

SECTION 07 72 16

ELECTRONIC ROOF EDGE PROTECTION SYSTEM

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

Uniform General Conditions, Supplementary General Conditions, Forms, Specification Sections found in Division 1 through 32 and all Drawings apply to Work specified in this Section.

1.2 DESCRIPTION

- A. Work of this Section consists of supplying and installing the “Roof Defense” roof edge protection monitoring system produced by Beldon Technologies, Inc., d/b/a “Roof Monitor”, P.O. Box 100840, San Antonio, Texas 78201; (844)-4WARNING (844) 492-7646, www.roofmonitor.com, or approved equal.
- B. The system shall include all hardware, software, on-site servers, on-site notification devices, remote monitoring, and notification methods to the Owner via cell phone, e-mail or other approved methods.
- C. The roof edge monitoring system shall have been developed and tested to operate in extreme weather conditions, and to specifically measure and continuously monitor pressure applied on the perimeter edge of the roof providing alarms and timely notification of the building Owner and/or designated persons in the event of an intrusion on the pad surface. The System shall:
 - 1. Be securely installed at the perimeter edge of new or existing roofs.
 - 2. Provide single points of technology for real-time monitoring of pressure applied to the pads.
 - 3. Provide alarm alerts when persons step on the pads to protect against intrusion and/or to act as fall protection for persons working on the roof.
 - 4. Provide alerts and alarms with protocols defined by the Owner and/or other designated end user.

1.3 SUBMITTALS

- A. Provide submittals in accordance with Section 01 33 00 – Submittals (*as applicable*)

- B. Submit documentation attesting that the products proposed for installation meet the requirements of these Specifications.
1. Product documentation shall include the primer, adhesive tape and any other roof level product required by the project.
 2. An accurate plan of the roof indicating all building perimeters and any other change in roof level where pads would prove beneficial.
 3. Written documentation that the Roof Monitor Authorized Service Provider is in good standing with the System Manufacturer.
- C. The Owner, in conjunction with the Roof Monitor Authorized Service Provider, shall acquire, execute and submit the following documentation to Roof Monitor at the address indicated above prior to any work beginning and prior to any materials being ordered or shipped, unless noted otherwise. Documents listed below are available at www.roofmonitor.com, and may not be altered or changed without written permission from Roof Monitor. These documents shall be shared equally between the Owner, System Authorized Service Provider and Roof Monitor and become part of the project permanent file.
1. Owner Agreement for Edge Defense System.
 2. Standard Terms and Conditions for Edge Defense Owner Agreement.
 3. Landlord Consent to Installation and Maintenance. *(if applicable)*
 4. "Smart Roof Protection System Limited Warranty" by Roof Monitor. *(a copy of the unsigned document will be shared as part of the submittal process then executed upon completion of the work)*
 5. Change Order Form *(if applicable)*
 6. Certificate of Completion *(to be executed following installation)*

1.5 QUALITY ASSURANCE

- A. The Authorized Service Provider shall be approved in advance of the work and be supported with resources as needed by Roof Monitor. The Authorized Service Provider shall be fully trained and equipped in the design and installation of all components of the system.
- B. Roof Monitor shall employ companies and/or individuals with demonstrated capabilities required to perform all aspects of the work including but not limited to manufacture of the hardware components,

design and installation of firmware and software components relative to the system, installation of the physical components of the system, remote monitoring of the system, and all other aspects required for a properly operating system.

- C. Roof Monitor recommends that the system be routinely tested, and the Owner shall periodically test the general system and its components, and Roof Monitor shall provide any updates to the controller software to ensure accurate operation of the system to meet the terms of operation and warranty.

1.6 JOB CONDITIONS

- A. The Owner shall execute the required documents listed above and further explained below prior to the work commencing.
- B. The Owner shall designate locations for the controllers.
- C. The Owner shall provide Roof Monitor approved electrical resources for interface with the new system.

PART 2 – PRODUCTS

2.1 EDGE DEFENSE – SAFETY MAT

- A. Safety mat shall be a proprietary product, yellow in color, with U-V coated surfacing, and non-skid omnidirectional grid design surface.
- B. Each mat shall contain concealed integral electrodes providing for a sealed sensor system designed to prevent falls. Each mat's non-steel electrodes shall be non-corrosive, non-magnetic, flexible and anti-static. Electrodes shall be designed to withstand rust and dents.
- C. Mat sizes:

1.	Standard mat widths (A dimension) – inches/millimeters					
	12”	/	305 mm	36”	/	914 mm
	18”	/	457 mm	42”	/	1067 mm
	24”	/	610 mm	48”	/	1219 mm
	30”	/	762 mm			
2.	Standard mat lengths (B dimension) – inches/millimeters					
	12”	/	305 mm	84”	/	2134 mm
	18”	/	457 mm	90”	/	2286 mm
	24”	/	610 mm	96”	/	2438 mm
	30”	/	762 mm	102”	/	2591 mm
	36”	/	914 mm	108”	/	2743 mm
	42”	/	1067 mm	114”	/	2896 mm
	48”	/	1219 mm	120”	/	3048 mm

54"	/	1372 mm	126"	/	3200 mm
60"	/	1524 mm	132"	/	3353 mm
66"	/	1676 mm	138"	/	3505 mm
72"	/	1829 mm	144"	/	3658 mm
78"	/	1981 mm			

3. Standard mat sizes are 4'-0" (1.21 meters) by 12'-0" (3.66 meters). Mats shall be available in seven (7) standard shapes. Special shapes may be provided when required.

