



Structure Monitoring Technology

FROM DECK TO CLOUD: Inverted Roof Leak Detection Systems



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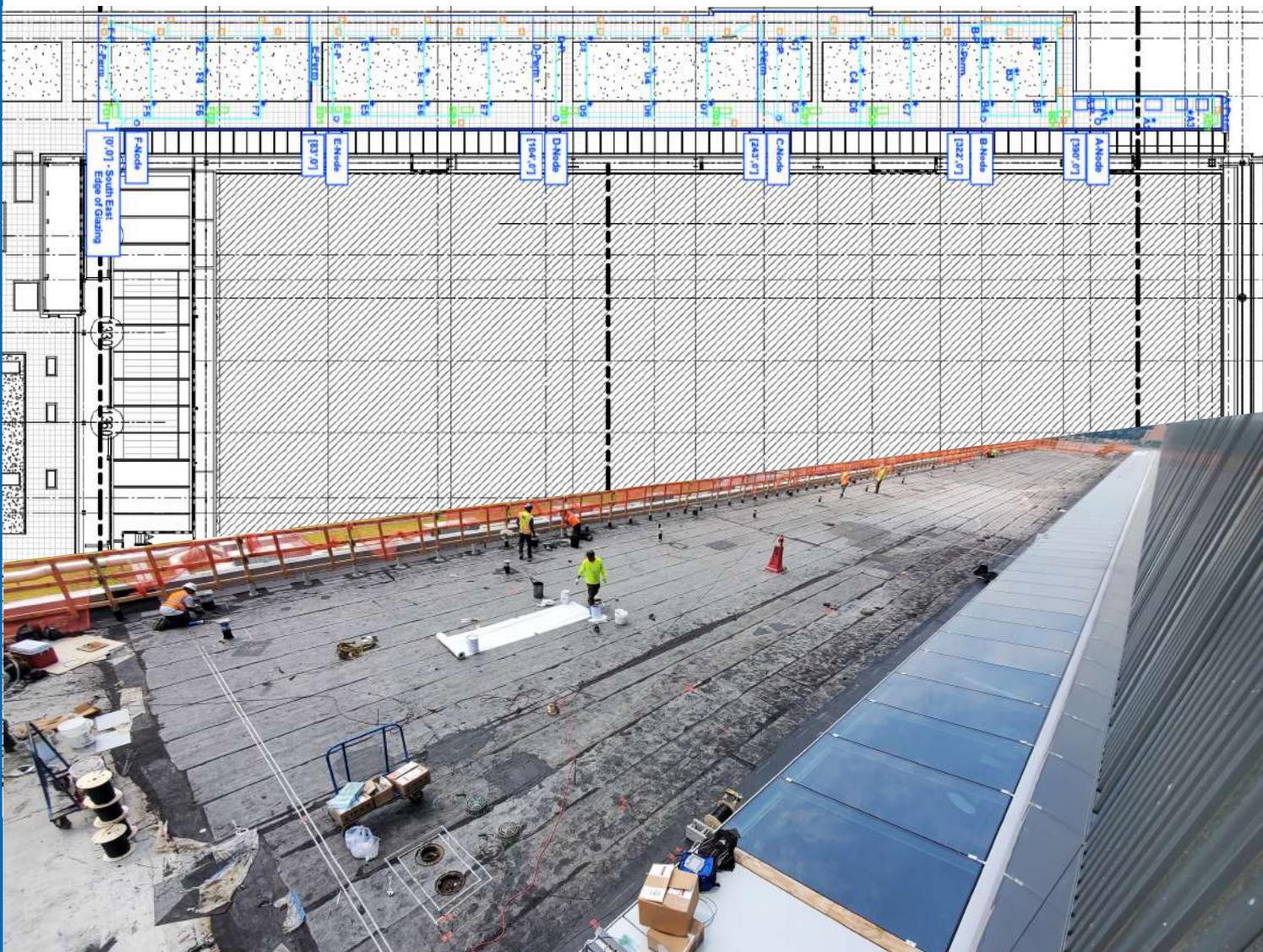
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1. DEFINING THE PROJECT

We are delighted that you are considering SMT for your project. For over 15 years we have been trusted by architects, general contractors, roofers, and building owners to install state-of-the-art sensors and enable the best possible leak detection across the globe.

