

TECHNICAL ASSURANCE

High Performance
Building Enclosure
Experts



Statement of
Qualifications

TECHNICAL ASSURANCE

Company Overview

Technical Assurance, Inc. is a nationally-recognized building consulting firm founded in 1993. Technical Assurance, Inc.'s current staff of professionals manages building enclosure consulting and design for assignments of varied size, scope and geographic location.

Our practice includes a considerable focus on solving a variety of building system deficiencies. Areas of expertise include roofs, façades, fenestrations (doors, windows and skylights), below-grade structures, parking areas and multi-level parking structures.





In addition, a number of the Technical Assurance clients engage the company to comprehensively manage their physical assets programmatically. These kinds of assignments generally include, predictive and preventative maintenance, capital budget integration and even client staff training.

We also have a full-service Commissioning Group to improve new construction building design and perform functional testing of the system during construction. Our Commissioning Group also performs Building Retro-Commissioning to improve existing building enclosure performance and energy loss.

Technical Assurance's success is due to our ability to lead the planning, design and implementation process for projects of any type, with a history of delivering projects on time and within budget. Our staff is committed to design excellence and client service with a team approach. Each program is approached individually, without preconceptions, and designed to serve the needs of the particular client – always with the goal of achieving excellence in delivery.

The professionals at Technical Assurance, Inc. have substantial critical facility industry experience. We have an extensive staff of consultants, engineers, field technicians, project and construction managers, database managers, GIS consultants, technical staff and office support. We maintain in-house capabilities to provide asset management and produce design drawings and project specs with complete cost estimating and budget preparation. Additionally, we continue to serve our clients with bidding services and construction administration during the entire course of the task, project, or program. Our services are sought primarily by those clients who value their building assets as "critical" in running their daily operations.

Points of Differentiation

-  Established knowledge of critical facility project standards, guidelines and safety and security requirements.
-  30 years of proven work experience providing planning, assessment, technical design consultation, construction observation, asset life cycle management and building enclosure commissioning (BECx) services.
-  Approximately \$100 million of building envelope restoration, replacement and repair projects completed by Technical Assurance on an annual basis.
-  Technical Assurance is one of the largest specialized building enclosure consulting and engineering firms in the United States.

SERVICE OVERVIEW



Building Envelope Asset Management

Technical Assurance's ON-PNT® allows facility owners the ability to manage building system inventory, condition assessments and ongoing building system data within one central location. This technology provides for robust GIS mapping and automated reporting metrics for simple data consumption.



Roof Consulting

We are your partner for total roof management. With a team of highly trained roofing specialists, we deliver comprehensive solutions for the assessment, design and implementation of roofing projects of any scope and size. Our programmatic approach to roof management ensures that your roofing investment is optimized to extend the service life of the roof system and to reduce the Total Cost of Ownership.



Façade Consulting & Structural Engineering

We offer vertical facade and structural engineering services including masonry and concrete exterior walls, curtain walls, balconies, exterior insulation finishes, fenestrations (doors, windows and skylights) and structural consulting to diagnose the cause of structural distress. We design repairs and restorative solutions that protect the structural integrity and aesthetic design of the building enclosure.



Parking Garage Consulting

Technical Assurance provides comprehensive consulting services for the restoration, repair and preventative maintenance of existing parking areas. Our deep understanding of the requirements for keeping your parking areas highly maintained and safe will help you operate with a low cost of ownership and extend the life of these necessary and valuable assets.



Exterior Hardscape Consulting

The exterior hardscape serves as a first impression and welcomes visitors to your facility. Regular maintenance of these areas will improve safety and increase the perceived value of your facility. Technical Assurance provides condition assessments, functional design consulting and durability recommendations.



