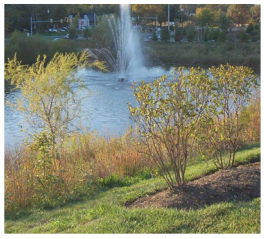
LANGAN

STATEMENT OF QUALIFICATIONS

SUSTAINABILITY



Technical Excellence | Practical Experience | Client Responsiveness



SUSTAINABLE DESIGN

Langan professionals design solutions that maintain the inherent connections between structures and their natural surroundings. The result - sustainable communities for future generations to live, work and play.

HEALTH & SAFETY

Langan is committed to providing a healthy and safe working environment. Langan's goal is to be SAFE (Stay Accident Free Everyday).


CORPORATE SUMMARY

INTEGRATED SOLUTIONS. MEASURABLE VALUE.

Langan provides an integrated mix of engineering and environmental consulting services in support of land development projects, corporate real estate portfolios, and the energy industry. Our clients include developers, property owners, public agencies, corporations, institutions, and energy companies around the world.

Founded in 1970, Langan employs over 1,200 professionals in its Parsippany, NJ headquarters and among regional offices in:

- New York City, NY
- White Plains, NY
- New Haven, CT
- Boston, MA
- Lawrenceville, NJ
- Philadelphia, PA
- Bethlehem, PA
- Doylestown, PA
- Pittsburgh, PA
- Cleveland, OH
- Arlington, VA
- Denver, CO
- Houston, TX
- San Francisco, CA
- Oakland, CA
- Sacramento, CA
- San Jose, CA
- Los Angeles, CA
- Santa Barbara, CA
- Irvine, CA
- Seattle, WA
- Phoenix, AZ
- Miami, FL
- Fort Lauderdale, FL
- Tampa, FL
- West Palm Beach, FL
- Orlando, FL

Langan International, the firm's wholly owned subsidiary headquartered in New York City, provides all firm services for projects in the Middle East, Europe, Latin America, and the Caribbean. Langan International regional locations are in:

- Athens
- Calgary
- Dubai
- London
- Panama

Langan's broad range of services includes the following:

- Geotechnical Engineering
- Foundation Design
- Site/Civil Engineering
- Environmental Engineering
- Earthquake/Seismic
- Surveying
- Sustainability Services
- 3D Laser Scanning
- Building Information Modeling (BIM)
- Natural Resources Assessments & Permitting
- Landscape Architecture + Planning
- Transportation/Traffic Engineering
- GIS/Data Management Services
- Asbestos, LBP, Indoor Air Quality/Mold Consulting
- EHS Management and Compliance
- Waterfront Design
- Flood Protection
- Demolition Engineering

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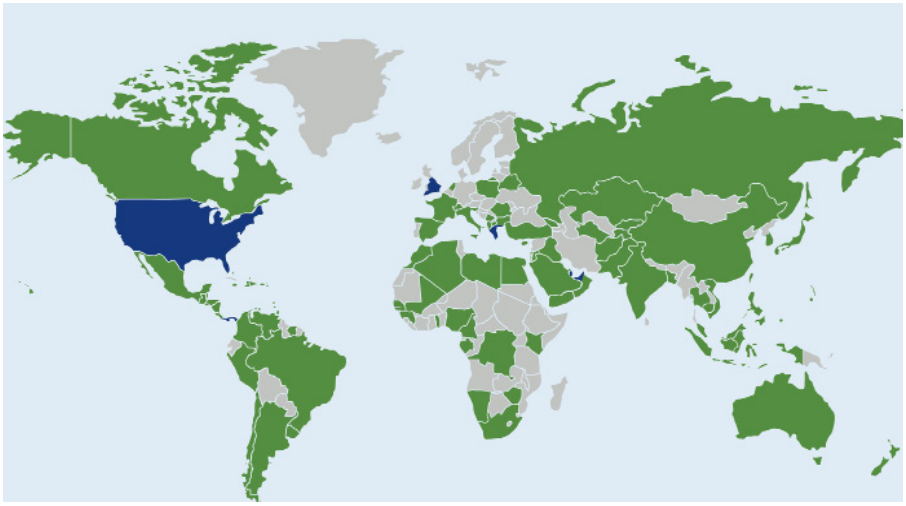


Green denotes countries where Langan has worked; blue denotes countries where Langan has offices.

SUSTAINABLE ENGINEERING

TURNING VISION INTO REALITY

Langan is a leader in providing sustainable engineering services on urban infill, brownfield, and landfill development projects. These projects help clients and communities reuse impacted lands. The sustainability benefits to communities are many – reducing traffic, lowering reliance on cars, preserving undeveloped open space, reducing pollution and carbon emissions, and promoting health and quality of life.

With over 100 Leadership in Energy and Environmental Design Accredited Professionals (LEED APs and Green Associates) and ENVISION Sustainability Professionals on staff, sustainable design weaves through all Langan services. Our expertise allows us to make significant contributions in developing sustainable sites. Langan has been an instrumental player on hundreds of LEED and sustainable design projects.

Langan Sustainable Engineering Services:

- LEED Site Feasibility Analysis
- Air Quality Assessments
- Transit-Oriented Development
- Pedestrian/Bike Infrastructure
- Low-Impact Stormwater Design and Master Planning
- Brownfield Redevelopment
- Green Roof Design
- High Efficiency Site Lighting
- Wildlife And Habitat Evaluations
- Wetland Delineation, Design, and Mitigation
- Geothermal Feasibility Studies and System Design Support
- Landfill Post-Closure Redevelopment
- Greenhouse Gas Inventory and Reduction
- Green and Sustainable Remediation
- Climate Change Resiliency
- Corporate Social Responsibility and Sustainability Reporting

PRACTICING WHAT WE PREACH

INTERNAL SUSTAINABILITY PRACTICES

At Langan, we believe that individuals and organizations will thrive in a future built on the principles of sustainability. We are committed to helping build that future through our technical expertise in sustainable matters, as well as our internal operations and corporate environmental stewardship. To support Langan's corporate sustainability vision, we set measurable goals that correspond with our company's core values and the three pillars of sustainability: financial, environmental, and social. We have set baselines for these goals and are measuring progress annually to evaluate our progress, adjust our goals and raise the bar. **In August 2018, Langan reached a milestone in our sustainability efforts: we now operate as a carbon-neutral business.**

COMMITMENT TO OUR CLIENTS' SUCCESS

- Expanded sustainability service offerings to 20 practice areas
- Established a Langan "Sustainability Project of the Year" Award
- Established a Langan Sustainability Director to Drive our Progress Forward

2018 LANGAN'S SUSTAINABLE PROJECT OF THE YEAR CO-WINNER

Bartram's Mile project transformed a mile of the Schuylkill River waterfront in Pennsylvania into a destination for the public.

CAREER GROWTH, ENTREPRENEURIAL SPIRIT, AND TEAMWORK

- Enhanced in-house training and provide continual staff development opportunities for sustainable design and engineering practices
- Increased staff with sustainability credentials to 112
- Offset carbon footprint of our internal meetings and workshops

KNOWLEDGE TO BENEFIT OUR INTERNAL INITIATIVES

- Expanded paperless office practices and reduced paper usage by nearly half in 5 years
- Increased Green Team participation in each office with about half of our offices certified by LEED or other green building program.
- Increased employee incentives for using alternative means to commute, and have implemented a flexible work schedule

2018 BIKE TO WORK DAY

Our San Francisco office led the Bike to Work Day among our offices to promote the annual nationwide event.

VOLUNTEERING WITH SUSTAINABILITY IN MIND

Pictured above is a recent volunteer activity in which we helped build a chicken coop for an inner city school.

CITIZENSHIP TO FOSTER POSITIVE CHANGE

- Became carbon neutral in our internal operations
- Cultivated and supported a spirit of volunteerism focused on supporting sustainability in our communities
- Established sustainability guidelines to enhance corporate responsibility

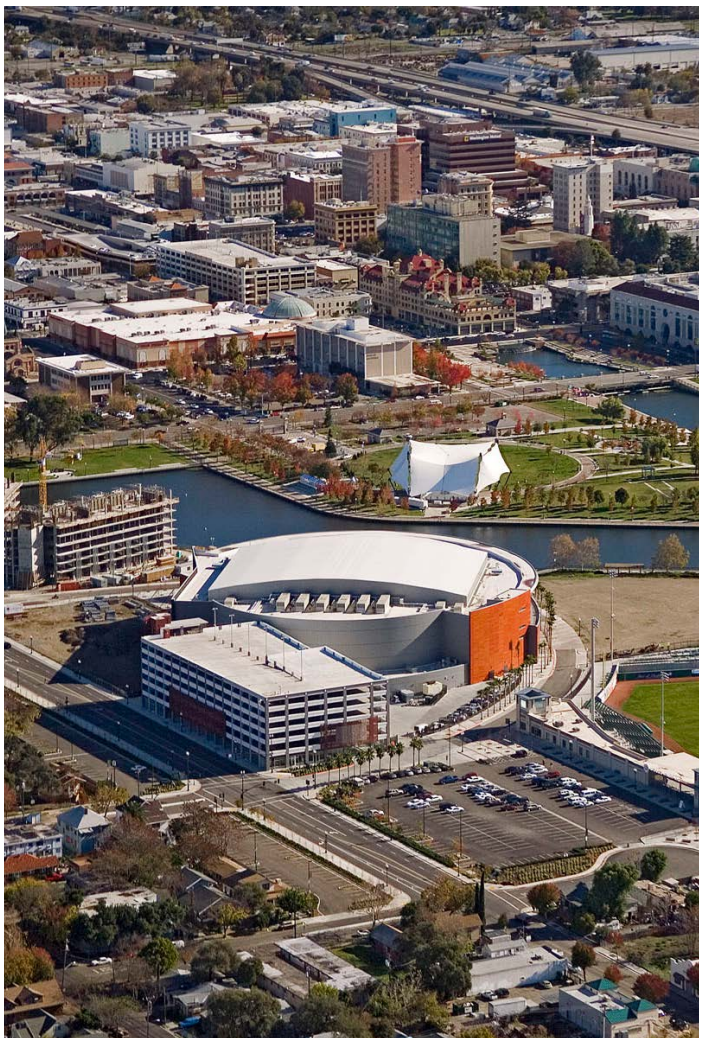
SUSTAINABILITY SERVICES

BROWNFIELD REDEVELOPMENT

URBAN CORE REVITALIZATION

Since the 1970s, decades before the common use of the "Brownfield" term, Langan has provided comprehensive services for the reuse of urban sites, the decommissioning and subsequent redevelopment of large industrial facilities, and the investigation and remediation of hazardous waste sites.