D. Edge Defense mat wiring options:

1. E (standard wiring): 2-2 conductor wires existing at opposite corners on B dimension.
2. X: 2-2 conductor wires exiting at center of mat on B dimension.
3. W: 4 conductor wire out of the top left corner (home run wiring to mat controller). For single mat application only.
4. P: 4 conductor wire out of the upper left corner; 20' (6 meters) plug extension supplied standard. (home run wiring to mat controller) For single mat application only.
5. Single mats and first and last mats of a daisy chain system will require longer wire. Specify length when ordering.
6. Maximum of six pads per controller.

2.2 DOUBLE-SIDED ADHESIVE TAPE AND PRIMER

- A. Mats shall be adhered to new or existing TPO or modified bitumen prepared roof membranes with approved attachment method. Mats shall be attached to PVC roof membranes with pieces of PVC membrane heat welded to the existing PVC roof membrane. Roof Monitor must approve attachment prior to installation.
- i. Approved methods
 1. M1, by Chem-Link
 - a. <http://www.chemlink.com/m-1>
 2. Aqua Base, by Carlisle
 - a. <https://www.carlisesyntec.com/view.aspx?mode=media&contentID=1165>

2.4 SOFTWARE, HARDWARE AND CONNECTIVITY

- A. Firmware and software shall be as provided by Roof Monitor.
- B. Controllers and cloud-based servers, where specified, shall be selected and provided solely by Roof Monitor for operation of the Roof Monitor system.
- C. Roof Monitor will select and provide all cabling, connection hardware, USB's and other required connectivity devices as needed for the Roof Monitor system to operate as intended.

PART 3 – EXECUTION

3.1 INSPECTION AND PREPARATION

- A. Following execution of the contracts and required forms the Roof Monitor Authorized Service Provider / Roof Monitor Team shall meet with the Owner and the Owner's designated IT or other personnel to outline the specific requirements of each party for the installation and operation of the Edge Defense System.
- B. During the meetings and subsequent inspection of the building(s) the Authorized Service Provider / Roof Monitor Team will confirm with the Owner locations for controllers, cable routing (if any), electrical connections, internet interface, and roof edge plan development.
 - 1. The Controller(s) shall be located as close to mats as possible.
- C. The Authorized Service Provider / Roof Monitor Team shall survey the roof to determine any roof repairs or modifications necessary for the Edge Defense System to function as intended. In some cases the Owner may be required to furnish recommended repairs to the roof. The Authorized Service Provider shall be provided with skilled support by Roof Monitor to address these issues as needed.
- D. Following the inspections and investigations a plan will be developed by the Roof Monitor Team for installation of the Edge Defense System mats on the roof and locations for various components of on-site hardware as required. The Owner shall review the plan with the Authorized Service Provider / Roof Monitor Team, and upon approval of the Owner, installation will be scheduled.
- E. A schedule shall be developed with the Owner / Building Users for installation of the system components. The schedule will take the Owner / Building Users' on-going operations into account and avoid disruptions to the greatest extent possible.

- F. Installation of the Edge Defense System shall not begin until all required construction, repairs, modifications, etc., on the roof is totally complete in order to avoid possible damage to the new mats. The mats are pressure sensitive so all foot traffic on the roof surface shall be restricted after installation begins.

3.2 INSTALLATION

- A. Installation of hardware and software components and mats shall be in strict adherence to the requirements of Beldon Technologies and Roof Monitor and be performed by qualified technicians.
- B. Best roofing practices shall be performed in the installation of the mats. Mats shall be located where determined by the advance plan and be fully adhered to the existing or new roof surfaces.
 - 1. Mats shall be installed on the various roof surfaces using the double-stick tape specified above and primer as required.
 - 2. Preparation for gravel-surfaced asphalt and coal tar roofs:
 - a. Gravel and flood coat shall be spudded to bare felt in a pattern 2" larger in all dimensions that the new mats and be swept clean.
 - b. One ply of granule-surfaced SBS modified bitumen membrane shall be torch applied over the exposed felt. Any exposed felt at the perimeter of the mats shall be touched-up with asphalt flashing cement neatly applied by tube or trowel.
 - c. The modified bitumen surface shall be primed in the outline of the new double-stick tape.
 - 3. Preparation for granule-surface modified bitumen membrane roofs:
 - a. The existing roof membrane shall be swept free of granules, dirt and debris in the location of each pad.
 - b. The exposed membrane shall be primed, as required by adhesive manufacturer, to the outline of the Edge Defense system.
 - 5. Preparation for single-ply (TPO or EPDM) membrane roofs:
 - a. The existing roof membrane shall be swept free of all dirt and debris in the location of each mat.