SMT offers leading edge leak detection monitoring for Inverted Roof Systems. Our systems are embedded into the roof during new construction periods (or renovation and rehabilitation) allowing checks of the membrane integrity without the need for extremely costly investigative work.

Our experienced team is ready to assist clients in finding the solution that suits their requirements and budget. Once a client has decided to install an SMT Sensor Network on their project, SMT will determine the scope of the project by taking into consideration instructions, drawings and specifications. Then we work within the construction schedule to install our smart monitoring system without causing disruption to other trades.



DIGISCAN 360°

The logo for Digiscan 360 features the text 'DIGISCAN' in a large, bold, blue, sans-serif font, with '360°' in a smaller, blue, sans-serif font below it. To the right of the text is a graphic of a sunburst or fan shape composed of several dark grey arrows pointing outwards from a central point.

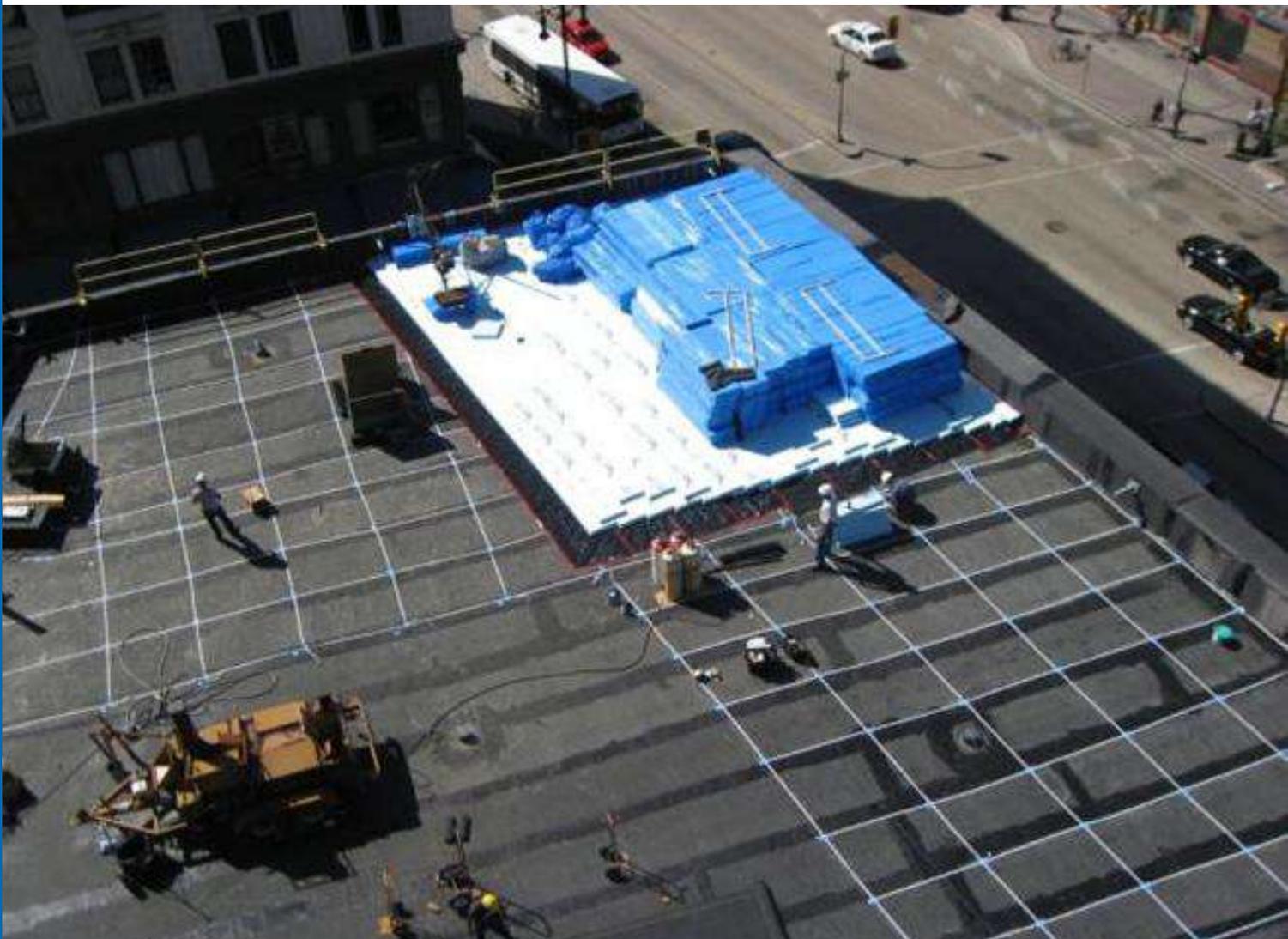
- Prior to installation of our systems, SMT performs an electronic membrane integrity scan using our patented Digiscan 360.
- Digiscan 360 is a state of the art electronic leak detection service which can find pinhole leaks and defects. SMT performs this service to ensure membrane integrity prior to installing a monitoring system.
- A DigiSCAN can be performed on a membrane prior to installation of the overburden for Quality Assurance - the last chance to be sure your membrane is intact.



