Metro

ISDS PROJECT

INTEGRATED STATION DESIGN SOLUTIONS

Bird Abatement

White Paper

June 2022

Gensler ARUP RAW INTERNATIONAL STUDIO-MLA Claris Strategy Kilograph

Bird Abatement
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1.0 Element Overview and Problem Statement

1.1 Description of Element

Metro requires updated standard practices for deterring birds from landing and/or roosting on station structures, features and furnishings. Methods and techniques to achieve this include station design elements as well as active and passive bird abatement.

1.2 Problem Statement

The presence of pest bird species, including feral pigeons, house sparrows and starlings, creates an adverse passenger experience and significant maintenance issues. Bird activity in and around stations can be a nuisance to passengers, with birds nesting in station canopies or on flat surfaces, perching on light poles, flocking to trash receptacles and leaving their droppings across surfaces. Droppings can cause health and safety issues, and deteriorate structures. Certain bird abatement devices, such as spikes, are visually unattractive, ineffective, and can collect litter, only adding to the problem.

Figure 1-1 Birds spikes in the Metro system. 7th Street/ Metro Center (above); Westlake/MacArthur Park Station (below).

Figure 1-2 Bird spikes on a pylon sign, Pershing Square Station.

2.0 Design Process and Principles

2.1 Design Process

The Project Design Team for this element was led by Arup, and included Gensler and RAW. Cost estimates were provided by Leland Saylor Associates.

Metro departments across the agency provided input throughout the design process. Beginning in May 2018, Metro Working Group Members accompanied the Project Design Team on site visits of existing Metro stations to observe and document the existing conditions of bird activity. The Project Design Team also conducted a series of interviews with representatives from a wide range of Metro departments, including:

- Arts + Design
- Environmental Compliance and Sustainability
- Facilities Maintenance (including separate interviews with FM field staff and management)
- Operations Liaison and Planning
- Program Management
- Project Engineering
- System Security & Law Enforcement

Based on the analysis and the information provided during interviews with Metro staff, the Project Design Team developed initial design concepts that were presented to the Working Group in July 2019.

Using the feedback provided by Metro Working Group members, the Project Design Team refined the initial design concepts and delivered the Design Documentation packages in March 2020. For additional information, see “Table 2-1: Timeline of Design Process” on page 4.

2.2 Working Group Feedback

Metro Working Group Members provided the following feedback on bird abatement:

Station Design

- Focus more on exterior station environments
- Birds are being witnessed in the stations and sometimes even on trains
- Birds perch on VMS screens and any other flat surface
- Limit size of open voids to deter birds
- Integrated design solutions are best
- Current standard architectural drawings need to be looked at to ensure bird abatement is considered in existing designs

Active Deterrent

- Audible bird deterrents are effective but cause disruption to neighbors

Passive Deterrent

- Piano wire is good for narrow surface
- Gel is ineffective, hard to maintain and creates a mess
- Spikes and Daddi Long Legs are mostly ineffective and create visual clutter

Figure 2-1 Ineffective deterrents at Harbor Freeway Station.

Figure 2-2 Spikes and Daddi Long Legs create visual clutter (Pershing Square Station).

2.3 Design Principles

Bird abatement should be seen as a comprehensive strategy that relies on three key principles:

1) Station Design

The design of the station should inherently create a space that prevents access for pest bird species and discourages birds from seeking comfort within the station environment.

2) Maintenance Operations

Maintenance efforts should focus on minimizing access to potential food sources for birds and provide sufficient opportunities for riders to dispose of trash and debris.

3) Monitoring & Adjustments

Station areas that can not conform to the above principles should be retrofitted with bird deterrent devices. Additionally, if surfaces conforming to these principles are found to attract birds, retrofitted deterrents should be installed. Deterrents should be designed to be durable, have minimal visual impact on station features and equipment, and require minimal maintenance.

