



West Virginia Division of Natural Resources

BID RESPONSE

Expression of Interest

for

**A/E Services for Structural Repairs at
Various State Parks**

AEOI 0310 DNR1800000009

Thursday, August 2, 2018 by 1:30pm

West Virginia Division of Natural Resources

Property and Procurement Office

Attn: Angela White Negley

324 4th Avenue

South Charleston, WV 25303

(304) 558-2165

WDP & Associates Consulting Engineers, Inc.

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Charlottesville, Virginia 22901

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ORIGINAL

August 1, 2018

West Virginia Division of Natural Resources
Property and Procurement Office
324 4th Avenue
South Charleston, West Virginia 25303



Attention: Angela White Negley
Reference: Expression of Interest, A/E Services for Structural Repairs at Various State Parks
Solicitation #: AEOI 0310 DNR180000009

Dear Ms. Negley:

Charlottesville, VA

Manassas, VA

Blacksburg, VA

Myrtle Beach, SC

New York, NY

WDP & Associates Consulting Engineers, Inc., (WDP) is pleased to submit our expression of interest to provide professional services for the evaluation and design of repairs and Hawks Nest, Pipestem Resort, and Twin Falls Resort State Parks.

WDP is an SBA-certified (1KZR5) consulting engineering firm with a proven history of investigating structural and moisture related issues, as well as in the design of repairs to remedy those problems. Building envelope and structural engineering is not just a service that we provide; it's at the heart of our business. Our technical staff has performed these services for public and private sector clients throughout the United States, including West Virginia state agencies. The proximity of our Blacksburg and Charlottesville offices gives us the ability and flexibility to respond to the needs of these projects in southern West Virginia both during the investigative phase and through construction administration. Our projects have brought us to the state on a weekly or bi-weekly basis for the past two years. Additionally, our ability to conduct the testing needed to identify the sources of the leakage, assess the condition of the existing structures, and design the needed repairs in-house provides a cost-savings to our clients.

Our senior staff are nationally recognized experts that are actively involved on the national level in standard and code development committees, and our involvement includes current Chairs of standard committees that write and develop the standards which are used to design, construct, repair, and test buildings. This engagement brings a level of expertise and insight that will be an invaluable resource for determining the solutions for the problems currently being experienced. We have found our ability to provide scalable or tiered-approach services to be particularly appreciated by our cost-conscious clients working within tight budget constraints.

The attached expression of interest submission clearly and concisely conveys our experience and abilities for the requested services for the Division of Natural Resources.

Thank you for your consideration, and we look forward to hearing from you.

Respectfully submitted,
WDP & Associates Consulting Engineers, Inc.


Rex A. Cyphers, P.E.
Principal

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Firm Profile

WDP & Associates Consulting Engineers, Inc., is a SBA-certified (1KZR5), consulting engineering firm specializing in building envelope, façade investigations and repair, structural investigations and repair, and building science analysis. Creating lasting solutions that extend the service life of structures is at the heart of our business.

Since the firm's establishment in 1995, WDP's expertise, particularly in regard to building envelope investigations and structural repair, has garnered recognition on a national level and makes us uniquely qualified to evaluate and repair existing structures. Building envelope investigation and repair design are the hallmark services of our firm, and our tailored professional services can preserve and enhance the value of client facility assets.

WDP is a small business with a national presence and a firm commitment to the state of West Virginia. **Our experience in the state began over 17 years ago with a project at West Virginia University in Morgantown**, and we remain dedicated to serving the needs of our West Virginia clients. In the last five years alone, we have worked on more than twelve projects from Charleston to Morgantown to Snowshoe; our services on those projects have included investigating air and water infiltration issues, evaluating the hygrothermal properties of existing wall assemblies, and providing recommendations and repairs to improve the air and water tightness of structures. Our ongoing project at the Capitol Complex for the West Virginia General Services Division and our recently completed project at the Public Service Commission Headquarters building have brought us to Charleston on a weekly basis for the past two years.



Interior of West Virginia Capitol Building

Companywide, WDP performs around 100 structural and building envelope investigation and repair projects every year. **Building envelope consulting and structural engineering is not just a service that we provide; it is at the core of what we do.** We have been the designer of record for numerous projects regarding buildings of historic significance and with historic designations, including a UNESCO World Heritage site and the oldest continuously in-use higher education building in the United States. Our investigative strategies and cost-effective design approaches have addressed countless issues, such as structural deficiencies caused by moisture infiltration issues, poor workmanship, or general deterioration of building materials, or building envelope problems manifested through air/water leakage, occupant comfort issues, biological growth, and aesthetic deficiencies, among others. Our senior staff members are nationally and internationally recognized for their technical expertise, project accomplishments, and involvement in industry organizations and National Design Standards committees.

Our ability to provide a wide range of services in-house minimizes or eliminates the need for numerous subconsultants, translating into cost savings for our clients. Our in-house capabilities include the combination of structural and building envelope engineering, non-destructive testing capabilities, engineers proficient in field testing for air and water infiltration, in-house laboratory testing of materials, and the ability to conduct hygrothermal analyses with our WUFI-trained engineers.

Additionally, we take a tiered approach when developing recommendations for repairing the problems in our clients' structures. Rather than simply presenting the most comprehensive (and typically most expensive) repair option, whenever possible, we prefer to develop two or three options which range from addressing the most immediate issues as a minimal repair approach to proactively correcting conditions that can adversely affect the structure's longevity as a comprehensive repair approach. **We have found that our clients appreciate these cost-conscious solutions for budget constraints.**

Structural Services

WDP's structural experience is both broad and deep, encompassing investigation, analysis, repair, and restoration of all structure types, including masonry, concrete, steel, wood, and combinations thereof. The structural projects in WDP's extensive portfolio include repairs to federal, state, municipal, institutional, commercial, manufacturing, transportation, and residential buildings.

WDP's knowledge and experience has been broadened through decades of structural investigation on myriads of existing structures, from historic to contemporary, which gives the added understanding of how existing structures have been constructed, how they perform over time, and how they fail.

Our structural investigation capabilities include:

- Visual and tactile (sounding) surveying
- Non-destructive testing methods
- Materials testing
- Structural instrumentation and health monitoring

WDP's material investigation and testing work is supported by our own in-house laboratory, which is accredited by the Washington Area Council of Engineering Laboratories (WACEL) and the American Association of State Highway and Transportation Officials (AASHTO). WDP is proficient in testing concrete, masonry, soil, asphalt, and aggregate materials. WDP's certified material testing laboratory can offer a wide range of quality control testing for, new construction, materials analysis and monitoring, and failure investigations. Each piece of equipment that WDP's technicians use in both the laboratory and the field is calibrated at intervals as required by ASTM or sooner if results are not consistent. All calibrations use instruments and gauges that are traceable to the National Institute of Standards and Technology (NIST).

WDP's engineers are actively engaged in sharing their and knowledge and experience with others in the industry through regular publication of research papers and presentation at professional conference.

Structural engineering for existing structures presents additional challenges that are not present with new construction. The location, condition, and suitability of existing structural members create additional constraints that the repair design must satisfy, which often precludes the use of standard design approaches and construction practices. When necessary, WDP is able to leverage its structural experience and toolsets to develop original and innovative design solutions to address the unique challenges presented by an existing building.

Building Envelope Consulting Services

As your building envelope consultant, WDP brings a level of proficiency gained through our regular exercise of the methods and practice and an intimate familiarity acquired through writing the standards that maintain these practices. In other words, we don't just execute test standards; we develop them.

Our professional building enclosure consultant services include:

- diagnostic testing and field investigation of reported air and moisture issues in existing buildings;
- façade assessment of existing buildings;
- peer review of architectural design of building enclosures;
- repair and restoration design for building facades;
- mock up and field performance testing utilizing standardized testing methods for air and water;
- enclosure commissioning; and
- warranty inspections.

Our expertise in the diagnosis and correction of exterior envelope systems includes extensive knowledge of brick and natural stone masonry, window/curtain wall systems, roofing, exterior insulation and finish systems (EIFS), stucco, precast concrete wall panels, architectural metal panel systems, concrete, and steel structures. Our flexibility enables us to address a discrete problem or design a comprehensive restoration program for an entire complex. As energy codes evolve and LEED certifications become more commonplace, air barrier systems have become a major item of the building envelope that requires inspection and certification.

WDP has Licensed Field Auditors who have been trained and certified under the Air Barrier Association of America's Quality Assurance Program.

As building envelope consultants, WDP engineers have in-house nondestructive testing capabilities to provide a seamless interface between field evaluations, engineering evaluation, and maintenance/repair design. We have a broad range of construction investigation experience and materials testing capabilities. Using test specifications developed by the American Society for Testing and Materials (ASTM), American Architectural Manufacturers Association (AAMA), American National Standards Institute (ANSI), American Concrete Institute (ACI), and others, our laboratory can offer a wide range of quality control testing for new construction, materials analysis and monitoring, and failure investigations. In addition, we routinely develop strategic equipment combinations to diagnose the issues leading to poor or inefficient building performance. For example, we deploy ambient temperature and humidity data loggers to determine the conditions over the course of time in spaces prone to moisture-related or HVAC control issues including crawl spaces, basements, attics, and plenums. We also have temperature and humidity data logging probes that can be deployed interstitially within building enclosure assemblies to determine the conditions within stud cavities, mass masonry walls, exterior cavities and other locations in an assembly where elevated moisture can lead to long term failures. Other instrumentation can be used to determine the in-situ thermal performance of an existing wall or roof assembly, as well as measure the impacts of solar radiation or wind-driven rain on an assembly.

