

John Voorhees

Senior Water Resources Engineer

Education

MS, Civil and Environmental Engineering, University of Wisconsin-Madison, 1989
BS, Civil and Environmental Engineering, University of Wisconsin, Madison, 1986
BS, Social Change and Development - Economics, University of Wisconsin, Green Bay, 1986

Years of experience

34

Registrations/Certifications

Professional Engineer
Professional Hydrologist

Professional affiliations

American Society of Civil Engineers

Standard Oversight Council Teams

Wet Detention Pond Design
Vegetated Swales
Proprietary Stormwater Filtration Devices
Dry Detention Systems

Mr. Voorhees has 34 years of experience with stormwater management in both the public and private sectors. Most notably, he is co-author of the widely used urban stormwater pollution model WinSLAMM (Source Loading and Management Model). WinSLAMM is a standard tool for evaluating stormwater pollution and stormwater control device effectiveness in urban areas and is also recognized by the Wisconsin Department of Natural Resources as a model of choice for compliance with the stormwater regulatory program. As a PV & Associates partner, he continues to update and revise the program code, teaches short courses throughout the country on the model's application and is also responsible for some PVA administrative tasks .

His project work includes industrial, transportation, and municipal stormwater quality control practice design; hydraulic, floodplain, and hydrologic modeling; stream restoration and biofilter design; site drainage and design; marina, erosion control, and highway design; groundwater modeling; and stormwater-related construction projects. He has developed stormwater runoff and erosion control rules, design standards and design training for the Wisconsin Department of Transportation, and has performed WisDOT statewide stormwater pollutant loading analyses and assisted WisDOT with meeting its TS4 requirements.

Mr. Voorhees has also worked extensively on innovative BMP design, regulatory compliance, and evaluation of stormwater control device effectiveness. This includes, for example, designing transportation and industrial stormwater quality control systems, performing field investigations to develop wetland protection compliance plans and evaluating grass swale and catchbasin water quality data to develop computer model algorithms for those practices.

Private and Public Sector Engineering Experience

PV & Associates, Partner, 2001 – Current
Earth Tech/AECOM, Senior Water Resources Engineer, 2006 – Current
WisDOT, Stormwater and Erosion Control Engineer, Madison, WI, 2001 – 2006
JJR, Project Engineer and Office Manager, Madison, WI, 1996 – 2001
Warzyn, Project Engineer, Madison, WI, 1991 – 1996
OTAK, Project Engineer, Kirkland, WA, 1989 – 1991

Selected Project Experience

Stormwater Quality Management, Planning, and Design

City of Madison, Wingra Creek Parkway and Waterway Study/Streambank Stabilization, Madison, Wisconsin.

Evaluated the streambank and streambed quality as part of a study to rehabilitate the creek and convert it into a water and bike trail. Designed bioengineered streambank restoration measures and minimal dredging to restore the creek to navigable condition, and presented the results at public meetings. Prepared streambank stabilization construction documents using bioengineering techniques.

USG Interiors, West Detention Pond/Infiltration Basin Treatment System, Walworth, Wisconsin. Developed conceptual and final design and oversaw preparation of construction documents for a wet detention pond/infiltration basin treatment

system to address the light-weight pollutants from the facility. The project required both a long-term water quality analysis of the system using WinSLAMM and a peak flow analysis using SWMM to account for stormwater pumping. [01/01/2008-12/31/2008]

Wisconsin Department of Transportation - Southwest Region, USH 12-14 Seminole Highway Interchange Arboretum Parking Lot Rain Garden Design, Madison, Wisconsin. Designed the rain gardens for a half-acre parking lot in the University of Wisconsin Arboretum to have essentially no stormwater discharge while meeting arboretum aesthetic requirements. [02/01/2008]

City of Fond du Lac, Stormwater Management Plan, Fond du Lac, Wisconsin. Evaluated alternative stormwater best management practices for a city-wide stormwater management plan. Alternatives included sizing and siting wet detention basins, catch basins, biofilters, porous pavement, grass swales, disconnecting drainage systems, and street sweeping. [01/01/2005-12/31/2005]

Various Clients, WinSLAMM Analysis, Various Locations, Wisconsin. Performed modeling to evaluate the stormwater runoff quality (with different stormwater control scenarios) of the villages of Kohler and Wilson and town of Sheboygan using the batch processor component of WinSLAMM and GIS data from each community. [01/01/2005-12/31/2005]

City of Tomah, Electric Substation Stormwater Management Design and Construction, Tomah, Wisconsin. Evaluated an electric substation site for compliance with Wisconsin stormwater regulatory requirements, designed interception trenches and erosion control for the site and prepared the construction documents. [01/01/2005-12/31/2005]

Neenah Foundry, Foundry Biofiltration Design, Neenah, Wisconsin. Developed the hydraulic analysis and prepared construction documents for a biofilter located on a foundry site. Key concerns were peak flow control and water quality improvement using an engineered soil and native plants. [09/01/2005]

Milwaukee County, Bradford Beach Rain Garden System, Milwaukee County, Wisconsin. Reviewed design documents for the Bradford Beach rain garden/biofiltration systems, a set of six rain gardens designed to reduce bacteria loadings to the Milwaukee County beach on the Lake Michigan shore. The reviews modified the design documents so they conformed to state biofiltration design standards and previous biofilter design experience, and also followed proper construction document requirements. [08/01/2007]

Neenah Foundry, Parking Lot Biofiltration Design, Neenah, Wisconsin. Developed final design and oversaw preparation of construction documents for a series of biofilters for a new parking lot. Key concerns were peak flow control and water quality improvement using an engineered soil and native plants integrated with a parking lot design accessible to factory employees. [08/01/2006]

