

Laser Scanning Helps Preserve
Historic Biltmore Hotel

Sustainable Design and LEED
Practices Shape Multiple Projects

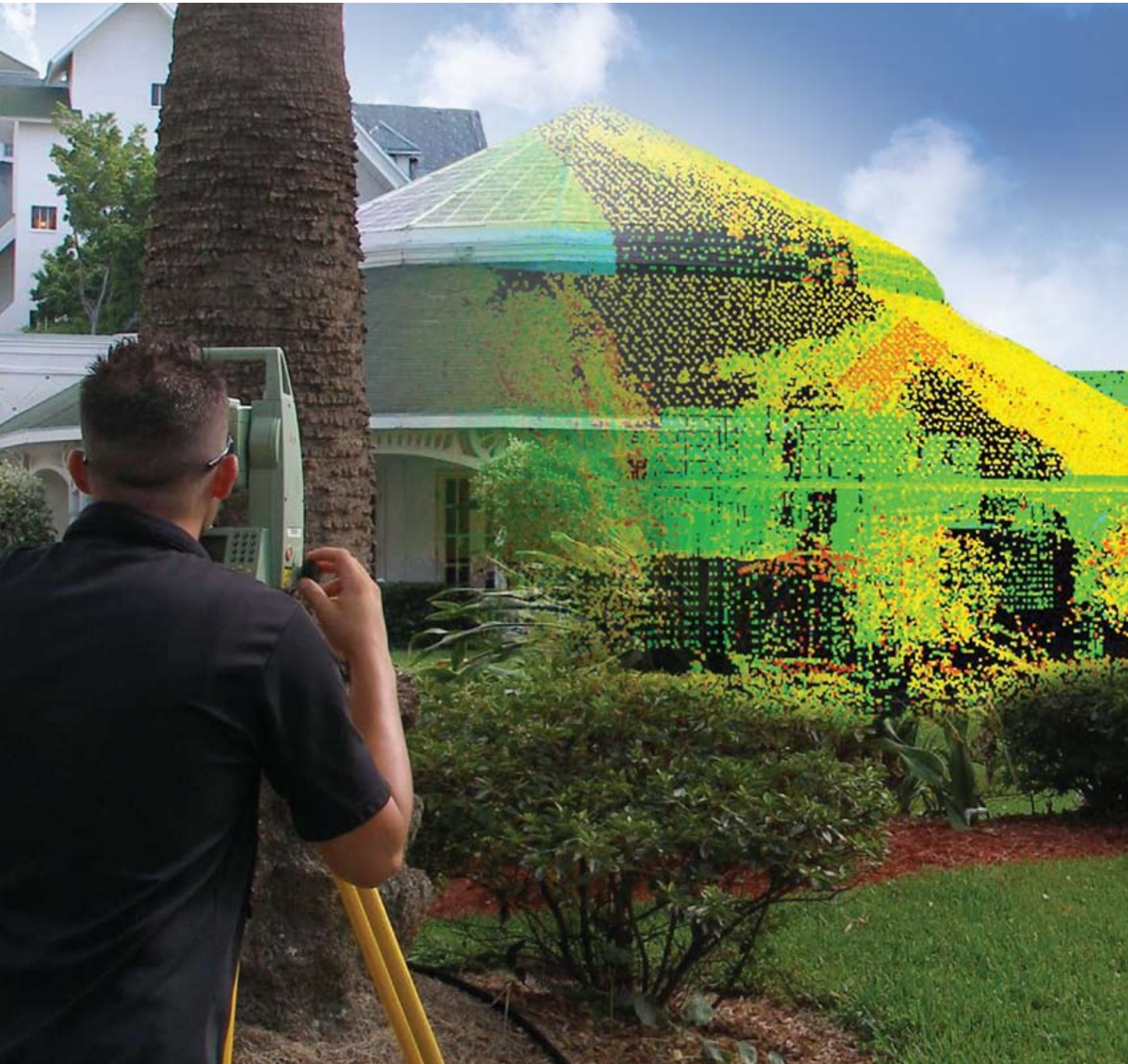
Line Stop Repair Keeps Water
Flowing to Customers

Wastewater Upgrade Protects
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INNER VIEW

A WADE TRIM PUBLICATION

VOLUME 21 ■ NO. 2 ■ 2007



LASER SCANNING HELPS PRESERVE HISTORIC BILTMORE HOTEL

BY ROB DURANCZYK, PS

Wade Trim surveyors joined an impressive list of Belleview Biltmore Hotel visitors when laser scanning was performed on site to support architectural renovation and preservation efforts. This famous west Florida landmark has hosted presidents, celebrities and business tycoons since 1897 and is on the National Register of Historic Places. As-built data collected will assist R. J. Heisenbottle Architects with redesign and remodeling of this Victorian hotel.