Building Sciences Services

The study of building science traditionally includes detailed analysis and assessments of building materials, building envelope systems, operational conditions and expectations, HVAC systems, and energy consumption. The aim is to view buildings as a holistic, highly-functioning assembly of systems which have been both individually and collectively optimized. As building owners' and occupants' expectations of interior comfort levels and specific occupancy uses require precise and accurate control over interior conditions, more and more is expected of both the building envelope and the HVAC systems. WDP can bridge the gap between the design, assessment, and optimization of the two integrally connected building envelope and HVAC systems.

An understanding of building science is also critical when evaluating moisture related issues within a building envelope beyond bulk water infiltration. The deleterious effects of water vapor, and the movement of water vapor through convection and diffusion, can create long term issues ranging from microbial growth to the deterioration of wall elements and finishes. To understand and evaluate these effects requires a comprehensive knowledge and experience based in building failures, sustainable design practices, and code requirements, building material properties coupled with in depth understanding of the physical sciences including thermodynamics, psychometrics, environmental science, material science, physics, and structural engineering.

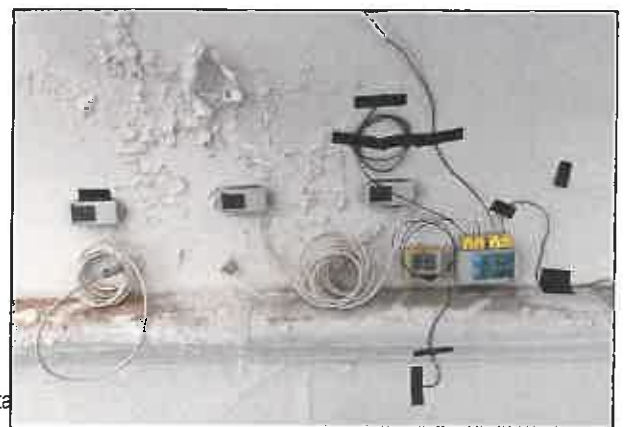
WDP's building science related services generally fall into the following categories:

Data logging and Field Data Collection

In conjunction with an existing condition assessment, we routinely develop strategic plans to deploy an assortment of data logging instrumentation in order to understand heat and moisture movement within a building to diagnose the issues leading to inefficient building performance or moisture related issues. Among other tools, we utilize ambient temperature and relative humidity data loggers to determine the conditions over the course of time both in conditioned spaces and other spaces prone to moisture-related or HVAC control issues, to include crawl



Structural section loss

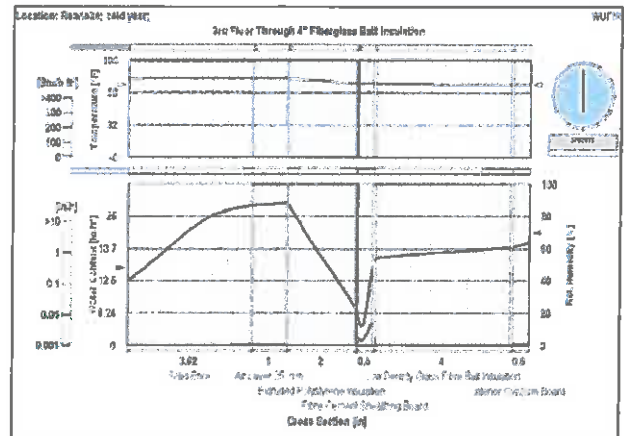


Field instrumentation (above) collects the data used to conduct

spaces, basements, attics, and plenums. We also have temperature and relative humidity data logging probes that can be installed interstitially within building enclosure assemblies in order to determine the conditions within stud cavities, mass masonry walls, exterior cavities and other locations in an assembly where elevated moisture can lead to long term failures. Furthermore, we can assess the in-situ thermal performance of existing wall assemblies utilizing thermocouple and heat flux sensors to measure the actual behavior of a wall.

Hygrothermal Analysis

Hygrothermal analysis is the study of the simultaneous heat and moisture transport within wall assemblies. WDP routinely performs both transient and steady-state hygrothermal analysis. We use WUFI Pro software developed by the Fraunhofer Institute to conduct the transient analysis and either hand calculations, internally developed spreadsheets, or the Heat, Air and Moisture (HAM) toolbox by Quirouette Building Science for steady-state analysis. Our analysis is generally conducted in accordance with ASHRAE 160 “Criteria for Moisture-Control Design and Analysis in Buildings” and ASHRAE Fundamentals. We routinely perform these analyses in conjunction with our data logging capabilities in order to calibrate our models and provide an accurate representation of the existing conditions. This is



WUFI output of data gathered with field instrumentation.

particularly important when evaluating existing buildings for energy upgrades, which typically includes adding insulation to improve the thermal performance of an existing wall assembly or incorporation of a continuous air barrier, to ensure changes to the thermal or vapor properties of an assembly will not create long-term moisture related issues within an existing assembly.

Building Materials Selection & Testing

Hygrothermal analysis is intimately related to and dependent upon a comprehensive understanding of building material properties and compatibilities. WDP routinely collects and performs laboratory and field testing on building material samples in order to determine their hygrothermal related properties. We are proactive with respect to new building materials, and work with manufacturers to determine the properties of and/or testing new products, as well as correcting issues with new products to alter their standard installation details to make the products more effective.

Code compliance and Coordination

WDP works to coordinate our designs with the various code requirements that impact the building envelope while ensuring the performance of the envelope is what the owner expects. There are many interrelated code requirements that must all be considered simultaneously and WDP has extensive experience with coordinating these requirements for both new and renovation projects.

WDP Staff Participation in National Standards Development

WDP's ability to expertly serve the needs of the WV Lottery Building is due, in part, to the extensive engagement on the part of our engineering staff with the industry organizations responsible for developing the professional design standards that are pertinent the building envelope. The list below represents the specific code committees on which WDP's engineers are either a member or Chairperson.

<p>Air Barrier Association of America</p> <ul style="list-style-type: none"> • Research Committee <p>American Concrete Institute</p> <ul style="list-style-type: none"> • Director, ACI National Capital Chapter • 216 Fire Resistance and Fire Protection of Structures • 444 Structural Health Monitoring and Instrumentation • 530 Masonry Standards Joint Committee 	<p>American Society for Testing and Materials</p> <ul style="list-style-type: none"> • C-09 Concrete and Concrete Aggregates • C-09.60 Testing Fresh Concrete • C-09.64 Non-destructive Testing • C-09.98 Evaluation of Laboratories • C-11 Gypsum and Related Building Materials and Systems • C-12 Mortars for Unit Masonry • C-15 Manufactured Masonry Units
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<ul style="list-style-type: none"> • 546 Repair of Concrete <p>American Society of Civil Engineers</p> <ul style="list-style-type: none"> • Structural Engineering Institute • Architectural Engineering Institute • Geo-Professional Institute • Technical Council on Forensic Engineering <p>International Concrete Repair Institute</p> <ul style="list-style-type: none"> • 210 - Evaluation <p>The Masonry Society</p> <ul style="list-style-type: none"> • Secretary, TMS 402/602 Building Code Requirements and Specification for Masonry Structures Committee <ul style="list-style-type: none"> ○ Seismic & Limit State Design Subcommittee ○ Design Subcommittee • Past Committee Chair, Existing Masonry Committee • Existing Masonry Committee <ul style="list-style-type: none"> ○ Façade Task Group • Standards Development Committee • Author, Masonry Designers Guide 	<ul style="list-style-type: none"> • C-16 Thermal Insulation • D-08 Roofing and Waterproofing • D-18 Soil and Rock • E-06 Performance of Buildings • E-06.24 Building Preservation and Rehabilitation • E-06.41 Air Leakage and Ventilation Performance • E-06.51 Performance of Windows, Doors, Skylights and Curtain Walls • E-06.55 Performance of Building Enclosures • E-36 Accreditation & Certification • E-36.70 Agencies Performing Construction Inspection, Testing, and Special Inspections
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Proposed Project Team

Rex A. Cyphers, P.E., has been with WDP since 2003 and will serve as **Principal-in-Charge** on this project. His educational background includes a bachelor and master's degree in civil engineering from West Virginia University, along with a graduate certificate in Cultural Resource Management (2003). Rex has extensive experience in the evaluation and repair of existing buildings experiencing structural, air leakage, and/or moisture related issues, particularly the repair of occupied buildings requiring unique air barrier solutions to maintain operations during the execution of repairs. Mr. Cyphers has been a leader in the building science field, serving as a task group chair responsible for the development of ASTM Standard E3069, "Standard Guide for Evaluation and Rehabilitation of Mass Masonry Walls for Changes to Thermal and Moisture Properties of the Walls." Additionally, Mr. Cyphers has written over 27 papers in the last 16 years on topics ranging from the thermal performance of historic mass masonry walls to strategies to improve energy efficiency in existing buildings. He is a registered engineer in the state of West Virginia and has been the driving force in expanding our work there. His recent projects at WVU, the West Virginia Public Service Commission, and the West Virginia State Capitol have led to our pursuit of a new office location in the state.