Table 2-1 Timeline of Design Process

May to June 2018	Project Design Team and Metro Working Group Members conducted site visits of existing stations, including: 7th Street/Metro Center, Arcadia, Aviation/LAX, Expo/Bundy, Cal State LA, Harbor Freeway, Hollywood/ Highland, North Hollywood, Pacific Coast Highway, and Wilshire/ Vermont.
June to November 2018	Project Design Team conducted interviews with Metro departments, including: Arts + Design, Environmental Compliance and Sustainability, Facilities Maintenance (including separate interviews with FM field staff and management), Operations Liaison and Planning, Program Management, Project Engineering, and System Security & Law Enforcement.
February to May 2019	Project Design Team developed initial design concepts.
July 2019	Project Design Team presented initial design concepts to the Working Group.
October 2019	Draft Design Documentation Package and White Paper submitted.
March 2020	Revised Design Documentation Package submitted.
March 2020	Final Design Documentation Package and White Paper submitted.
March 2020	Draft MRDC and Architectural Standard/Directive Drawings updates submitted.

3.0 Design Solution

Careful consideration was given to balancing station design elements with the need for active and passive deterrent options as station and environmental conditions vary. Therefore, certain station architecture and design features and standards are proposed to mitigate bird activity. When it is necessary to implement retrofit bird abatement devices, specific recommendations are provided.

In existing stations where current conditions allow birds to congregate, several retrofitting options exist. Active deterrents such as waste management, as well as passive deterrents including bird netting, bird slope barriers, bird wire systems and electric shock track systems can all be deployed in existing stations to help mitigate bird intrusions. These are described in sections 3.2 and 3.3.

Depictions of deterrents in Figures 3-3 through 3-6 are courtesy of Bird Barrier USA, and are meant only as representative drawings. Actual specifications and installation requirements will vary depending on site needs, conditions, and location.

3.1 Station Design

New stations and holistic station retrofit projects can be designed with architectural features that minimize birds entering, perching and roosting within stations. Integrating deterrence into station design minimizes the need for retrofits and reduces ongoing maintenance requirements.

Restricted Open Voids

Station design should exclude open voids that create potential perching areas. When these voids are greater than 1.5" wide and 2" high, they can attract pest birds. Deterrents outlined in Sections 3.1 through 3.3 may be required in station areas such as covered ledges, ventilation shafts, elevated alcoves, etc.

Sloped Surfaces

Sloped surfaces are inhospitable to pest bird species, though this solution may not be feasible in all locations. Where possible, surfaces should have a minimum of 25° slope to discourage birds from roosting, a minimum of 35° slope if the surface is medium-rough, and a minimum of 50° slope if the surface is very rough. Surfaces such as station equipment, the tops of columns, signage, and Ticket Vending Machine enclosures should all be designed with appropriate slopes. See Figure 3-1 for an example of a sloped column top design.

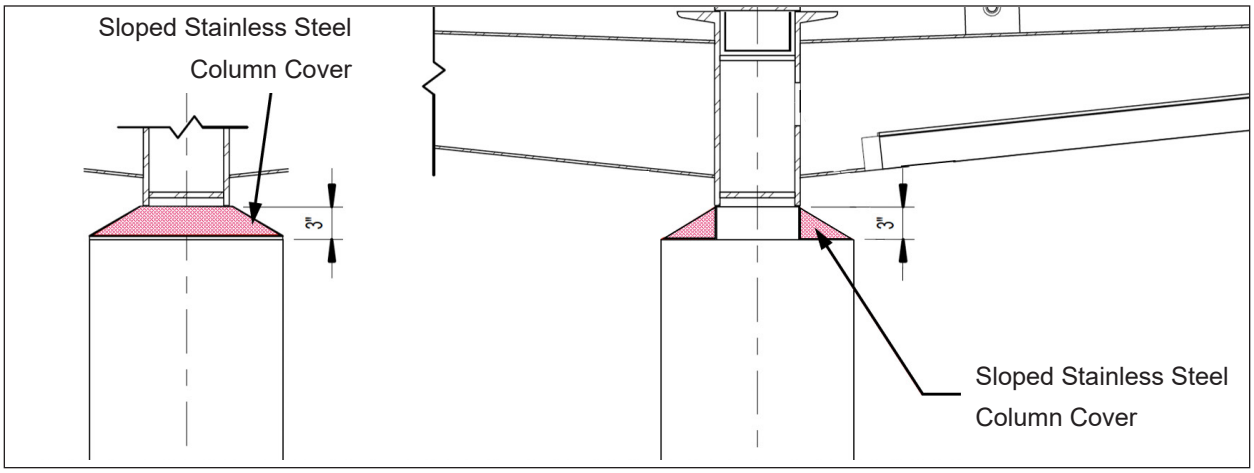

Figure 3-1 Sloped surfaces as component of column design.