Langan's value engineering and cost-saving solutions in Brownfield Redevelopment have led to an unparalleled track record of award-winning reuse projects. We have negotiated precedent-setting regulatory agreements, utilized risk-based site closure strategies, provided technical assistance during grant application submissions, and served as Technical Program Managers for National Brownfield Pilot programs. Langan has also played a key role in the success of numerous public/private reuse partnerships that facilitated fast-track, large-scale redevelopment projects. Furthermore, we were actively involved with the ASTM E-50.03 Task Group that developed the Standard Guide to the Process of Sustainable Brownfield Redevelopment.



LANDFILL REDEVELOPMENT

TRILOGY OF ENGINEERING: ENVIRONMENTAL, GEOTECHNICAL, AND SITE/CIVIL

To help facilitate redevelopment of former landfill sites, Langan provides an integrated mix of engineering and environmental consulting services. We address environmental risk issues and mitigation; geotechnical, foundation and site settlement issues; and site/civil design for landfill capping and utilities. We thrive in the challenge to achieve a successful landfill post-closure development program. Langan has found the engineering solutions that come from our environmental, geotechnical, and site civil disciplines are tightly woven together. As a result, we believe our inter-disciplinary approach provides the most practical and efficient path towards project success.

Langan has strong relationships with federal, state and local regulators for landfill developments. Through these associations and our extensive land use permitting knowledge, we have obtained the permits necessary to expedite the developmental process and help to turn our clients' vision into a reality. Our first step is to prepare process flow diagrams to chart the permitting process. We then guide clients' projects through the multiple-agency programs, provide technical information for site applications and permits, design engineering solutions and incorporate team input, coordinate submittals to the reviewing agencies upon completion of our design, and present the project to the local authorities for approval.

RESILIENCY PLANNING & SHORELINE EXPERIENCE

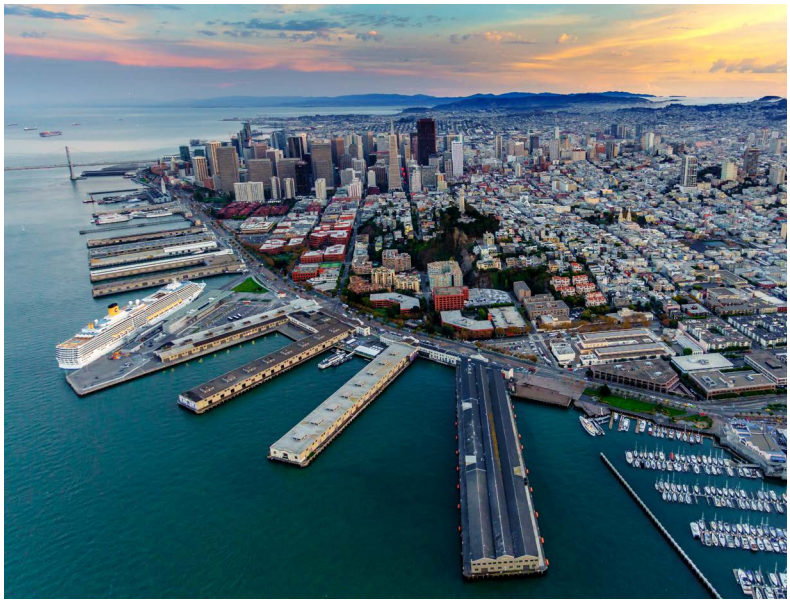
FOSTERING GLOBAL MITIGATION WITH LOCAL ADAPTATION

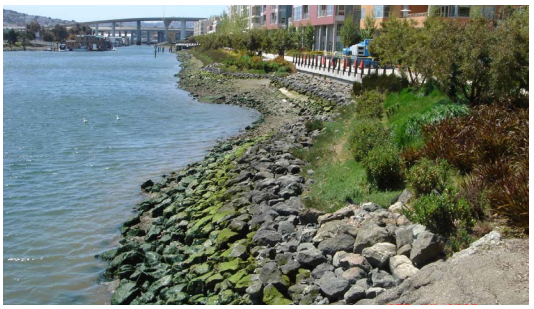
Strengthening our coastal projects' resiliency to sea level rise, severe storms, earthquakes, and flooding is a necessary objective for our engineers in all our shoreline projects. We bring together geotechnical, site/civil, seismic, and environmental engineers and geologists to develop and implement innovative mitigation strategies for shoreline protection and erosion stabilization. Post-Sandy, we completed numerous flood barriers and other flood proofing measures for public infrastructure, parks, and buildings to mitigate risks for future storm events. With our resiliency projects on both West Coast and East Coast as well as globally, we stay on the front-line in addressing some of the most challenging projects with creative solutions.

Developing sound environmental solutions not only requires technical expertise in hazard mitigation, but also the ability to involve multiple stakeholders and the community. We know first-hand that to achieve project goals, we must build trust and foster positive relationships with local officials, public agency staff, and the community at large. To this end, we prepare detailed agency scope and approval matrices, lead technical workshops, and coordinate the timing of all stakeholders towards project completion.

Langan Resiliency Planning Services:

- Waterfront Investigations/Evaluations
- Coastal/Waterfront Structure Design
- Slope Stabilization Design
- Flood Planning, Modeling, and Mapping
- Building and Architectural Support
- Resilient Engineering Design
- Flood Damage Assessments
- Flood Protection Systems
- Flood and Sea Level Rise Mitigation Recommendations/ Designs
- Green Infrastructure Approaches
- FEMA/HUD Grant Coordination
- Federal, State, and Local Waterfront Permitting
- Waterfront Construction Support/Inspection
- Sea Level Rise Vulnerability Assessment





CORPORATE SUSTAINABLITY PLAN DEVELOPMENT

PUTTING PLANS INTO ACTION

Clients come to Langan for assistance with creating corporate sustainability plans, achieving compliance with Global Reporting Initiative (GRI) sustainability reporting standards, and meeting the standards set by local municipalities for office green certification. On the development front, clients have enlisted our services to help prepare greenhouse gas emission inventories for remediation and construction projects.

Langan applies its own knowledge gained and lessons learned with our sustainability efforts to help other firms with their initiatives. We constantly strive to help others learn about the impacts of internal operations and establish a collaborative process to better define goals and metrics to reduce and offset their internal or project carbon footprint.

In addition to operating as a carbon neutral firm, Langan has achieved green business certification from local municipalities, such as the San Francisco Green Business Program (administered by SF Environment), the Bay Area Green Business Program (administered by the Association of Bay Area Governments), and the Philadelphia Green Business Program (administered by the Pennsylvania Environmental Council).

Our Commitment to the Three Pillars of Sustainability

FINANCIAL: CONTINUED STRENGTH

Develop and further expand sustainable practices with our clients.

Maintain growth-focused operations.

Reward employees' efforts.

Remain financially strong.

Continue to foster a client-focused culture.

Hire and grow exceptional employees.

ENVIRONMENTAL: JUDICIOUS STEWARDSHIP

Continue environmental stewardship.

Conserve energy, water, and other natural resources.

Implement pollution prevention and waste minimization.

Comply with applicable environmental regulations.

Work with government agencies to develop workable environmental guidelines.

SOCIAL: CONNECTION TO COMMUNITY

Contribute time, skills, and knowledge to foster positive change in the communities where we live and work.

Deepen connections to our communities.

Provide opportunities for employees to contribute globally, regionally, and locally.

ECOLOGICAL RESTORATION AND WETLANDS MITIGATION

NAVIGATING POLICY AND NATURE

Langan has strong relationships with federal, state, and local regulators through our experience in more than 1,000 wetland and permitting projects. Our natural resource staff consists of certified professional wetland scientists, ecologists, and wildlife biologists with experience throughout the US. Our federal and state permitting specialists work closely with our engineers to design a "permittable" project while providing the most economic return to our clients. Our ability to identify critical natural resource issues early in the design process and our in-depth understanding of regulatory programs and policies result in an expedited application and approval process.