Andrew W. Wagner, P.E., will be the **Project Manager**. Mr. Wagner has been with WDP since 2007 and specializes in the evaluation and repair of building enclosures, including facades and roofing. He has extensive experience managing projects for clients in multiple industries, including projects with leakage and moisture issues. Mr. Wagner is an active member of ASTM International and a member of the Air Barrier Association of America's (ABAA) Research Committee. As a member of ASTM International, Mr. Wagner serves as the task group chair for the E06.41, "Air Leakage and Ventilation Performance" subcommittee, and is responsible for ASTM Standard E241, "Standard Guide for Limiting Water-Induced Damage to Buildings." He is also actively engaged in the subcommittees responsible for air leakage and water penetration testing and performance of building enclosures. He has published several papers pertaining to air barriers and water penetration.

Jodi M. Knorowski, P.E., will serve as **Project Engineer** on this project. Ms. Knorowski has five years of experience and regularly provides professional design, building condition assessments, and construction administration services for post-occupancy failures of existing buildings as related to the building envelope. She was recently involved with the West Virginia General Services Division as the lead design engineer for the façade replacement and structural improvements to the Public Service Commission headquarters building and is currently the project manager for the investigation, design of repairs, and construction administration of the West Virginia Capitol Dome moisture intrusion project. Ms. Knorowski's competence in understanding and evaluating the building envelope has been augmented by her certification with WUFI Pro for hygrothermal modeling of wall assemblies and with the National Fenestration Rating Council (NFRC) for certified thermal simulations. Her experience in deploying instrumentation devices and subsequently analyzing the data acquired to determine how heat, air, and moisture are moving simultaneously through building envelope assemblies, which has been utilized on large projects such as the air and water infiltration issues experienced at the University of Virginia's John Paul Jones Arena and at the ongoing project with the College of William & Mary's historic Wren Building (circa 1600s).

Patrick B. Dillon, Ph.D., P.E., will serve as **Project Engineer** on this project. Dr. Dillon has over eight years of research and professional work experience, particularly on projects experiencing structural issues. Dr. Dillon is an active member of The Masonry Society's 402/602 Building Code Requirements and Specifications for Masonry Structures committee and in the Seismic & Limit State Design, Design, and Form & Style subcommittees. He is the Chair of the Technical Committee and Member of the Organizing Committee for the upcoming 13th North American Masonry Conference scheduled to be held in Salt Lake City, Utah, in June 2019.

Rex A. Cyphers, P.E. | Principal-in-Charge



Mr. Cyphers, P.E., is a Principal and Chief Operating Officer with WDP & Associates Consulting Engineers, Inc., working primarily out of the Charlottesville, Virginia, office. He is responsible for overseeing the work of all WDP divisions, WDP's hiring process, staff development, and company operational

decisions. Mr. Cyphers joined WDP in 2003 and has 16 years of experience.

Mr. Cyphers specializes in the design and repair of existing plazas and structures, historic preservation, and nondestructive testing. He performs forensic field and laboratory investigations, façade and building envelope investigations, structural inspection/analysis and design, architectural retrofit and repair, roofing and waterproofing investigations, and development of design documents, and repair recommendations.

Mr. Cyphers regularly presents and co-authors for various technical publications.

Education

Master of Science, Civil Engineering, West Virginia University, 2003.

Graduate Certificate, Cultural Resource Management, West Virginia University, 2003.

Bachelor of Science, West Virginia University, Civil Engineering, 2002.

Professional Registration

Professional Engineer – VA, WV.

Professional Memberships/Committees

- ASTM Committee E06.24 Performance of Buildings-Preservation and Rehabilitation Technology
 - ASTM E3069 – 17 Standard Guide for Evaluation and Rehabilitation of Mass Masonry Walls for Changes to Thermal and Moisture Properties of the Wall
 - Task Chair, "New Guide for Evaluation and Rehabilitation of Mass Masonry Walls for Changes to the Thermal and Moisture Properties of the Wall"

Relevant Experience

West Virginia University, Summit Hall, Façade Investigation, Morgantown, WV. WDP was retained after a competitive bid process to provide a façade evaluation of a 10-story dormitory building. The comprehensive field investigation was performed from swing stages and included diagnostic water testing to identify sources of bulk water infiltration, exploratory openings to identify existing conditions and sources of air leakage between adjacent building components, and visual surveys of deteriorating conditions of the envelope. WDP developed recommendations to address all problems encountered during the investigation and will provide design and construction phase services once funding is available.

West Virginia Capitol Dome Moisture Intrusion, Charleston, WV. Led the investigation and subsequent design of repairs into the chronic water leakage of the 1930s-structure designed by architect Cass Gilbert (designer of the United States Supreme Court Building). WDP performed diagnostic water tests, exploratory openings, installation of sensors and instrumentation, and review of prior design documentation to determine the root cause of interior damage. Among other things, bulk water infiltration at intersections of building elements caused supplementary internal drainage elements to fail, which led to significant damage of interior finishes. WDP developed repair recommendations, construction documents, and provided bid assistance. Construction is in progress, with WDP providing construction administration services.

Newcomb Hall Terrace, University of Virginia Term Contract, Charlottesville, VA. Project Manager. WDP was retained to develop a new layout of a terrace space that was experiencing water infiltration to occupied spaces beneath and concerns regarding the structural stability. Developed construction documents for the removal and replacement of the existing waterproofing and pavers, which included a full structural analysis of the existing structure to ensure the repairs would function as designed.

Virginia State Capitol, Historic Portico and Terrace Investigation, Richmond, VA. Project Manager. WDP conducted a field investigation into the structure, which was designed by Thomas Jefferson and constructed over 200 years ago. WDP conducted a historic document review as well as a field investigation into the water infiltration through historic stucco as well as through the South Terrace to occupied spaces below. WDP developed full contract documents for the repair of plaza waterproofing and the repair of the original stucco clad columns.

1 – QUALIFICATIONS & EXPERIENCE

PROPOSED PROJECT TEAM STAFF RESUMES

St. Francis of Assisi Catholic Church, Historic Stone Cladding Replacement, Staunton, VA *Principal Structural Engineer.* Performed construction administration services for complete façade restoration of 100+ year old church. **Traditional historic masonry** and copper procedures and materials were combined with new technologies such as GFRP reinforcing, and complex strengthening and phasing systems to facilitate removal and replacement of over half of the wall section without disruption of church functions. Additional services included review and approval of submittals, RFIs, shop drawings, and contractor pay applications during construction.

New Rochelle City, Plaza Waterproofing and Structural Steel Evaluation & Repairs, New Rochelle, NY. *Sr. Structural Engineer.* New Roc City was constructed in the late 90s and provides multi-purpose occupancy, including a shopping center, movie theater, restaurants, and a fitness center. WDP conducted diagnostic water testing and a condition assessment of the corrosion deterioration of the plaza structural steel framing and performed a rigorous structural analysis and finite element model to evaluate the reserve capacity of the remaining steel. The repair design documents included various strengthening details, which had to accommodate existing space constraints and other obstructions created by the atypical, multi-level framing system. The design also included the complete removal of the plaza pavers and waterproofing system. Performed construction administration services during the steel repair work and the waterproofing, masonry and concrete work done as a previous phase of work at this location.

Repairs to Whisnand Terrace and Wilkinson Court Wall, University of Virginia Term Contracts for A/E Services, Charlottesville, VA. *Project Engineer.* WDP conducted a field investigation to determine the cause of water infiltration under a terrace and at integrations with building components. WDP developed Contract Documents and provided construction administration services for terrace and courtyard wall renovations and upgrades including full waterproofing, perimeter flashing replacement, and brick paver and veneer replacement.

Judge Advocate General (JAG) School, University of Virginia Term Contract, Charlottesville, VA. *Project Manager.* Conducted forensic investigation into the cause of the severe corrosion related damage to the exterior steel stud wall framing and masonry distress. Produced contract documents for structural repair and full façade replacement to include new wall and balcony waterproofing. Project was awarded an Outstanding Repair Award from the Baltimore-Washington, DC Chapter of ICRI in 2012.

West Virginia University, South Agricultural Sciences Building, Morgantown, WV. *Designer of Record.* *Project Manager.* WDP developed full contract documents to replace the existing metal panel façade of the building with brick, stone and precast elements. Numerous structural and moisture related problems were present in the building that had to be overcome in the design. The design allowed for the existing lab and research spaces to remain operation while the exterior of the building was removed and replaced.

Andrew W. Wagner, P.E. | Project Manager



Mr. Wagner joined WDP & Associates in 2007. He specializes in the evaluation and repair of building enclosures and facades, where he has over ten years of experience helping clients diagnose, remedy, and prevent problems. He has completed projects in multiple industry sectors

including Healthcare, Higher Education, K-12, and historic preservation. He is active in the development of new industry standards through ASTM and is the chair of the task group responsible for ASTM E241, "Standard Guide for Limiting Water-Induced Damage to Buildings." He is also a member of the Air Barrier Association of America (ABAA) Research Committee, a licensed air barrier auditor through ABAA, past Vice President of the Central Virginia Chapter of CSI, has written numerous papers relating to the building envelope, and routinely speaks at industry organizations.