FUTURE CAST



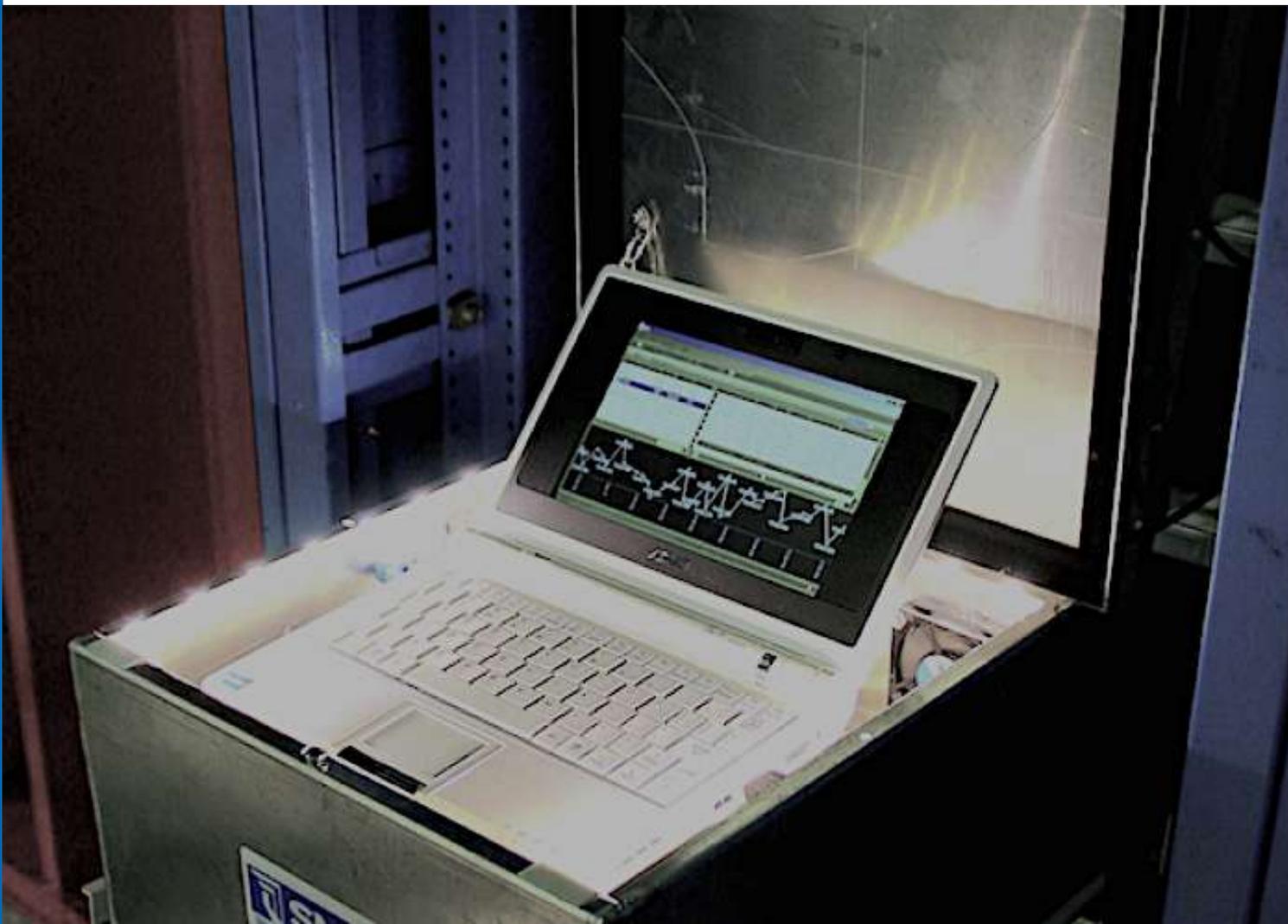
- An extensive sensor network which is placed on the waterproofing membrane to locate leaks.
- Connected to a junction box which will be easily accessible post-construction for manual readings, enabling an inspection of the membrane without destruction of the overburden or walking out onto the roof.
- This system can be upgraded to Building Intelli automated monitoring at any time.



