

High Performance Building Enclosure Experts

Statement of Qualifications

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

- Stablished 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 project meets specific а quality requirements.

GEOGRAPHIC COVERAGE

Technical Assurance has the capacity to provide national building enclosure consulting services. Our projectrelated 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



Project & Program Experience

CH-UH CITY SCHOOL DISTRICT

Client: CH-UH City School District Assignment: Façade Restoration Size: 990 windows, 4 schools





Technical Assurance, Inc. was chosen by the Cleveland Heights-University Heights City School District as the prime consultant for this major window replacement program, most of which had complex masonry details surrounding the windows.

The scope of the work included inspection and detailed study of multiple school buildings followed by development of a comprehensive building façade and window replacement restoration program.

Technical Assurance conducted the Discovery Phase of our 5-step program to assess the current conditions. During this phase, we uncovered numerous hidden masonry defects which had to be addressed prior to window replacements. In the meantime, our design staff took great care to match the original school windows by carefully reviewing historical photographs and developing window replacement systems. We then prepared construction documents and provided Project Management and Quality Observation Services during construction restoring the aforementioned schools to their former grandeur.

In all, a combined total of 525 windows at the University Heights High School and Monticello Middle School were replaced during the Phase I Project, in addition to substantial masonry repairs to the buildings. Furthermore, another round of 465 windows was replaced at the Roxboro Middle and Elementary and Noble and Oxford Elementary Schools. At the end of the project, the total cost was 13.5% under budget, with only 1.3% in additional change orders when compared to the original contracts.





FREMONT LOCAL SCHOOL DISTRICT

Client: Fremont LSD / OFCC

Assignment: New Elementary and High Schools; BECx Services

Size: 425,600 SF

Cost: \$107 million



Fundamental BECx Services included:

Technical Assurance was engaged by Heapy Engineering to provide BECx services during the design, construction and occupancy phases of the project. The project scope included the design and construction of four (4) new schools to house grades PK-5 and Fremont Ross High School.

- Fremont Ross High School 200,800 SF; \$50.6 million
- Atkinson Elementary 56,200 SF; \$14.1 million
- Croghan Elementary 56,200 SF; \$14.1 million
- Lutz Elementary 56,200 SF; \$14.1 million
- Otis Elementary 56,200 SF; \$14.1 million

Each new school was built on the site of the equivalent existing school. After construction is complete, the existing buildings will be demolished. The goal is to achieve LEED silver, and the building enclosure commissioning plays a role in achieving that goal.

- 1. Review & refinement of the Owner's Operational Performance (OPR)
- 2. Assist in the development of the Basis of Design (BOD) related to enclosure construction document design details and specifications.
- 3. Establish appropriate and quantifiable enclosure related performance metrics, test standards and test methodology as necessary to validate the OPR and BOD.
- 4. Develop BECx Plan to include review of enclosure durability, performance, energy efficiency, maintenance, costs, material and system options, occupancy type, geographic location and climate, acoustics, aesthetics and security.
- 5. Design Phase Review provide independent third-party review of the enclosure related drawings and specifications at the DD and CD phases. Establish enclosure related performance metrics, test standards and methods. Issue a specification for BECx for inclusion in the bid/permit documents.
- 6. Construction Phase quality observation, functional testing, other quality assurance services as required by the OPR and BOD, and field test. Performance testing includes an IR roof scan to detect moisture infiltration, storefront water infiltration testing, coatings adhesion testing and water hose testing.
- 7. Performance testing IR Scans of thermal and air barrier systems in accordance with ASTM C1060. IR scans of the roof system in accordance with ASTM C1153. Water hose testing in accordance with AAMA 501.2. Weather barrier coatings adhesion testing in accordance with ASTM D4541.

The four elementary school constructions were complete in summer 2020. The high school construction is currently underway. The high school construction was complete in 2021. Post-Occupancy Review was complete in 2022.









GREENON LOCAL SCHOOL DISTRICT

Client: Greenon LSD / OFCC Assignment: BECx Services Size: 188,400 SF

Cost: \$44.3 million



new construction project. The project included a new 188,405 SF elementary, middle and high school to house over 1,500 students in grades PK-12. The scope of work also included the abatement and demolishment of Indian Valley Middle School, Greenon Jr./Sr. High School and the abatement of Enon Elementary. Technical Assurance provided adhesion testing during the

In 2017 Technical Assurance was engaged by Heapy Engineering to provide BECx services for the Greenon Local School District

Technical Assurance provided adhesion testing during the installation of spray foam systems, confirming good adhesion of the weather barrier. Additionally, we provided quality observation during the roof install, identifying installation issues that need to be addressed. Our primary focus during QO visits was to ensure that the building envelope provides a continuous weather and thermal barrier and that it is installed in compliance with the design intent.