Langan Ecological Restoration and Wetlands Mitigation Services:

- Wetland Delineation
- Army Corps of Engineers Section 10/404 Permit Applications
- State Permit Applications to Agencies, including SEQR
- Environmental Assessments / Environmental Impact Statements (EIS)
- NEPA Environmental Review Documents
- Alternatives Analysis
- Wetland Mitigation Design (Creation, Restoration, Enhancement)
- Dredge – Cut / Fill Analysis
- Coastal/Waterfront Development Permitting and Planning
- Wildlife Surveys and Habitat Assessments
- Threatened and Endangered Species Surveys and Habitat Assessments
- Essential Fish Habitat Assessments
- Baseline Ecological Evaluations (BEE)
- Natural Resource Damages Assessments
- Ecological Risk Assessment
- Wetland Functional Assessments
- Streambank Restoration / Bioengineering
- Riparian Zone Mitigation/Restoration

GREEN AND SUSTAINABLE REMEDIATION

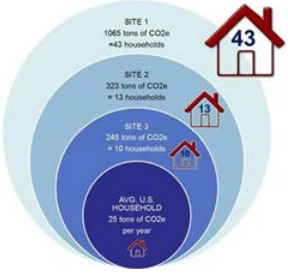
FINDING THE RIGHT BALANCE

Langan is a leader in the practice of Green and Sustainable Remediation (GSR). GSR involves the application of sustainable practices to environmental investigation, remedial feasibility studies, remedial design, and remedy implementation. A GSR approach strikes a balance between economic viability and impacts to the community's quality of life where the remediation takes place. A GSR approach considers impacts on local, regional, and global scales.

Our team directly applies principles of GSR to projects, producing identifiable benefits and savings for our clients. We have performed remedial system carbon footprints so clients can evaluate the sustainability of remediation approaches, performed remediation system optimization using GSR principles, assisted clients in reusing construction materials on projects, and incorporated natural alternative remediation alternatives. For example, we have used TreeWells in place of mechanical pumps to improve the economics and sustainability of a project.

Langan was the first corporate member of the Sustainable Remediation Forum (SURF), a non-profit professional society incorporated in 2010 that is devoted to promoting and developing SURF. Responsibilities include leading a committee to identify metrics that can be used to track the sustainability of a remediation project, leading a committee to develop a rating system for verifying the sustainability of a remediation project, serving as the mentor for the Stanford University chapter of SURF, and serving on the SURF Board of Trustees.

Langan is also actively involved in the Interstate Technology Regulatory Council's (ITRC) Green and Sustainable Remediation Task Force. Our team members have chaired sessions focused on GSR at the Symposium on Bioremedation and Sustainable Environmental Technologies and the Conference on Remediation of Chlorinated and Recalcitrant Compounds. Langan presented numerous platform and poster presentations at these and other conferences on topics such as the demonstration of carbon footprinting for remediation projects, use of carbon footprinting for sustainable decision-making, and case studies of projects that used GSR principles.



EHS & SUSTAINABILITY MANAGEMENT SOLUTIONS

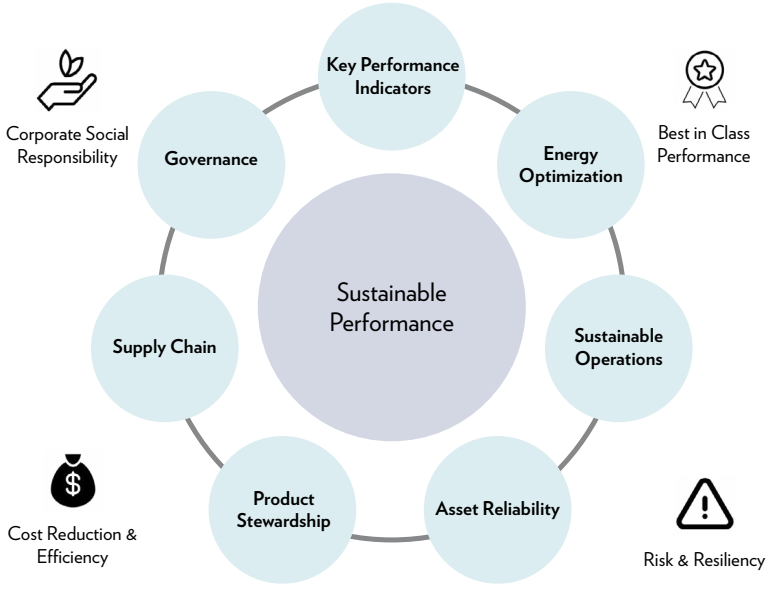
LEVERAGING TECHNOLOGY AS THE GAME CHANGER

Companies today are facing more stringent environmental regulations while also increasing their own efforts to operate more sustainably. How does one measure their progress to meet regulations and fulfill corporate sustainability goals? This is where technology and business intelligence come into play. Our Environmental, Health, Safety (EHS) and Sustainability management team works with clients to leverage digital solutions for data collection, information management, and business analytics to achieve client's visions and goals. These range from meeting the demands of the regulatory and stakeholder community, to tracking water and energy resource usage, to monitoring daily process operations, and finally to reporting on corporate social responsibility and sustainability.

We consult with clients to help them achieve their sustainability goals leveraging data-driven business decisions that can be accomplished through the following:

- Automated data collection and digital business analytics
- Transparent tracking of regulatory and corporate compliance requirements
- End-to-end supply chain knowledge for product compliance assurance and transparency
- Cost and resource efficiency trending and reporting
- Project measurement against corporate key performance indicators (KPIs)
- Streamlined processes for environmental, social, and financial impact assessments
- Benchmarking project performance against historical trends, future projections, and industry peers
- Predictive management of energy efficiency programs

Our Langan team works hand-in-glove with clients to generate information that demonstrates how an organization's sustainability initiatives are working and what opportunities can be implemented to continuously improve their business processes, information management systems, and people enablement. Our clients have improved the health and safety of their employees, enhanced the community environment, optimized business performance while decreasing operational costs, reduced liability and risk exposure, increased the value and sales of products and services, enhanced their product brands, and created a more robust strategic and sustainable organization.



GREEN STORMWATER DESIGN

REDUCING AND TREATING STORMWATER AT ITS SOURCE

Langan has led the way in the environmental engineering of Green Stormwater Best Management Practices (BMPs). These practices reduce the initial rate of runoff and improve the quality of stormwater runoff from sites. Generally, BMPs focus on water quality problems caused by increased impervious surfaces from land development.

BMPs are designed to reduce stormwater volume, peak flows, and/or nonpoint source pollution through evapotranspiration, infiltration, detention, and filtration. These are increasingly required by local, state and federal development codes. Green Stormwater BMPs include modified landscaping and hardscaping practices to reduce impervious surfaces and create more capacity to infiltrate stormwater within the site. Integrating sustainable stormwater elements early in the design provides a more economical approach to drainage. Langan has helped clients and cities transform their approach to drainage by moving to relatively low-tech green infrastructure measures.

For example, Langan led some of the first Green Stormwater Infrastructure (GSI) partnership projects in Philadelphia, including the 58th Street Greenway, Bartram's Mile, and Parkside Edge at Centennial Commons. For these projects, we helped city agencies and non-profit partners find win-win solutions in planning, design, constructability, maintenance, and funding for implementation of GSI systems. These projects resulted in the implementation of the broadest, most innovative, and most impactful green stormwater systems in the nation.

Langan Green Stormwater BMP and Infrastructure Measures:

- Rain Gardens and Green Roofs
- Bioswales
- Pervious Safety Surfaces
- Native Meadow Plantings
- Infiltration Trenches
- Porous Paving to Manage Stormwater
- Various Methods to Limit Impervious Footprints
- Limit Compaction to Protect Soils' Ability to Infiltrate
- Isolate "Clean Runoff" From Roof and Pavement
- Design Water Reuse Systems
- Prepare Retrofit and Credit Applications for Agencies that Offer Relief from Stormwater Management Fees

LEED AND GREEN BUILDING DESIGN

LEEDing THE WAY

With more than 100 Leadership in Energy and Environmental Design (LEED) APs on staff, sustainable design weaves through all Langan services. Our diverse portfolio of intelligent site planning, design, and engineering coupled with our Brownfield and site remediation expertise places us at the forefront of the sustainable design movement.

Langan has been an instrumental player on hundreds of sustainable design projects. Our integrated environmental, geotechnical, site/civil, landscape architecture/planning, and sustainable design services can positively impact 61 points under the LEED system.

Langan practices what we preach. Eight of Langan's offices have completed, or are pending, LEED certification.

Langan LEED Services:

- LEED Site Feasibility Analysis
- Greenhouse Gas Emissions Inventory
- Development Density and Community Connectivity
- Alternative Transportation
- Low Impact Stormwater Design / Master Planning
- Brownfield Redevelopment
- High Efficiency Site Lighting
- Green Roof Design
- On-site Renewable Energy
- Baseline Ecological Evaluations
- Water Efficient Landscaping
- Urban Design and Regeneration Planning
- Construction Waste Management

Credit: Dorsky + Yue International Architecture

SUSTAINABLE LANDSCAPE ARCHITECTURE

SENSE OF PLACE

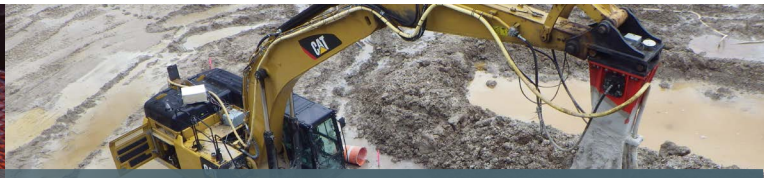
Langan landscape architects and planners understand what makes places work. We shape effective design solutions that range from regional or city scale down to the most intimate courtyards and garden spaces. In every project, we strive to identify and enhance the "sense of place," which makes each site unique and memorable. This places us at the forefront of the rebirth of our cities and aging downtowns, guiding their revitalization as destinations where people live, work, shop, and play.