Architectural preservation of historic buildings is a priority of governments and citizens across the country. However, obtaining the accurate, as-built data needed to support a renovation can be difficult. Structural beams and roof trusses often have inconsistent dimensions and as-built documents rarely exist to aid the architect during design. Conventional surveying techniques for collecting as-built data require painstaking measurements of buildings using steel tapes, theodolites and photogrammetry. This process is often time consuming and can be cost-prohibitive.

High density laser scanning (HDLS) is an alternative surveying technique that delivers highly accurate and comprehensive data. From a ground-level tripod, the laser scanner is used with a computer to quickly scan a structure and capture vast amounts of as-built data. The combined data points, or point cloud, can then be used with various software applications to generate cross-sections, plans and 3D models to aid in design.

Beginning with the hotel's exterior, Wade Trim surveyors used laser scanning to collect as-built data quickly and safely eliminating the need to climb the hotel's steep roofs and gabled dormers to perform hand measurements. As the largest wood-framed building in Florida, the structure reaches heights of 65 feet in four

and half stories and stretches 600 feet from north to south and 600 feet from east to west. The site also includes three cottages.

Horizontal and vertical control were established around the hotel as the first step in the process to orient the project and enable adjustment using the least squares method. Wade Trim surveyors then established 26 scan world positions to collect data around the exterior of the hotel. While the laser scanner was busy collecting data from each scan position, the field crew recorded additional physical measurements of specific features to ensure quality control and data integrity.

Once the exterior scanning was completed, the data points collected at each scan world position were combined, or registered, into a single point cloud. The point cloud contained millions of individual data points that created a 4-gigabyte digital file. To make the data easier to manage, data sets or smaller point clouds were established by hotel wing for the architect to use during design.

Minimizing disturbances to hotel guests was critical since the hotel remained open during the entire process. Exterior scanning was performed without paint markings and stakes were only temporarily inserted into the ground. Interior scanning was performed from dusk to early morning hours when guests were least likely to be disturbed by crews. Scanning was easily performed during these late hours since light is not required to operate the scanner.

Establishing control inside the building presented challenges since no permanent marks could be made on the antique hardwood flooring or carpeting. Existing nails in the wood flooring were used as control points when practical or non-marring strips of tape were placed each evening and removed in



SCAN DATA WAS COLLECTED FROM 26 EXTERIOR LOCATIONS AND THEN COMBINED INTO A SINGLE POINT CLOUD THAT IS BEING USED TO CREATE A 3D MODEL.

the morning. This allowed the crews to extend the control network precisely into the hotel's interior rooms.

Interior laser scanning was performed on the hotel's Tiffany and Starlight Ballrooms as well as its restaurant and lounge areas. The most difficult area was a 500-foot long hallway lined with alcoves, doorways, stained glass windows and eclectic shops. Once completed, the scanned point data from the hallway tied the horizontal and vertical datums of the interior together into a single data set.

The architects will use the scan data with their software to determine existing dimensions and create elevation drawings and plans for remodeling this elegant hotel over the next few years. The scan data will be integrated into



SURVEYORS WERE ABLE TO COLLECT AS-BUILT DATA OF THE ENTIRE HOTEL AND THREE COTTAGES DURING A TWO-WEEK PERIOD WITHOUT CLIMBING THE STEEP ROOFS AND GABLE DORMERS.



ALL INTERIOR SCANNING WAS PERFORMED AT NIGHT TO MINIMIZE GUEST INCONVENIENCE.

remodeling plans that will preserve the hotel's unique historical features. A single digital 3D point cloud of data will be submitted with the proposed plans for historical restoration to the National Register of Historic Places. The hotel's historical aspects must be maintained during remodeling to retain its historic designation.