Building Enclosure Commissioning

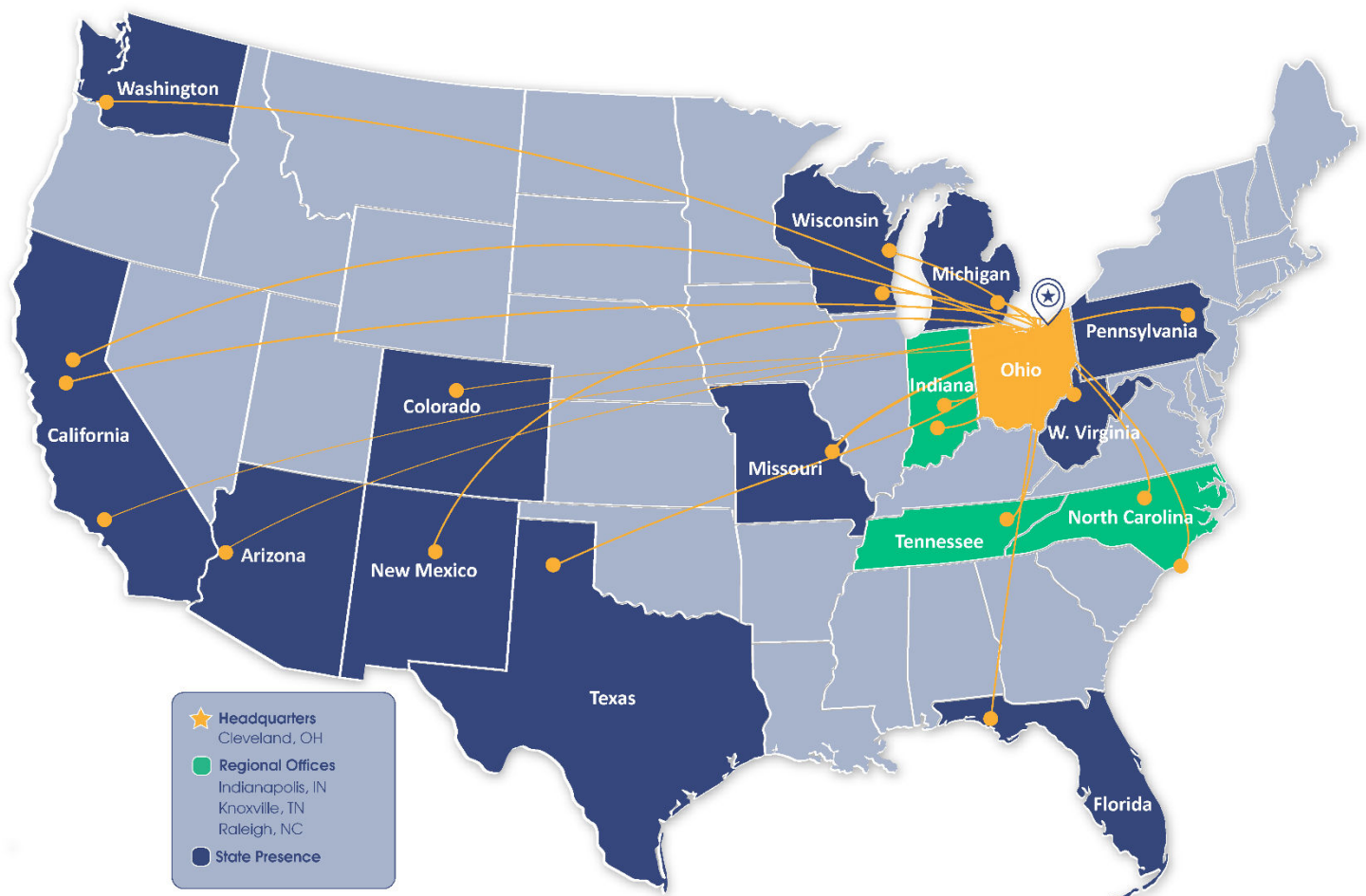
The full-serve BECx Group specializes in providing data-driven, quality improvement suggestions to new construction building design and performs functional testing during construction. Building enclosures directly affect the longevity and energy efficiency of a building. With a systematic approach to quality assurance, our BECx process improves the performance, safety and efficiency of a building and ensures that a project meets specific quality requirements.

GEOGRAPHIC COVERAGE

Technical Assurance has the capacity to provide national building enclosure consulting services. Our project-related field teams span across the United States, as we are continuously recruiting top talent in different markets in order to efficiently staff client program needs. We have successfully delivered roofing and building envelope projects across all 50 U.S. states and in Canada.