Langan Landscape Architecture + Planning Services:

- Site Feasibility and Yield Studies
- High Performance Site Planning
- Land Development Approvals
- Brownfield Redevelopment
- Waterfront Design
- Park and Playground Design
- Complete Streets, Streetscape Design and Traffic Calming
- Landscape Planting and Irrigation Design
- Landscape Restoration Design
- Contract Documents
- Rooftop Garden Design
- Site Lighting Design
- Water Feature Design
- Construction Administration and Inspection
- Expert Testimony and Zoning Reviews
- Community Outreach

Credit: Edmund Hollander Landscape Architects

GENERAL SERVICES



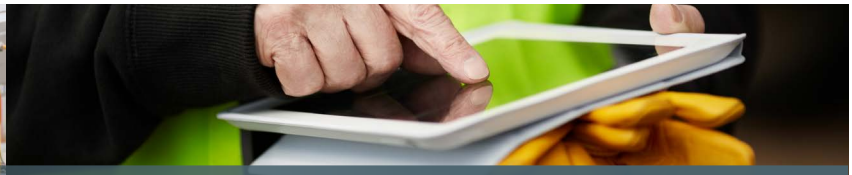
ENVIRONMENTAL

TECHNICAL AND REGULATORY ADVOCACY

Langan environmental engineers, geologists, and scientists work with project teams every day to investigate and improve property conditions. We obtain cost-effective solutions and strategies that are unique to each region

Environmental Services:

- Environmental Site Assessments
- Site Characterization
- Soil Excavation
- Vapor Intrusion Evaluation and Mitigation
- Brownfields Redevelopment
- Due Diligence Support
- Permitting/Regulatory Approvals
- Remediation Design/Oversight
- Hazardous and Solid Waste Management
- GIS/Database Management
- Manufactured Gas Plant Remediation Services
- Human Health Risk Assessment
- Site Feasibility Studies
- Remediation by Natural Attenuation
- Expert Witness
- Free Product Volume and Mobility Modeling
- Storage Tank Management
- Remedial Action Planning



EHS MANAGEMENT & COMPLIANCE

SUCCESSFUL ENVIRONMENTAL, HEALTH, AND SAFETY PROGRAMS

Langan uses a systematic approach to plan, design, and implement business processes and technology solutions for our clients to manage their environmental, health, and safety (EHS) compliance, asset integrity, product stewardship, and sustainability initiatives. Our services enable Langan's clients to prepare for frequently changing EHS regulations and shifting economic conditions resulting in increased operational efficiency and productivity, reduction of risks, and enhanced collaboration and transparency of their businesses.

EHS Services:

Process Improvement:

- Business Process Optimization
- Best Management Practices Assessment
- Digital Master Planning
- Materiality Assessment

Information Management:

- Technology Selection & Implementation
- System Enhancements
- Digital Governance
- Cyber Security

People Engagement:

- Organizational Change Management
- Knowledge Management
- Training

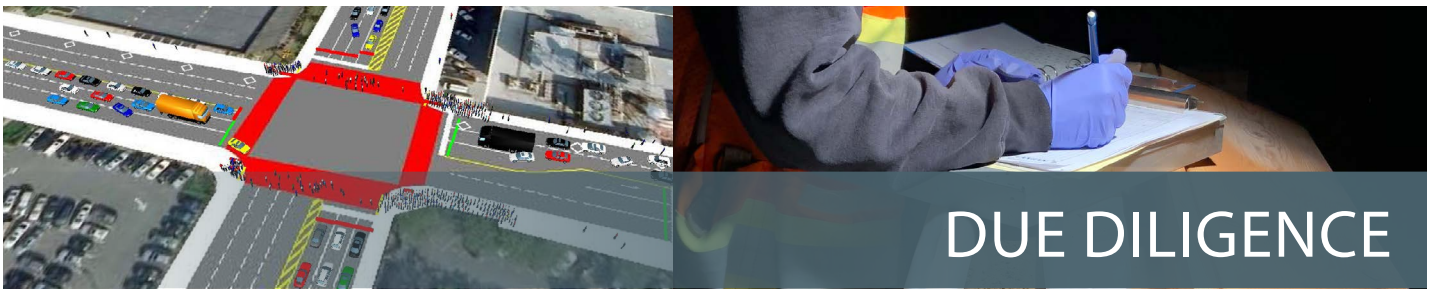
ENVIRONMENTAL COMPLIANCE

STREAMLINED COMPLIANCE MANAGEMENT

Langan's environmental compliance team has significant experience providing the energy industry with a full scale of services to streamline compliance, data management, and reporting to keep pace with evolving regulations. As active participants on industry technical environmental committees, we are among the first to learn about regulatory developments and potential changes that may impact our clients' operations. As strong industry advocates, our team helps clients achieve compliance with current regulations, prepare for what is to come, and make important business decisions accordingly.

Compliance Services:

- Multimedia Regulatory Compliance Audits
- Air Quality General Permitting
- Title V Facility Permitting
- NPDES Evaluations & Permitting
- Storage Tank Management & Compliance
- EPCRA TRI & Tier II Reporting
- Contingency Plan Preparation & Compliance Evaluations (SPCC, FRP, PPC, SPR, SWPPP)
- Waste Analysis & Characterization
- EHS Management Systems
- Applicability Determinations
- Compliance Training & Regulatory Guidance
- POTW Discharge Permitting
- Hazardous & Residual Waste Management & Reporting



DUE DILIGENCE

IDENTIFYING AND OVERCOMING THE UNFORSEEN

In any economy, before purchasing property, retaining a consultant for due diligence is a wise investment. Langan helps clients conduct timely feasibility studies and overall site due diligence facilitate the right choice on critical go-no-go decisions. Our team can investigate the potential unforeseen problems; identify significant cost impacts to development; and help design solutions that overcome seemingly insurmountable obstacles.

Due Diligence Services:

- Purchase and Sale Agreements
- Distressed Asset Analysis
- Real Estate Portfolio Assessments
- Records Review
- Survey & 3D Laser Scanning
- Phase I/II Environmental Site Assessments
- Environmental Permitting Review
- Environmental Compliance Audits
- Geotechnical Investigations
- Site Inspections
- ASTM Transaction Screens
- Zoning Analysis/Studies
- Permitting Requirements
- Entitlement Review
- Natural Resources Assessment
- Traffic Conditions Assessment
- Utility/Infrastructure Capacity/Needs Assessments
- Building Condition Assessments
- Concept Planning
- Construction/ Development Cost Analysis
- Asbestos, Lead-paint, and Hazardous Materials Assessment
- Microbial and Water Intrusion Investigations
- Indoor Air Quality/Vapor Intrusion Assessments

GEOTECHNICAL ENGINEERING

SUBSURFACE SOLUTIONS

Langan was founded as a geotechnical consulting company in 1970, and geotechnical engineering remains a core discipline at Langan today. We work closely with our clients and the design and construction team to engineer cost-effective geotechnical solutions appropriate for proposed structures and the governing site conditions.

Geotechnical Services:

- Subsurface Investigations
- Slope Stability Analysis
- Crossing Design Using Trenchless Techniques
- Subsurface Utility Engineering
- Earthquake/Seismic
- Materials Analysis
- Foundation Design
- Retaining Structures
- Soil Improvement/Ground Modification
- Dewatering Design & Permitting
- Excavation Support & Underpinning Design
- Geological Mapping of Rock Slopes
- Mine Investigations
- Earth & Rock Fill Dams
- Tunnels/Microtunneling
- Seawalls, Piers, & Bulkheads
- Pre-Construction Conditions Surveys
- Construction Observation
- Forensic Engineering/Expert Testimony
- Geotechnical Hazard Assessment Tool

SITE/CIVIL ENGINEERING

RESPONSIVENESS THAT DELIVERS RESULTS

Langan's site/civil engineers work closely with the design team to develop final designs that minimize disturbances, permitting requirements, and cost. Our quality submittals lead to rapid permit approvals. Langan staff observes construction to ensure adherence to our design criteria and simplify the permit process.

Site/Civil Services:

- Site Feasibility Studies & Conceptual Plans
- Grading & Drainage Design
- Erosion & Sediment Control Plans/ Permits/Inspection
- Site Restoration Plans & Analysis
- Post-Construction Stormwater Earthwork Analysis
- Construction Observation
- Utility Infrastructure Designs
- Landscape Plans
- Hydrologic & Hydraulic Studies
- Waterfront Systems Designs
- Property Acquisition Support
- Regulatory Coordination/Compliance
- CADD/GIS/Computer Animations

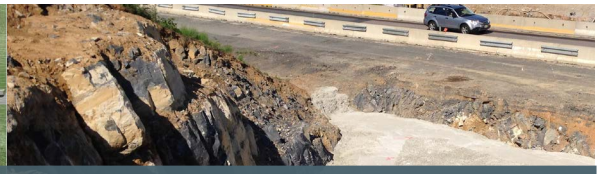
NATURAL RESOURCES

NAVIGATING POLICY AND NATURE

Langan has developed strong relationships with federal, state and local regulators through our experience in more than 1,000 wetland and permitting projects. Our Natural Resource staff consists of certified professional wetland scientists, ecologists and wildlife biologists with extensive experience throughout the United States. Our ability to identify critical natural resource issues early in the design process and our in-depth understanding of regulatory programs and policies result in an expedited application and approval process.