Neenah Foundry, Stormwater Management Control System, Neenah, Wisconsin. Neenah Foundry, Stormwater Management Control System, Neenah, Wisconsin. Designed and prepared plans for the Foundry stormwater treatment system, including the pumping system, settling pond and inclined plate settling tank. Key consideration was to reduce TSS discharge concentration to 50 mg/L using particle size distribution developed from site data. [02/01/2005]

Wisconsin Department of Transportation - North Central Region, Business 51 Environmental Assessment, Plover, Wisconsin. Prepared the stormwater environmental assessment for this 3.2-mile urban highway reconstruction project. Developed overall drainage system conceptual plan for the project, which required coordination between DNR, WDOT, and village of Plover water quality design standards. Final recommendations included median biofilters, extensive use of sumped catch basins, and bridge deck treatments to reduce salt use. Subsequent work involved preparing a detailed stormwater quality analysis to determine the location of the proposed biofilters. The analysis included a review of various median and apron alternatives for the village of Plover. [01/01/2006-01/01/2010]

Wisconsin Department of Transportation - District 4, Stormwater Mapping and Illicit Discharge Detection, Various Locations, Wisconsin. Project manager and lead engineer for drainage system mapping and illicit discharge investigations, which include locating highway outfalls and delineating drainage basins. [07/01/2004]

City of Racine, Stormwater Management and Erosion Control Ordinance Review, Racine, Wisconsin. Developed comprehensive flow charts and checks lists for the city's new erosion control and stormwater management ordinance so that city staff can easily meet all relevant ordinance requirements. [09/01/2004-11/30/2004]

King County, SeaTac Master Drainage Plan, King County, Washington. Conducted nonpoint source analysis; modeled delivery of metals and nutrients to receiving waters on a source area basis for an urbanizing basin. Analyzed the effectiveness of various controls (e.g., catch basins, street sweeping) on pollutant loading levels. [Prior to AECOM]

Recycling Client, Industrial Site Stormwater Control, Wisconsin. Designed stormwater management controls at a metal recycling plant to reduce nonpoint source pollution from runoff. [Prior to AECOM]

Wisconsin Department of Natural Resource, Urban Stormwater Modeling, Wisconsin. Developed runoff, suspended solids, and metals parameters for calibration of the urban nonpoint source water quality model, SLAMM, and programmed enhancements to the model. [Prior to AECOM]

Rumar Manufacturing, Mayville, Erosion Control, Wetland Mitigation, and Stormwater Plans, Wisconsin. Prepared an erosion control plan, wetland mitigation plan, and stormwater management plan for an industrial site that impacted wetlands. Project required extensive coordination with Wisconsin DNR staff and the contractor. [Prior to AECOM]

Didion Milling, Erosion Control Plans, Cambria, Wisconsin. Prepared erosion control plans, detention pond design, and site work construction documents to protect site wetlands and improve quality of runoff contaminated by both floating and settling particles from grain milling operation. Worked on-site with the DNR to develop emergency erosion control measures. [Prior to AECOM]

University of Wisconsin, Stormwater Plan Review, Madison, Wisconsin. Reviewed the university's stormwater management plan as a part of the campus wide master planning process. Commented upon the strengths (e.g., salt loading master analysis) and where improvements, such as an illicit discharge investigation, could be made. [Prior to AECOM]

Wayne County, Rouge River Stormwater Management, Wayne County, Michigan. Calculated annual stormwater volumes from urban areas that enter wetlands along the Rouge River using small-storm hydrology analysis procedures. Resulting analysis was used to design a stormwater bypass system to protect and enhance existing wetlands. [Prior to AECOM]

Wisconsin Department of Natural Resources, SLAMM Model Calibration, Wisconsin. Performed the site land use and source area inventory, evaluated runoff and pollutant data, and developed runoff, suspended solids, and metals parameters for the calibration of the urban nonpoint source water quality model, SLAMM, and programmed enhancements to the model. [Prior to AECOM]

City of Madison, SLAMM for Windows Model Development, Madison, Wisconsin. Programmed the urban nonpoint source water quality model, SLAMM. Responsible for analyzing stormwater runoff data and control practice data, to develop the algorithms that are used in the WinSLAMM program. Other efforts include developing and enhancing the user interface for the programming, and writing the computer code to make the algorithms and interfaces operational. [Prior to AECOM]

Wisconsin Department of Transportation, STH 26 Wetland Investigation, Jefferson County, Wisconsin. Evaluated the impact of new highway alignment and profile on the wetland immediately downstream of the project. Work included the field investigation and report that described the minimal impact of the highway on the wetland system, and also proposed design alternatives that would reduce the impacts to the wetland water balance even further. [Prior to AECOM]

Minnesota Pollution Control Agency, Stormwater PAH Source Study, St. Paul, Minnesota. Performed a literature review-based study of and prepared the report sections that evaluated the applicable control treatment practices for polycyclic aromatic hydrocarbons (PAHs) in stormwater. [05/01/2008-07/01/2008]

Wisconsin Department of Transportation, WisDOT Stormwater Mapping – District 4. Worked with GIS staff to develop the site maps needed to report, as required in Attachment A4 of the DNR-DOT Memorandum of Understanding. The Wausau area maps included contours, ortho-photos and all relevant road networks and labels. After site reviews were completed, developed the graphic requirements for analyzing the data used for the stormwater pollutant loading analyses and the associated drainage areas and outfall locations. [2004]

Stormwater Training & Manuals

WinSLAMM Help Files and Algorithm Descriptions. Lead author for the help file guidance and algorithm descriptions found in the WinSLAMM web site and program.

