WJE

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Summary of Advantages and Disadvantages of Rope Access Techniques

The following is a brief summary of advantages and disadvantages of using rope access techniques to access the facades of buildings based upon our project experience in this area as well as discussions with building owners and window washing contractors. For the purposes of this advisory, the term "rope access" is intended to mean both "rope descent systems" and "industrial rope access"; we differentiate between these two techniques where necessary.

BACKGROUND

Facade access on mid- and high-rise buildings is usually achieved via rope access or via suspended powered platforms. Rope access requires workers to be suspended from a primary working line with a backup fall arrest line and can take the form of rope descent systems (RDS) or industrial rope access (IRA). Rope descent systems and industrial rope access are somewhat similar in that they both involve workers being suspended via ropes; however, industrial rope access uses different equipment and has greater training and supervision requirements. Suspended work platforms consist of aluminum or steel platforms that are often suspended from contractor-supplied temporary outriggers or parapet clamps, or from building-provided dedicated outriggers, davits, or rooftop carriages. The platforms are raised and lowered using motors (i.e., hoists).

RECENT CHANGES IN OSHA REGULATIONS

On November 17, 2016, OSHA issued a final rule updating the fall protection requirements of the General Industry Rules 29 CFR 1910, known as Subpart D, *Walking-Working Surfaces*. OSHA's General Industry Rules apply to maintenance work performed on or in existing structures and facilities. The new rules cover a wide array of conditions and hazards.

Notably, effective January 17, 2017, the use of rope descent systems for maintenance activities is now restricted to locations no higher than 300 feet above ground level unless it is not feasible to access such heights by any other means or if those means pose a greater hazard than rope descent. The burden for proving that no other safe and feasible method exists rests with the entity whose employees are performing the work via rope descent. The 300-foot arbitrary height limit on rope descent systems is based on a similar limit promulgated by the administratively withdrawn and now de-accredited IWCA I-14.1 *Window Cleaning Safety* standard. OSHA drafted their provisions and based their decision

on testimony from the IWCA committee members prior to the suspension and subsequent de-accreditation of the IWCA committee by the American National Standards Institute (ANSI) due to the "number and severity" of violations of ANSI regulations, along with the IWCA's failure "to carry out its responsibilities in a fair, comprehensible and compliant manner". Nevertheless, OSHA's new regulations must still be followed, despite the questionable nature and origin of the limit.

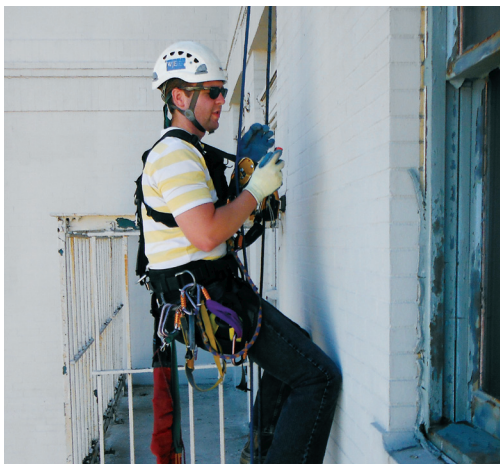
Effective November 20, 2017, OSHA requires that building owners provide documentation to contractors accessing the facade via rope descent systems that the applicable provisions of the OSHA regulations have been met prior to use. All anchorages used to support rope descent systems must be identified, inspected, and tested to demonstrate they are capable of supporting at least 5,000 pounds in any direction for each employee attached. Certification by a qualified person, such as a professional engineer, is required at 10-year intervals (maximum).

On November 20, 2017, OSHA issued a clarifying memorandum that may allow employers and building owners additional time to comply with the new rope descent anchorage certification requirements on a case-by-case basis, *"provided that employers and building owners can demonstrate and document they are exercising due diligence to come into compliance with the standard's requirements."* OSHA cited the motivation for granting this enforcement discretion to its Compliance Safety and Health Officers as being *"due to a limited availability of qualified persons to inspect, test, and certify anchorages for RDS use."* However, there are significant caveats in this memorandum regarding enforcement discretion that make its practical applicability unclear.