Education

Virginia Polytechnic Institute and State University, Bachelor of Science in Civil Engineering, 2007

Professional Registration

Professional Engineer – Virginia

Professional Registration

Air Barrier Association of America Research Committee
ASTM Committee E06 on Performance of Buildings

- E06.41 – Air Leakage and Ventilation Performance
 - Task group chair for E06.41.04
- E06.51 - Performance of Windows, Doors, Skylights and Curtain Walls
- E06.55 – Performance of Building Enclosures

Relevant Experience

University of Virginia Term Contract, McLeod Hall Façade Repairs, Charlottesville, Virginia. *Project Manager:* Conducted forensic evaluation of spalling and cracking in exterior masonry façade located at mortar joints and shelf angle. Evaluation also included assessment of a through wall crack in a section of the roof parapet. Based on the findings of our investigation we outlined repair options to the University and developed repair documents to address the structural issues.

Virginia State Capitol, Historic Portico and Terrace Investigation, Richmond, VA. *Project Engineer:* WDP conducted a field investigation into the structure, which was designed by Thomas Jefferson and constructed over 200 years ago. WDP conducted a field investigation into the water infiltration through historic stucco as well as through the South Terrace and exterior stair to occupied spaces below. Developed repair details for waterproofing and stucco repairs.

University of Virginia Term Contract, Hereford College, Charlottesville, VA. *Project Manager:* Performed a condition assessment of a multi-building residence hall complex to evaluate reported water infiltration degradation of envelope systems, corrosion of steel connections, and failure of railing attachments. Developed repair documents to address discrete issues as well as maintenance related items and provided Construction Administration services during the execution of repairs.

University of Virginia Term Contract, Pavilion VII (Colonnade Club) Porch Repair, Charlottesville, VA. *Project Manager:* Developed structural repairs for a reinforced concrete terrace on a historical structure within the Monticello/University of Virginia UNESCO World Heritage Site. Severe moisture-related structural problems necessitated that the 1910s-era terrace be replaced. Structural distress of the historical masonry supporting the slab and existing masonry Doric columns bearing on the terrace slab was also addressed. Developed an innovative repair design to relieve load on the historical masonry. The design permitted the existing columns supported on the terrace to remain in place during construction. Designed a modified surface profile of the new slab to add ADA accessibility to the terrace. Provided construction administration services during construction.

Virginia Institute of Marine Science, Chesapeake Bay Hall, Gloucester, Virginia. *Project Manager:* As part of a HVAC replacement project, WDP performed an evaluation of reported air leakage at a mixed-use office and laboratory building on the Chesapeake Bay. WDP used data acquisition, industry standard test methods, and infrared thermography to diagnose the causes of air leakage. Using hygrothermal modeling, calibrated with the data collected in the field, we were able to determine the air leakage was allowing moisture to dissipate from the exterior walls, thus masking issues that would have emerged if the interior air barrier was continuous. Based on these findings we were able to develop comprehensive recommendations to address the occupant comfort issues while mitigating the potential for long term moisture related issues in the exterior walls.

Jodi M. Knorowski, P.E. | Project Engineer



Ms. Knorowski joined WDP in 2013 and has 5 years of experience providing professional design, building condition assessments, and construction administration services for post-occupancy failures of existing buildings related to the building envelope. She has performed diagnostic field investigations to determine the root cause of these

failures in order to develop repair recommendations. In this process, she has utilized Hygrothermal modeling techniques to analyze the long-term effects of heat and moisture movement through a wall or roof assembly. Jodi has also worked as a building envelope consultant on design teams and provided construction monitoring services for new construction projects, to include quality assurance testing and observations of the structural, material, and architectural elements of the building envelope.

Education

Master of Science, Civil Engineering, Old Dominion University, 2012

Bachelor of Science, Civil & Environmental Engineering, Old Dominion University, 2010

Professional Registration

Professional Engineer – VA

Certifications

WUFI-ORN 5.3/WUFI-Pro 5.3 and Weather Analyzer 1.0
 NFRC Certified Simulator

Professional Memberships/Committees

A.I.A. Women in Design, Charlottesville Chapter
 ASTM, C16 Committee, Voting Member
 ASTM, E06 Committee, Active Participant

Relevant Experience

West Virginia Capitol Dome Moisture Intrusion, Charleston, WV. *Project Engineer.* Oversaw the investigation and subsequent repair design into chronic water leakage of the 1930s-structure designed by architect Cass Gilbert. WDP performed diagnostic water tests, exploratory openings, installation of sensors and instrumentation, and review of prior design documentation to determine the root cause of interior damage. Among other things, bulk water infiltration at intersections of building elements caused supplementary internal drainage elements to freeze and fail, which led to

damage of interior finishes. WDP also identified structural failures within the wall structures beneath the inner dome and developed sequencing and repair details to remove and replace historic hollow clay tile components. WDP developed recommendations and construction documents to repair problematic conditions while maintaining the historic nature of this iconic building. WDP provided bid assistance and is providing construction administration services while construction is in progress.

West Virginia Public Service Commission Headquarters, Façade Repair & Replacement Design, Charleston, WV.

Project Engineer. Oversaw building envelope and structural conditions assessment and subsequent façade repair design services for WDP as joint venture member with a construction firm. The design involved complete removal of the building's exterior and replacement with new glazing, brick, air barrier, and thermal insulation to improve the performance of the walls and fenestration assemblies. The design also included temporary enclosures to protect interior finishes and building occupants and a phased demolition and construction plan to ensure minimal disruption as the building remained fully occupied for the duration of the project. During construction, a number of deficient conditions of the existing building were uncovered that brought design challenges to ensure compatibility between the new façade and the structural components of the building.

College of William & Mary, Wren Building Moisture Evaluation, Williamsburg, VA.

Project Engineer. Oversaw the evaluation of historic mass masonry building constructed between 1695 and 1700 exhibiting interior plaster failures. As part of the investigation, WDP deployed data logging instrumentation to determine air and vapor movement around problematic areas and utilized hygrothermal analysis incorporating collected data to calibrate models as a tool to determine the cause of damage. WDP also analyzed and correlated data from the HVAC control systems to evaluate the impact of the interior controls on the problematic conditions that were observed. WDP will provide recommendations for repairs at completion of investigation.

Repairs to Whisnand Terrace and Wilkinson Court Wall, University of Virginia Term Contracts for A/E Services, Charlottesville, VA. *Staff Engineer.* WDP conducted a field investigation to determine the cause of water infiltration under a terrace and at integrations with building components. WDP developed Contract Documents and provided construction administration services for terrace and courtyard wall renovations and upgrades including full waterproofing, perimeter flashing replacement, and brick paver and veneer replacement.

Patrick B. Dillon, Ph.D., P.E. | Project Engineer



With eight years of combined research and field work experience, Dr. Dillon conducts evaluations and assessments of structural and building envelope systems for WDP since joining the firm in 2015. He regularly performs diagnostic field investigations to determine the root cause of post-occupancy failures of existing buildings and develops repair recommendations to solve the problems. Dr. Dillon is also involved with a variety of other architectural and structural engineering disciplines, including development of specifications and drawings, peer review of design documents, and construction management and administration. Dr. Dillon has also authored, co-authored, or presented 20 articles and publications articles at industry conferences in the last five years.

Education

Doctor of Philosophy, Civil Engineering, Brigham Young University, 2015.

Bachelor of Science (With Honors), Civil Engineering, Brigham Young University, 2010.

Professional Registration

Professional Engineer – VA

Professional Memberships/Committees

- 13th North American Masonry Conference (2019), Chair of Technical Committee & Member of Organizing Committee
- American Institute of Steel Construction (AISC), Member
- The Masonry Society, Member
 - TMS 402/602, *Building Code Requirements and Specifications for Masonry Structures*, Main committee, Corresponding Member
 - TMS 402/602, *Seismic & Limit State Design* Subcommittee, Secretary & voting member
 - TMS 402/602, *Design* Subcommittee, Voting member
 - TMS 402/602, *Form & Style* Subcommittee, Corresponding member

Relevant Experience

University of Virginia Term Contract, Pavilion VII (Colonnade Club) Porch Repair, Charlottesville, VA. *Structural Engineer.* Developed structural repairs for a reinforced concrete terrace on a historical structure within the

Monticello/University of Virginia UNESCO World Heritage Site. Severe moisture-related structural problems necessitated that the 1910s-era terrace be replaced. Structural distress of the historical masonry supporting the terrace and existing masonry Doric columns bearing on the terrace slab brought design challenges to be considered. Developed an innovative design for a new terrace slab capable of supporting and transferring the terrace and column loads to grade to relieve load on the historical masonry. The design permitted the existing columns supported on the terrace to remain in place during construction. Designed a modified surface profile of the new slab to add ADA accessibility to the terrace. Provided construction administration services during construction.

West Virginia Capitol Dome Repair Project, Charleston, WV.

Structural Engineer. Designed structural repairs and retrofits for load-bearing architectural components inside the dome of the 1930s-structure designed by architect Cass Gilbert (designer of the United States Supreme Court Building). WDP performed diagnostic water tests, exploratory openings, installation of sensors and instrumentation, and review of prior design documentation to determine the root cause of interior damage. Among other things, bulk water infiltration at intersections of building elements caused supplementary internal drainage elements to freeze and fail, which led to significant damage of interior finishes. Provided repair recommendations, construction documents, and bid assistance. Construction is in progress, with WDP providing construction administration services.