North American Stormwater and Erosion Control Association, WinSLAMM Training, Madison, Wisconsin. Project manager for preparation and presentation of a WinSLAMM training course. [01/01/2009-12/31/2009]

Wisconsin Department of Transportation, Stormwater Quality Training, Wisconsin. Project manager and lead trainer for a training program for WisDOT engineers so the DOT can meet stormwater quality requirements described in the cooperative agreement and in TRANS 401, the DOT stormwater regulations. Training includes modules on grass swale, wet

detention pond and biofiltration/infiltration design using WinSLAMM as well as preparing overall stormwater conveyance system design training for non-pipe drainage systems. Manual preparation includes rewriting the DOT design manual sections on riprap and open channel design. [01/01/2007-12/31/2009]

Wisconsin Department of Transportation - Bureau of Equity and Environmental Services, Stormwater Services Training, Madison, Wisconsin. Project manager and lead engineer for training in the use of the WinSLAMM urban water quality model; chairing and completing work of the department's riprap design committee, completion of work on the DOT Facilities Development Manual riprap design standards; and providing as-needed stormwater consulting services. [05/01/2005]

City of Beloit, WinSLAMM Training, Beloit, Wisconsin. Prepared and presented a one-day course on the use of the WinSLAMM water quality model to city engineering staff. Emphasis was on design and evaluation of stormwater infiltration and biofiltration control practices for city projects. [02/01/2010]

Iowa Department of Natural Resources, WinSLAMM Training, Cedar Falls, Iowa. Prepared and presented a one-day course on the use of the WinSLAMM water quality model to introduce use of the program to public and private engineering staff in the state. Emphasis was on the design and evaluation of stormwater infiltration and biofiltration control practices. [02/01/2010]

Transportation Design & Drainage

Wisconsin Department of Transportation, I-39/90 Corridor Improvements, State Line to Madison, Wisconsin. Corridor management team drainage engineer responsible for the writing the 100+ page corridor drainage manual addressing non-standard hydrology, drainage design, water quality, aquatic organism passage, landscaping and erosion control issues for the corridor. Prepared the TMDL analysis to determine the water quality improvement goals for corridor projects. Reviewed all construction plan drainage, erosion control and water quality features and provides guidance for all non-standard drainage issues. Developed and presented training to corridor design engineers to implement the corridor water quality requirements. Reviewed contractor erosion control implementation plans and provide erosion control inspections as needed. Coordinated native vegetation management work to meet corridor water quality and aesthetic goals. [June, 2012 – present]

Wisconsin Department of Transportation, STH 60 - Prairie du Sac to Lodi Road, Wisconsin. Assisted in preparation of final plans for the highway, including design of the rural drainage system and erosion control system for the site. Used the existing hydrologic analysis to determine pipe, culvert, and ditch sizes for the area of concern. Evaluated minimum cover requirements for selected pipe materials. [Prior to AECOM]

Wisconsin Department of Transportation, STH 67 Fish Passage Culvert Design and Stream Re-Alignment – Fond du Lac County, Wisconsin. Responsible for preparing the hydrologic and hydraulic analysis, and the culvert design, for a culvert draining to Long Lake. The culvert also required an aquatic organism passage analysis using HEC-26. Design included preliminary and final structure design for a single cell box culvert and a sheet pile retaining wall to provide fish passage for spawning walleye. Extensive public involvement with the surrounding community and local public interest groups and close coordination and collaboration with agencies including the WDNR, ACOE and FHWA was necessary. The project included stream realignment and wetland improvement work to improve fish spawning habitat upstream of the structure.

Wisconsin Department of Transportation, STH 136 - CTH PF to Rock Springs, Sauk County, Wisconsin. Developed, with the project manager, the urban and rural preliminary alignments, profiles, and cross sections for a 3.6-mile rural/urban highway. Responsible for modeling and preparing construction documents for all stormwater systems (rural and urban) for the project. [Prior to AECOM]

Wisconsin Department of Transportation - Southwest Region, Lien Road/I-90 Drainage Design, Madison, Wisconsin. Project manager for a drainage analysis to determine pipe and drainage swale design for a bridge widening and associated local roadways. [08/01/2008-12/01/2009]

Wisconsin Department of Transportation - Southeast Region, STH 33 Emergency Repair, Various Locations, Wisconsin. Project manager for an emergency evaluation to determine the culvert sizes necessary to repair the damaged drainage system along STH 33 between the Wisconsin River and I-39. Managing site inspections, meetings, survey data collection, and drainage analysis using the revised Conger Method to evaluate the basin hydrology and either HY-8 v 7.0 or HEC-RAS v 3.1.1 to evaluate the culvert hydraulics. [06/01/2008-12/31/2009]

Wisconsin Department of Transportation - District 1, TRANS 233 Drainage Review, Wisconsin. Project manager for review of drainage designs submitted to the DOT by developers to determine if the designs are in compliance with TRANS 233, a state rule that requires developers to limit the stormwater drainage impacts from their projects on DOT highway facilities. [06/01/2006-12/31/2006]

Wisconsin Department of Transportation - District 1, STH 33 Stormwater Design Review, Fox Lake, Wisconsin. Project manager and lead engineer for review of storm sewer drainage design submitted to the WDOT. The initial design required replacement of all existing storm sewers in the project, and WDOT wanted to review this analysis. Managed the review of the drainage basin hydrology using a detailed site review, SCS routing procedures, and use a routing model (XPSWMM) to evaluate the existing system hydraulic design. The more complex modeling procedures demonstrated that the existing drainage system did not need to be replaced. [06/01/2006-12/31/2006]

Wisconsin Department of Transportation - District 1, STH 80 Storm Sewer Design, Highland, Wisconsin. Project manager for the hydrologic and hydraulic design to convey stormwater runoff from the STH 80 project to the local creek in an area with flooding problems and a steep hill that causes significant inlet bypass problems throughout the site. Managing modeling of the drainage area, development of a proposed drainage design, and preparation of plans and specifications for the design using Wisconsin DOT standards. [04/01/2006]