Office Locations

Headquarters	38112 Second Street, Willoughby, OH 44094
Raleigh, NC	301 Kilmayne Drive, Suite 204, Cary, NC 27511
Knoxville, TN	10426 Jackson Oaks Way, Suite 103, Knoxville, TN 37922
Indianapolis, IN	160 West Carmel Drive, Suite 244, Carmel, IN 46032



5 STEPS TO SUSTAINABILITY

Technical Assurance's unique 5 Steps to Sustainability process ensures thorough, superior results in program assessment, planning, design and management. Our process-driven approach allows our team to systematically lead all phases of building envelope programs — providing a framework for collaboration and creative solutions.

DISCOVER

Development of Owners Facilities Requirement (OFR), inspect, test, explore, excavate, evaluate and observe existing facilities and parking structures to develop an accurate condition assessment. This step frequently involves forensic investigation for facilities problems.

PLAN

Prepare and develop repair programs and capital plans along with work schedule priorities based on discovery phase findings.

SOLVE

Meet with the Owner's Team and develop design (construction documents, plans and specifications) solutions for all building and parking conditions requiring repair, restoration and/or remediation.

MANAGE

Manage and administer the construction process to ensure cost control, energy savings, quality assurance requirements and compliance with construction documents.

SUSTAIN

Implement and monitor preventative maintenance programs based on long-range component life-cycle forecast to reduce Total Cost of Ownership.

ROOFTOP FALL PROTECTION HAZARD ASSESSMENTS

Falls from heights and working surfaces are among the leading causes of serious work-related injuries and deaths. One of an employer's first priorities is to protect its people from possible fall hazards. Fall protection safeguards employees and company assets from preventable accidents.

As part of our roof consulting services, the Technical Assurance team can perform routine rooftop fall protection hazard assessments to help keep your facilities OSHA compliant and maintain safe rooftop working environments. Our two-pronged approach includes both roof condition and fall protection hazard assessments in order to provide a comprehensive understanding of the entire roof system for clients – from both life safety and serviceability standpoints.

COMPLIANCE & STANDARDS

OSHA 1910.28 (b)(1)(i) requires employers to provide fall protection for employees performing work at heights of 4 feet or more.

ANSI 359 fall protection and fall restraint standards address fall protection equipment and systems for an array of fall hazards.

IWCA1-14.1 outlines a set of standards to protect workers in the window cleaning industry. The standard requires a certain amount of certifiable roof anchorage systems.



The Role of Fall Hazard Assessments

1. Identify fall hazards
 - Access
 - Perimeter Edges
 - Equipment Access
 - Openings
 - Navigation
2. Inventory existing fall protection system and equipment
3. Assign risk values to hazards and prioritize accordingly
4. Propose solutions

These assessments are not intended to serve as a certification or recertification of fall protection.

Our Approach

At Technical Assurance, we believe that the condition and serviceability of your roof and fall protection system(s) compliance go hand in hand.

Our two-pronged approach includes assessing both systems in order to create a comprehensive understanding of how to address maintenance, remediation and/or replacement of the roof comprehensively.

What is the benefit of our approach?

Time and Cost Efficiencies
Roofing Best Practices Considered



TECHNICAL ASSURANCE

**Project & Program
Experience**

PACKAGING CORP OF AMERICA (PCA)

Client: Packaging Corp of America

Assignment: Building Enclosure and Pavement Assessments

Size: 95 sites – 18 million sf roofs; 5.4 million sf walls; 13.7 million sf pavement

Packaging Corp of America (PCA) has grown rapidly in the last decade through acquisition and expansion. As a result, they have inherited a facility portfolio that required a consistent national assessment program so that management could prioritize facility related repair and replacement needs.

In 2018, Technical Assurance began the assessment of the roofs, walls and pavements for 95 sites across the country for PCA. Our multi-men teams completed the assessments of 95 sites within a 7-month timespan.

The collected data was put into ON-PNT® along with historical data, deficiencies, leaks, as-built information and other relevant system data. The goal of the assessment is to establish a condition index baseline of their exterior building systems in order to understand how to prioritize repair and replacement projects over the next 1, 3, 5 and 10 years.

Technical Assurance's roof assessors, outfitted with GIS-enabled iPad tablets, gather available roof system data and observed roof defect data for import into the ON-PNT® GIS and portal database Enterprise Solution. The assessment roof data, once imported into the ON-PNT® database, automatically sets roof estimated replacement costs, other costs associated with construction and consulting fees, and the costs of defect repairs listed and current maintenance costs. A condition index (CI), remaining service life (RSL) and total cost of ownership (TCO) value was calculated for each facility site and across the portfolio.