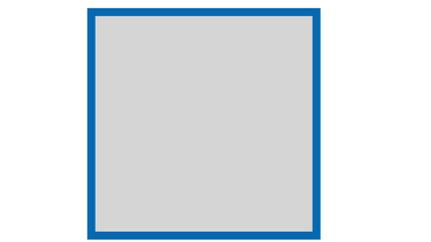
BUILDING INTELLI

The logo for Building Intelli is located to the right of the main title. It features a blue Wi-Fi symbol (three curved lines) centered within a square grid of blue 'x' marks.

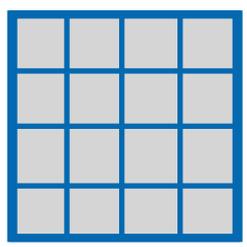
- The Futurecast sensor network is connected to a monitoring gateway, transmitting near-live data to SMT's data monitoring centre from which data can be viewed graphically and alarms/notifications engaged.
- This system is constantly monitoring, allowing SMT to provide advanced warning of potential leaks, as well as a host of usable intelligence.
- The best option to protect high value assets and assist proactive roof maintenance.



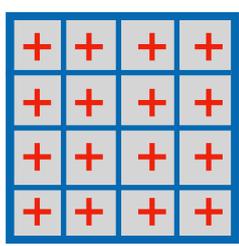
2. HOW IT WORKS



Clear Deck with Membrane



EFT Grid Applied



Digistar Sensors Placed