Wisconsin Department of Transportation - District 1, STH 140 Drainage Hydraulic Analysis and Design, Clinton, Wisconsin. Project manager for project to prepare the hydrologic and hydraulic analyses for an area of the village that floods regularly, to prepare a conceptual storm sewer design for the entire village. [06/01/2006-12/31/2006]

Indiana Department of Transportation, I-465/USH 40 Interchange Stormwater Drainage Design, Indianapolis, Indiana. Prepared the stormwater pipe drainage design and detention pond design for this I-465 corridor intersection in Indianapolis. The project was done per Indiana DOT drainage design requirements for a 1.0-mile section of USH 40, and included side street pipe systems and a network of detention ponds to meet the master plan drainage requirements. The work required significant coordination with and modifications to the overall project drainage master plan for the area. [01/01/2007-12/31/2007]

Indiana Department of Transportation, I-465/Sam Jones Expressway Airport Interchange Stormwater Drainage Design, Indianapolis, Indiana. Prepared the stormwater pipe drainage design and detention pond design for this I-465 corridor intersection in Indianapolis. The project was done per Indiana DOT drainage design requirements for a 0.7-mile section of the Sam Jones Expressway, and included a network of detention ponds to meet the master plan drainage requirements. The work required significant coordination with and modifications to the overall project drainage master plan for the area. [01/01/2008-12/31/2008]

Wisconsin Department of Transportation, USH 12, Baraboo, Wisconsin. Reviewed the hydraulic and hydrologic results of the storm sewer design and oversaw development of the StormCAD hydraulic model used to check the initial analysis, and analyzed those result. [Prior to AECOM]

Wisconsin Department of Transportation, USH 51 Detention Pond Design, Lafayette County, Wisconsin. Prepared the HydroCAD model of a proposed detention pond to reduce flow entering a farm drainage structure after construction of the new highway section. Determined the effect of various discharge structures and pipe sizes on the flow rate. [Prior to AECOM]

Wisconsin Department of Transportation, STH 26/Jefferson Bypass Detention Pond Design, Jefferson County, Wisconsin. Lead engineer for a series of detention ponds designed to detain flows discharging from the drainage basin to rates were lower than the existing conditions. The HydroCAD model included three detention ponds and a multiple culvert drainage network as part of the bypass highway system. Prepared the conceptual design, grading and earthwork estimates. [Prior to AECOM]

Wisconsin Department of Transportation, STH 26 – Townline Road, Rock County. Prepared a XP-SWMM model of the Townline Road drainage basin along the STH 26 corridor in Rock County to evaluate the potential for flooding in the kettle basin in the southeast quadrant of the Townline Road/STH 26 intersection.

Wisconsin Department of Transportation, STH 23 Detention Pond Design, Sauk County, Wisconsin. Reviewed proposal to add stormwater detention to a proposed development to maintain the predevelopment peak flow beneath the highway. Determined that the proposed pond only had half of the needed detention storage, based upon the information submitted by the developer. [Prior to AECOM]

Wisconsin Department of Transportation, STH 23 Storm Sewer Design - CTH W to CTH P, Sauk County, Wisconsin. Prepared the HydroCAD model to evaluate the drainage basins and determine the runoff flows for 12 miles of STH 23 between the CTH W and CTH P intersections, developed a TRANS 401 drainage evaluation for the area. [Prior to AECOM]

Wisconsin Department of Transportation, STH 89 Drainage Design – Avalon Rd to Poet St, Sauk County, Wisconsin.

Reviewed and updated the hydrology and hydraulics of the existing HydroCAD model to determine the runoff flows for an urban section of STH 89. Developed three alternatives to convey runoff through two major basins while maintaining existing flows and provided a summary report and the appropriate design information to complete the plans. The project included plans for an underground rock detention storage area as well as swale drainage and detention storage at various site locations. Changes in peak flows were minimized to address downstream flooding concerns.

Transportation Policy and Guidance

Wisconsin Department of Transportation Bureau of Technical Services - TRANS 401/TS4 Permit Reports. Prepared annual Stormwater Reports submitted to the DNR for the Department since 2008. The reports document the WisDOT stormwater management plan and goals, and describe the stormwater-related activities the Department has performed. More recently, the reports also report how the Department has met the requirements described in the TS4 permit issued by the DNR. [2008 – 2022]

Wisconsin Department of Transportation Bureau of Equity and Environmental Services, Stormwater Management Assistance. Project manager and lead engineer for preparation of the 2004 stormwater memorandum of understanding for submittal to the Wisconsin Department of Natural Resources. Managing training assistance to WisDOT on stormwater models, and providing other general stormwater management technical assistance. [09/01/2005]

Wisconsin Department of Transportation Bureau of Project Development, Fish Passage Study, Statewide. Wrote the draft study to describe fish passage requirements for designing WisDOT culverts. The project included the preparation of the analysis of five culverts in the state using the HEC-26 Fish Passage design methodology, and included writing the draft design guidelines for WisDOT culverts that need fish passage accommodations as well as the preparation of the design spreadsheet for fish passage based upon HEC-26.

Wisconsin Department of Transportation Bureau of Equity and Environmental Services, Guidance for Stormwater Practices Near Airports. Prepared FDM sections that included rewriting selected section of the DOT Facilities Development Manual Chapters 10 and 13. The Chapter 10 section is the draft guidance for stormwater management and quality planning for airport facilities. The guidance included a summary of FAA rules for addressing stormwater concerns near and at airports, and defines the water quality control practices that are appropriate for airport vicinities. The list includes fifteen practices that do not rely upon open water treatment practices, but instead rely on particulate filtering, infiltration, or hydrodynamic control practices.