Laser scanning's ability to document existing buildings safely, without impact, and at a faster pace and lower cost may inspire architects and building owners to take a closer look at rehabilitation, adaptive reuse and historic preservation. The resulting high quality detail and 3D modeling capabilities provide owners with confidence that the data accurately represents every detail of the building, no matter how complex or intricate.

Data collection in the field took two weeks and electronic data manipulation and management took a few days in the office. The entire process was unobtrusive for this 110-year-old hotel that was threatened with possible demolition in 2004 and then listed as number 11 on the list of the most endangered historic places. By using laser scanning, surveyors were able to quietly collect data without impacting this historic jewel.

Rob Duranczyk, PS, manages and coordinates our laser scanning services for architectural, engineering and industrial projects in Florida. He can be reached in our Tampa office at 888.499.9624 or rduranczyk@wadetrim.com.

SUSTAINABLE DESIGN AND LEED PRACTICES SHAPE MULTIPLE PROJECTS

BY LEAH GROYA, AICP, LEED-AP & JUSTIN KOWATCH, PE

Incorporating sustainable design and green building practices into projects clearly benefits the environment, but can also lead to economic, health and community benefits. As documented by the U.S. Green Building Council (USGBC), green design and construction practices conserve natural resources and improve air and water quality. They also reduce operating costs, enhance the asset value and profits, improve employee productivity and satisfaction, minimize strain on local infrastructure, and contribute to the overall quality of life.

The USGBC's Leadership in Energy and Environmental Design (LEED) certification program sets the nationwide standard for "green projects." LEED certification provides independent, third-party verification that a building project meets the highest green building and performance measures. Intended to promote a whole-building approach to sustainability, LEED provides a benchmark for the design, construction and operation of green projects by rating performance in six environmental categories: sustainable site development; water efficiency; energy and atmosphere; materials and resources; indoor environmental quality; and design innovation.

LEED certification is awarded in various levels based on the building and site's overall environmental performance. First, a project must be registered with the USGBC. The certification process then requires that specified prerequisites be met and awards performance "credits" within each of the categories based on the design and construction of the project. A total of 69 possible credit points can be earned. Four potential ratings (Certified, Silver, Gold or Platinum) are designated depending on the number of credits earned.

While the LEED program was originally focused on buildings and structures,



EFFICIENT USE OF ENERGY AND WATER HELPED BATA'S NEW TRANSIT CENTER EARN LEED GOLD CERTIFICATION WHILE PROVIDING A COMFORTABLE ENVIRONMENT FOR USERS.

it now encompasses the elements and impacts of the entire project development such as site selection, density, storm water management, plant material selection, pervious materials, parking provisions, transportation alternatives, protection and restoration of natural resources, and recycling. Wade Trim engineers, landscape architects and planners are helping clients achieve LEED certification and incorporate sustainable design concepts into a wide variety of projects.

The **Bay Area Transportation Authority** brought home the Gold with its new LEED-certified transit center in Traverse City, Michigan. Clark, Walter and Sirrine Architects designed the \$1.2 million green facility that boasts a large concourse/waiting area, staff offices, public restrooms, and an outdoor

bus canopy for loading. Wade Trim helped achieve LEED credits in four categories by designing the facility's mechanical and plumbing systems. An in-floor radiant heating system, powered by a 95% efficient condensing/modulating boiler plant, and highly efficient 16 SEER air conditioning systems reduce energy consumption and impacts on the environment. Energy recovery ventilation systems, operated by a CO₂ demand-based control system, provide a comfortable indoor environment for occupants. The building's mechanical systems exceeded energy code requirements by more than 57%, earning 10 of the 39 LEED credits. Water conserving plumbing fixtures and waterless urinals were installed to reduce water consumption by 35% over conventional fixtures.

Wade Trim is working with **Henry Ford Health Systems** on a 300-bed hospital in West Bloomfield Township, Michigan. The project is seeking LEED certification. The expansion involved a wetland assessment, tree inventory, and wetland remediation design that enhanced acres of natural areas with thousands of new trees, shrubs and native plantings. The quality and quantity of storm water runoff is being controlled by conveying drainage through vegetated swales, allowing water to filter and infiltrate the soil. Four pretreatment systems with grit and oil removal chambers are being installed upstream of a detention pond, and a rain garden drainage system with a porous base is used to sustain some of the wetlands with filtered surface water and reduce runoff.