As a result of the assessment, Technical Assurance was able to provide PCA with both site-specific and portfolio reports on their leased buildings. These reports supported PCA with ongoing lease negotiations with building owners.

During the assessment, our team identified a few critical roof replacements that needed immediate attention as well as some structural wall issues that posed life safety risk. We provided PCA with corrective action plans in order to avoid catastrophic issues and future hazardous conditions.

The screenshot displays the ON-PNT® software interface for a roof assessment. It includes a header with the Technical Assurance logo and a form with the following fields:

Location	
Site	Altoona, Park
Address	Altoona Park Rd, Altoona Park, IL 60004
MO	80
Building No	8001
Survey Category	New Survey
Survey Type	Roof Walked
Site Image Url	25.00

Below the form is a section for "Roof Section" with a diagram of a roof section. The "Roof Section" table includes:

Roof Section	
Roof ID	Altoona_Park-8001-RP01
Roof Section	RP01
Year Built	2000
VR Built Yr	Yes
Underlaid	8/2010 Roof Coverings
Roof System	TPO/IRMA-FB
Roof System Descr	Thermoplastic Ballasted
Roof System Group	SP
Assessor	Jim McManis
Assessment Date	12/18/2018
Roof Overview Image	

At the bottom, the "Condition" section shows a bar chart for "CI" (Condition Index) with a value of 44.50 % and a "Conditions" section with a "Bad" label.



ABBOTT LABS

Client: Abbott Laboratories (Nutrition Division)

Assignment: Roof Asset Management Program Pilot

Size: 668,740 square feet

In December 2018, Technical Assurance performed an assessment on 11 buildings in Abbott Park as part of a Roof Asset Management Program Pilot. **The assessment included a mixture of manufacturing, distribution and administration buildings totaling approximately 668,740 square feet of roof assets.**

The scope of work included:

- A customized Abbott ON-PNT enterprise asset management web portal, including GIS poly line drawings of each building roof section.
- The inventory and assessment of each roof building, included photo overview of the section and observed deficiencies. All deficiency type, location and quantities were input into the ON-PNT database.
- Data collected included condition indices, total and remaining service life, replacement cost estimates, effect cost estimates, total cost of ownership savings associated with repair and maintenance programs, ad repair and ongoing preventative maintenance programs.
- Final condition assessment report

During the assessment, our team discovered that the roof sections were in varying conditions – Excellent, Good, Fair, Poor, Bad, Very Bad and Failed – on a scale of 0-100%. The Pilot Program assessment was completed successfully and the relationship with Abbott Labs Nutrition Division is still developing.

The screenshot displays the 'Roof Section Key plan image' and a detailed data table for 'Roof Section'.

Roof Section	
Roof ID	Abbott_Park-0001-49-01
Roof Section	9075
Year Built	2000
1st Built List	Yes
Unbraked	0.0710 Roof Coverings
Roof System	1142/004-0
Roof System Details	Thermoplastic Ballasted
Roof System Group	SP
GP	
Assessor	Jan M. Brown
Assessment Date	12/18/2018
Roof Overview Image	

Below the table, a 'Condition' bar shows a score of 44.25 %.



CONFIDENTIAL FORTUNE 500

Client: Fortune 500 – Manufacturer of Tissue Consumer Products, Packaging, Building Products and Related Chemicals

Assignment: Roof Consulting



A Fortune 500 Company had plans to replace \$5 million in roof systems at one of their western US plant sites. They had been operating on a run-to-failure program model and were prepared for a full replacement.

Given the costs, the client engaged us to help them fully understand their investment options before moving forward with a complete replacement. After performing an initial assessment at their site, we found that only a portion of their roof sections required a complete replacement, while other sections still had useful life opportunities – provided a complete roof repair and restoration program was implemented immediately, along with annual roof maintenance. We pivoted to think about what could be done to extend the life of their assets while saving them money. The savings captured were substantial.

As a new partner, we serve as an objective third-party to financially analyze the building assets, ultimately helping our client view their buildings as a business investment. As part of our roof life cycle management program, we have established life cycle metrics for their roof assets to create accountability and set goals for savings—all while accounting for regular proactive maintenance during the life of the assets.