West Virginia Public Service Commission Headquarters, Façade Repair & Replacement Design, Charleston, WV.

Structural Engineer. Developed structural repair design for a façade repair/replacement. The office building is a steel-framed structure with brick exterior that required maintaining building occupancy throughout the entirety of the project. WDP's design improved the thermal performance of the wall assembly and glazing. The design involved complete removal of the building's exterior, providing temporary enclosures to protect interior finishes and building occupants, and replacement with new brick, air barrier and thermal insulation on a phased demolition and construction plan to ensure minimal disruption to the building occupants. During construction, a number of deficient conditions of the existing building were uncovered that brought design challenges to ensure compatibility between the new façade and the structural components of the building.

St. Stephen Episcopal Church, Richmond, VA. *Structural Engineer.* Conducted a building assessment through the investigation of water leakage issues using diagnostic water testing methods.

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WDP's ability to serve the West Virginia Department of Natural Resources is due to our extensive experience on projects of similar size and scope, along with our ongoing experience on projects within the state itself. The following examples highlight a small sampling of our experience in determining the cause of moisture related issues and the condition of structural elements and systems and designing a repair program to correct and adequately address the deficiencies while balancing the constraints of a cost-conscious budget.

We have included detailed write-ups of recent projects which share similarities with the scope found within the DNR's expression of interest.

Newcomb Hall & Plaza Rehabilitation of Plaza over Occupied Space Charlottesville, VA

Owner

University of Virginia

WDP's Client

University of Virginia

Reference

Don Sundgren, P.E.
Associate Vice President and Chief
Facilities Officer
(434) 982-5834
Des5j@virginia.edu

WDP's Role

Construction Documents
Construction Administration

Construction Cost

\$611,000

Project Details

- Water Infiltration
- Terrace / Plaza Over Occupied Space
- Architectural / Structural Design
- Construction Administration



Scope of Project and Services Provided:

Since its original construction in the 1950s, the building has been expanded upon and renovated multiple times and currently contains a movie theater, several dining facilities, a grand ballroom, and the student newspaper. The terrace originally featured sheet applied waterproofing with a large planted area which spilled out onto the adjacent plaza and occupied roughly 50% of the terrace. The planted space was flanked with narrow sidewalks allowing limited access, creating pedestrian flow issues. The other portions of the terrace featured unstable exposed aggregate concrete pedestal set pavers. Water infiltration into the occupied spaces below the terrace required the replacement of the failed waterproofing system while changes to University programming created the need for a large open outdoor gathering space. The building's true divided light wood windows were deteriorated.

WDP was retained to work directly with the office of the Architect of the University in order to develop a new layout of the space which now features both sand-set brick and Ipe/Brazilian hardwood pavers with two small planters on either side of the wide monumental stair cases which now opens the terrace up to the adjacent plaza. WDP was contracted to develop construction documents for the removal and replacement of the existing waterproofing and finishes. Our services included several working sessions with the University to provide the exact architectural finish, full structural analysis of the existing concrete slab and design of repairs to cracked locations, structural design of both the new planters and handrails, and the development of all Architectural details required for proper execution of the new waterproofing and paving systems. The new waterproofing system was primarily fully reinforced hot applied rubberized asphalt with cold fluid waterproofing within the new planters. Our services also included construction administration for the

project.

Virginia State Capitol Leakage Investigation Testing & Investigation of Portico and Terrace Richmond, VA

Owner

University of Virginia

WDP's Client

Virginia Department of General Services

Reference

Trev Crider

Project Manager

DEBinfo@dgs.virginia.gov

WDP's Role

- Building Envelope Testing & Investigation
- Contract Document Development
- Bid Assistance & Construction Administration

Construction Cost

\$800,000

Project Details

- Historic Structure
- Water Infiltration
- Terrace / Plaza Over Occupied Space
- Structural / Building Envelope Investigation
- Architectural / Structural Design
- Construction Administration



Scope of Project and Services Provided:

Designed by Thomas Jefferson and built in 1788, the Virginia State Capitol is a National Historic Landmark and accommodates the Virginia General Assembly, the oldest legislative body in the Western Hemisphere. WDP was retained to investigate water leakage and excessive cracking both within the historic Capitol building and in an underground expansion completed in 2007.

The underground addition to the Virginia Capitol building experienced leaks through the south terrace skylight and failed waterproofing on the plaza. WDP was retained to evaluate the water infiltration, conduct a condition survey, and perform diagnostic testing to determine the underlying chronic structural issues and the cause of acute failures of previously attempted exterior surface repairs. Based upon the findings, WDP also provided repair alternatives consisting of temporary repairs, repair-in-place option to address the waterproofing issues only, structural repairs to the skylight, and an option for the complete rebuild of the skylight.

WDP developed Contract Documents to repair the waterproofing at the integration of the stairs and the lower terrace, as well as provide additional drainage provisions to eliminate standing water on the terrace. Furthermore, repairs were undertaken to restore the cracked columns at the top of the South Portico. The repair scope was carefully developed to maintain the historic nature of the building when executing the repairs.

New Roc City Mall

Moisture Infiltration Investigation & Structural Repair

New Rochelle, New York

Owner

New Roc Associates, LP

WDP's Client

EPR Properties
 909 Walnut Street, Ste. 200
 Kansas City, MO 64106

Reference

Rich Kraus
 Acumen Development
 303-799-8300
richkraus@acumendev.com



WDP's Role

Enclosure Investigation
 Structural Investigation
 Design Engineer of Record
 Construction Observation

Construction Cost

\$1,640,000

Project Details

- Water Infiltration
- Terrace / Plaza Over Occupied Space
- Waterproofing, Hardscape, and Masonry Design
- Structural / Building Envelope Investigation
- Architectural / Structural Design
- Construction Administration

Scope of Project and Services Provided:

WDP was engaged after facility maintenance at the New Roc City Mall discovered a systemic issue with severe corrosion and section loss throughout the steel framing network that supports over 7,500 square feet of public sidewalk and plaza above. The steel framing was coated with a mineral wool fireproofing that obscured the majority of the corrosion that had taking place and allowed the degradation of the steel to continue largely unnoticed until the damage was significant enough that large sections of fireproofing were falling from the framing where layers of surface corrosion were debonding from the steel below.

WDP designed and executed a thorough diagnostic leakage investigation to understand the specific sources and paths of water infiltration from the plaza above. Ultimately, WDP was able to identify that the waterproofing membrane sandwiched between the structural concrete slab and topping slab was inadequate and discontinuous, particularly at the knee walls that bridged the various plaza levels. The existing plaza had to be demolished to replace the old waterproofing, and WDP detailed the new waterproofing and hardscaping, which updated the look of the plaza and improved lighting in the area (Figure 1).

After the sources of infiltration was addressed such that the risk of accelerated future corrosion was effectively mitigated, WDP went about performing a comprehensive investigation and documentation of the specific level of degradation sustained throughout the framing network. WDP used calipers and ultrasonic thickness gages from an elevated lift platform to quantify the exact steel section loss at various locations along the span of several

dozen columns and over 100 girders of various lengths and sizes. A rigorous analysis of each member's remaining shear and flexural capacity was



Plaza hardscape demolition and new continuous, fluid-applied waterproofing

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compared against the service loads determined through use of a finite element model. Some girders and structural members experienced severe section loss and needed to be outright replaced in kind (Figure 2). WDP's analysis and strengthening design included both composite and non-composite beams, built-up sections, as well as bolted and welded connections (Figure 3). Many girders and areas of decking experienced section loss and needed to be strengthened to achieve adequate design capacity for anticipated service loads (Figure 4).



Plaza staircase structural supporting members with holes through the web before repair [left] and after repair [right]

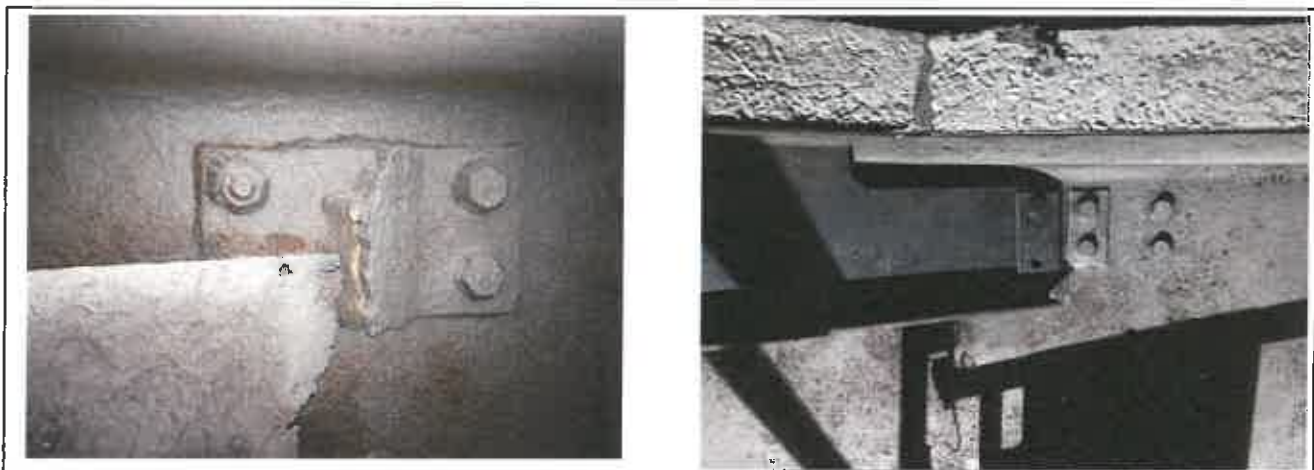


Figure 3 – Secondary framing connection with 100% section loss before repair [left] and replacement connection [right]

Through both phases of the work, WDP developed repair construction drawings and specifications and assisted with project procurement, as well as provided construction administration services and quality control engineering oversight during construction of both the plaza waterproofing and steel repair, to ensure that the work was executed generally in conformance with the project drawings and specifications, as well as in general compliance with the applicable New York State Building Code.