3.2 Active Deterrent

Waste Management

Litter should be reduced through the frequent distribution and frequent emptying of trash receptacles to minimize availability and access to potential food sources for birds. The trash receptacle design (seen in Figure 3-2) proposed in the Station Furnishings element of this project takes into consideration design features that will deter birds: it features a dome top and an opening at the side to reduce accessibility to pest bird species. This solution relies on sufficient staffing and proper waste etiquette by passengers.

Figure 3-2 Design features of ISDS trash receptacles that deter pest birds.

3.3 Passive Deterrents

Open Spaces

Bird netting is a passive deterrent that may provide a solution for bird intrusion into openings that are necessary for ventilation or other basic functions:

Bird Netting

Bird netting provides a design solution that prevents birds from accessing open voids in station areas that cannot be fully enclosed. Netting may be deployed where open voids exceed 1.5" in width and 2" in height, particularly if bird perching or nesting becomes an issue.

The bird netting should be fitted using a perimeter cable system, employing polyethylene twine and stainless steel installation hardware. The width of the mesh openings should not exceed 1". See Figure 3-3.

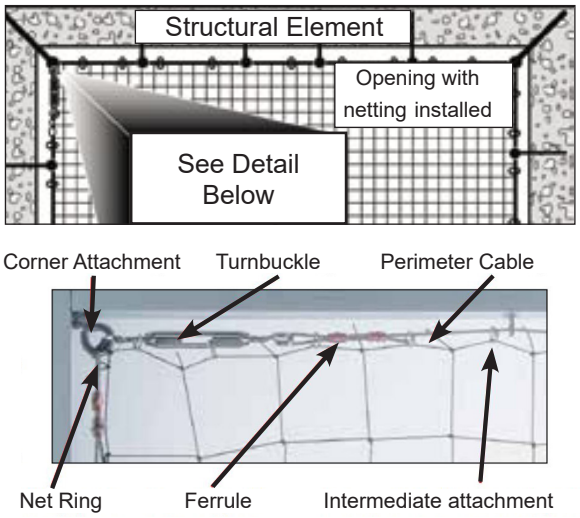

Figure 3-3 Example bird netting installation detail.

Flat Surfaces and Ledges

Various retrofitted deterrents are available to prevent birds seeking comfort on ledges and surfaces that are wider than 1.5" in width and under 25° in slope:

Electrical Shock Track System

This device transmits an intermittent, low-voltage shock that is memorable, but does not hurt birds. It teaches birds to avoid landing in the area. Discouraging pest birds from seeking comfort on surfaces, it should be installed where these species are to be totally excluded and low visibility is key. Independent chargers are available to power the system where it can not be tied into an existing electrical source. See Figure 3-4.

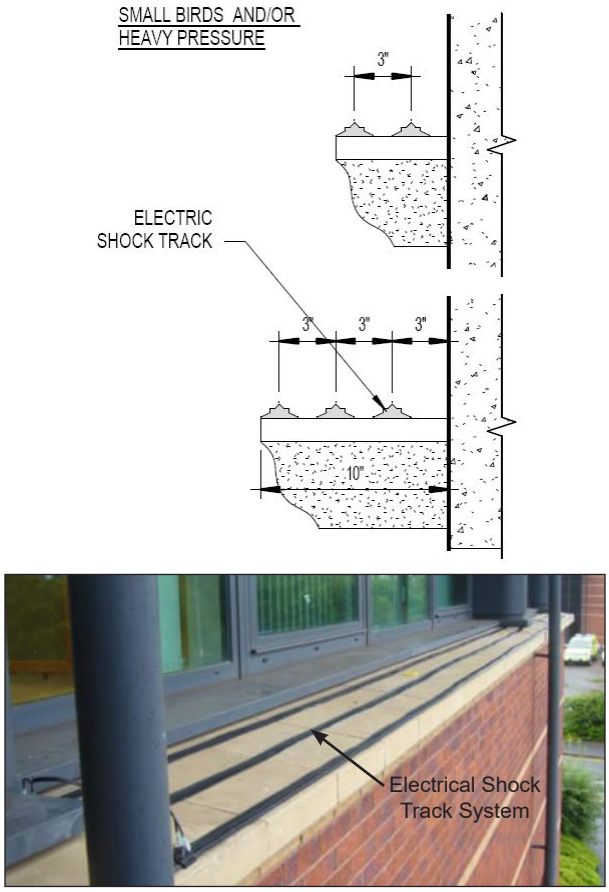

Figure 3-4 Example of electrical shock track system.