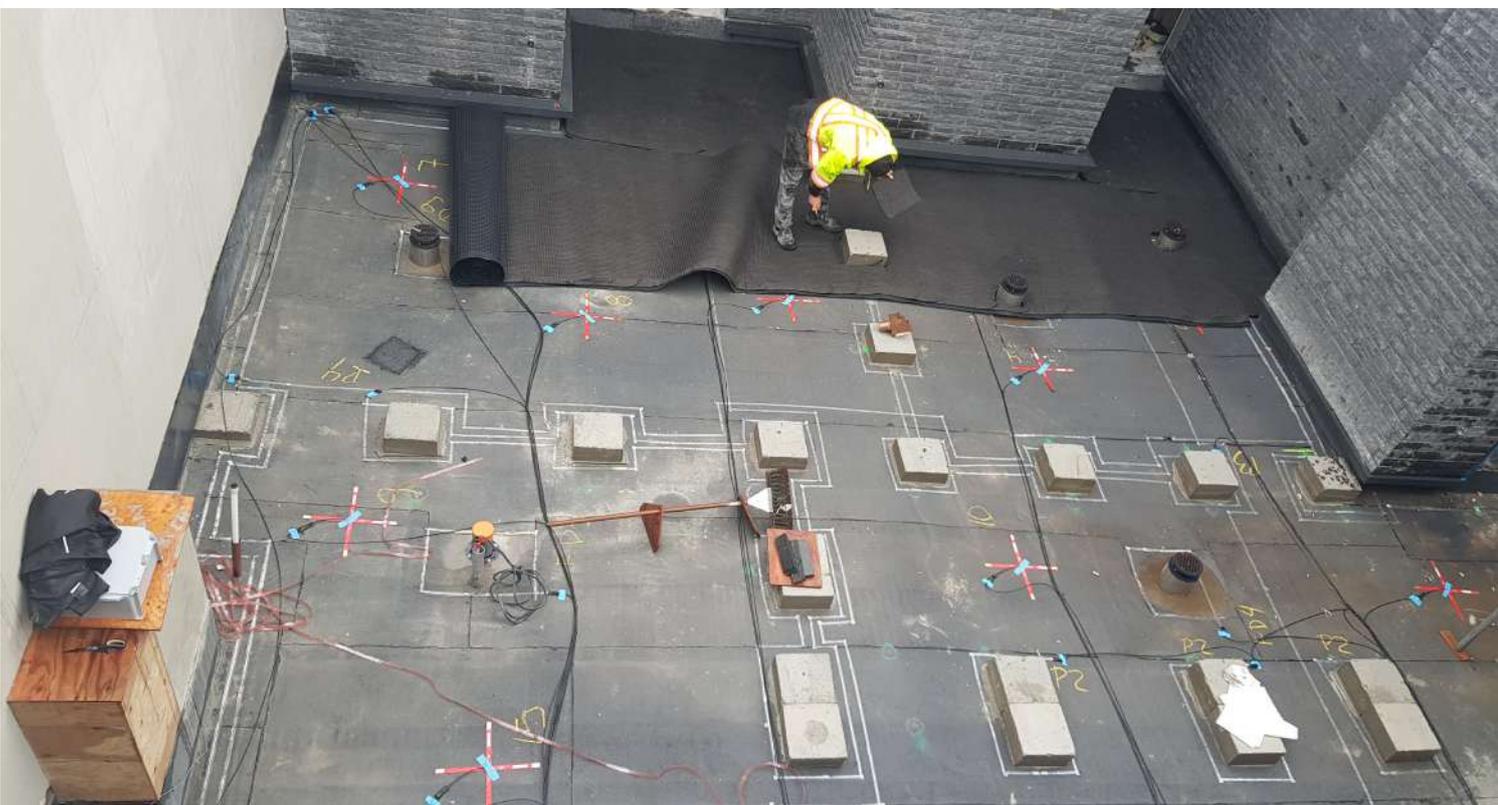
Electrical Field Tape (EFT) is applied to the upper surface of the waterproof membrane. The EFT grid defines the area that we monitor.

The grid is then fitted with Digistars, a sensor network which identifies voltage potential, signalling a connection to the protected steel or concrete substrate.

When installing the network, technicians will account for all anchors, drains, vents and/or other deck obstacles as encountered. Thus when a voltage potential is detected, it points to a deficiency in the membrane, and a potential leak.

SMT uses trend data to distinguish between actionable events and structural or electrical false positives (HVAC interference, active site work, power outages, etc.). The more seasonal reading that are taken, the more accurate our analysis, therefore Building Intelli provides the best intelligence.

