

Lightning Protection and Grounding Consulting



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A Lightning Protection and Grounding Consulting engagement generally follows the format outlined here; however, please keep in mind that no two sites are the same and that some items will receive a significant amount of emphasis while other items may be excluded or minimized as appropriate. It is important to note that all items must be considered in order to develop a complete and well-designed protection system that works.

Business Meeting

The first step, before inspecting the actual site, is to meet with the site management (chief engineer and/or business manager) and to identify the scope of the engagement and get an overall business and engineering understanding of the site. This meeting will focus on:

- The damage history of the site (how often, how much damage, what was damaged) and the business consequences of the outages;
- Identify any business or engineering constraints that may apply regarding any potential engineering changes and their impact on site's operation and cost structure;
- Identify and preliminarily agree on what equipment should be protected and what equipment should not be protected; and
- Start to create a high level sketch/schematic of the appropriate key areas of the site with particular attention to the equipment to be protected and the infrastructure supporting that equipment (antenna, transmission line, power feed, telephone connections, and control circuitry).

Understanding the level of past damage, business and engineering constraints, and the site's high level schematic gives the consultant and the client the same view of the site and a common basis for communications. This is a critical to any successful consulting engagement.

Walk Through Inspection

The next step is the actual site inspection and it is performed in two phases. The first phase is labeled as a "walk through." During this phase, the site representative(s) and the consultant literally walk through the site for the purpose of understanding the installation, associating the business discussion with the actual site, and to get a feel for the site as a whole. As necessary the site high level schematic is updated to reflect the real world. Once the big picture is understood, the second phase of the inspection is ready to begin.

Survivability Strategy Development

The second phase concentrates on specific areas that are key to establishing a site survivability strategy. On the exterior the following areas are inspected, measured and documented:

- The antenna base, guy-anchors, and their connection to the grounding system;
- The ground field radial system and optional resistance measurement;
- Coaxial cables as they leave the tower and enter the equipment facility, including cable ladders and ice bridges, and their connection to the ground system;
- Soil conductivity and pH measurement;
- External copper-based communications cable entrance and connection to the grounding system;
- Commercial and back-up power cable entrance and connection to the grounding system;
- Inspection of any near-by metal objects (fence, door frame, fuel tank, air conditioner, etc.) and their connection to the grounding system; and
- Any other external objects, both above and below grade, which are in the vicinity of the equipment facility.

On the inside, the following are identified, inspected, measured, and documented:

- The collection of radio, computer, and electronic equipment that are to be a part of the protection scheme;
- The electrical interconnections between the identified equipment to be protected and the rest of the world;
- Other near-by or collocated equipment in the vicinity of the equipment to be protected;
- The power distribution, telephone, and control signal wiring as it feeds the equipment to be protected;
- The equipment chassis, frame, and inter-frame grounding with respect to a single point ground; and
- Any existing lightning protection measures installed on the site.

Documentation

During this second pass through the site, the high level schematic is updated as appropriate and a photograph record of key elements of the installation is created. The schematic and photographs become the basis upon which the protection recommendations are developed. Also, at this time there is the opportunity for the site engineer to interact with the consultant to ensure a thorough understanding of the principals and practices being applied before they are committed to the report.

Time scale

On a small to medium size site, the management meeting and physical site inspection can be performed in a single day. For larger sites, or if the optional ground system measurement is performed, the effort could take two or more days depending on the size of the site and the complexity of the ground system being measured.

Once the site inspection has been completed a consulting report is created. The report, which can take from two to four days of engineering time to create, contains a summary review of the existing installation followed by corrective action recommendations. The recommendations are presented in detailed and supplemented with drawings and photographic extracts. The recommendations are supported with a parts list and general guidelines for the overall installation. The final report is delivered within approximately two weeks after the completion of the site inspection.

Cost

	Commercial	Amateur
On-site work per day plus transportation and subsistence at actual cost	1500	500
Off-site work per hour for report creation (Commercial: minimum 8 hours), meetings, and related coordination	150	50
Post implementation site re-inspection per visit plus transportation and subsistence at actual cost	800	300

Summary

It is possible to create a bulletproof protection scheme — even from a direct lightning strike. All of the rules must be followed completely and accurately; a single violation voids the entire protection scheme. Periodic maintenance and inspection is required.

Are you ready?