The **Greater Cleveland Regional Transit Authority** is working with the Project for Public Spaces, Inc., design team on the Little Italy Transit Station that will provide a major transit hub at the Little Italy and University Circle neighborhoods in Cleveland, Ohio. The project is conceptually designed with several sustainable elements and is seeking LEED certification. The project includes a new transit station as well as Cleveland's first transit-oriented development that will integrate the light rail commuter station with private development within the center of Little Italy and University Circle. Wade Trim is providing structural engineering and landscape architecture services that incorporate storm water best management strategies, water reuse and streetscape improvements that will integrate active and passive sustainable design practices.

Wade Trim provided civil/site design and landscape architecture services for a heavily-wooded, 14.67-acre site in Solon, Ohio. The **KeyBank Operations Center** is currently applying for LEED certification. The project included siting the building to preserve exist-

ing wetlands and significant vegetation, extensive native plantings, a naturalized detention pond and storm water bioretention area, restoration with meadow grasses, and vegetated swales.

In order to handle the ultimate build-out condition peak wastewater flows for Canton Township, Michigan, the **Western Townships Utilities Authority** (WTUA) is constructing an expansion of their Lower Rouge Equalization Basin facilities to double the amount of flows it can store and pump to the wastewater plant for treatment. Wade Trim has incorporated several sustainable practices in the design of the new 5.5 million gallon basin and pump station located on a seven-acre site. The concrete basin is being constructed completely underground with the roof covered with soil and a vegetated no-mow tall fescue. The entire site is being restored with native prairie plantings and storm water management features to reduce the quantity and improve the quality of storm runoff from the site. Storm water management features include a retention pond with sediment forebays to capture and treat first flush runoff, and an approximate 6,000 cubic foot storage capacity rain garden. The rain garden will feature a variety of plants to assist in filtering impurities in the storm water runoff prior to discharging to the Rouge River. Rather than additional impervious surface, grass pavers are being used for a secondary vehicle access for periodic maintenance of the basin and pump station.

The Historic Jordan School Restoration project in St. Petersburg, Florida, is anticipating a LEED-Silver certification under the LEED for Schools rating system. Opened in 1925, **Jordan Park Elementary** was the City's second school for African American children and once served over 1,000 children in 12 classrooms. Wade Trim is assisting Renker Eich Parks Architects with

civil/site design and engineering, site electrical engineering, and landscape architecture services to restore the building and incorporate sustainable practices. Anticipated site elements currently being discussed include pervious materials for parking areas, landscaping that conserves water and protects the environment, and a water wise irrigation system.

The environmental, economical and social benefits of green design practices are far-reaching. Wade Trim helps clients identify opportunities and incorporate these practices into a wide variety of facilities and project sites. Designing a sustainable future is something we can all be proud of.

Leah Groya, AICP, LEED-AP, is a professional planner who uses her knowledge of sustainable design concepts to help clients create projects and developments that balance site function with environmental responsibility. She can be reached in our Taylor, MI, office at 800.482.2864 or lgroya@wadetrim.com.

Justin Kowatch, PE, helps clients integrate LEED and green building practices into mechanical, plumbing and electrical systems designs for a variety of facilities. He can be reached in our Gaylord, MI, office at 800.968.4440 or jkowatch@wadetrim.com.

LINE STOP REPAIR KEEPS WATER FLOWING TO CUSTOMERS

BY DAN BROOKS, PE

Interrupting water service to customers is something that no water utility looks forward to. Yet, it is often a necessary part of routine maintenance and repair work that keeps a water system operational and reliable.

Water main valves are the primary method used to control the flow of water. Typically, when a water main break occurs or a repair is needed, the valves on either side of the repair area are shut off so the work can be performed. Critical parts of a water system, valves require regular maintenance and operation and eventually replacement due to age or inoperability.

In Garden City, Michigan, six inoperable valves along the City's 16-inch main transmission line had complicated water main repairs for several years. Without the ability to use the valves, breaks in the water system required shutting down water service to two or three blocks at a time for repair work. Concerns were also growing that a break in the 16-inch transmission line would severely impact the supply of water from two meter pits that connect to the City of Detroit's system. A valve replacement project was needed to restore the full operability of their water system.