ADVANTAGES OF ROPE ACCESS SYSTEMS

Some of the advantages of rope access systems, compared to powered platform access, include:

- **Low-cost equipment.** Traditional rope access systems require very little in terms of equipment. Two ropes, a boatswain's chair (if a rope descent system is being used), a descender, a rope grab, a full-body harness, a lanyard, and a suction cup for work station stabilization at windows are typically all that are required to perform a drop over the side of a building using rope access. In contrast, a powered platform typically requires a platform that may weigh as much as 1,500 pounds, two operators, two hoists, two suspension wire ropes, electric power and a power cable, two davits or outriggers, continuous or intermittent stabilization on the facade, two fall arrest lifelines, two full-body harnesses, two rope grabs, and two lanyards. In addition, the hoists typically include emergency descent systems, overspeed limiters, upper limit sensors,



and lower limit sensors — all of which must be functional in order for the hoists to be used safely. The increased costs of powered equipment are either directly or indirectly borne by the building owner.

- **Less complicated equipment.** Although both rope access and powered platforms have weaknesses, arguably less can go wrong with rope access systems. Rope access systems are fundamentally simpler than powered equipment, and though human error and/or equipment malfunction are both possible, management of the rope access system is relatively easy due to its simplicity. Mobilization and rigging of powered equipment is more complicated, presenting greater potential for human error and/or equipment failure. With powered equipment, failures can also occur in the mechanical or electrical systems that are not necessarily directly within the operator's control.

- **Less intensive labor requirements.** In our conversations with window washers, many state that they prefer to wash windows from rope descent systems (e.g., boatswain's chairs), and that powered equipment is more expensive and time-consuming to set up and operate and therefore less preferred. Again, any increased costs are ultimately passed on to the building owner.

- **Smaller design load effects on existing structures.** Although the factored design *forces* from rope access systems and powered platforms may be approximately similar, the bending *moments* associated with rope access are often a fraction of the bending *moments* that a powered system must be able to support because powered equipment suspended from davits or outriggers often requires a much greater eccentricity or "lever arm" to ensure the platform clears the edge of the building, which amplifies the effects on building components. In our experience, existing buildings are more likely to be able to accommodate the additional loads from new rope access system anchorages without retrofit compared to the loads from a new permanent powered platform support system (e.g., davit system or rooftop carriage).

  Furthermore, the typical service load on a rope access primary working line is only about 500 pounds when impact is considered. With a powered platform, the typical service load on a suspension cable can vary between 1,000 to 1,500 pounds, plus the effects of impact or stall loads, which can double or triple the service loads. Consequently, the typical service loads on rope access systems are a fraction of the loads from powered platform systems.

- **Smaller stabilizing loads.** Wind loads can adversely affect both rope access systems and powered platform systems. Because the sail area of a person is much smaller than that of a powered platform, the forces from wind that must be resisted by a rope access system are substantially smaller. In the event of windy conditions, window washers can tether themselves to a window using a suction cup, while powered platforms often require dedicated structural anchors or tracks on the side of the building to provide sufficient stability. Furthermore, the consequences of having insufficient lateral stabilization are arguably more severe for powered platforms, as the platform itself can get blown away from the facade and rotated in a manner such that the suspension cables get twisted,

precluding descent. It is much less likely for a similar condition to develop with rope access systems, and the potential of collateral impact damage to the building associated with an out-of-control scaffold is precluded.

- **Quicker descent.** In the event that a rapid descent to the ground is required, rope access systems generally allow their users to get to the ground quicker than powered platforms.

DISADVANTAGES OF ROPE ACCESS SYSTEMS

The following are some of the relative disadvantages of rope access systems:

- **More labor-intensive tasks are often difficult to impossible**. A greater number and variety of maintenance and construction tasks can be accomplished from a powered platform than from a rope access system. From replacing sealant to replacing glass, a suspended work platform provides greater flexibility in terms of the tasks that can be accomplished. While window washing and other light maintenance work can easily be performed using rope access, many other maintenance and/or construction tasks are difficult to impossible when using a rope access system.

- **Little room for tools.** Tools used with rope access are typically those that can fit in a bucket, while powered platforms typically have sufficient space for many and/or larger tools, including power tools. Further, any tools used with rope access systems typically must be tethered to the worker or the system, and any tools over 20 pounds must be suspended from a system independent of the industrial rope access system.