Exact layout dependent on building topology and specified granularity.



3. INSTALLATION: DECK & WEATHER CONDITIONS



Prepare the Deck

First the deck must be ready: cleaned, waterproofed, and free of debris or staging.

Staging of materials, heavy foot traffic, and falling debris all pose a risk to membrane integrity, so the sooner SMT can install, the better.



Membranes

SMTs sensor array is compatible with most waterproof membranes, including: SBS, Hot Melt, Single Ply, and liquid applied membranes.

SMT uses the DigiSCAN 360 to confirm that the waterproofing is 100% intact before installing the sensor array.



Weather conditions

SMT can install in light to moderate precipitation, and even sub-zero temperatures.

Installing on gravel, mud, ice, or under piles of trash presents issues with quality assurance and overall system function, our installers will decline to install if conditions are poor.

4. INSTALLATION: PLACING SENSORS



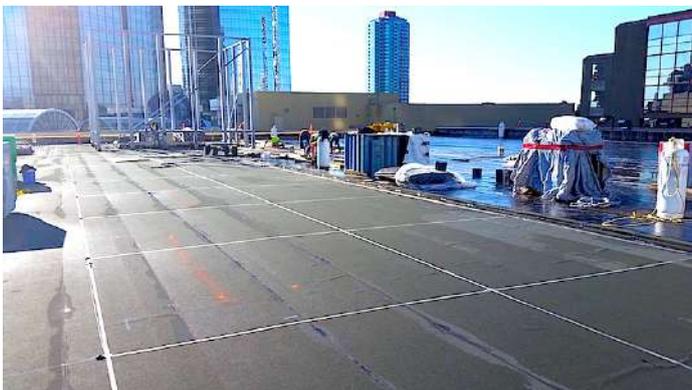
Designed for Success

Drawings of hardware placement shall be included in the shop drawing submittal. The installation will follow these design guidelines.



A Permanent Installation

The deck is first divided into zones, defined by the placement of EFT. The size and formation of each zone will depend on the specifics of the deck, but in general we are left with a 6'x6' or 10'x10' grid which will be left permanently attached to the membrane.



Protecting the Tape

Poly sheets or drain mat should be used in direct contact with the EFT to limit debris from impacting the tape lines. Slope packages and insulation can lie in direct contact with the sensors. Any metal debris or conductive material can not only damage the membrane, but also interfere with the system and must be removed or isolated. Conductive surfaces cannot touch the EFT under any circumstances.



Installing Digistars

Once the zone has been defined, and any potential interference isolated, SMT's patented Digistars are placed in a specific formation, giving coverage for smart monitoring of the membrane integrity for the lifespan of the building.

5. CABLE ROUTING & JUNCTION BOXES



A Wired Network

In most cases SMT uses cables to network its sensors, these cables are stepped down in junction boxes mounted near the roof deck.

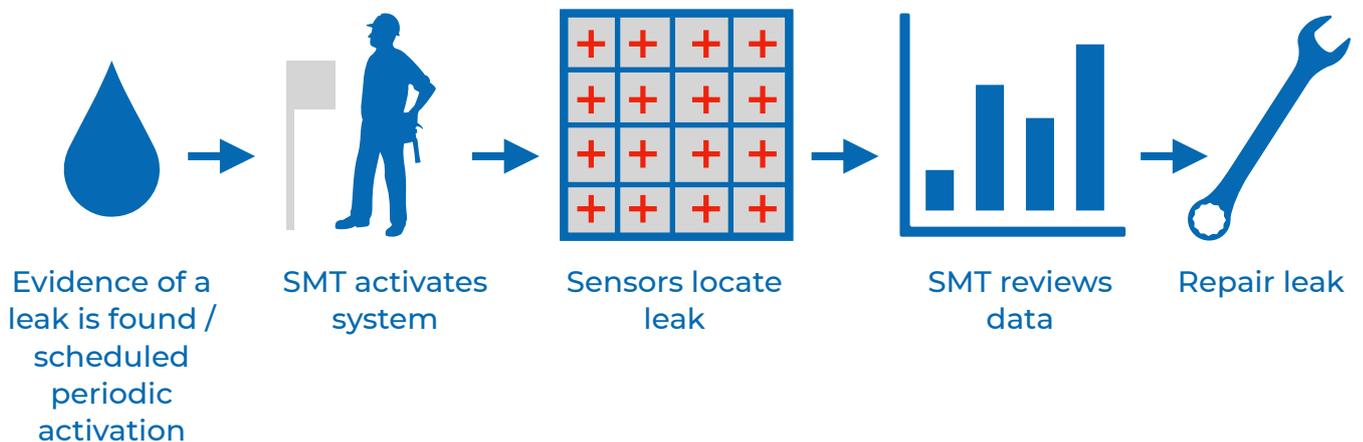
SMT makes significant effort to limit the amount of cable used, ensuring the best possible signal integrity while being cost effective.