Traditional valve replacement methods require suspending service to all customers located between the valves used to shut down a main. This shutoff area typically covers a distance of over 1,000 feet. This method also changes the flow of water in the water main breaking loose mineral deposits and other sediments that can lead to rusty water complaints. In addition, most shutoffs require closing multiple valves, increasing the chances of breaking other water mains.

An alternative valve replacement method called line stop repair overcomes several limitations of traditional methods. The line stop method

enables repair work to be performed without affecting large areas of the water system. Temporary plugs are installed just upstream and downstream of the broken valve to isolate it for repair. The need to take customers out of service is limited or eliminated and water service for emergency needs can be maintained. After the repair is complete, the temporary plugs are removed restoring the water main's original flow.

Based on the City's desire to expedite the project and minimize further impacts on its residents, Wade Trim engineers recommended the line stop approach for the City's valve replacement program. In fall 2006, the City replaced six valves over a six-week construction period. Wade Trim assisted the City with prequalifying contractors, provided full construction administration services, and worked with the line stop manufacturer to prepare contract documents.

"Line stopping enabled us to replace our 16-inch valves with minimal impact on residents," says Jack Barnes, Garden City DPW Director. "Now our crews can make water main repairs more efficiently."

Line stop technology has numerous applications for pressurized pipes from making emergency repairs to performing required maintenance while minimizing service interruptions.

Dan Brooks, PE, is a Project Manager with more than 25 years of roadway, water and wastewater systems experience. He provides day-to-day engineering services and design support to the City of Garden City and other municipalities. He can be reached in our Taylor, MI, office at 800.482.2864 or dbrooks@wadetrim.com.



PIPE FITTINGS ARE INSTALLED (ABOVE) ON EITHER SIDE OF A VALVE TO ENABLE THE LINE STOP (BELOW) TO ISOLATE THE AREA FOR REPAIR.



Tarrant County, Texas, is one of the fastest growing urban counties in the United States. The area's population and commercial growth is creating an increased demand for quality engineering services and opportunities for Wade Trim's land development services market segment. To expand our geographic reach, we have opened an office in the Dallas/Fort Worth Metroplex that will focus on land development services and provide water resources and municipal engineering.

Dave Speicher, a professional engineer who previously worked with Wade Trim until he relocated to Texas in 2004, is heading up our efforts. Dave worked for the Cities of Fort Worth and Denton where he was responsible for reviewing water, sewer and development plans. He understands local and state development requirements in the area including the various state and local permits, and city and county platting requirements. He is currently coordinating the plan review and approval process for Rayzor Ranch in Denton.

Wade Trim's Land Development market segment has previously worked in Texas. We worked with ADA Architects on Restaurant Depot's first four sites in Texas. Wade Trim performed site design for one new warehouse and three retrofitted warehouses in Richardson, San Antonio, Dallas and Houston.

Wade Trim's new office is located at:
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David Speicher, PE, joined our Dallas/Fort Worth Metroplex office as a Vice President. Dave will manage large land development and municipal engineering projects. He previously worked for Wade Trim's Bay City office before relocating to Texas in 2004. He brings valuable experience approving land development projects from the municipal perspective and helping developers guide their projects through the approval process. Dave previously served as an engineer with the Cities of Fort Worth and Denton.



David White, PE, Project Manager in our Indianapolis office, was named a Diplomate of the American Academy of Water Resources Engineers. The certification was developed to improve the practice, elevate the standards and advance the profession of water resources engineers. In addition, Dave presented at the Indiana Water Environment Association's Collection System Committee Green Solutions Seminar where he shared how horizontal directional drilling, used to install a force main, protected a sensitive project area in Oakland County, MI.



Randy Cunningham joined our Water Resources Group in the Indianapolis office where he will be responsible for hydraulic/hydrologic modeling, storm water design and water resources projects. Randy received his Bachelor of Science degree in Civil Engineering from Purdue University in 2005. He is completing his Master of Science in Civil Engineering in May of 2008. He is a member of the American Society of Civil Engineers and the National Society of Professional Engineers.



Daniel Cabage, PE, joined our Municipal Services group in the Bay City office. He will assist with project development, maintain ongoing relationships, and manage projects for local government clients. Dan has more than 18 years of experience in planning, design and construction of public utility and transportation projects. He is a member of the American Public Works Association.