St. Francis of Assisi Catholic Church

Structural Investigation & Repair

Staunton, VA

Owner

St. Francis of Assisi Catholic Church
Catholic Diocese of Richmond

WDP's Client

St. Francis of Assisi Catholic Church
Catholic Diocese of Richmond
118 North New Street
Staunton, VA 22815

Reference

Father Joseph Wamala
540-886-2262

WDP's Role

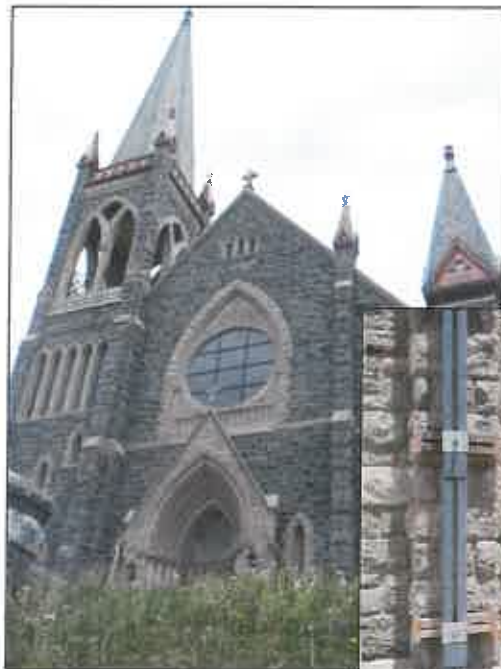
Enclosure Investigation
Structural Investigation
Design Engineer of Record
Construction Administration

Construction Cost

\$3,075,000

Project Details

- Historic Structure
- Structural & Building Envelope Deficiencies
- Structural / Building Envelope Investigation
- Architectural / Structural Design
- Construction Administration



Scope of Project and Services Provided:

Constructed in 1895 and designed in the English Gothic style, the original exterior mass masonry walls consisted of green serpentine stone laid in a random ashlar pattern and were backed by three wythes of brick masonry. In the late 19th century the green serpentine stone was prized for its distinctive green color. However, around the same time, it was becoming increasingly evident that the stone did not lend itself as a suitable building material. The green serpentine stone is "soft", as far as a rock is considered, and susceptible to deterioration. While the green serpentine stone was used for the majority of the building's north, south, and west elevations, there were several other stone types found in the building, and Native Shenandoah Valley limestone was used as the foundation stones. Indiana Limestone was used to make the window surrounds, elaborate entryway, and rose window surrounds as well as water table and trim courses around the building. In the 1960s, bluestone was installed at the uppermost portion of the bell tower to replace the damaged green serpentine stone. There was documentation of various masonry repairs implemented over the last few decades, including the repointing of the stone masonry and the application of a coating to the greenstone.

Over recent years, the stone continued to deteriorate. Metal catch baskets were installed above the north elevation entrance to protect Parishioners from falling rock and debris prior to the commencement of the façade repairs. WDP designed a façade repair and replacement program as well as an exterior shoring system and demolition / reconstruction phasing plan that permitted unrestricted use of the church interior during execution of the project. Hygrothermal analyses were conducted to permit selection of materials to minimize any change in moisture vapor movement through the wall system to protect the integrity of the original horse hair plaster used in the interior wall finish.

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St. Francis of Assisi Parish has an ever revolving weekly, monthly, and yearly calendar of events. Additionally, funeral services, weddings, and other events are held regularly and spontaneously. The main sanctuary and the other facilities on the grounds had to remain completely operational throughout the execution of the Work. WDP's development of an exterior shoring system and demolition/reconstruction phasing plan permitted unrestricted use of the church interior during execution of the facade replacement.

The restoration was substantially completed in May 2016, and the design and repairs were conducted in accordance with the requirements for obtaining Virginia's Department of Historic Resources Rehabilitation Tax Credits. This project won the 2016 MIA+BSI: The Natural Stone Institute Pinnacle Award of Merit in Renovation/Restoration.

WVU South Agricultural Sciences Building Exterior Cladding Replacement Morgantown, WV

Owner

West Virginia University

WDP's Client

West Virginia University

Reference

John Thompson, P.E.
Associate Director, Design &
Construction
(304) 293-3625
John.Thompson@mail.wvu.edu

WDP's Role

Enclosure Investigation
Structural Investigation
Design Engineer of Record
Construction Administration

Construction Cost

\$1,500,000

Project Details

- Building Envelope Deficiencies
- Building Envelope Investigation
- Unforeseen Structural Deficiencies Encountered
- Architectural / Structural Design
- Construction Administration



Scope of Project and Services Provided:

The academic building consists of a 250-seat lecture hall, 8 research micro-biology/plant pathology labs, 2 teaching labs, as well as numerous faculty support areas, classrooms, and offices. The newly constructed building was experiencing water infiltration at below grade locations as well as through the existing insulated metal panel system that resulted in damage to the interior finishes and structural members as well as interior biological growth.

WDP was retained to assess the exterior building envelope and conduct a feasibility study that examined the implications of replacing the existing metal panel cladding with brick veneer. The assessment included evaluation of potential thermal performance improvements to meet current energy code requirements, as well as performing hygrothermal analysis to verify the proposed wall assembly would provide long-term performance and not cause moisture related issues similar to what the building was currently experiencing. Furthermore, WDP performed a structural analysis of the existing stud framing to support the proposed brick veneer cladding. WDP designed the exterior cladding replacement to include new sheathing, air and water barrier, insulation, and fenestration and developed Contract Documents to include Drawings and Specifications. WDP provided construction administration services during the project, which uncovered a significant number of structural deficiencies with the existing stud framing that required many unique repair details to be developed and executed.

Public Service Commission of West Virginia Headquarters Building Envelope Investigation & Façade Replacement Charleston, West Virginia

Owner

Public Service Commission of West Virginia

WDP's Client

Public Service Commission of West Virginia
201 Brooks Street
Charleston, West Virginia 25301

Reference

Cheryl Ranson
Director of Administration
(304) 340-0356
Cranson@psc.state.wv.us

WDP's Role

Engineer of Record

Construction Cost

\$4,250,000

Project Details

- Building Envelope / Structural Deficiencies
- Building Envelope Investigation
- Architectural / Structural Design
- Construction Administration



Scope of Project and Services Provided:

Originally constructed in 1984, the headquarters for the Public Service Commission of West Virginia contains a traditional brick veneer with limestone window surrounds that provides office space for various public divisions, such as Utilities and Administration. In 2015, the Public Service Commission issued a request for proposals for a Design-Build renovation of the building's façade, indicating the desire to replace the brick exterior and upgrade fenestration assemblies. The Design-Build team of Pullman, LLC and WDP proposed replacing the existing façade with new brick due to the known longevity of brick masonry, its aesthetic compatibility with neighboring buildings, and the overall value of using brick. Additionally, the thermal performance of the wall assembly could be improved with the addition of exterior cavity insulation and a continuous air and water barrier. Furthermore, the new design called for the addition of improved glazing, to include self-tinting glass in conference room spaces, eye-catching metal work logos of the Public Service Commission over the entrances, and incorporation of a monumental limestone archway supported by existing steel columns where failing brick cladding had previously been removed. After competitive bidding, the Pullman-WDP design was selected by the Commission.



WDP conducted an initial field investigation to determine the cause of the excessive water leakage and condition of the steel and masonry structure prior to developing the design documents for the project in order to develop details based on existing conditions. The design involved a complete removal of the building's exterior, providing temporary enclosures to protect interior finishes and building occupants, and replacement with new brick, an air barrier, and thermal insulation on a phased demolition and construction plan to ensure minimal disruption to the building occupants. With the cladding of the building removed, the repairs were also able to address structural concerns such as adding reinforcement and anchorage to existing CMU walls and mitigating corrosion of structural steel elements due to moisture exposure. WDP also incorporated a custom structural frame assembly to expand the existing columns and incorporate the new limestone clad archway at the front of the building. WDP developed specific details to accommodate the unique existing conditions and ensure that the project was not delayed.