Junction Box Access

In a Futurecast system, the sensor network is not continually monitoring. It remains in place until either a tenant or building manager notices evidence of a leak, or until a scheduled SMT visit for preventative maintenance scanning.

An SMT technician then activates the system by bringing electronics to site and accessing the junction box. The system compiles data to locate the source of the leak.



Evidence of a leak is found / scheduled periodic activation

SMT activates system

Sensors locate leak

SMT reviews data

Repair leak

6. BUILDING INTELLI: OVERVIEW



To protect your most valuable assets, and for access to the most comprehensive data, SMT offers its custom active monitoring system: **BUILDING INTELLI**.

Active Membrane Monitoring

BUILDING INTELLI links SMT's sensor array to a monitoring gateway where data is collected at custom intervals and synced to the SMT Analytics Monitoring Center for trend analysis and actionable event support.

How It Works

Building Intelli utilises a custom Data Acquisition Board housed in each deck junction box. The MultiScan is a low voltage multiplexer that continually checks for system function through electrical measurements, while also calculating differential voltage to make integrity assessments on the health of the membrane.

Differential membrane assessments measure the electrical signatures of each conductor and plot them graphically to determine areas of concern. SMT's proprietary software samples the deck space over time with weighted averages and intensity assessment tools to determine the health of the membrane.

7. BUILDING INTELLI: INSTALL

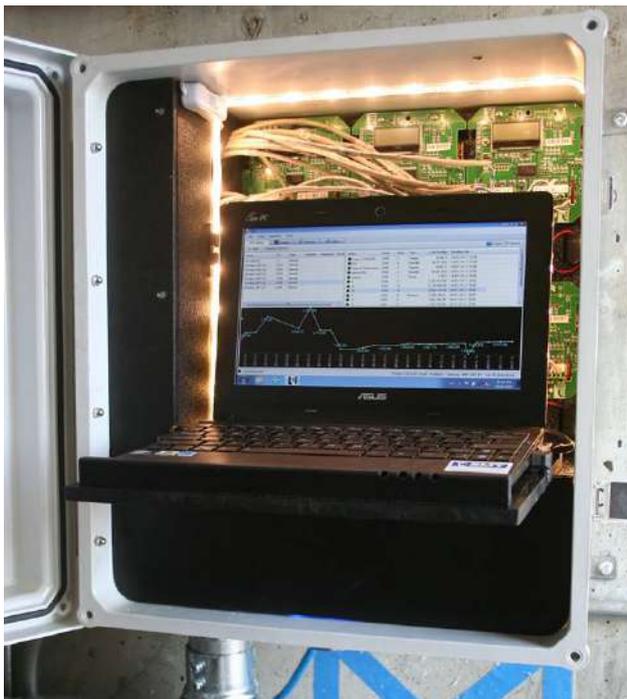
Monitoring Gateway

SMT has two solutions for adding Building Intelli to your system.

BiG™: A Windows based computer requiring 110v power, a static IP for analytics and updates, and a signal uplink for BMS integration (more on this later).