Bird Slope Barrier

Where a sloped surface cannot be designed into station architecture, the installation of bird slope barriers can similarly prevent birds from perching. To be effective, the barrier must run the full length of the ledge and be capped on both ends to prevent ingress. The barrier shall be applied using a silicone-based adhesive. Bird slope barriers should match or be compatible with the surface material to which they are applied, such as stainless steel when applied to the tops of canopy columns. See Figure 3-5.

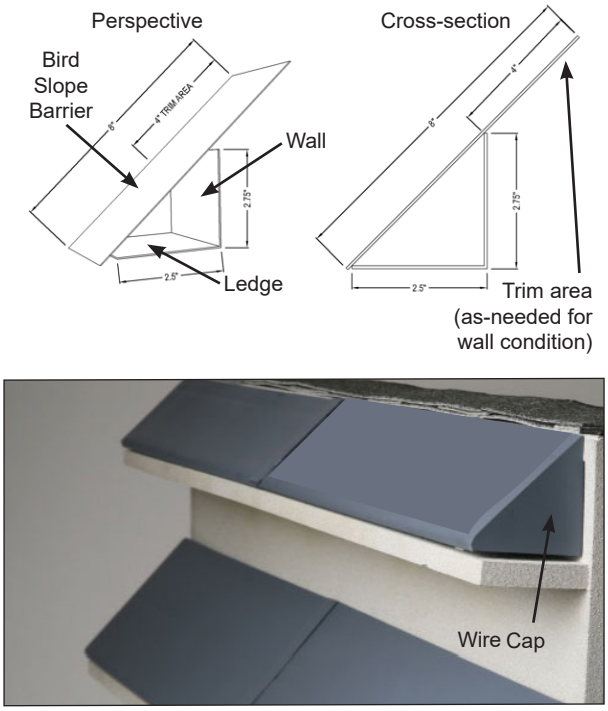

Figure 3-5 Example of bird slope barrier design.

Bird Wire System

A bird wire system creates an unstable landing surface which discourages birds from using the surface for perching, nesting or roosting. Suitable locations for its installation include long exposed ledges, parapets, signage, beams or pipes where the width is greater than 1.5", the inclination is less than 25°, and where low visibility is key. Stainless steel, nylon-coated wire is attached to stainless steel posts and tensioned using springs. Posts can be drilled, glued, or clamped onto a variety of surfaces. Rows of wire should be spaced a maximum of 3" apart, and posts should be a maximum of 5 feet apart. See Figure 3-6.

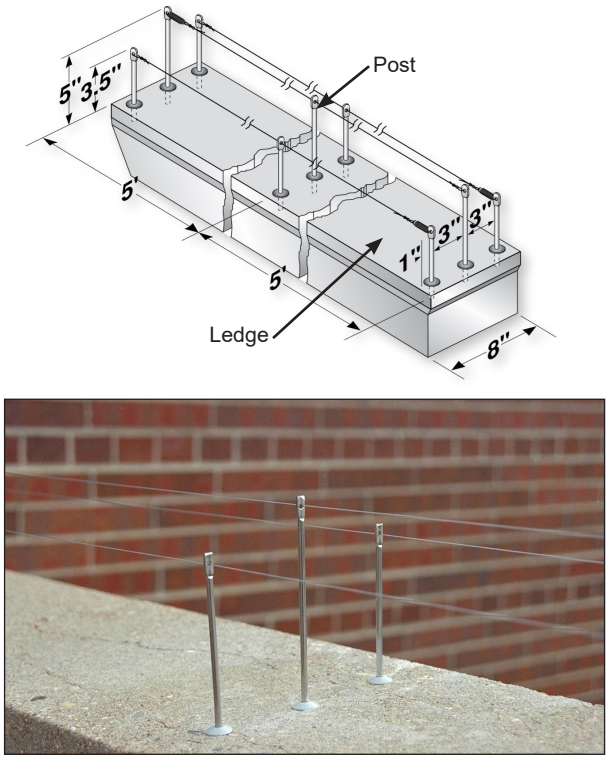

Figure 3-6 Example bird wire system installation.

Comparison

The table below (3-1) compares the cost, installation, and maintenance efforts of each passive deterrent. For additional information, see "Table 3-2: Key Design Features" on page 10.