West Virginia Capitol Dome

Building Envelope and Structural Investigation and Repairs

Charleston, West Virginia

Owner

West Virginia General Services Division

WDP's Client

West Virginia General Services Division

Reference

Kari Dean
Project Manager
(304) 957-7133
Kari.J.Dean@wv.gov

WDP's Role

Engineer of Record

Construction Cost

\$10.9 million

Project Details

- Building Envelope / Structural Deficiencies
- Building Envelope / Structural Investigation
- Architectural / Structural Design
- Construction Administration



Scope of Project and Services Provided:

Originally constructed in 1932 to replace the prior building which burned in 1921, the West Virginia State Capitol Building is a steel framed structure with brick masonry infill and limestone cladding capped with a 292-foot tall dome gilded with gold leafing. Since the time of its completion, the Dome has been plagued with numerous water infiltration issues, which have resulted in significant damage to interior finishes that are difficult to access. In 2015, the State of West Virginia General Services Division issued an RFP seeking professional services to identify and investigate the source of moisture intrusion leading to damage within the upper rotunda of the Dome and to recommend repairs, and WDP was selected after competitive interviews.

Due to the nature of the building, all personnel who worked on the investigation were required to go through a background check and receive badges that allowed access to areas of the Capitol that were not open to the public. WDP conducted a systematic three-week long investigation of the Dome and Capitol building, utilizing visual observations, exploratory openings, and diagnostic water testing to ascertain the construction of the building envelope and to identify the path of infiltrating water. Due to the location of the damaged interior finishes requiring investigation, unique access was required for the investigation. A swing stage system was installed through the interior of the building, as pictured to the left, and used to make observations to damaged interior finishes near the top of the Dome.

The main source of the water infiltration was found to be a result of improper flashing installation and deteriorated limestone mortar joints, along with failures in the internal water management systems, that allowed bulk water to penetrate through a mass masonry assembly to the interior. WDP developed a comprehensive report summarizing the findings and recommended a tiered approach to address the issues that were found. This allowed the General Services Division to evaluate increasingly more comprehensive repairs

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and their associated costs to determine the scope of work that would provide the most value to the project. Generally, the repairs will include removal of limestone cladding elements to install through wall flashing and waterproofing systems, replacement of internal plumbing and drainage elements, and repairs to damaged interior finishes.

WDP will continue to work closely with the General Services Division through an iterative process to develop the scope of work for the project, develop Construction Documents, to include drawings and specifications, and provide Construction Administrative services during the execution of the repairs. It is anticipated that repairs will be undertaken during the Spring of 2017 and the building will remain fully occupied during the execution of the work.

Proposed Approach & Methodology

The heart of our firm lies in the diagnosis of building problems and developing unique repair solutions sympathetic to our client's needs and budgetary limitations. WDP was founded on the award-winning expertise of the firm's Principals and Associates in the field of forensic engineering. Building upon advanced engineering degrees and years of experience, WDP's staff continues to conduct research and analysis in the fields of masonry, concrete, structural steel, and building envelopes. This knowledge is enhanced through our involvement in national committees for the development of building codes, industry standard test methods, and guidelines that will be utilized for the successful evaluation of the conditions at Hawks Nest, Pipestem Resort, and Twin Falls Resort State Parks.

Based on our understanding of the current scope of work, we anticipate all of the work will be done in-house to evaluate the existing structure and design repairs to address the leakage and repair of structural members as necessary. However, we also have several mechanical engineering firms that we have teamed with in the past, that could be engaged to provide their expertise as necessary. WDP's organized project approach to fulfilling the needs of this RFP are outlined in the following steps:



Project Identification - Our project approach is client centric. We recognize that the correct solution for a given project is not purely technical. Rather cost, schedule, occupancy, and many other considerations must be evaluated to ensure a successful project. As such, during the initial phases of the project, we will engage with the West Virginia Department of Natural Resources and pertinent staff at each of the State Parks, to be better understand the project specific goals and needs. From past experience, we know that the project specific goals may change as the project progresses; therefore, our Project Manager strives to provide updates at key project milestones and engage the various stakeholders for feedback. Our staff holds paramount the importance of delivering technically sound reports, recommendations, and repair documents that effectively communicate information in a professional manner. We have a long history working with governmental agencies with large portfolios and have strong long-term relationships with state universities, public facilities groups, and large health care organizations, which we feel speak to the successful implementation of WDP's approach. In short, we listen to the client, provide what they ask for, and strive to make the entire process as seamless as possible.

Document Review – Our investigations are generally conducted in accordance with ASTM E2128, “Standard Guide for Evaluating Water Leakage of Building Walls.” As such, our evaluation of each of the state parks, starts with a review of all drawings and documents related to the construction and maintenance history of the buildings so that we can understand the components and systems. This information will be used to help inform the location and duration of field testing. Additionally, it has been our experience that a successful field investigation must be somewhat fluid and adapt to information gleaned as the investigation progresses. Understanding the original construction and maintenance history through a review of the documents, provides the context necessary to evaluate and understand the results of field testing.

Site Investigation – Concurrently or shortly after the document review, WDP's staff will perform a field investigation to evaluate the reported conditions at each state park. Prior to our field investigation, we will provide a written outline of our anticipated field evaluation and discuss with the Division of Natural Resources the coordination of the investigation to help limit impacts to scheduled operations. Our staff often perform field evaluations on occupied buildings, and are experienced with testing in conditions in a manner that limits disruptions, and holds paramount occupant safety. The investigation scope listed in this section is based on the information provided to date and our understanding of the conditions at each park may change based on information gathered from the further discussions with the Division of Natural Resources. At the onset of our investigation, a member of our team will be devoted to interviewing building

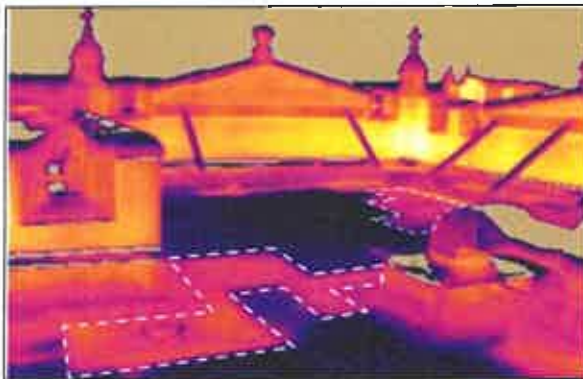
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staff to gain a better understanding of past water leakage and moisture related issues. The goal of these conversations is to verify whether additional conditions should be evaluated based on the observations of building occupants and help gain a better understanding of reported conditions.

Simultaneously, we will begin our visual and tactile survey of the conditions. Based on the descriptions provided to date, it is our understanding that many of the issues are resulting from moisture exposure. As such, the repair must address both the deterioration resulting from the leakage and the source of the water infiltration itself. Diagnostic water testing will be used to systematically evaluate the exterior conditions in order to understand the conditions contributing to water leakage. Our staff not only is experienced conducting testing in accordance with industry standards, we serve on the committees which develop these standards, because we have found that having a detailed understanding of the intent of the various testing standards allows us to better understand the appropriate application in the field.



Diagnostic Field Testing



Infrared Thermography Used to Identify Water Leakage

We also routinely deploy non-destructive testing (NDT) methods to evaluate and document existing conditions. WDP has the unique capabilities of performing highly specialized field sampling, testing, and structural analysis, should the need arise. WDP's team is well experienced in performing nondestructive testing of structures, including Infrared Thermography, Pachometer survey, Surface Penetrating Radar (SPR), Impact-Echo (IE), and Ultrasonic Pulse Velocity (UPV). These highly specialized test methods, all performed by WDP personnel, can be invaluable in identifying existing conditions, developing the proper diagnosis, and subsequently, the most effective repair methods for a given structure. Particularly, in the evaluation of damage due to masonry expansion, these tools are often used to identify wall conditions and locations of reinforcement or supports in brick masonry walls so that we can better understand the behavior of the condition.

We recognize that the RFP referenced possible mechanical repairs, and WDP has established relationships with several reputable mechanical engineering firms in the region who we can engage as necessary to aid in the evaluation of mechanical issues. The best teaming partner will be selected based on discussions with the Division of Natural Resources and a more thorough understanding of the actual issues.

Lastly, throughout the field investigation stage, we will work to keep the designated representatives for the Division of Natural Resources abreast of our progress, and any modifications to our investigation that might impact continued occupancy of the State Parks. Additionally, based on the description of the issues provided to date, it is likely that exploratory openings may be a necessary component of the investigation in order to properly detail repairs. If undertaken, these openings will be used to better understand leakage paths through exterior plaza or enclosure components; assess the condition of existing materials such that recommendations for material replacement, refurbishment and repair can be developed; and the as-built conditions can be documented to help produce accurate repair documents that help limit unforeseen conditions and allow for more accurate construction pricing.