While this is still a fairly new partnership, we have already saved them a considerable amount of money in roof repairs and replacement projects alone. As we progress in our relationship with this company, our goals are to:

- Continue to assess and monitor opportunities for savings
- Keep roof systems on track with regular maintenance
- Lower cost of ownership by 15-20%

Savings & Successful Results with Life Cycle Management

The company was planning on a capital roof replacement spend of \$6.4 million over 10 years at the one site with no preventative maintenance included – \$4.5 million was to be spent to replace most roofs in the first year. Our professionals determined that they actually needed to spend only \$1.4 million on immediate roof replacements and \$1.7 million in restoration maintenance/life cycle investment in the first year, and then \$30k annually on preventative maintenance for the full alternate 10-year plan.

Not only did we help them avoid unnecessary replacements and save more than \$3 million over 10 years, but we also helped extend their roof assets for another 10 years.

U.S. DEPARTMENT OF ENERGY RAMP PROGRAM

Client: U.S. Department of Energy –
National Nuclear Security
Administration

Assignment: Roof Asset Management
Program (RAMP)

Size: 25 million total roof square feet

Technical Assurance, Inc. was contracted by Honeywell FM&T to provide the implementation of a comprehensive Roof Asset Management Program (RAMP) for the U.S. Department of Energy – National Nuclear Security Administration at nine (9) different sites in ten (10) locations throughout the U.S.

Sandia National Laboratory – Livermore, CA
Lawrence Livermore National Laboratory – Livermore, CA
Nevada National Security Site – Las Vegas & Mercury, NV
Y-12 National Security Complex – Oak Ridge, TN
Sandia National Laboratory – Albuquerque, NM
Los Alamos National Laboratory – Los Alamos, NM
Pantex Plant – Amarillo, TX
Idaho National Laboratory – Idaho Falls, ID
Savannah River National Labs – Savannah, GA

The overall purpose of the RAMP is to provide high performance, energy efficient capital renewals and the implementation and management of roof sustainability repair and maintenance programs that can extend roof system life cycles and lower total cost of roof asset ownership. The scope of work called for Technical Assurance to provide complete roof condition evaluation, asset assessment, financial and budgetary modeling (both constrained and unconstrained) and management of roof life extension efforts by sub-contractors. The scope also involved the performance of professional design services and contracting for construction services, including normal civil, structural, mechanical, electrical and architectural services related to roofing replacement and repair, along with the selected demolition of abandoned roof top equipment.

In 2015, 21 million square feet of roofs were assessed in an expedited manner of 10 months. In 2021 and 2022, Technical Assurance is re-assessing the roof assets.

In 2019, the annual capital roof renewals reached \$60 million and 1 million square feet of roofs were either replaced or coated, and \$58.6 million was completed in 2020. Since 2015, Technical Assurance has managed over \$273.5 million of design-bid-build projects through the program.

Technical Assurance serves as the single prime contract holder for the design-build projects at all locations – serving as the Program Manager, Asset Manager, Database Manager, Designer and Construction Manager. The program is implemented through Technical Assurance's unique 5 Step Process: Discover-Plan, Solve-Manage and Sustain.

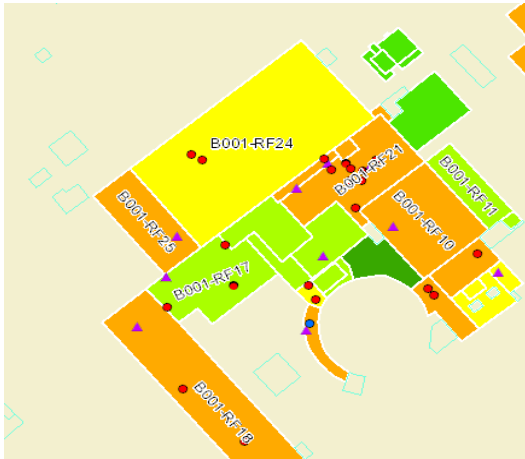
FIRSTENERGY CORP.

Client: FirstEnergy Corp.

Assignment: Building Exterior Asset Management Program

Size: 15 million SF

Project Complete: Ongoing



Technical Assurance has been engaged by FirstEnergy since 2010 first to assess then to develop a long-term roof and building envelope sustainability program encompassing 400 sites over a 5-state area (Maryland, New Jersey, Ohio, Pennsylvania and West Virginia). This totals over 15 million square feet of roof assets, valued at roughly \$425.5 million. FirstEnergy was concerned with the aging condition of their building envelope and how these conditions may impact their electrical generation and transmission operations.