Table 3-1 Relative cost comparisons (material, installation and maintenance) between bird deterrents

Deterrent	Materials	Installation	Maintenance
Bird Netting	Low	High	Medium
Electrical Shock Track System	High	High	Medium
Bird Slope Barrier	Medium	Low-Medium	Low
Bird Wire System	Medium	High	Medium

3.4 Solutions Considered but not Selected

The following design solutions were initially considered as part of this project but not selected for varying reasons, listed below:

- Alternative nesting sites: High maintenance costs; potential for community opposition
- Bird lasers: Only effective at night; visually distracting
- Audio deterrent: Can cause disruption to neighbors; frequency can occasionally be heard by children
- Owl decoy: Minimally effective, birds can be become habituated to its presence
- Reflectors: Only effective during the day; create visual clutter
- Daddi Long Legs: Minimally effective against pest bird species
- Bird spikes: Minimally effective; add visual clutter and can collect litter
- Bird gel: High maintenance costs; difficult to clean
- Bird coil: Minimally effective; adds visual clutter and can collect litter

Cost Estimates: Bird Abatement Devices

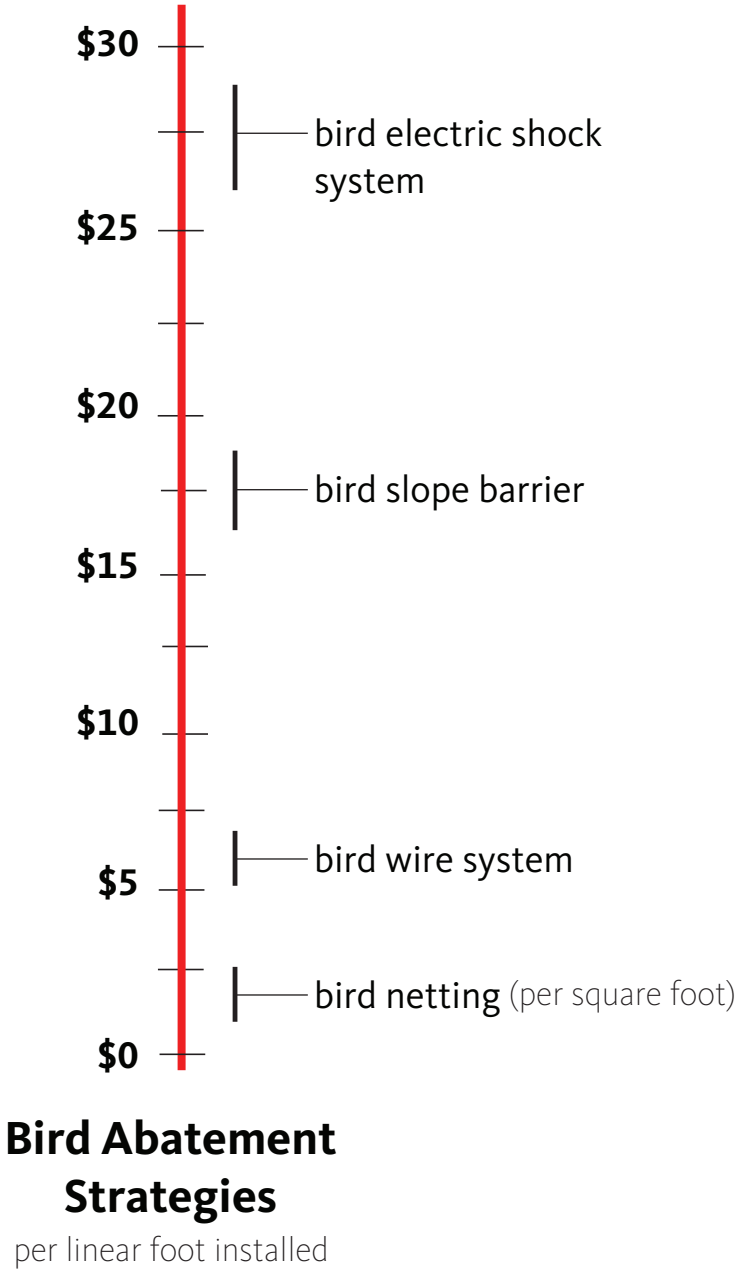

Figure 3-7 Cost estimate for various types of bird abatement devices

Note: Figures provided represent rough cost estimate based on concept design. Actual cost may vary based on several factors, including: exact material, location of installation, number of units ordered and installed, and availability of labor and materials.

