition.

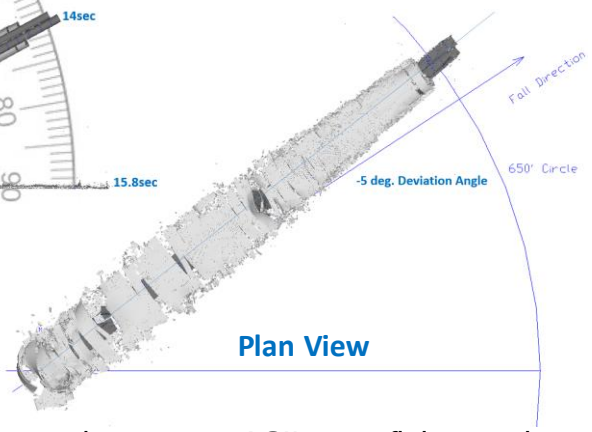
Standing approximately 650 feet tall, the chimney featured a reinforced concrete shell with a 68-foot base diameter and varying thickness, housing three carbon steel flues critical to its structural integrity. Predicting the behavior of these elements during demolition presented challenges, necessitating advanced modeling techniques for accurate analysis.

Budget Demolition Corp strategically weakened specific structural components and utilized controlled implosion to ensure the chimney collapsed precisely as intended. ASI supported this strategy by modeling scenarios that selectively removed or weakened critical elements of the chimney, ensuring safe collapse away from sensitive areas and infrastructure, such as nearby boilers.

ASI's detailed 3D numerical model, developed using ELS software, simulated various demolition scenarios, considering interactions between the chimney's reinforced concrete shell, steel liners, and ground conditions. Multiple simulations assessed the strategy's sensitivity to material properties and structural conditions, consistently demonstrating its effectiveness with an estimated drop time of 15.8 seconds from initiation and deviation angle of 5º measured from the intended falling direction. Early cracking of inner liners before the outer stack collapse aligned with predictions.



Front View



Plan View

This optimization study underscores ASI's proficiency in advanced numerical modeling and simulation for chimney demolition projects. Leveraging ELS software and AEM methodology, ASI provided crucial insights that guided the safe and efficient execution of the Thunder Bay GS Plant chimney demolition. This collaboration exemplifies a dedication to innovation and precision in structural engineering practices, ensuring successful outcomes in challenging demolition endeavors.

0 sec. 4 sec. 6 sec.

8 sec. 10 sec.

12 sec.

14 sec.

15.8 sec.

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