Wisconsin Department of Transportation Bureau of Project Development, FDM Chapter 13 Open Channel Updates. While at WisDOT as a District Stormwater Engineer, organized and coordinated the team of engineers and academics who began work on the updates to the WisDOT FDM riprap design guidance. After joining AECOM, became the project manager and lead author for the updates to Section 13-30 (Channels and Road Ditches) of the FDM. The updated sections are the design sections on the hydraulic design of open channels, grass and rock riprap lined channels and rock riprap lined chutes. The work also included updating Standard Specification 606, Riprap. [2003 -2009]

Wisconsin Department of Transportation Bureau of Project Development, FDM Chapter 13 Riprap Analysis Updates. Modified FDM Chapter 13-30-25 (Rock Riprap Lined Channels) to incorporate the new Extra-Light Riprap classification. While at WisDOT as a District Stormwater Engineer, organized and coordinated the team of engineers and academics who began work on the updates to the WisDOT FDM riprap design guidance.

Wisconsin Department of Transportation Bureau of Technical Services, FDM Chapter 10 Stormwater Quality Updates. Project manager and lead author for the updates to Sections 10-25, -30, and -35 (Stormwater Quality, Stormwater Quality Analysis, and Stormwater Control Measure Selection) of the FDM. The updated sections describe the new processes developed to analyze, track and report the stormwater quality practices constructed to meet the required pollutant load reductions for highway projects for wet detention ponds, catchbasins, grass swales, filter strips, biofiltration and street cleaning. [2011 – 2013, 2015]

Wisconsin Department of Transportation Bureau of Equity and Environmental Services, Statewide Stormwater Pollutant Loading Analysis. Project manager and lead engineer for developing the statewide stormwater quality pollutant loading analysis for the Wisconsin DOT. The work included developing the policy and procedures to evaluate the loadings from the state highway network, negotiating with the state Department of Natural Resources, directing the collection and development of the GIS data base used for the analysis, developing the modeling approach using WinSLAMM, and preparing the reports. [08/01/2008]

Wisconsin Department of Transportation Bureau of Technical Services, Stormwater Control Practice Inspections. As lead engineer and trainer, directs and coordinates stormwater control practice inspections for WisDOT stormwater facilities throughout the state. Duties include overseeing a staff of engineers and interns to perform inspections and inspection document reviews, coordinating activities with the WisDOT Statewide Stormwater Engineer and addressing unusual situations such as potential illicit discharges and urgent site maintenance issues. [2021 – 2023]

Wisconsin Department of Transportation Bureau of Technical Services, Stormwater Pollution Prevention Plan (SWPPP) Inspections. As project leader, directs and coordinates SWPPP inspections for the 31 WisDOT facilities (Division of Transportation System Development and salt storage sites) throughout the state. Duties include overseeing a staff of engineers and interns who perform inspections and coordinating activities with the WisDOT Statewide Stormwater Engineer. [2022 – 2023]

Wisconsin Department of Transportation District One, TRANS 401 Rule Development. While at WisDOT District One as the District Drainage Engineer, participated in the development of the TRANS 401 (Construction Site Erosion Control and Stormwater Management Procedures for Department Actions) rule. Duties included participating in regular meetings between WisDOT, WDNR and the Wisconsin Transportation Builders Association, and providing comments, text and reviews for each version of the document. [2003 – 2004]

Wisconsin Department of Transportation Bureau of Project Development, Design-Build Guidance Development. Team Leader for the development of the Drainage and Vegetation sections of Book 2 of the Design-Build templates for WisDOT. Work included writing, coordinating team comments and editing both the drainage Section 12, which also included water quality requirements, and the vegetation Section 14, which also included erosion control requirements. Also commented upon Section 4, Environmental Compliance to provide consistency between Section 4 and the other two sections. [2021]

Wisconsin Department of Transportation Bureau of Technical Services, FDM Chapter 10 Erosion Control Matrix Updates. Updated the WisDOT Erosion Control Slope and Channel Matrices to reflect current practices and provide more complete and consistent guidance to designers who apply the matrices to determine appropriate erosion control practices on WisDOT erosion control plans. [2001 – 2002]

Wisconsin Department of Transportation Bureau of Equity and Environmental Services, Statewide Stormwater Pollutant Loading Analysis. Project manager and lead engineer for developing the statewide stormwater quality pollutant loading analysis for the Wisconsin DOT. The work included developing the policy and procedures to evaluate the loadings from the state highway network, negotiating with the state Department of Natural Resources, directing the collection and development of the GIS data base used for the analysis, developing the modeling approach using WinSLAMM, and preparing the reports. [On-going]

Hydraulic & Hydrologic Analysis & Design

Milwaukee County, Bender Park, Oak Creek, Wisconsin. Designed stormwater drainage system and erosion control system for \$12 million shoreline protection, bluff stabilization, and shoreline park project in Milwaukee County. Prepared construction documents for the harbor breakwater, launch ramp, and park areas. Other responsibilities included overall project management, scheduling, preparing cost estimates, construction administration and shop drawing review, and all client contact. [Prior to AECOM]

Silver Bay Marina, Marina Design, Minnesota. Project manager for preliminary engineering and design of a 144-slip marina located on the north shore of Lake Superior. Prepared the stormwater and water quality analysis for the project. [Prior to AECOM]

Ewa Marina, Stormwater Drainage Design, Oahu, Hawaii. Developed and evaluated 14 alternative grading strategies and stormwater drainage designs for an 800-acre residential, commercial, and marina development. Evaluation included earthwork balance and open channel/storm sewer drainage design calculations. [Prior to AECOM]