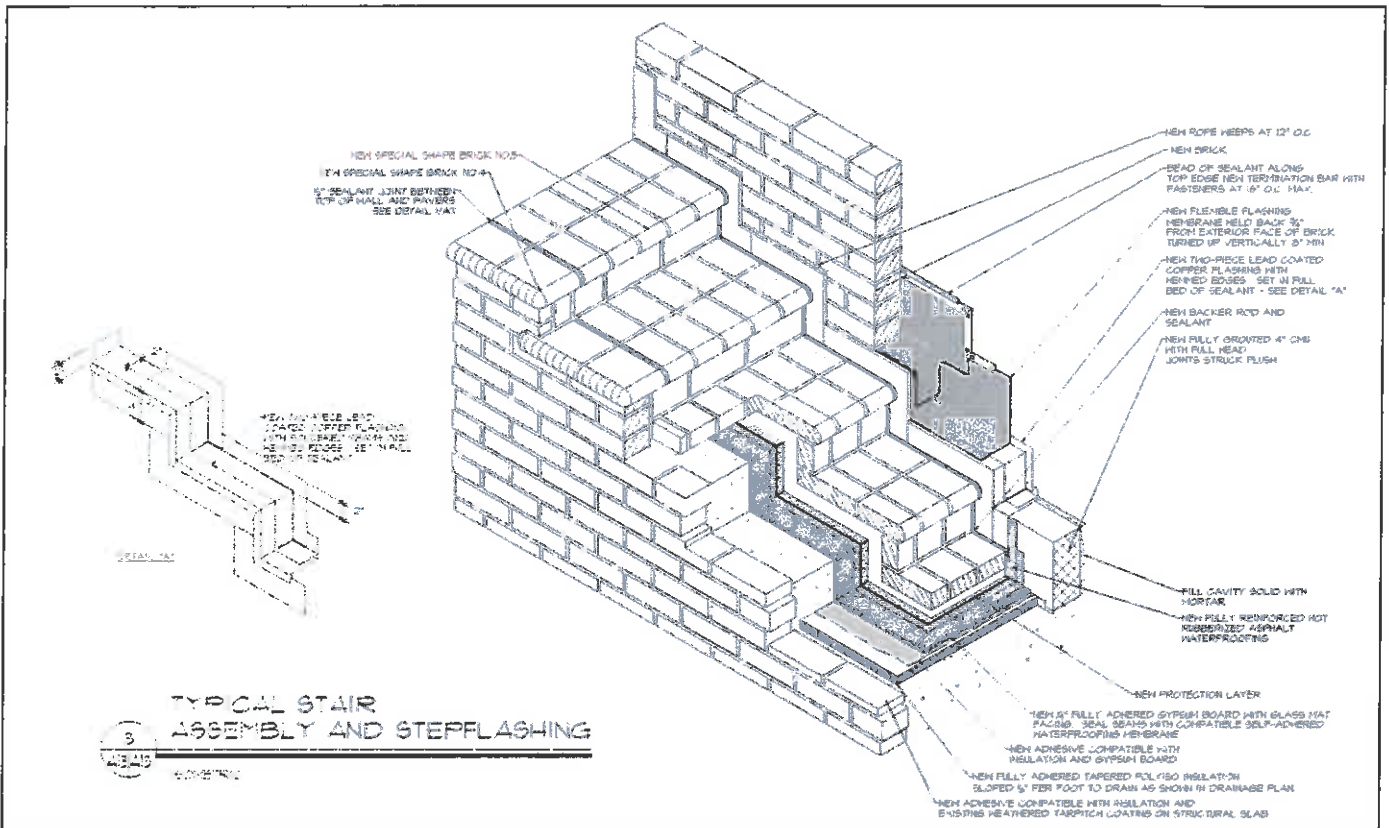
Surface Penetration Radar Scan on Concrete Masonry

Analysis and Report - At the conclusion of our investigation, WDP will compile our findings into a summary report, documenting our observations and recommendations in a manner to facilitate the transition from the investigative phase to the design and implementation of repairs. Where possible, we will present scaled repair options so that the Division of Natural Resources can make an informed decision about the appropriate scope of repairs for the project. Based on our experience with these types of repairs, we

will often include budgetary cost estimates using recent repair pricing from similar projects to help aid in the evaluation of repair solutions. After completing the report, we will discuss our findings and recommendations during a meeting with the relevant stakeholders to help establish the most appropriate scope of repairs for each condition.

Development of Repair Documents – We routinely transition from the evaluation of problems into the production of repair and restoration design documents, and we are experienced in the development of design documents that phase or sequence the work to accommodate existing conditions or occupancy requirements to the greatest degree possible. We also have extensive experience with historic preservation to include the necessary process and techniques to restore historic or key elements that are vital to the architectural fabric of the existing conditions.

As the design progresses, we recognize the importance of coordinating our design and receiving feedback from the necessary stakeholders. We often provide schematic or preliminary submissions, to allow opportunities for comments that can be incorporated as the design develops. Internally, we have project team meetings on a weekly basis to coordinate efforts and ensure the design delivery schedule is maintained so that desired construction start dates are achieved. We also encourage bi-weekly or monthly meetings with the Division of Natural Resources to establish a routine method for engaging comments and to provide status updates.



Example of Isometric Repair Details Developed to Convey Critical Repair Sequence and Layers for Flashing and Waterproofing Installation

Our final Contract Documents, which will include construction drawings and specifications, will be sealed by an Engineer licensed in the State of West Virginia. We strive to develop construction documents focused on attention to detail, durability, and practical constructability. Construction documents are often presented in isometric form or in sequential construction to assist contractors with proper sequencing. WDP also places special emphasis on providing clear delineation of work items within the bid document to minimize miscommunication during the bid process.

Construction Administration Services – WDP will provide the range of construction administration services needed for successful implementation of the repairs. These services will include pre-bid meetings, pre-bid question clarifications, bid review, record drawing production, pre-construction meetings, submittal and shop drawing reviews, on-site progress meetings and site visits, addressing RFIs, punch list generation, reviewing change orders and pay applications, and the development of field reports and job bulletins as

needed to address unforeseen conditions. We recognize that our involvement during the implementation of the design is as critical as the design documents themselves, particularly for existing buildings that can encounter unforeseen conditions. Consequently, we strive to provide an engaged and collaborative presence during the construction phase to help resolve questions in a timely and cost effective manner.

Quality Assurance - Delivering quality work is a hallmark of our firm and one of our core values. A shadow team comprised of engineers with an appropriate level of expertise and familiarity with the project, led by one of our senior staff, will routinely review project deliverables to verify technical content. This team is comprised of staff with relevant technical experience, separate from our Project Team, intended to provide a fresh set of eyes to evaluate recommendations, details, and direction at critical points in project. The shadow team does not duplicate efforts, but is intended to provide a group of technical experts that are assigned to the project to provide consistency to our quality assurance process. We find that this is a cost-effective method of improving technical accuracy while incorporating the institutional knowledge of our firm.

West Virginia Department of Administration, General Services Division
Charleston, West Virginia

Projects:

Building 13 Parking Garage, Consulting Services
West Virginia Capitol Dome, Moisture Intrusion Investigation & Repair

Contacts:

Greg Melton, Director, WV General Services Division – 304.558.1808, Gregory.L.Melton@wv.gov
Kari J. Dean, Construction Project Manager, WV General Services Division – 304.957.7133, Kari.J.Dean@wv.gov

West Virginia University
Morgantown, West Virginia

Projects:

College of Physical Activity and Sport Sciences Building, Water Infiltration Investigation
Summit Hall, Building Envelope Investigation & Repair Recommendations
Engineering Science Building, Building Envelope / Structural Investigation & Repair Recommendations
Art Museum, Building Envelope Investigation
South Agricultural Sciences Building, Façade and Structural Repairs
...and many more.

Contact:

John C. Thompson, P.E., Associate Director, Design and Construction – 304.293.3625, John.Thompson@mail.wvu.edu

University of Virginia
Charlottesville, Virginia

Projects:

John Paul Jones Arena, Comprehensive Investigation and Repair
Gilmer / Chemistry Building, Façade and Structural Investigation and Repair
Judge Advocate General School, Façade Investigation, Structural Design Repairs
Campbell Hall, Partial Façade Replacement
Scott Stadium, Joint Replacement
UVA Chapel, Bell Tower Restoration
...and many more.

Contact:

Donald Sundgren, Associate Vice President & Chief Facilities Officer – 434.982.5834, DES5J@virginia.edu

The Certification of our response, the Addendum Acknowledgment Form, and the Purchasing Affidavit can be found on the following pages.

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

Rex A. Cyphers, P.E., Principal

(Name, Title)

Rex A. Cyphers, P.E., Principal

(Printed Name and Title)

335 Greenbrier Drive, Suite 205, Charlottesville, VA 22901

(Address)

434-245-6117

(Phone Number) / (Fax Number)

rcyphers@wdpa.com

(email address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

WDP & Associates Consulting Engineers, Inc.

(Company)



(Authorized Signature) (Representative Name, Title)

Rex A. Cyphers, P.E.

(Printed Name and Title of Authorized Representative)

August 1, 2018

(Date)

434-245-6117

(Phone Number) (Fax Number)

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.:

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

- | | |
|--|--|
| <input checked="" type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6 |
| <input type="checkbox"/> Addendum No. 2 | <input type="checkbox"/> Addendum No. 7 |
| <input type="checkbox"/> Addendum No. 3 | <input type="checkbox"/> Addendum No. 8 |
| <input type="checkbox"/> Addendum No. 4 | <input type="checkbox"/> Addendum No. 9 |
| <input type="checkbox"/> Addendum No. 5 | <input type="checkbox"/> Addendum No. 10 |

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

WDP & Associates Consulting Engineers, Inc.

Company


Authorized Signature

August 1, 2018

Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.

STATE OF WEST VIRGINIA

Purchasing Division

PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL CONTRACTS: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: WDP & Associates Consulting Engineers, Inc.

Authorized Signature:  Date: _____

State of Virginia

County of Albemarle, to-wit:

Taken, subscribed, and sworn to before me this 1st day of August, 2018.

My Commission expires August 31, 2019.

AFFIX SEAL HERE

NOTARY PUBLIC _____