

# The Routine Structural Inspection of Artificial Climbing Structures

Presented by John McGowan  
**ELDORADO**  
CLIMBING WALLS

## Overview

Routine structural inspections of climbing walls should be performed on a regular basis. In order to determine the frequency of component inspections, one should consider both the likelihood of wear as well as the potential for injury should a system fail. Rope anchors, for example, should be inspected quite frequently due to potential of high wear plus the potentially disastrous consequences should an anchor fail. Conversely, climbing wall texture systems may be inspected with less frequency because the likelihood of injury due to failure is very small.

It should be noted that each system might readily be inspected for wear and structural integrity by means of visual, non-destructive evaluation. The intention of a routine structural inspection is not to determine if a system was designed correctly (the presumption is that the original installer designed and installed the climbing structure to meet all applicable loads), but to evaluate if any deterioration or deficiencies have occurred over time, whether modifications to the original design are deficient or to identify possible precursors to problems that might develop.

The following procedures outline an entire Artificial Climbing Structure inspection for illustrative purposes only. More than likely, routine structural inspections will evaluate individual components at separate frequencies. It is up to the individual wall operator to establish an inspection schedule.

*Disclaimer: This document is intended for informational purposes only. Eldorado Wall Company, Inc. in no way implies that any of the methods, information or recommendations provided herein will decrease the odds of an incident of injury, death or possible structural failure.*

## Inspection Procedures

A starting point for routine structural inspection should be a visual inspection from the ground to identify obvious potential problems such as general deformities like skin or belay anchor (bar) deflection, structural cracking, inappropriate modifications and/or repairs, etc. It should be noted that due to the constant movement of facility walls, foundations, floors and roof structures, that minor cracking is probably not reflective of more serious problems. (When in question, consult with the climbing wall original manufacturer to determine the difference between minor aesthetic cracking and potential structural problems.)

Next, one should conduct a visual inspection of the interface between the Artificial Climbing Structure and the parent structure (facility wall, or foundation, generally), which generally requires climbing around behind the climbing wall. The connection between the climbing wall structure and the facility and/or foundation generally involves some form of mechanical anchors. These connections should be visually inspected for any sign of separation. (Any sign of bolts pulling out of concrete or facility walls, for example, would be reason for concern.) Additionally, anchors should be checked for general integrity and tightness. Finally, generally attachment members (ledgers, girts and columns) should be visually evaluated for any sign of un-natural deflection or breakage (which might be indicative of any load related failure).

Next up is the general evaluation of the structure of the Artificial Climbing Structure. Since climbing wall structures may vary widely in composition, it is important to note that the intention of the inspection is to make sure that the structure remains as initially installed. Special attention should be given to the joints between members, as well as the straightness of the members themselves. Look for evidence of damage, deformation, cracking, excess oxidation, inappropriate modifications or repairs or any other obvious deficiency. If the structure is composed of wood, a full evaluation of wood members and fasteners should be conducted. If welded steel in composition, visual inspection of the structural members and welds\* should be conducted. If bolted steel composition, structural members should be visually inspected and fasteners should be checked for tightness and integrity. Reasons for concern would be large deflection or breaks on structural members, broken, sheared or highly stressed joints, excessive corrosion on members and joints, or obvious damage to structural components.

Typically the highest frequency inspection is the physical and visual inspection of all Top Rope and Lead anchors employed. Since most anchor systems employ mechanical anchors to attach them to the structure, all fasteners should be evaluated for integrity and tightness. Note: because of the large loads applied, all such anchors should be attached directly to the frame (sometimes after market installers neglect this formality). In addition to fasteners, all welds (such as those on belay bars) should be visually inspected\*. Belay bars should also be inspected for signs of wear, as well as for breaks and/or deflection. All anchor hardware (such as bolt hangers, quick-links, chain, super-shuts, quick draws and slings, carabiners, etc) should be carefully inspected for excessive wear, cracking, deformation, corrosion, missing or inappropriate replacement parts, etc. Any deficiencies should be noted and repaired or replaced.

Floor anchors, if installed, should also be inspected quite frequently. To do so, pull up the flooring and inspect all fasteners for integrity and tightness, and check all components for wear, cracks, corrosion, deformation, etc. Note: floor anchors are typically designed to anchor a belayer to the floor – not to anchor a rope (the

load of a falling climber could easily exceed the design load of almost any floor anchor).

The substrate, while inspected less frequently, should be evaluated as well. Again, this inspection is performed from behind the climbing structure. The attachment of the substrate to the structure should be carefully evaluated for signs of panel to frame separation, panel breakage or deformation, water and environmental damage, and puncture damage due to fasteners pulling through (which may indicate that holds are being installed with excessive force). It is also a good time to note where handhold fasteners need to be repaired or replaced. The textured surface on the substrate may also be inspected at this point from the front of the wall. Beyond aesthetic concerns, one should look for large cracks or signs of displacement or deformation that would possibly indicate that the climbing wall surface is moving. With Large scale movement one should try to evaluate the root cause.

The facility maintenance staff may perform visual weld inspections. Non-destructive evaluation of welds involves visual inspection whereby one looks for discontinuities (cracks) within the weld or at the junction of the weld with the base metal. Any joints with substantial discontinuity may be noted for evaluation with the original equipment provider or an AWS certified weld inspector to determine if any repair will be necessary. (Note that it is common and acceptable for small star-crater cracks to form at the start or end of a weld.)