Developer, Detention Analysis, Multiple Cities, Illinois. Prepared the detention analysis, drainage design, and construction documents per local requirements, for a recreation center and a church. [Prior to AECOM]

Wisconsin Department of Administration, State Office Complex Erosion Control and Stormwater Design, Madison, Wisconsin. Developed an erosion control plan for a state office building complex that increased erosion control protection while minimizing costs by emphasizing phased installation and prompt inspection. The stormwater drainage network design included curb and gutter, sheet flow/infiltration, and wetland/detention drainage systems. [Prior to AECOM]

Huston Properties, Erosion Control Plans, Dane County, Wisconsin. Used the Dane County soil loss analysis approach to prepare erosion control plans for two quarries and a residential development. [Prior to AECOM]

Ozaukee County, Hammes Lake, Ozaukee County, Wisconsin. Evaluated the surface and groundwater components, using surface and groundwater models and a pump test, of a small drainage basin to determine the probability for the successful construction of a private, constructed lake in fractured limestone bedrock. Determined proper liner requirements, lake outlet design, and prepared construction documents. [Prior to AECOM]

Lafarge Quarry, Water Balance Models, Alpena, Michigan. Prepared a series of annual water balance models to evaluate the impact of surface and groundwater flows into a quarry under varying surface area and rainfall conditions, and wrote the Water Management plan to present the quarry's options for controlling their water. [Prior to AECOM]

Macomb County, Groundwater Well Capacity Analysis, Macomb County, Michigan. Estimated the radius of influence and the cone of depression for a water supply well in Michigan to evaluate the effects of the well on nearby property owners.

City of Appleton, Floodplain Modeling, Appleton, Wisconsin. Developed the HEC-RAS floodplain model for an unmapped section of the Apple Creek and designed a relocated section of the creek and replaced the existing section of the model with the new channel configuration. [09/01/2005]

Douglas County, CTH A Culvert Design, Douglas County, Wisconsin. Designed the new culvert crossing for CTH A to address periodic flooding over the roadway. The analysis included a HEC-RAS surface model to analyze culvert performance and the use of two different hydrologic methods to determine the peak flows for the drainage basin, which included significant wetland areas. [05/01/2007-12/31/2007]

World Dairy Center, Drainage Study, Madison, Wisconsin. Performed water balance analysis for a closed drainage basin in urbanizing area, developed stormwater drainage system, and designed the hydraulic systems necessary to protect the site wetlands. [Prior to AECOM]

Edgewood College, Stormwater Management Plan, Madison, Wisconsin. Prepared drainage plan for highly impervious campus site. Plan required applications of surface and underground detention storage, infiltration, and careful redesign of the conveyance system to redirect high runoff flows. Also prepared construction site erosion control plan. [Prior to AECOM]

Village of Cottage Grove, Township Flood Mitigation and Wetland Enhancement Plan, Cottage Grove, Wisconsin. Developed a wetland/stormwater management plan convert a 400-acre farm field into a wetland and detention pond system for a major village drainage basin. Prepared preliminary regional analysis of stormwater drainage system to wetland complex. Designed erosion control system per Dane County standards. [Prior to AECOM]

Federal Emergency Management Administration, Applegate River Flood Insurance Study and Floodplain Analysis, Oregon. Conducted flood insurance study using HEC-2 for a 25-mile segment of the Applegate River; CAD maps were developed for both the floodway and floodplains. [Prior to AECOM]

City of Redmond, Sanitary Sewer Study, Washington. Analyzed sewer system options for a 1.7-square-mile area, using spreadsheet computer models for flow rates and capacities. [Prior to AECOM]

Thaden Parcel, Stormwater Analysis, Cottage Grove, Wisconsin. Developed a basin-wide analysis to determine the impact of a proposed development on a drainageway. Integrated SCS hydrographs from the basin with a SWMM model of the site to evaluate the hydraulics of a very flat drainage system with extensive backwater conditions. [Prior to AECOM]

Moseman, Floodplain Modifications, Sauk City, Wisconsin. Evaluated Wisconsin River site encroachment impacts using HEC-2 and submitted modifications to DNR for review. [Prior to AECOM]

Wisconsin Department of Transportation, STH 51/113 Intersection Wetland Analysis, Madison, Wisconsin. Used HEC-2 and HEC-RAS to evaluate water surface profiles and wetland creation potential of the area adjacent to a branch of Starkweather Creek. Designed discharge controls into the wetland for a detention pond adjacent to the intersection. [Prior to AECOM]

City of Davenport, Northeast Development, Davenport, Iowa. Prepared the hydrologic and hydraulic analyses as well as erosion control plan for a golf course and residential/commercial development project. Developed stormwater construction plans based upon the analysis. [Prior to AECOM]

Wisconsin Department of Transportation, USH 51 Floodplain Analysis, Detention Pond Design and Creek Rechannalization, Grant County, Wisconsin. Prepared the HydroCAD model of proposed detention ponds to match existing flows after construction of the new highway section. Evaluated the impact of new highway alignments and profiles on the Little Platte River floodplain using HEC-RAS. Prepared the streambank rechannalization design for the sections of

Blockhouse Creek affected by the project, addressing streambed, meander, pool/riffle, channel slope and bank protection considerations. [Prior to AECOM]

Wisconsin Department of Transportation, STH 113 Rain Garden and Creek Rechannelization, Columbia County, Wisconsin. Evaluated the impact of new highway alignment and profile on the floodplain of Spring Creek, south of Lodi, using HEC-RAS. Designed and oversaw the construction of the rain garden requested by the city. Prepared the streambank rechannelization design for the sections of Spring Brook affected by the project, addressing streambed, meander, pool/riffle, channel slope and bank protection considerations. [Prior to AECOM]