Natural Resource Services:

- Due Diigence Assessments
- Wetland and Waterway Surveys & Impact Permitting (Federal, State, & Local)
- Land Use Permitting
- Stormwater & Industrial Discharge Permitting
- Coastal/Waterfront Development Permitting & Planning
- NEPA Compliance
- Environmental Assessments/Environmental Impact Statements
- Alternatives Analysis
- Wetland Delineations & Functional Assessments
- Wetland Mitigation Design & Monitoring
- Stream Restoration
- Riparian Zone Mitigation/Restoration
- Floodplain Analysis
- Habitat Assessments
- Wildlife & Ecological Surveys
- Threatened & Endangered Species Surveys
- Ecological Risk Assessment
- GIS Land-Use Mapping



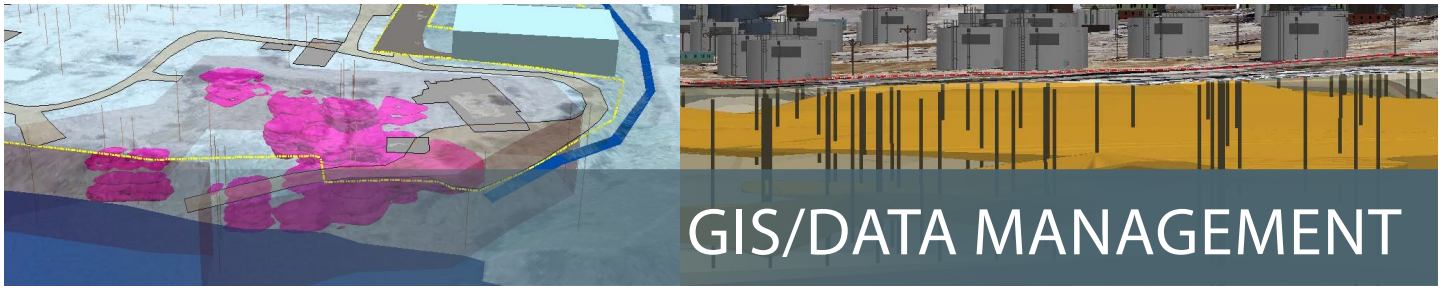
TRANSPORTATION

SAFE. EFFICIENT. INNOVATIVE.

Langan's transportation engineering and planning work includes highway and local street design, as well the design of parking, transit, and non-motorized transportation facilities. For the planning and design of these types of facilities we have provided simulation modeling, master plans, traffic impact studies, operational analysis, signal design, traffic calming measures, signage and wayfinding studies, origin/destination surveys, travel demand modeling, corridor studies, urban transportation plans, transit station and route planning, terminal planning, bikeway planning, and permitting services through counties, municipalities, and the various transportation agencies.

Transportation Services:

- Highway Occupancy Permits for Crossings & Driveways
- Truck Routing/Video Logs
- Vehicular Traffic Studies
- Road Use & Maintenance Agreements
- Traffic Modeling & Simulation
- Station Planning
- Site Access/Site Engineering
- Site Feasibility Studies
- Driveway Design



GIS/DATA MANAGEMENT

CUTTING-EDGE DATA VISUALIZATION

Langan uses the latest GIS, Data Management, and CADD software applications to analyze and design cost-effective solutions to our clients' problems. Our Geospatial Solutions group provides custom training, programming, and technical support to both our staff and to our clients in ESRI's ArcGIS Enterprise suite of applications including ArcMap, ArcGIS Online, ArcGIS Portal/Server, and ArcGIS Pro and their assorted extensions as well as Autodesk's Map, Land Desktop and Civil 3D. Langan provides our clients with easy access to their project data by developing and implementing Enterprise GIS Extranets and data portals that allow for easy data exchanges between all of the project team members. Our Web designers can develop custom Web-based applications to further leverage our clients' data.

GIS/Data Management Services:

- Pipeline Corridor Routing
- Geo-Hazard Analysis
- Well Pad Installments
- Permitting
- Land Acquisition
- Environmental Monitoring
- Transportation Logistics
- Field Data Collection

SURVEYING, SCANNING, & MAPPING

CUTTING-EDGE TECHNOLOGY & EFFICIENCY

Langan's survey group provides rapid response times and flexible schedules to meet client needs and maintain schedules for fast-track projects. Our field crews utilize state-of-the-art surveying equipment including electronic data collectors, global positioning systems (GPS), robotic and prismless total stations, and BIM-compatible 3D Laser Scanning. Equipped with Internet-enabled laptops, field crews accommodate design changes in real time and download data into Langan's network where it is edited, adjusted, analyzed and plotted. This allows for mapping that accurately reflects existing site conditions and boundary/legal issues, which could reveal potential problems early in a project's development..

Surveying Services:

- Well Plat Surveys
- Topographic Surveys
- Boundary, Right-of-Way, & Corridor Surveys
- ALTA/ACSM Land Title Surveys
- Utility Surveys
- GPS Surveys
- Hydrographic/Bathymetric Surveys
- Highway/Route Surveys
- Construction Stake-Out
- As-Built Surveys
- Photogrammetric Control
- GIS/LIS Data Acquisition
- Geographical Information Systems
- Deformation/Monitoring Surveys
- Utility/Thermal Scanning

PROJECT EXPERIENCE

BARTRAM'S MILE
Philadelphia , PA

OUR SERVICES:
Site/Civil Engineering
Geotechnical Engineering
Transportation Engineering
Survey
Permitting

CLIENT:
City of Philadelphia Parks & Recreation Department

ARCHITECT:
Andropogon Associates

AWARDS:
ULI Philadelphia Willard G. "Bill" Rouse III Award for Excellence, Bartram's Mile Project, 2017

Notable Project of the Year (Runner-Up), Pennsylvania Society of Professional Engineers. Bartram's Mile Project, 2017

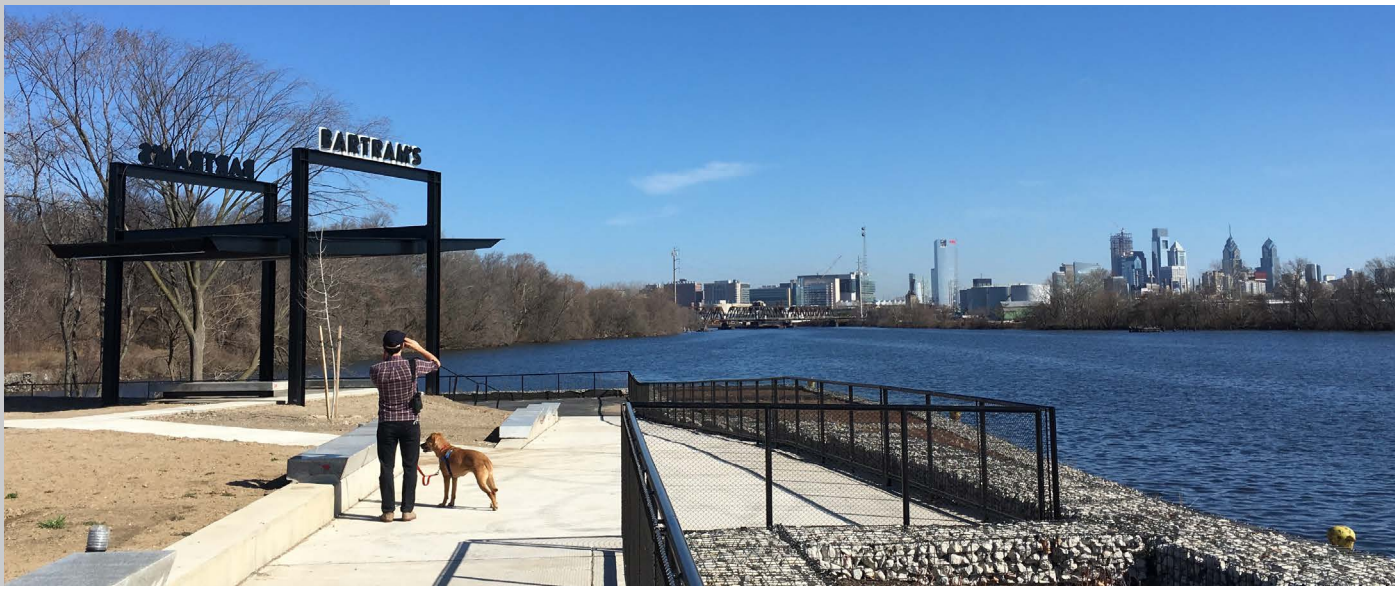
Langan helped the City of Philadelphia transform a one mile of stretch of vacant river frontage along the western banks of the tidal Schuylkill between Grays Ferry Avenue and 58th Street into a new destination, through the extension of the Schuylkill River Trail, the addition of new parks, and the creation of an innovative neighborhood stormwater management system.

Langan was responsible for the conceptual design of the stormwater system, permitting, geotechnical investigation, and final design of all project elements, including trail design, traffic engineering, and complete streets design. The ultimate goal of the project was to spur construction of a sustainable Innovation District, extending R&D and facilities for business start-ups from the university campuses of the University of Pennsylvania, Drexel, and others south to Bartram's Garden — a historic riverfront property that was also the nation's first botanical garden.

Challenges for the project include:

- Multi-agency coordination (not only for permitting, but also for refining concepts for multiple uses, assigning design tasks and financing the project)
- Addressing environmental contamination from former and current tank farms and industrial facilities along project route
- Coordinating with the nationally-recognized historical and archeological resources of Bartram's Garden
- Coordinating design with neighboring industrial businesses, including designing streets to both handle existing heavy truck traffic and become future green, complete streets.

Langan brought its unique multi-disciplinary experience and its sustainability expertise to the project, and is helping the project get completed on an accelerated two-year design and construction schedule.



CRANBURY LOGISTICS CENTER

Cranbury, NJ

Once a blighted and unapproachable site, the 395-acre site for the Cranbury Logistics Center has set the stage on how successful remediation can transform the environment and revitalize the economy of New Jersey. Formerly a DOD munitions manufacturing facility, the site was closed in 1954 after an accident that resulted in the explosion of some of the munitions. After 50 years of vacancy and another 10 years of remediation, the site is now home to two e-commerce fulfillment centers totaling 2.35 million SF with another 450,000 SF of warehouse/distribution in the pipeline.