TiG™: A Linux based computer system designed for low power applications, or where signals must be buffered or amplified. Requires a static IP and either solar, battery, or hardline power.

These gateways allow front end control of the system, and data monitoring from remote locations.



Low Profile, Easy to Access

The SMT sensor array is routed to a junction box on the deck. The junction boxes are then linked, via cable or wireless, to a single monitoring gateway inside the building.

This linkage can involve substantial lengths of cabling. Junction boxes and monitoring systems are installed in interior and exterior locations, and can be installed in most construction environments. Let us know at the time of quotation if routing conduits, FT6 locations, or outdoor environments exist to provide the best options for your building.

8. BUILDING INTELLI: ANALYTICS



What Happens to all that Data?

SMT sensors communicate to junction nodes, which stream to the site gateway where data is uploaded to SMT Building Analytics and/or BMS control centres. An outbound Internet connection is essential.

Local and recent data is available at the terminal to assist with local field repairs, while monthly and yearly data is stored in perpetuity off-site at SMT Analytics.

Intelligence You Can Rely On

SMT analytics reviews data prior to a repair dispatch. Using multiple data sets, we assist building owners/managers in determining the appropriate level of response - we believe in the scalpel not the jackhammer.

SMT Analytics accounts for weather patterns, neighbouring sensors, season, occupancy rate, and other factors when assessing triggered events. Many times these observations consume multiple weeks and months until a condition of urgency is established. Thanks to SMT's sensor network, once a repair is sanctioned we will be able to provide an accurate location and verify the integrity of the repair.

Choose Your Level of Engagement

Email or other forms of notification can be engaged to alert the client of developing conditions. SMT can produce intelligence ranging from basic reports to advanced graphing, depending on the needs and wishes of the client. We also offer on-line drawing and photo management, and BIM interface.

9. BUILDING INTELLI: BMS RELAYS & API



SMT Monitoring Gateway



Building Management System

A System that Plays Well with Others

Data from SMT’s sensor networks often needs communicating to third party control systems, integrating our system into the building’s management suite. SMT utilises the BACnet building automation and control networking protocol, a fully autonomous, always online, executive control interface. Developed by ASHRAE, BACnet is accessible both remotely and locally, and has become the protocol of choice for most building automation control networks.

How It Works

SMT’s Building Intelligence Gateway (BiG) gathers data from wired CAN networks and/or wireless sensor networks and communicates this information to a CAS 2700 gateway on the same network. The CAS gateway, communicates to 3rd party BAC NET systems using BAC NET IP over a standard Ethernet network.

SMT Analytics also offers an API for interfacing to other online BMS’ and BIM related graphical tools. Roof leak status can be shown graphically on BIM models to enhance the visibility of the leak location and the conditions that lead to the leak.

10. FAQs

I Installed a FutureCast System, Now What?

The best solutions are put in place before there is a problem. For proactive preventative maintenance, SMT technicians can visit the site at arranged intervals to collect data. Using the trends that emerge from this data, SMT determine where maintenance may be required.

Alternatively, you may simply wait until a building manager or occupant notices an event, then SMT can take a reading to accurately determine the location of the leak.

Finally, if you want more regular data, a passive system can be upgraded to an active system with the installation of a monitoring gateway.

What Do I Get From My Active System?

With SMT's Building Intelli active monitoring system, you are getting constant evaluation of your membrane's integrity.

SMT can establish an SMS or Email warning system for when an event has been triggered, and there is an option to integrate the SMT sensor network with your building management system.

If you would like regular data, SMT offers packages with extensive graphing and visualisations of your membranes integrity.

What If I Need Support?

SMT is always available for phone, email, and video conference support. We also offer webinars to help you get more out of your structural monitoring solution.

Is My System Under Warranty?

Yes, the most basic SMT sensor network comes with a 2 year manufacturers warranty for all components, with options for longer warranty for a slightly higher premium.