Wisconsin Department of Transportation, STH 80 Creek Rechannelization, Grant County, Wisconsin. Prepared the streambank rechannelization design for the tributary to the Mounds Branch of the Little Platte River affected by the project, addressing streambed, meander, pool/riffle, channel slope and bank protection considerations as well as upgrading the stream culvert to facilitate fish passage. [2008]

Environmental Remediation

Livingston County, Shiawassee River, Livingston County, Michigan. Analyzed the extent of PCB contamination in floodplain and river sediments through a statistical analysis of sediment transport (modeled using HEC-6), floodplain elevation and velocities, and extensive sample data. [Prior to AECOM]

IMC, Groundwater Remediation, Iowa County, Wisconsin. Developed remediation alternatives for groundwater contaminated with fertilizers and herbicides. Responsible for design and operations oversight. [Prior to AECOM]

Sturgis and Eagle Mills, Groundwater Contamination Remediation, Various Locations. Developed groundwater extraction alternatives to remediate aquifer contamination using the finite difference analytic element groundwater flow models SLWL and Quickflow. [Prior to AECOM]

US Environmental Protection Agency - Region V, Hagen Farm Superfund Site Investigation, Stoughton, Wisconsin. Authored the alternatives array document and feasibility study for the groundwater unit. [Prior to AECOM]

US Environmental Protection Agency - Region III, Superfund Site Investigation, Shenango, Pennsylvania. Designed and installed the stormwater runoff and leachate monitoring network and conducted the preliminary river sediment contamination investigation. The monitoring network included twelve flow meters and eight samplers. [Prior to AECOM]

US Environmental Protection Agency - Region V, Subsurface Contaminant Transport, Multiple States. Performed the contaminant transport analysis in both the unsaturated zone and the aquifer for selected VOCs at a Superfund site and a gas station; estimated acceptable soil cleanup levels based upon groundwater contaminant standards using USEPA contaminant transport models SESOIL and AT123D. [Prior to AECOM]

Developer, Smith Island Development, Everett, Washington. Developed preliminary designs for 700,000-cubic-yard waterfront commercial development fill project in Puget Sound area; designed site sedimentation ponds using CAD; responsible for acquiring appropriate government agency approvals. [Prior to AECOM]

Publications

Pitt, R. J. Voorhees, and S. Clark, "Evapotranspiration and related calculations for stormwater biofiltration devices: Proposed calculation scenario and data," in: W. James, E.A. McBean, R.E. Pitt and S.J. Wright, eds, Stormwater and Urban Water Systems Modeling, Monograph 16, CHI, Guelph, Ontario, pp. 309-340. 2008.

Voorhees, J. and M. Reynolds, "Meeting Wisconsin Department of Transportation TMDL and TSS Reduction Goals", StormCon Conference Proceedings, Portland, OR, August 2014

Pitt, R. and J. Voorhees, "Using decision analyses to select an urban runoff control program" Chapter 4 in: W. James, E.A. McBean, R.E. Pitt, and S.J. Wright, eds., Contemporary Modeling of Urban Water Systems , ISBN 0-9736716-3-7, Monograph 15, CHI, Guelph, Ontario, pp 71-107, 2007.

Pitt, R., D. Williamson, and J. Voorhees, "Review of historical street dust and dirt accumulation and washoff data," in: W. James, K.N. Irvine, E.A. McBean, and R.E. Pitt, eds., Effective Modeling of Urban Water Systems , Monograph 13, CHI, Guelph, Ontario, pp 203-246, 2005.

Pitt, R. and J. Voorhees, "SLAMM, the Source Loading and Management Model," in: Richard Field and Daniel Sullivan, eds., Wet-Weather Flow in the Urban Watershed , CRC Press, Boca Raton, pp 103-139, 2002.