Technical Assurance's first assignment was to inventory and assess the FirstEnergy Nuclear Plant, Fossil Power Plant, Service Station, Transmission Line, Substation and Corporate Administration facility roofs. Technical Assurance needed to establish an objective set of facility asset management metrics to manage and prioritize the replacement, repair and maintenance requirements of the facilities. Under the direction and management of FirstEnergy Corporate Facilities Management and Project Management staff, Technical Assurance prepares and manages multi-project cash flows and work schedules, which must be closely maintained and monitored throughout the annual projects.

From 2010-2012, Technical Assurance assessed approximately 12 million square feet of the FirstEnergy roof assets. Technical Assurance deployed their GIS-enabled ON-PNT® Enterprise Asset Management technology to set a Condition Index (CI), Remaining Service Life (RSL) and Total Cost of Ownership (TCO) metrics for each roof section asset. In addition to the facility asset management metrics, a Current Replacement Value (CRV) and total Repair and Preventative Maintenance (RPM) estimate was set for each roof section asset. The overarching goal of the RAMP was to prioritize the capital roof renewals over the next 10 years and identify roofing assets that could be repaired and maintained to extend roof system life cycle and lower total cost of roof asset ownership.

Since 2010, Technical Assurance has designed and managed the replacement of nearly 3.4 million square feet, with a renewal value of nearly \$118 million. These efforts have afforded FirstEnergy with total cost of ownership savings of \$54 million over the life of their roof portfolio.

UNITED STATES POSTAL SERVICE

Client: USPS

Assignment: Roof Asset Management System

Size: 116+ million square feet

In 2018, Technical Assurance, in partnership with Wood® Environment & Infrastructure Solutions, Inc. and RoofConnect, was awarded the federal United States Postal Service (USPS) Roof Asset Management Systems (RAMS) program.

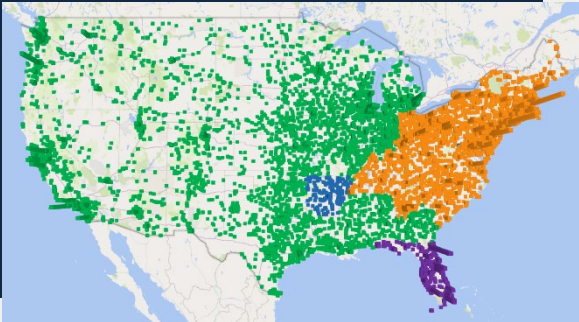
The USPS currently owns 8,215 facilities across the United States, totaling approximately 186 million square feet of roof assets valued over \$3 billion. The purpose of the RAMS program is to maintain an accurate inventory of the roofing infrastructure, to accurately and consistently assess its condition, and to develop and implement a long-term plan for maximizing its life expectancy and the associated costs for doing so.

The scope of the RAMS program includes:

- condition assessments
- biannual preventative maintenance
- repair and alterations
- emergency leak response
- roof design services
- roof restoration projects
- construction management
- quality observation
- building envelope systems (below-grade, exterior wall and fenestration systems)

In the first year of the program (2018-2019), Technical Assurance assessed 3,170 facilities, totaling approximately 69.4 million sf of roof assets. Geographical coverage included the Great Lakes, Pacific, Southern and Western regions of United States. Additionally, the Technical Assurance team mobilized to 1,230 sites for preventative maintenance (PM) visits.

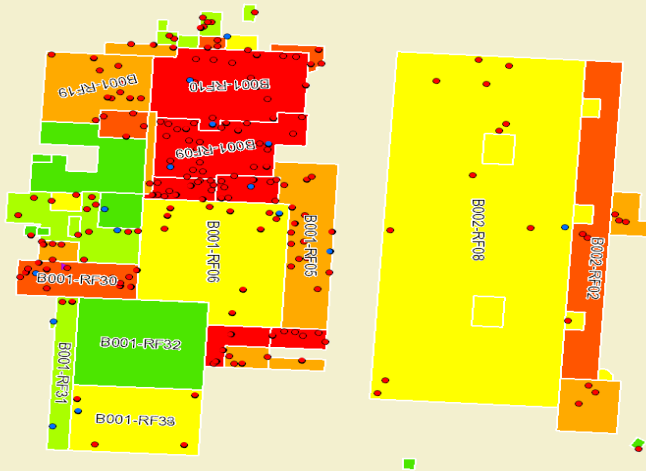
Additionally, we are providing design services for upcoming roof replacement projects and performing construction administration and quality observation on active projects.