Table 3-2 Key Design Features

Design Feature	Rationale
1. Sloped Surfaces: Surfaces/ledges should be sloped to discourage birds from seeking comfort.	Horizontal ledges shall be avoided to minimize the collection of dust and discourage pest bird species from roosting in station structures. Surfaces should comprise an inclination greater than 25° for smooth construction materials (metal, glass, plastics), 35° for medium-rough materials (e.g. wood, concrete), and at least 50° for rough materials (e.g. sandstone, rough concrete). These ledges should also not exceed 1.5" in depth. Any surfaces which are unable to be designed to these specifications (e.g. at an inclination greater than 25°, 35° or at least 50° for smooth, medium-rough or rough surfaces, respectively) shall be retrofitted with bird abatement devices as appropriate.
2. Restricted Open Voids: Should be sufficiently small to prevent access to pest bird species.	Open voids (greater than 1.5" wide and 2" high) should be avoided as part of the initial station architecture to prevent ingress by pest bird species. If open voids exceed 1.5" in width and 2" in height, they shall be retrofitted with bird abatement devices as appropriate.
3. Waste Management: Trash receptacle proposed in the Station Furnishings element of this project shall be distributed across public station areas and frequently emptied to prevent access to and availability of food to pest bird species.	Trash receptacles should be deployed frequently throughout all public station areas to eliminate food sources for pest bird species, dissuading birds from utilizing the stations. Receptacles should be concentrated around food dispensaries, seating areas, and pinch points. Proper waste etiquette by passengers and frequent checks of receptacles by maintenance staff will help mitigate litter accumulation. The design of the trash receptacles should comprise a side opening and a domed/sloped top, to prevent ingress by pest bird species into the trash receptacles, and to prevent birds from perching on top.

Design Feature	Rationale
4. Bird Netting: Use fine mesh to prevent pest bird species from accessing voids and other potential roosting sites.	If the initial design of the station architecture does not discourage pest bird species, then open voids may be enclosed with netting to prevent access for pest bird species. Netting should be constructed of fine polyethylene twine and stainless-steel attached to a pre-installed cable system, with mesh openings not exceeding 1".
5. Electrical Shock Track System: A low-profile electrified track, delivering mild electrical shock to dissuade pest bird species from seeking comfort on surfaces.	If the initial design of the station architecture does not discourage pest bird species, then a low-profile UV-stabilized PVC and stainless steel electrical shock track system should be glued to surfaces or ledges with less than 25º slope and exceeding 1.5" in length. Where pest bird species are to be totally excluded and low visibility is key, this solution should be installed to discourage birds from seeking comfort on these surfaces.
6. Bird Slope Barrier: Creates a slope on horizontal ledges to prevent pest bird species from seeking comfort on the surface.	If the initial design of the station architecture does not discourage pest bird species, a bird slope barrier should be installed on surfaces that exceed 1.5" in width and have less than a 25º inclination. The inclination of the barrier is based on the roughness of the surface and prevents birds from gripping the surface. This device should be installed where the aim is to prevent all bird species from resting on a surface or ledge. To be effective, the barrier must run the full length of the ledge, and be capped on both ends to prevent ingress. Bird slope barriers should match or be compatible with the surface material to which they are applied, such as stainless steel when applied to the tops of canopy columns. The barrier shall be applied using a silicone-based adhesive.

Design Feature	Rationale
7. Bird Wire: Install fine wire to horizontal surfaces to prevent pest bird species from seeking comfort on the surface.	If the initial design of the station architecture does not discourage pest bird species, a bird wire system should be installed on surfaces that exceed 1.5" in width and have less than a 25° inclination. A bird wire system creates an unstable landing surface that discourages birds from using the surface for perching, nesting or roosting. Suitable locations for its installation include long exposed ledges, parapets, signage, beams or pipes where the width is greater than 1.5", the inclination is less than 25°, and where low visibility is key. This should comprise stainless steel, nylon coated wire at varying heights, attached to stainless steel posts (glued or drilled onto surface) and tensioned using springs.

Note: This table provides a summary of key features only and is not an exhaustive list of all design features. Project design documentation provides complete details and requirements, and is available upon request.

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