The environmental clean-up, under the supervision of a NJ-Licensed Remediation Professional, involved extensive efforts to delineate and mitigate munitions and impacted soil. Munition and Explosives of Concern (MEC) was identified, excavated, screened, and detonated on-site in a controlled manner. An innovative practice used for this project was combining the clean-up with the mass grading and stormwater infrastructure required for redevelopment. This allowed for proper management of stormwater during the remediation and left the project site "pad ready" upon completion.

Proper remediation of the site required impact to nearly 50 acres of contaminated wetlands. A significant wetlands mitigation plan was implemented to offset these impacts. In order to minimize impacts to forested areas, sparsely vegetated uplands were excavated to form shallow concave grades to allow water to accumulate in these areas, creating an amphibian habitat. An extended 10-acre stormwater basin was also used to create additional wetlands mitigation by designing planting shelves and islands within the basins to allow for wetland plantings to grow.

OUR SERVICES:

Site/Civil Engineering
Environmental Engineering (LSRP)
Geotechnical Engineering
Surveying
Traffic Engineering
Roadway Design
Natural Resource Permitting
Wetland Mitigation Design
Landscape Architecture
Professional Planning

CLIENT:

Clarion Partners

HERCULES GAS PLANT
Santa Barbara County, CA

OUR SERVICES:

Environmental Remediation

Ecological and Human Health Risk Assessment

Ecological Restoration

CLIENT:

Confidential Major Oil Corporation

Langan developed and gained a regulatory agreement on a final remedy for a former major oil corporation gas plant site. The remediation of this property resulted in a benefit to the community through the creation of enhanced wildlife habitat, elimination of potential contaminant input to the nearby Pacific Ocean, and, consistent with the Santa Barbara County Comprehensive Plan, increasing the scenic value of this area which is seen by thousands of commuters on a daily basis.

The agreed upon path to closure used a background analysis and risk assessment to identify attainable remedial cleanup standards for constituents of potential concern. By taking a face-to-face approach with regulators (DTSC, Region 9 EPA, Central Coast RWQCB, County of Santa Barbara) and presenting a strong argument for a risk-based strategy to closure, Langan achieved an agreed upon 1 to 2 year path to closure that was 27 years (case opened in 1988) in the making with two previous consultants.

As part of this project, Langan prepared estimates of total projected GHG emissions under proposed cleanup scenarios using the USEPA SiteWise Version 3 Software. The GHG emissions estimate was critical to approval of a sustainable soil reuse approach that reduced approximately 4,000 tons of GHG emissions and 180,000 cubic yards of soil off-haul, and 10,000 truck trips from the remediation project.

Our landscape architects translated an ecological restoration plan provided by a certified ecologist into an ecological restoration planting plan for the ravine and side slopes. This plans serves to control erosion and provide habitat for local wildlife.

NYCSCA PRIMARY SCHOOL 62
Kathleen Grimm School for Leadership & Sustainability
Staten Island, NY

P.S. 62 The Kathleen Grimm School for Leadership and Sustainability is the first net-zero energy school in New York City and one of the first of its kind worldwide. The school will harvest as much energy from renewable on-site sources as it uses on an annual basis. The school is NYCSCA's first "sustainability lab" and will help achieve PlaNYC goals for significant reductions in global warming emissions.

Langan performed a geotechnical subsurface investigation program and geotechnical engineering design work for the design team. Geotechnical engineers managed a subsurface investigation, which consisted of borings for collecting foundation design information and in-situ percolation test is for collecting stormwater retention system design parameters. Subsurface information collected was provided to the structural and site/civil engineers for foundation, tie-down anchors and pavement design.

This 68,000 SF, two-story courtyard-shaped building takes advantage of sunlight for both daylighting and photovoltaic arrays on the roof and south façade. Other sustainable features include an ultra-tight high-performance building envelope, day-lit offset corridors, energy-efficient lighting fixtures, low-energy kitchen equipment, a greenhouse garden, a geo-exchange system, energy recovery ventilators, demand-control ventilation, and a solar thermal system for hot water.

Langan's extensive knowledge of Staten Island's subsurface conditions provided valuable input to the design team for designing structures and pavements on poor drainage material.

OUR SERVICES:
Geotechnical Engineering
Subsurface Investigation
Site/Civil Engineering

CLIENT:
New York City School Construction Authority (NYCSCA)

ARCHITECT:
Skidmore, Owings & Merrill (SOM)

AWARDS:
2017 ULI Awards for Excellence in Development: Institutional Development Finalist

2016 ENR New York Best Projects Awards: Green Project and K-12 Education

2016 Winner Architizer A+ Award, Jury and Popular Choice Awards

2016 MASterworks Awards: Best New Infrastructure


Credit: James Ewing/OTTO

LAKEHOUSE
Oakland, CA

OUR SERVICES:
Geotechnical Engineering
Environmental Engineering

CLIENT:
East Bay Asian Local Development Corporation
UrbanCore Development, LLC

ARCHITECT
Pyatok
AVRP Studios

LakeHouse is a mixed-income residential development offering 360 market rate and affordable apartment units. The development, located near downtown overlooking Lake Merritt, will be a 26-story tower and a 7-story mid-rise over a single-level podium and two levels of underground parking.

Langan's environmental team performed a health risk assessment to evaluate the potential exposure of fine particulate matter (PM2.5) and toxic air contaminants at the site. Our team also conducted a greenhouse gas analysis in compliance with the City of Oakland Standard Condition of Approval (SCA), and develop a greenhouse gas reduction plan.

Langan's geotechnical team conducted an investigation and provided subsurface conditions at the site. We are also providing geotechnical consultation during final design and construction.


Credit: AVRP and PYATOK

PORT OF REDWOOD CITY
Redwood City, CA

The design-build Wharves 1 & 2 Replacement Project included the demolition of a timber wharf and warehouse, and construction of a new concrete wharf, longshoreman's office, and site improvements. The site is underlain with soft to stiff clay (Bay mud).

For coastal resiliency, Langan provided recommendations for the design of the rip-rap slope stabilization and a seawall that accounted for the estimated total and differential consolidation settlement of the underlying Bay mud. The seawall was constructed along the top of the shoreline slope to protect the site from inundations due to anticipated sea level rise.

Langan also evaluated the site's soil and groundwater conditions and site specific seismicity and seismic hazards, including liquefaction potential. Our site/civil team helped with the design of underground utilities, grading and drainage, parking lots and pedestrian access walkways, locating of the new longshoreman's office, and preparation of building deconstruction and material salvage plans. Langan's environmental team conducted soil sampling and chemical analysis, asbestos and lead-based paint evaluations, universal waste surveying, and creosote sampling and reporting. We prepared specifications for the removal and disposal of identified waste and prepared a Soil Management Plan for excavation and construction.

Grading was an important aspect of this project because of the strict conformance to FEMA, sea level rise, and City Flood Plain Elevation regulations. Due to the proposed wharf's increase in height that created a 7-foot elevation difference between the Port site and top of wharf, we addressed the additional complication of connecting the entrance and exit ramps to the site. Langan provided innovative grading and traffic techniques to create a safe driving path for cargo trucks, and Port personnel. Our site/civil engineers coordinated with our geotechnical team to devise an alternative to traditional soil fill with the use of light weight fill materials.

OUR SERVICES:

Waterfront Engineering
Site/Civil Engineering
Geotechnical Engineering
Environmental Engineering

CLIENT:

Port of Redwood City

RUTGERS UNIVERSITY BUSINESS SCHOOL
Piscataway, NJ

OUR SERVICES:
Site/Civil Engineering
Permitting
Stormwater Design

CLIENT:
Rutgers University

ARCHITECT:
TEN Arquitectos

The Business School's glass exterior and 5-foot-high columns represent Rutgers University's commitment to renewable energy. Two solar fields on campus will supply the building with electricity and a nearby geothermal field will provide its heating and cooling. This building was designed to achieve LEED Silver certification.

Langan's site/civil design responsibilities included site layout, grading and drainage, stormwater management, utility layout, soil erosion and sediment control, site work construction details, and construction specifications. Our stormwater management strategy incorporated several Best Management Practices (BMPs) such as a bioretention basin and a constructed stormwater wetland. Other challenges included the relocation of several active campus utility mains and the incorporation of a geo-thermal well field into the project's overall green initiative.

BRIDESBURG RIVERFRONT PARK
Philadelphia, PA

The Bridesburg Park will be developed as one part of a large redevelopment initiative for Philadelphia's North Delaware Waterfront. It will occupy a 10-acre former brownfield site, which will be reconfigured, removing hardscape, and installing greenscape that better suits the new public space's design and purpose.

Having a prior history with the site, Langan had key knowledge about its environmental and geotechnical challenges, which included a 10-feet high mound of construction and demolition debris that occupied half the site (over a decade, the mound had been overgrown with vegetation and become a recovering riparian forest); a river edge made of illegally-dumped concrete and asphalt shavings, which one observer described as "looking like frozen lava"; and potential groundwater contamination from surrounding industrial uses.

Langan provided its environmental and geotechnical expertise to guide the new landscape design, and led the design of the improved connector street to incorporate a parallel multiuse trail, green stormwater infrastructure, and safer pedestrian crossings and bump-outs. Langan continues to support the project team with fundraising and agency coordination, which will be key to completing this park as the second new park on the city's waterfront in the past 40 years.