TECHNICAL ASSURANCE

ON-PNT®
Simplified Asset
Management



ON-PNT®

Building System Asset Management Made Simple.

01

Enable a More Efficient Field Crew Data Collection

- > GIS PWA mobile app
- > Increases efficiency and effectiveness
- > App syncs with web portal every night

02

Brings Database to the Field & the Field to the Database

- > GIS integrated database
- > Easily visualize the condition of roof assets
- > Analyze effects of repairs and maintenance

03

Analysis & Reporting: Performance, Metrics & Goals

- > High level executive summary metrics (KPIs)
- > Scorecard review of building conditions
- > Custom reports & charts
- > Triage scores
- > Constrained budget analysis tool
- > GIS mapping

04

Simplified Management

- > Robust project management tool
- > Document & task management
- > Schedule & cost management
- > Data repository
- > Warranty management & reminders

The ON-PNT Enterprise Solution is a GIS-enabled database and web portal technology solution for:

- Building System Management
- Design Services and Bid Management
- Construction Management
- Sustainable Maintenance Management

ON-PNT allows facility owners the ability to manage building system inventory, condition assessments, repairs and ongoing building system data within one central location. This cutting-edge technology provides robust GIS mapping and automated reporting metrics for simplified data consumption.

ON-PNT is fully customizable per client. In fact, we build a unique ON-PNT Portal for each client program. This means we can incorporate each client's unique program nomenclature, ID system, special acronyms, custom metrics, etc.

A SCIENTIFIC APPROACH

The ON-PNT system provides repeatable and objective analysis using established facilities asset management (FAM) standards. The database is modeled using the following engineering standards:

- ✓ "Asset Lifecycle Model for Total Cost of Ownership," IFMA/APPA
- ✓ ASTM E917-05 Measuring Life-Cycle Costs of Buildings and Building Systems
- ✓ ASTM E1057-06 Measuring Internal Rate of Return and Adjusted Internal Rate of Return for Investments in Buildings and Building Systems
- ✓ ASTM E1121-12 Measuring Payback for Investments in Buildings and Building Systems
- ✓ ASTM E1765-11 Standard Practice for Applying Analytical Hierarchy Process (AHP) to Multi-Attribute Decision Analysis of investments related to Buildings and Building Systems

Using these standards to work within the structure of our database, we are able to ensure consistent findings and reporting with our Asset Management solution. The standards also allow us to bring in unique characteristics and attributes important to our clients from a non-monetary perspective.



RECOMMENDATIONS & BUDGETING

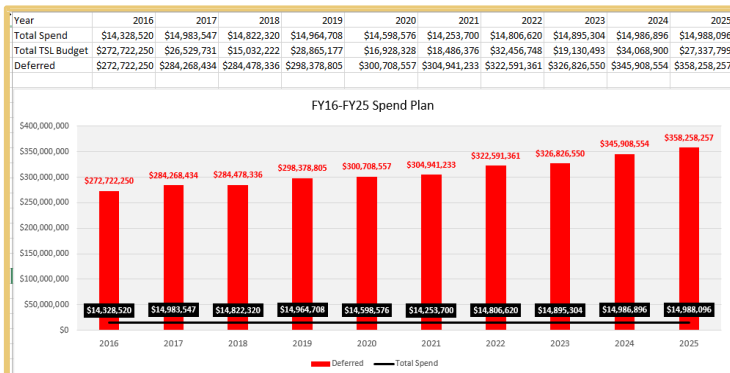
ON-PNT® includes a built-in Business Intelligence for Capital and O&M budgeting and planning, along with work schedule priorities based on discovery phase findings. The automated budgeting reports include scientific methodology for ranking capital replacements and repair projects. The Triage Budget Report and Project analyzer tool is based upon the:

- ✓ Building or building system Condition Index (CI)
- ✓ Mission Dependency Index (MDI)
- ✓ System Component Index (SCI)
- ✓ Total Cost of Ownership (TCO)