Fundamental BECx Services included:

- 1. Review & refinement of the Owner's Operational Performance (OPR)
- 2. Develop BECx Plan to include review of enclosure durability, performance, energy efficiency, maintenance, costs, material and system options, occupancy type, geographic location and climate, acoustics, aesthetics and security.
- 3. Design Phase Review provide independent third-party review of the enclosure related drawings and specifications at the DD and CD phases. Establish enclosure related performance metrics, test standards and methods. Issue a specification for BECx for inclusion in the bid/permit documents.
- 4. Construction Phase shop drawing and technical submittal review, mock up testing, quality observation, functional testing, other quality assurance services as required by the OPR and BOD and field test.
- 5. Performance testing included an IR roof scan to detect moisture infiltration, IR scans of the roof systems and adhesion testing

The project was completed in 2021.







TEAYS VALLEY SCHOOL DISTRICT

Client: Teays Valley School District Assignment: Building Envelope Size: 8 schools





Technical Assurance, Inc. performed a façade assessment and maintenance plan for 8 schools within the Teays Valley School District:

- The High School
- The Freshman Building
- East Middle School
- West Middle School
- Ashville Elementary School
- Walnut Elementary School
- Scioto Elementary School
- South Bloomfield Elementary School

The condition of each of the school facilities differed. Common deficiencies found included failed sealant joints, insufficient water sealer material on masonry walls, deterioration/open mortar joints, cracking/spalling of CMU, moisture and water infiltration within the façade systems, and no evidence of effective cavity wall drainage systems. Our team created a 10-year maintenance plan and budget for the school district to help prioritize repair and maintenance projects. Restoration budget totaled nearly \$1.6 million.

Following the assessment, Technical Assurance completed the design, bid and construction phase services for the façade restoration on the East and West Middle Schools, along with the concession stands and restrooms at the football fields for each respective school. The restoration and remediation efforts were performed on the window/glass doors, sealant joints, masonry, CMU and mortar joints.

The following year, our team performed an assessment on the roof systems of each of the schools, again providing a 10-year plan for repair and maintenance project prioritizations. Roof systems included asphalt shingles, EPDM, PVC and metal panel. The roofs were identified to be in a variety of conditions, depending on the system age, number of defects and history of maintenance. Common findings included nail pops, improperly deigned and/or installed rooftop ventilation, water infiltration at hip vents, split shingles, missing counterflashing, and bucked and detached expansion joint flanges.

Technical Assurance has a strong relationship with the school district and will continue to work with them on future building envelope projects as they arise within the 10-year plan.



UPPER ARLINGTON K-12 SCHOOL DISTRICT

Client: Upper Arlington School District

Assignment: 6 Locations within Arlington, OH; BECx Services

Size: 6 Schools

Cost: \$230 million

Technical Assurance was engaged to provide BECx services during the pre-design, design, pre-construction, construction and occupancy phases of the project. The project scope included the design and construction of one (1) new high school, three (3) new elementary schools and two (2) elementary school renovations.

- Upper Arlington High School 398,000 SF; includes a natatorium
- Wicklliffe & Windermere Elementary Buildings 74,900 SF each
- Barrington Elementary Renovation & Addition 25,000 addition + 85,000 SF of renovation
- Tremont Elementary Renovation & Addition 8,350 SF addition and 40,495 SF renovated space
- Greensview Elementary Renovation and Addition 75,000 SF renovated space

Fundamental BECx Services included:

- 1. Review & refinement of the Owner's Operational Performance (OPR)
- 2. Assist in the development of the Basis of Design (BOD) related to enclosure construction document design details and specifications.
- 3. Establish appropriate and quantifiable enclosure related performance metrics, test standards and test methodology as necessary to validate the OPR and BOD.
- 4. Develop BECx Plan to include review of enclosure durability, performance, energy efficiency, maintenance, costs, material and system options, occupancy type, geographic location and climate, acoustics, aesthetics and security.
- 5. Design Phase Review provide independent third-party review of the enclosure related drawings and specifications at the DD and CD phases. Establish enclosure related performance metrics, test standards and methods. Issue a specification for BECx for inclusion in the bid/permit documents.
- Pre-construction Phase review shop drawings and submittals for technical content and continuity of building enclosure systems, recommendations of findings and reporting. Technical Assurance also supported Heapy in the RFI and submittal phase for review of special conditions related to wall and interfacing systems.
- Construction Phase quality observation, functional testing, other quality assurance services as required by the OPR and BOD, and field test. Performance testing includes an IR roof scan to detect moisture infiltration, storefront water infiltration testing, coatings adhesion testing and water hose testing.