OUR SERVICES:

Site/Civil Engineering
Transportation Engineering
Urban Planning
Sustainable Design
Complete Streets
Landscape Architecture
Green Stormwater Infrastructure

CLIENTS:

Delaware River City Corporation
Philadelphia Department of Parks and Recreation

ARCHITECTS:

SITIO
Ground Reconsidered

Credit: SITIO

SOUTHWEST PARK
Hoboken, NJ

OUR SERVICES:
Site/Civil Enginering
Environmental Engineering
Geotechnical Engineering
Natural Resources & Permitting
Landscape Architecture

CLIENT:
City of Hoboken

ARCHITECT:
Starr Whitehouse

Southwest Park will be New Jersey's first resiliency park with integrated green infrastructure to mitigate flooding. This one-acre city park incorporates the delay and store components of the Rebuild by Design approach.

Following the city's Green Infrastructure Strategic Plan, Langan designed and prepared the stormwater management for this park. We designed a system to hold the equivalent of a 10-year storm volume through green stormwater infrastructure components, including bioswales and rain gardens to mitigate existing flooding within this area of the city. The green infrastructure designed into the project will allow the neighborhood to enjoy the community green space and provide flood mitigation during storm events that impact this area.

As the Licensed Site Remediation Professional for the project, Langan provided the necessary environmental controls while maintaining the design intent. We also provided geotechnical engineering services and worked with the team to provide cost-effective design alternatives by incorporating light-weight fill material to eliminate the need for piles.

Credit: Starr Whitehouse

SWARTHMORE COLLEGE
New Palmer, Pittenger, and Roberts Residence Hall
Swarthmore Borough, PA

Swarthmore College is adding a 120-bed residence hall near its Palmer, Pittenger and Roberts residence-hall complex. The minimize environmental impact, the design team followed the recommendations established in the college's sustainability framework.

To meet the college's sustainability goals, Langan worked closely with the project landscape architect, Studio Bryan Haynes, to design the site to preserve trees, respect the ball fields adjacent to the resident-hall quadrant, provide outdoor space for student enjoyment, provide low-impact stormwater-management features, and conserve energy. We worked with the design team to develop a strategy to maximize the sustainability potential of the building roof areas. This strategy included balancing the stormwater benefits of the vegetated roof with the energy benefits of the solar panels. Our design also included collecting rainwater from the solar-panel roof areas for reuse within the building.

Langan's experience with designing and permitting innovative stormwater management on tight urban sites was a key contribution to the success in the design and approval process for this project.

OUR SERVICES:
Site/Civil Engineering
Geotechnical Engineering
Survey

CLIENT:
Swarthmore College

ARCHITECT:
DIGSAU Architecturen
Studio Bryan Haynes

TEXAS INSTRUMENTS
Sustainable Groundwater Extraction Treatment System
Santa Clara, CA

OUR SERVICES:

Environmental Compliance

Remedial Engineering and Design

Groundwater Monitoring Services

Operation and Maintenance

CLIENT:

Texas Instruments

Langan has been assisting Texas Instruments manage the environmental compliance and remedial efforts associated with this Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site since 2003.

Our team designed a new treatment system to treat extracted groundwater from the well network that controls migration and removes mass at a large chlorinated solvent plume at the Superfund site. The previous system consisted of a series of air stripper towers to treat 43 million gallons of extracted groundwater annually, which was then discharged to a storm drain or a man-made lake that overflowed to the storm drain. Our design included replacing the aging air stripper towers with a single air stripper unit. The new system is health protective, more efficient, and has lowered operating costs. To support the client's corporate sustainability goals, we designed the air stripper unit to discharge treated water to a holding tank and ultimately to the client's reverse osmosis system for reuse onsite in cooling towers and also irrigation. Reuse of the treated groundwater has reduced city water use by an estimated 11 million gallons per year.

Langan assisted Texas Instruments with obtaining permits from the Bay Area Air Quality Management District (BAAQMD), National Pollutant Discharge Elimination System (NPDES), and City of Santa Clara Building.

Langan also provided construction oversight for installing the air stripper treatment unit and associated treatment pad, piping, equipment, tanks, and instrumentation; removing the existing air stripper treatment towersand associated equipment, tanks, and piping; and start-up of the air stripper treatment unit and verification sampling.

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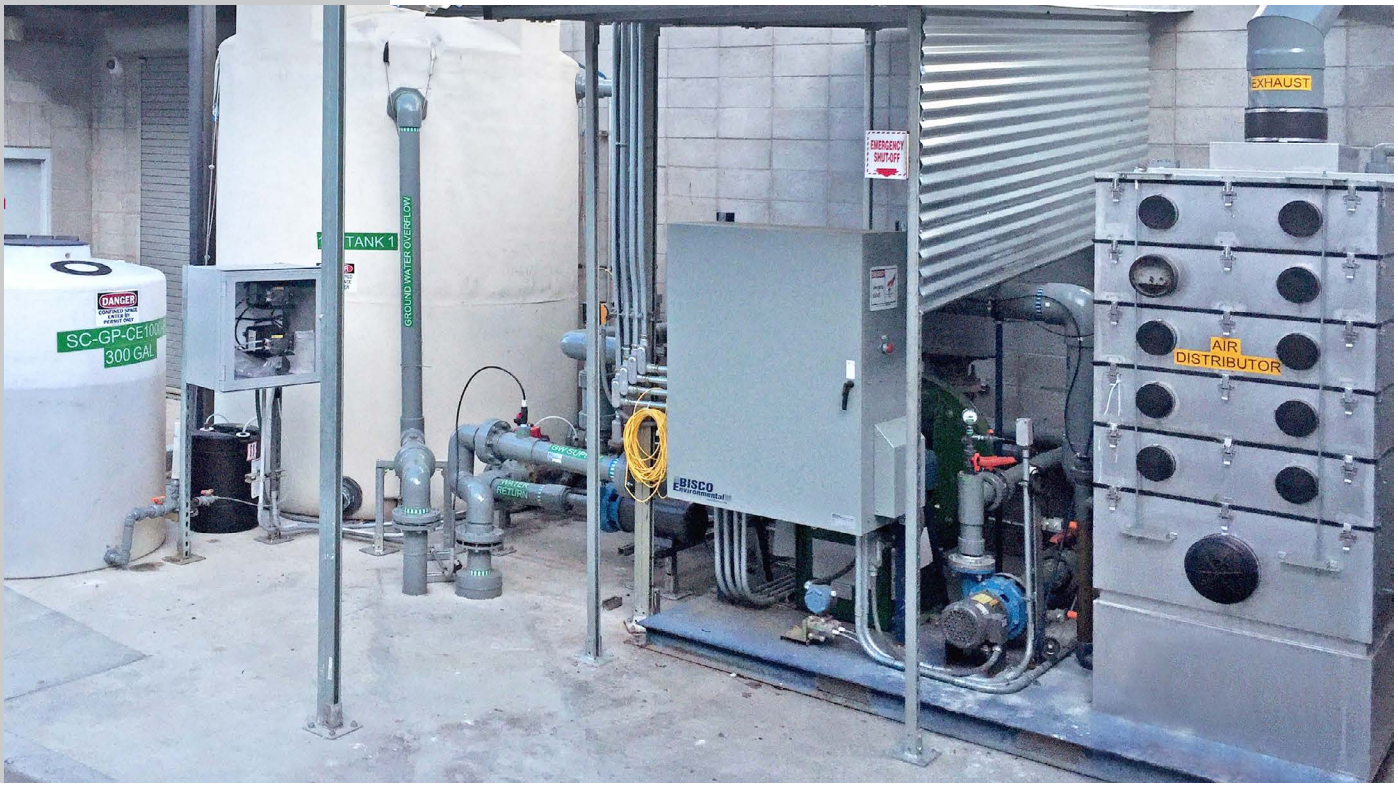

TREVOR DAY SCHOOL
New York, NY

To accommodate the school's planned 25-percent increase in middle and high school enrollment, the Trevor Day School built a 12-story high sustainable building with one below-grade level. To achieve the sustainability goal, Langan assisted in geothermal conductivity testing to evaluate the use of energy piles.

A total of 365 piles were installed, and geothermal loops were installed in many of the piles to create a geothermal energy pile system that provides most of the heating and cooling supply. Along with annual energy savings of $60,000, the school is working to integrate the geothermal system into its sustainability curriculum.

The site is in a historic marsh area known for settlement problems. We designed a piled foundation to limit settlements. We also conducted a site specific seismic study. Our seismic analysis resulted in significant design and construction cost savings.

Our environmental team completed Phase I ESA and Phase II Environmental Site Investigations. We also performed a supplemental environmental investigation after oil was found in soil after demolition of the structures. The New York State Department of Environmental Conservation approved our recommended remedy for spill closure. In addition, Langan provided expert testimony on behalf of Trevor Day School to recover costs associated with the oil spill caused by the demolition contractor.

Site/civil engineering services include site utility design, right-of-way streetscape design, and erosion and sedimentation control design. Langan's scope also includes New York City Department of Environmental Protection approvals for the stormwater detention design and New City Department of Transportation approval of the proposed Con Edison vault.

OUR SERVICES:

Environmental Engineering
Geotechnical Engineering
Geothermal Testing
Earthquake Engineering
Site/Civil Engineering
Asbestos and Lead Paint Abatement Monitoring
Construction Inspection of Piles
Environmental Construction Monitoring
Expert Testimony

CLIENT:

Trevor Day School

ARCHITECT:

Peter Gisolfi Associates

AVAYA STADIUM, SAN JOSE EARTHQUAKES
San Jose, CA

OUR SERVICES:
Geotechnical Engineering
Seismic Engineering
Environmental Engineering
Construction Monitoring

CLIENT:
Wolff Urban Development, LLC

ARCHITECT:
360 Architecture (now HOK)

AWARD:
2015 EPA Phoenix Award - Excellence in Brownfield Redevelopment

Home to the Major League Soccer's San Jose Earthquakes, Avaya Stadium is a soccer-specific stadium that opened in early 2015 with 14,000 seats. Site history includes the operation of the FMC Corporation's Central Plant. Following an RCRA facility investigation, the California Department of Toxic Substances Control (DTSC) ordered a closure of the former Central Plant

To address DTSC's corrective measures, Langan assisted the construction team to comply with the agency's approved Soil Management Plan, worked with DTSC to recycle concrete from the former FMC facility, and evaluated potential vapor intrusion risks from residual volatile organic compounds, which demonstrated that a sub-slab vapor mitigation system was unnecessary.