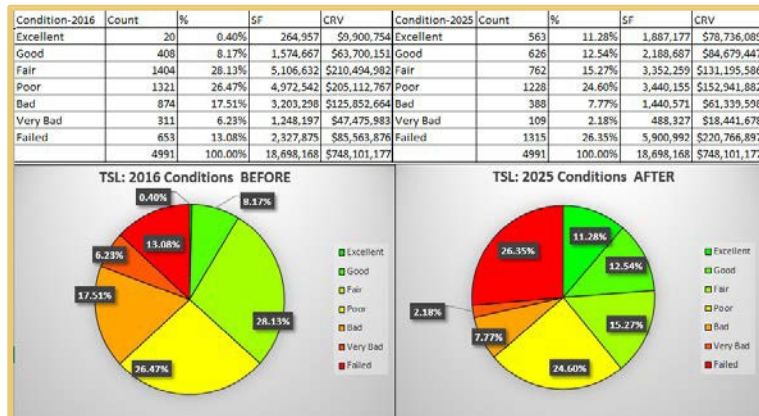
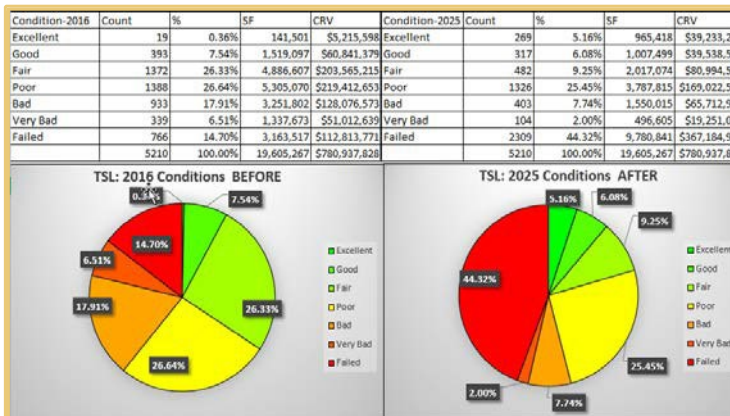
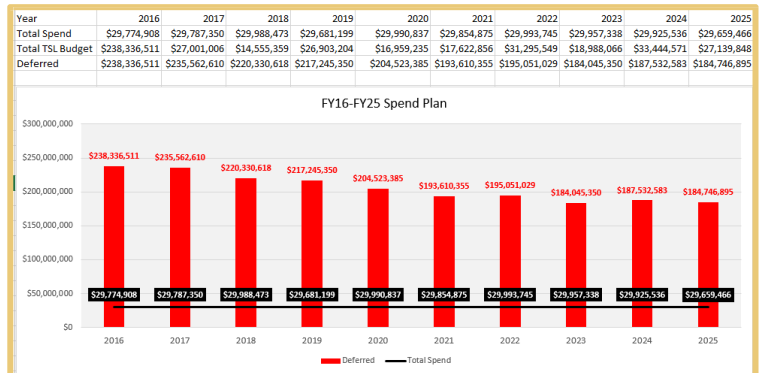


ON-PNT lets you generate ad-hoc Triage Budget Plans based upon set budget constraints. You can also set your organization's inflationary rate and/or cost of capital or value of cash percentage rate. Once constraints and other rates are set, you can easily generate Triage Budget Plan and/or special Spend Plan and Deferred Maintenance Reports.

10-Year Spend: \$15 million/Year



10-Year Spend: \$30 million/Year



Building System Asset Management Made Simple.

Enable a More Efficient Field Crew | Data Collection

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- Increases efficiency and effectiveness
- App syncs with web portal every night

Brings Database to the Field & the Field to the Database | Dynamic Mapping

- GIS integrated database
- Easily visualize the condition of roof assets
- Analyze effects of repairs and maintenance

Analysis & Reporting: Performance, Metrics & Goals | Data Consumption

- High level executive summary metrics (KPIs)
- Scorecard review of building conditions
- Custom reports & charts
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Simplified Management

- Robust project management tool
- Document & task management
- Schedule & cost management
- Data repository
- Warranty management & reminders



REQUEST A CONSULTATION

We would love to talk with you about your facility needs.
Connect with us on our [website](#) to request a consultation.

Or Contact:

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