Each school is currently in a different project phase. The entire project is was complete in 2022.







Warrick County Schools

Client: Warrick County School Corporation

Assignment: Roof Replacement

Size: Castle North Middle School

Project Complete: 2022



In 2021 Technical Assurance, Inc. provided assessment, design, bid and construction phase services. The scope of work included roof replacement services for Castle North Middle School.

The services provided included:

- Discover-Plan Phase Conduct initial roof assessment of building exteriors. Conduct testing, including roof core cut(s) sampling, examination and patching of examined conditions.
- Solve Phase Conduct site visits and pre-design review. Develop specification documents aligned with Building Code Standards, provide special conditions, testing requirements and bid forms as required. Develop drawings from confirmed testing, exploration and project analysis data. Conduct design review and coordinate bidding phase with WCSC and conduct pre-contract award review.
- Construction Phase Conduct contract preparation, review of project schedule and submittals and periodic construction phase administration. Provide on-site project management and part-time quality observation including reports after each visit.
- Performance Testing Coordinate and conduct material application testing procedures regarding project guidelines and standards are met before each phase of work. Coordinate Independent Testing as required and approved by the Owner.

The project was completed in November 2022.





WICKLIFFE CITY SCHOOLS

Client: Wickliffe PK-12 Campus/OFCC Assignment: BECx Services Size: 208,000 SF Cost: \$61,500,000 Technical Assurance was engaged by Karpinski Engineering to provide BECx services to Wickliffe City Schools. The project site located in Wickliffe, OH took place at the existing Wickliffe High School and athletic fields. The scope of work included building and site improvements, including a PK-12 School serving approximately 1,237 students, a Performing Arts Center (with 500 seats), Athletic Field Complex (including new varsity baseball field and new artificial turf for the stadium), and the abatement and demolition of the existing Wickliffe High School, Middle School, and Elementary School. The goal is LEED Silver Certification.







Fundamental BECx Services included:

- Providing an independent third-party review of the enclosure related drawings and specifications at the DD and CD phases and issue a specification for BECx for inclusion into the bid/permit documents.
- Conducting a general review of the exterior envelope shop drawings and technical submittals for compliance with the contract documents.
- Conducting Quality Observation site visits along with written field reports disclosing the findings during the QO and subsequent issues log.
- Conducting Performance Testing—ASTM C1153 Roof Insulation Infrared Scanning, ASTM C1060 Building Insulation Infrared Scanning, ASTM D4541 Coating Adhesion Testing and AAMA 501.2 Water Hose Testing.
- 5. Performance of a post-occupancy review of the building enclosure.

As of Fall 2022 the project is on time and on budget with complete building enclosure set for November 2022.





ON-PNT® Simplified Asset Management



ON-PNT®

Building System Asset Management Made Simple.



Enable a More Efficient Field Crew Data Collection

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



03

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



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



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

Five Steps to Sustainability 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
- \oslash

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:



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-YearS pend: \$15 million/Year



10-Year Spend: \$30 million/Year

Condition-2016	Count	%	SF	CRV	Condition-2025	Count	%	SF	CRV
Excellent	19	0.36%	141,501	\$5,215,598	Excellent	269	5.16%	965,418	\$39,233,204
Good	393	7.54%	1,519,097	\$60,841,379	Good	317	6.08%	1,007,499	\$39,538,521
Fair	1372	26.33%	4,886,607	\$203,565,215	Fair	482	9.25%	2.017.074	\$80,994,534
Poor	1388	26.64%	5,305,070	\$219,412,653	Poor	1326	25.45%	3,787,815	\$169,022,56
Bad	933	17.91%	3,251,802	\$128,076,573	Bad	403	7.74%	1,550,015	\$65,712,98
Very Bad	339	6.51%	1,337,673	\$51,012,639	Very Bad	104	2.00%	496,605	\$19,251,090
Failed	766	14.70%	3,163,517	\$112,813,771	Failed	2309	44.32%	9,780,841	\$367,184,91
	5210	100.00%	19,605,267	\$780,937,828	7	5210	100.00%	19,605,267	\$780,937,821
TSI - 2016 Conditions REFORE				TSI: 2025 Conditions AFTER					









Building System Asset Management Made Simple.

Enable a More Efficient Field Crew | Data Collection

- GIS PWA mobile app
- 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
- Triage scores
- Constrained budget analysis tool
- GIS mapping

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: Liam Flannery, Director of National Sales (919) 637-1444 Lflannery@technicalassurance.com