Geotechnical challenges included designing a foundation system to adequately accommodate the estimated earthquake-induced total and differential settlements as well as removing existing buried obstructions at the site. Langan used detailed geotechnical analyses to recommend shallow foundations for support of the stadium, providing significant cost savings compared to deep foundations.

UNIVERSITY OF CONNECTICUT
Innovation Partnership Building, Storrs, CT

The first building within UConn's North Campus technology park, this 115,000 SF facility houses flexible laboratory, incubation and office space. Academic researchers, business entrepreneurs, and private industry scientists work together in this building to develop innovative technologies in flexible electronics, materials science, additive manufacturing, cybersecurity, energy, and other fields.

Langan's site design minimized the impacts to the primarily wooded lot by stepping the building into the hillside and reducing the parking views along the roadway through grading and the landscape design. The landscape included "pods" to foster a unique pedestrian experience as people move from parking areas, through the building's open air portal, out through the rear courtyard, and onto the connection to the wooded trail system.

Our stormwater management team designed and implemented a low impact development approach to protect and minimize disruption to the natural resources and environmentally sensitive areas. This approach combined treatment practices in a series to enhance pollutant removal and achieve groundwater recharge, channel protection, and peak runoff attenuation. Treatment measures included infiltration basins, water quality swales, bio-retention/rain gardens, hydrodynamic separators, and catch basin inserts.

The structure will house imaging equipment, which is highly sensitive to varying levels of vibration. To meet this design objective, Langan's geotechnical design combined shallow foundations and drilled caissons (aka drilled shafts or mini-caissons) advanced into rock to mitigate the vibration in these building areas.

The project has been submitted for LEED Silver certification.

OUR SERVICES:
Site / Civil Engineering
Landscape Architecture
Geotechnical Engineering
Surveying

CLIENT:
University of Connecticut

ARCHITECT:
Skidmore, Owings, & Merrill


Credit: Skidmore, Owings, & Merrill

ECOCENTER AT HERON'S HEAD PARK
San Francisco, CA

OUR SERVICES:
Geotechnical Engineering
Methane Mitigation Design
Environmental Engineering

CLIENT:
Literacy for Environmental Justice

ARCHITECT:
Toby Long Design

STRATEGIC PARTNERS:
Port of San Francisco,
San Francisco Environment
California Coastal Conservancy

Located at a former landfill, this urban educational center was built using recycled materials and boasts a vegetation roof. Now open, the building operates 100 percent by solar power, and features its own on-site wastewater treatment system. The non-profit Literacy for Environmental Justice (LEJ) intends for the facility to be used as an environmental education center available for neighborhood schools, churches and local clubs.

To minimize the possibility of methane migration from the underlying landfill waste into the building, Langan designed a passive "green" methane mitigation system that was installed by KLM Builders. The system was installed beneath the building slab and is composed of a methane-impermeable membrane, which is in turn underlain by a crushed rock layer that contains a network of horizontal perforated pipes that lead to vertical risers that extend to the roof level. This system allows the methane to be trapped beneath the membrane and transmitted through the crushed rock and pipe to the outside atmosphere at the roof level.

Our geotechnical recommendation for a shallow mat foundation for the structure was a cost-effective and efficient solution as opposed to the more expensive pile foundation typically found beneath structures on closed landfills.

CANDELA LOFTS
Hoboken, NJ

On the site of a former candle factory, Candela Lofts pays homage to an era before electricity. Langan provided environmental testing and remediation services for the redevelopment, which has achieved Passive House Certification — the highest performance standard in the world. Designed as a self-sufficient, zero-energy set of residences, the development establishes a new threshold for sustainability in residential design, using advanced energy modeling, building systems, and building envelope assembly.

We faced multiple challenges due to the building's former use as an industrial business. As part of the environmental due diligence, Langan completed a Phase I Environmental Site Assessment/Preliminary Assessment and Soil and Groundwater Investigation. Based on our finding, a number of areas of concern (AOCs) were identified on the site and further investigated. A Langan LSRP managed and supervised these AOCs in accordance with the Site Remediation Reform Act.

Langan worked with the demolition and site contractor to oversee the building demolition. We helped address the remediation of on-site hotspots as well as historic fill removal and disposal.

OUR SERVICES:

Environmental Engineering

Licensed Site Remediation Professional (LSRP)

Remediation Oversight

CLIENT:

Bijou Properties

ARCHITECT:

Nastasi Architects

Credit: Nastasi Architects

THE NEW SCHOOL
New York, NY

OUR SERVICES:

Environmental Engineering

Phase II Environmental Site Investigation & Waste Characterization Report

Geotechnical Engineering

CLIENT:

The New School

ARCHITECT:

SOM (Design Architect)

SLCE Architects (Residential Architects)

STRATEGIC PARTNERS:

The Dusrt Organization

DeSimone Consulting Engineers

Founded in 1913, The New School established itself as New York City's premiere progressive school for social change. Located in Greenwich Village, the school expanded its academic and student "social" spaces with construction of a 16-story educational facility. Development included demolition of a building and construction of a 375,000 SF structure with two cellar levels. The building houses seven floors of academic and classroom space, including a large auditorium, and nine floors of efficiency dormitory apartments (totaling 600 beds).

Langan's environmental engineers supervised a field investigation and prepared a Phase II ESA report for The New School. Our team completed geoprobe soil borings, the installation of 3 temporary monitoring wells, and the collection of 62 grab soil samples, 11 composite soil samples and 2 groundwater samples.

Langan site/civil engineers developed the site grading, site water, storm drainage and sanitary sewer design for the project. We helped aquire permits through New York City Department of Environmental Protection and addressed issues such as layout, grading, earthwork, drainage, storm water management, utility connections, and utility relocations.

REMSEN AVENUE YARDS
Brooklyn, NY

The New York City Department of Environmental Protection (DEP) Repair Facility was our first sustainable project in the city. Langan provided multi-disciplinary services for the reconstruction of the 60,000 SF Repair Facility, which includes administrative offices, staff facilities, storage and workshops. The 2.5-acre site is in the Canarsie section of Brooklyn,

Langan performed an extensive stormwater runoff and water usage analysis to maximize the capture and reuse of rainwater for numerous site operations, such as filling DEP jet-flusher trucks, site washdown, and dust control of material stockpiles. Our site civil team also provided services for the site grading and drainage, underground utilities, and vehicular circulation and layout for the site, which is home to more than 70 various DEP maintenance vehicles and two fueling stations. We were also responsible for obtaining site construction permits from the DEP, DOT (paving plans), and the MTA for construction work related to an LIRR railroad embankment bordering the site.

Langan developed the geotechnical investigation program and prepared the geotechnical engineering study. We evaluated the subsurface conditions and provided recommendations for foundation design and construction.

We also conducted environmental investigations for historical use, current environmental conditions, and intrusive soil and groundwater testing. After we completed our investigation, we prepared estimates for remediation and a Remedial Action Plan (RAP). The RAP included recommendations for closure of a groundwater system, removal of underground storage tanks, and handling and disposal of petroleum contaminated soil and groundwater. DEP approved the RAP. Our team then prepared plans and specifications to implement the remediation.

The building is a LEED-certified facility.

OUR SERVICES:

Geotechnical Engineering

Phase I/Phase II Environmental Site Assesments (ESA)

Environmental Engineering

CLIENT:

New York City Department of Design and Construction

ARCHITECT:

Kiss + Cathcart Architects

STRATEGIC PARTNER:

Buro Happold

BUSHWICK INLET PARK
New York, NY

OUR SERVICES:
Environmental Engineering
Waterfront Engineering
Topographic and Boundary Surveys
Underwater Sonar Surverying

CLIENT:
New York City Department of Parks and Recreation (NYCDPR)

ARCHITECT:
Kiss + Cathcart Architects

AWARDS:
2014 ACEC NY, Gold Award
2014 AIA COTE Green Project, Honorable Mention

Langan participated in the revitalization of five-acres on the Greenpoint-Williamsburg waterfront. The multifaceted-public park includes a two-story building (13,300 GSF) with a sloped roof with green spaces. The middle of the site contains a soccer field and the western portion of the site contains landscaped and waterfront walkways. Additional spaces include administrative and parks department offices, maintenance facilities, comfort stations, public meeting rooms and a kitchen for catering public events. This project received LEED Platinum certification for its innovative sustainable design.

Langan's multi-disciplinary team of engineers provided services for all aspects of this project. Creative phased permitting was utilized to open the park's soccer field before completion of the building structure. Services included a geotechnical engineering subsurface investigation and subsequent foundation recommendations; waterfront engineering; complete surveying of the project area including complete boundary and topographic survey including underwater sonar scanning along the East River.

Langan environmental engineers completed a Phase I ESA and gained New York City Department of Environmental Protection (DEP) approval for E-designation for the project. We processed extensive New York State Department of Environmental Conservation permitting and DEP tidal wetlands and stormwater permitting for the site.

Langan site/civil engineers provided improvements for site drainage including innovative drainage and irrigation solutions utility design and surface/subsurface drainage.

Credit: Paul Warchol

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