- **Rope descent systems only go down.** Rope access systems are unpowered, and rope descent systems only go down. Workers using rope descent systems typically drop down the face of the building, disconnect at the bottom, then go back up to the roof to perform the next drop. While also predominantly used in a downward work pattern, industrial rope access affords considerably more flexibility in movement, with the ability for workers to move upward and laterally in some instances, and even transfer from one line to another mid-drop. Nevertheless, powered platforms often provide the greatest ease of use if work requires significant upward movement.

- **Less flexibility regarding who can use the system.** In our experience, rope access systems are difficult to impossible for less experienced personnel to use. As consultants, our staff often ride suspended powered platforms to investigate the condition or

performance of the facades of buildings. However, if access to the facade is via rope access, only specially trained staff members are permitted to perform the investigation.

- **Practical limits to rope access.** Rope access requires workers to move fairly heavy coils of rope and raise and lower the ropes over the side of the building by hand. For example, for a 600-foot tall building, a worker would have to rig two approximately 50-pound coils of rope in order to use a rope access system. Beyond a certain length, the ropes reach the point of being unwieldy, and rigging accidents become more likely.

- **Regulatory limitations.** OSHA regulations may preclude some forms of rope access. As stated above, OSHA now precludes use of rope descent systems for heights greater than 300 feet unless no other safe and feasible method exists. Industrial rope access, however, is still permitted for buildings of any height. Some state or local jurisdictions have provisions for the usage of rope access systems that are more restrictive than those found in Federal OSHA.

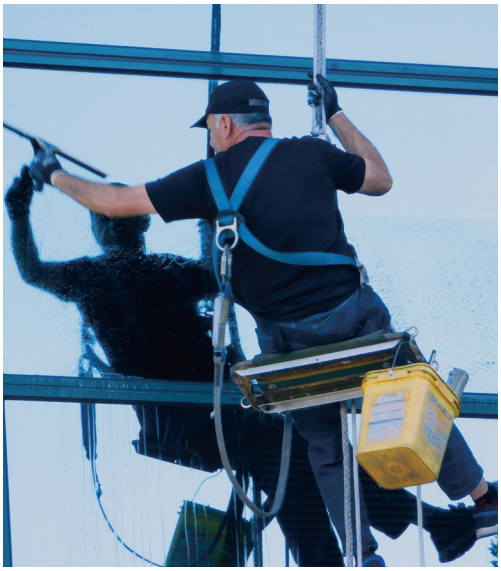
USE OF ROPE DESCENT SYSTEMS

As mentioned above, buildings that use rope descent systems are now required to have dedicated anchorages that are "identified, tested, certified, and maintained" such

that they are capable of supporting 5,000 pounds in any direction for each employee attached. Certification by a qualified person, such as a professional engineer, is required at 10-year intervals (maximum). Many buildings that are less than 300 feet in height currently lack the tested, certified, dedicated anchorages required to use rope descent systems in compliance with OSHA regulations.

USE OF INDUSTRIAL ROPE ACCESS

Buildings that exceed the 300-foot limit may still be accessed via industrial rope access techniques, to which OSHA specifically declined to apply the 300-foot limit. We understand that a number of window washing firms are switching to industrial rope access to avoid running afoul of the arbitrary 300-foot OSHA limitation. To provide a similar level of safety to workers regardless of the type of rope access employed, WJE recommends that anchorages used for industrial rope access comply with the same requirements for testing and certification that OSHA mandates for rope descent systems.



LIMITATIONS

The above discussion is generic and does not encompass all possible issues or solutions. It is also important to recognize that there is no one-size-fits-all approach to facade access. Each building must be individually assessed and evaluated to find a workable solution.

CLOSING

We understand that there may be pressure to add building-provided powered platform systems to taller existing buildings for routine maintenance tasks in response to new OSHA restrictions on rope descent systems. However, there are other options available – including industrial rope access – that do not have the same 300-foot limit that applies to rope descent systems. If you are having trouble figuring out a strategy to comply with OSHA's new regulations in a way that makes sense for a given facility or if you need assistance testing and certifying your facade access equipment, please let us know. We would be glad to help.

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