- b. The membrane shall be thoroughly cleaned with a water-based detergent then rinsed or wiped clean. More stringent detergents may be required, but prior to use these shall be confirmed as acceptable by the membrane manufacturer.
 - c. Primer may be required depending on the membrane and bonding adhesive.
 - d. A sacrificial layer of membrane, may be installed, as required by the manufacturer to maintain the roofing membrane.
6. Preparation for single-ply (PVC) membrane roofs:
- a. The existing membrane shall be swept free of all dirt and debris in the location of each mat.
 - b. The membrane shall be thoroughly cleaned with a water-based detergent then rinsed or wiped clean. More stringent detergents may be required, but prior to use these shall be confirmed as acceptable by the membrane manufacturer.
 - c. The manufacturer of the existing membrane shall be identified if possible. Membrane materials employed for attaching the mats shall match the existing membrane or be those recommended by the membrane manufacturer.
 - d. A sacrificial layer of membrane, may be installed, as required by the manufacturer to maintain the roofing membrane.
7. Mat installation:
- a. Installer must have proper training and be in receipt of certificate, from Roof Monitor, prior to installation.
 - b. Roof load pallets containing mats and other required materials at least 12' from the perimeter edge.
 - c. Install roof edge and fall protection as required.
 - d. Check OHM reading to ensure connectivity as warranty will be voided if damaged.
 - e. Apply chalk lines for proper alignment of mats.
 - f. Avoid pulling any wires to prevent damage to connectivity.
 - g. Mats shall not be cut.

- h. Mats shall not be rolled or folded.
 - i. The longest wire will be the furthest mat from the controller and the second longest wire shall be for the last pad closest to the controller. Shipments will arrive at the jobsite in designated order of installation. The installer shall verify that mats are installed in the correct order.
 - j. Mats shall be spaced no more than 3" apart and no closer than 0.5" (1/2") to one another.
 - k. Mats shall be grabbed by the 3" edge with one hand and the other hand shall be used to support the mat. One person is required per 48" long mat minimum. Mats up to 12' in length required a minimum of three (3) installers per side to lift.
 - l. Slide mat onto sheet of TPO or PVC and slide to desired location. Mats shall not be slid over any penetration, curb, drain, etc. When the path is not clear for sliding the mat shall be placed on a sheet of plywood and be carried to the location.
 - m. Skip first and third and double stack middle.
 - n. For TPO membrane install approved primer where needed and approved bonding adhesive. Slide mat into place and align with chalk line. Once aligned stand in the middle of the sheet and lift along the long sheet direction and roll onto bonding adhesive. Hold mat by tabs until ready. Lay down the mat and walk the first half of the sheet into place. Repair for other side. Roll in edges and check for adhesion.
 - o. For PVC membrane slide mat into place and align with chalk line. Weld 3" PVC edge to existing or new PVC roof membrane. Do not weld the last 1" closest to the mat. Roll in edges and check for adhesion and any cold welds. Seal ends when using PVC to prevent water penetration.
 - p. For modified bitumen and built-up roof membranes set the mats on the specified double-sided tape. Walk in the mats after setting for full adhesion. Touch up exposed felt with new gravel in flashing cement at built-up roofs.
 - q. Repeat the above processes for remaining mats.
- D. Once mats are set the licensed electrician will connect the mats.
- E. Power supplies shall be provided as follows:
- 1. One 24-volt power supply for controller.

2. One 24-volt, VDC, power supply for siren. The electrician must size power supply to accommodate the selected siren(s).
 3. Sirens shall be minimum of 110 db and designed for outdoor use. The Owner shall provide the 24 VDC siren.
- F. Hardware Installation: Beldon Technologies, Inc., Roof Monitor personnel, and/or the Authorized Service Representative shall install all controllers and other required hardware in locations previously approved, including all required electrical and/or cabling connections. Hardware will be mounted securely on walls or other surfaces utilizing industry-accepted methods and materials. A bubble level, included in the kit with the hardware, shall be used to ensure the server is set and secured in a level position.

3.3 OPERATIONS AND TESTING

- A. Upon completion of the mat, hardware and software components Roof Monitor technicians will activate the system and all required components.
- B. The system shall be fully tested and interconnected with the 24/7 365 day remote monitoring services of the system.

3.4 TRAINING

- A. Roof Monitor technicians will meet with the Owner / Building Users and provide training in use of the system.
- B. Where the option is required, Roof Monitor technicians will assist the system users who are specified to receive alerts in activating the program on mobile phones, tablet computers, laptop computers and/or desktop computers.

3.5 WARRANTY

- A. Following installation of the system the Authorized Service Provider shall assist the Owner as required in submitting the completed Certificate of Completion. The Certificate of Completion confirms that the system has been completed and is operational as intended and notifies Roof Monitor to release the warranty.
- B. Roof Monitor shall deliver to the Owner the completed Roof Monitor Smart Roof Protection System Limited Warranty and continue remote monitoring for the duration of the agreed-upon contract period.
- C. The Roof Monitor Edge Defense System is not an alarm system and shall not be construed or interpreted as such. The expected performance of the system along with the Owner's and Roof Monitor's obligations is contained within the executed documents listed above under Article 1.4.D.

END OF SECTION