- Pitt, R. and J. Voorhees, "Unique Features of the Source Loading and Management Model (SLAMM)," in: W. James, ed., *Advances in Modeling the Management of Stormwater Impacts*, Volume 6, Computational Hydraulics International, Guelph, Ontario and Lewis Publishers/CRC Press. pp. 13-37, 1997.
- Pitt, R. and J. Voorhees, "Source loading and management model (SLAMM)," Seminar Publication: National Conference on Urban Runoff Management: Enhancing Urban Watershed Management at the Local, County, and State Levels. March 30 - April 2, 1993. Center for Environmental Research Information, U.S. Environmental Protection Agency, EPA/625/R-95/003, Cincinnati, Ohio, pp. 225-243, April 1995.
- Pitt, R., M. Lilburn, S. Nix, S.R. Durrans, S. Burian, J. Voorhees, and J. Martinson *Guidance Manual for Integrated Wet Weather Flow (WWF) Collection and Treatment Systems for Newly Urbanized Areas (New WWF Systems)*, U.S. Environmental Protection Agency, 612 pgs., 2002.
- Pitt, R., S. Clark, and J. Voorhees, "Water removal in bioretention devices by evapotranspiration processes and related issues affecting performance," Conference CD, Urban Runoff Modeling Conference: Intelligent Modeling to Improve Stormwater Management, Engineering Conferences International, Arcata, CA, July 2007.
- Pitt, R. and J. Voorhees, "The use of WinSLAMM to evaluate combinations of source area and outfall controls using continuous, long-term rainfall records," Conference CD, Urban Runoff Modeling Conference: Intelligent Modeling to Improve Stormwater Management, Engineering Conferences International, Arcata, California, July 2007.
- Pitt, R. and J. Voorhees, "The selection of an urban runoff control program using decision analyses," World Environmental & Water Resources Congress 2007, Conference CD, ASCE - EWRI, Tampa, Florida, May 2007.
- Pitt, R. and J. Voorhees, "The use of WinSLAMM to evaluate the benefits of low impact development," Low Impact Development Conference: Putting the LID on SWM, (conference CD-ROM) College Park, Maryland, Sept. 21-23, 2004.
- J. Voorhees, "Wisconsin DOT Rain Garden Design and Construction in Lodi, Wisconsin," StormCon, Orlando, FL, August 2005.
- Pitt, R., S. Clark, and J. Voorhees, "Water removal in bioretention devices by evapotranspiration processes and related issues affecting performance," Urban Runoff Modeling Conference: Intelligent Modeling to Improve Stormwater Management, Engineering Conferences International, Arcata, California, July 2007 (invited).
- Pitt, R. and J. Voorhees, "The use of WinSLAMM to evaluate combinations of source area and outfall controls using continuous, long-term rainfall records," Urban Runoff Modeling Conference: Intelligent Modeling to Improve Stormwater Management, Engineering Conferences International, Arcata, California, July 2007 (invited).
- Pitt, R. and J. Voorhees, "Demonstration of WinSLAMM, The Source Loading and Management Model," Urban Runoff Modeling Conference: Intelligent Modeling to Improve Stormwater Management, Engineering Conferences International, Arcata, California, July 2007 (invited).
- Pitt, R. and J. Voorhees, "The selection of an urban runoff control program using decision analyses," World Environmental & Water Resources Congress 2007, ASCE - EWRI, Tampa, Florida, May 15-19, 2007 (poster).
- Pitt, R. J. Voorhees, and S. Clark, "Evapotranspiration and related calculations for stormwater biofiltration devices: Proposed calculation scenario and data," Conference on Stormwater and Urban Water Systems Modeling, Computational Hydraulics, Inc., Toronto, February 22 and 23, 2007.
- Pitt, R. and J. Voorhees, "Using decision analyses to select an urban runoff control program," Conference on Stormwater and Urban Water Systems Modeling. Computational Hydraulics, Inc., Toronto, February 23 and 24, 2006.
- Pitt, R. and J. Voorhees, "The use of WinSLAMM to evaluate the benefits of low impact development," keynote address, Low Impact Development Conference: Putting the LID on SWM. College Park, Maryland, Sept. 21-23, 2004 (invited).
- Pitt, R., D. Williamson, and J. Voorhees, "Review of historical street dust and dirt accumulation and washoff data," Stormwater and Urban Water Systems Modeling Conference, Computational Hydraulics, Inc., Toronto, February 19-29, 2004.
- Pitt, R. and J. Voorhees, "Critical Source Area Controls in the SLAMM Water Quality Model," A National Symposium: Assessing the Cumulative Impacts of Watershed Developments on Aquatic Ecosystems and Water Quality, US EPA and Northeastern Illinois Planning Commission, Chicago, Illinois, March 1996 (invited).

Pitt, R. and J. Voorhees, "The Stormwater Quality Detention Pond Model (DETPOND)," 26th Annual Water Resources Conference, University of Minnesota, October 1993.

Pitt, R. and J. Voorhees, "The Source Loading and Management Model (SLAMM)," National Conference on Urban Runoff Management, US EPA, Chicago, Illinois, March 1993 (invited).

Presentations and Training

"Using WinSLAMM v10; Meeting Urban Highway Stormwater Management Goals", WisDOT SWECE One Day Training, HFSTB, Madison, WI, March 2015

"Aquatic Organism Passage Culvert Design-Construction", Road-Stream Crossing Workshop, UW Platteville, Platteville, WI, April 2016

"Aquatic Organism Passage Design Using HEC-26", Road/Stream Crossings: Inventory, Assessment, Design and Construction Workshop, Green Bay, WI, April 2014

"A Vegetation Management Model for Complex WisDOT Projects", ACEC 2020 Transportation Improvement Conference, Wisconsin Dells, WI, March 2020

"Meeting Wisconsin Department of Transportation TMDL and TSS Reduction Goals", StormCon One Day Training, 2014, Portland, OR, August 2014

"Modeling Urban Runoff Quality: An Introduction to WinSLAMM", Minnesota Erosion Control Association One Day Training, Minneapolis, MN, March 2006

"Using WinSLAMM v10 to Meet Urban Stormwater Management Goals", New Jersey Dept. of Environmental Protection One Day Training, Trenton, NJ, January 2013

"WinSLAMM Workshop", StormCon One Day Training, San Antonio, Anaheim, Denver, Portland, Austin, Indianapolis, Seattle, Atlanta, 2010 – 2019,

"Using WinSLAMM v 10; Meeting Urban Stormwater Management Goals", UW Madison Educational Professional Development Two Day Training, Madison, WI, 2010 – 2018.

"Using the Source Loading and Management Model (WinSLAMM) for Urban Stormwater Management", City of Beloit One Day Training, Beloit, WI, February 2010

"Stormwater Modeling Overview using WinSLAMM, the Source Loading and Management Model", USEPA One Day Training, Edison, NJ, March 2008.

"I-39/90 Corridor Water Quality Design Requirements Training", WisDOT One-Half Day Training, Edgerton, WI, May 2013, November 2014.

"Using WinSLAMM to Meet Urban Stormwater Management Goals – Current WinSLAMM Updates", NASECA One Hour Presentation, Wisconsin Dells, Wisconsin, 2016, 2018, 2020, 2022, 2023

"WisDOT Erosion Control Matrices and ECIP Training", Presented to Districts (One Day) and WTBA (One Hour), 2002 – 2004.

"Statewide Annual Stormwater Pollution Prevention Plan (SWPPP) Training" (Assisted with the training development and presentation), Presented to WisDOT Maintenance Staff (One Hour), July 2023