Jason Macdonald joined our Taylor office as a site designer where he will provide community planning and environmental design services to municipal and private sector clients. With over 10 years of experience working for land planning and landscape architecture firms, his expertise includes residential and retail master planning, streetscape improvements, urban revitalization, parks and recreation master planning, and landscape design.



Cliff Ashley joined our firm as CADD Manager in our Information Technology Group. Working from our Flint office, he will oversee and provide CADD and engineering application support to all our offices. He has more than 20 years of experience in engineering, surveying, and support, with extensive knowledge of Bentley engineering applications, especially Microstation and Geopak.

WASTEWATER UPGRADE PROTECTS FLORIDA KEYS CLIENT NOTES



The Florida Keys Aqueduct Authority (FKAA) is working to upgrade their Hawk's Cay Wastewater Treatment Facility to meet Advanced Wastewater Treatment (AWT) effluent limits by 2010 and provide centralized service to Hawk's Cay, Conch Key and Duck Key. The facility consists of two separate treatment plants and a reclaimed water storage and pumping system.

While some preliminary work had been completed by FKAA, Wade Trim evaluated the plants and recommended improvements. Without adequate record drawings of the facility, field measurements and depth readings in the tanks were taken to develop "as-measured" documents. Flow calculations, layout alternative evaluations, and CADD drawings were completed.

Results confirmed that a four-stage Bardenpho Process AWT plant with a Class I reliable reclaimed water system could be constructed to achieve the desired effluent quality. The design converts the two plants into a single treatment train and augments capacity by constructing another, similar treatment train adjacent to the existing one. This layout will facilitate plant operations and maintenance activities.

Maintaining treatment quality during construction is critical. A design-bid-operate-build process requires the contractor to prove plant operability and assume operations from 30 days prior to construction until six months after construction is complete. A detailed construction sequence was created to help the contractor understand the requirements of maintaining capacity and operations during construction. This approach creates a single point of responsibility for operations and construction activities.

The **City of Indianapolis Department of Public Works** is undertaking a sewer rehabilitation in the Hill Valley Estates neighborhood and German Park area. Field assessment and scoping evaluation for manhole and sewer rehabilitation have been completed. Design of improvements has begun and will include plans and specifications to replace an exposed 12-inch sewer line crossing in a creek, installation of a new 12-inch sewer connection to the South Marion County Regional Interceptor, and rehabilitation of several manholes. A scoping evaluation of Lift Station 221 will begin soon. The project is expected to bid next Spring.

The **Port Austin Area Sewer and Water Authority's (PAASWA)** newest customer is online with completion of final testing of the water system serving **Pointe Aux Barques Township**. Wade Trim worked with the Township and PAASWA to develop a transmission and metering system that provides water from the Huron Regional Water Authority's microfiltration plant in the Village of Port Austin. The new system will serve the Township's needs in the peak summer months and into the future.

The **City of Tawas City** improved their water system and enhanced fire protection services by replacing 3,000 feet of water main along Fifth Avenue and Matthews Street. In addition, work is underway to update the City's Five-Year Parks and Recreation Plan and complete a 20-Year Capital Improvements Plan.

The **Michigan Department of Transportation Cass City TSC** is replacing the M-19 and M-46 bridges over the Cass River. The M-46 bridge was widened from 30 feet to a 44-foot, three-span, I-beam poured deck and installed with caissons due to scour risk. The M-19 bridge is a single span, three-sided box structure with concrete footings and HMA pavement approaches. In addition, two bridges are being rehabilitated and replaced along the M-25 corridor in the Villages of Sebawaing and Caseville. Wade Trim is providing full construction engineering and inspection oversight on these projects.

The **Manatee County Public Works Department** selected Wade Trim to provide storm water piping design, permitting and construction administration services for Canal Road from 24th Street Court East to 29th Street East. Florida Power and Light is proposing to construct a transmission line in the Canal Road right-of-way and filling and piping of the ditch is required. The project will be constructed in 2008.

Tomoka Engineering is assisting **Florida Landmark Communities** with wetland and topographic surveying to map 50 miles of wetland for the first phase of Ormond Crossings, a 6,000-acre, mixed use project in Ormond Beach. Centered around a proposed new Interstate 95 interchange, the development will provide industrial and commercial sites to support future employment opportunities.




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InnerView is a publication of Wade Trim Group, Inc. © 2007

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