



AMERICAN COUNCIL
OF ENGINEERING COMPANIES
OF MONTANA

Engineering Excellence Grand Project Award

presented to

**STAHLY ENGINEERING
& ASSOCIATES, INC.**

for

Town of Manhattan Wastewater Treatment Plant

prepared for the

Town of Manhattan, Montana



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The Manhattan treatment plant is a 400,000 GPD plant in two trains, containing six 24 x 5.0 Bio-Wheel™. It is able to nitrify and denitrify, with two anoxic basins ahead of the aeration basins. Two conventional flight and scraper clarifiers are used. Three Penn Valley RAS/MLSS pumps are located in a separate pump room. The plant is designed for a future expansion to 0.8 MGD. At this time the effluent limits are 20 mg/L for BOD₅ and TSS, however the plant is designed for ultimate limits of 10 mg/L for BOD₅, TSS, total Nitrogen and less than 1 mg/L for Phosphorus which may be imposed soon because of its discharge into the Gallatin River.

The plant is of reinforced cast-in-place concrete construction. Each train is 20' wide by 14' deep. The general contractor was Johnson-Wilson Construction of Great Falls, Montana. Construction was begun in Spring 2007, with placement of the concrete walls being the first priority.

Following completion of the concrete work, the Bio-Wheel™ were installed in the aeration tanks. Note the patented "A-Frames" which suspend the wheels from the top of the concrete walls, so that the wheels may be removed without dewatering the tank or taking the train out of service.

A side-on view of the "A-Frames." Six 1½" stainless steel bolts hold the frames down to the top of the tank. The trunnion blocks with their UHMW bushings are preassembled in the "A-Frames."

Each frame is leveled in both directions before the installation of the wheel axle. Notice the lifting eyes on the top angles of the frames.

Each wheel is assembled in the tank. The wheel in the center is awaiting installation of the last six rows of plates.

Three rows of plastic plates are preassembled on the galvanized end plates, ready for installation. Each row is 8'-4" (2.5 m) in length.

The completed 24 x 5.0 Bio-Wheel™ are 20'-0" (6 m) wide by 14'-9" (4.5 m) in diameter and contain 31,500 sq. ft. (2930 sq. m.) of fixed film surface area.



The control building, sludge aeration tank and sludge press building were completed in November 2008.

The Bio-Wheel™ control panel is extremely simple. Each train of three wheels contains a single D.O. probe which is connected through a PLC to the wheels to regulate rotation speed and therefore the amount of oxygen in the mixed liquor.

The control panel contains primarily on-off switches for each wheel, and an operator interface to manually set the speed of each wheel.

On a clear, cold day at the end of November 2007, the wheel installation is completed and the plant is ready for initial start-up. The chains and SEW Eurodrive gearmotors are in place.

Clean water is piped into the bio-tank for checking the operation of the wheels. Note the condensation rising from the “warm” water.

A final check is made as the wheel begins its first rotation. The chain tension is checked and found to be proper as the wheel rotates at 0.45 RPM.

The three Bio-Wheel™ on the eastern train are in full operation. At this point it is necessary to install the fiberglass covers over the equalization and denitrification tanks.

Notice the RAS/MLSS/WAS pump building in the background adjacent to the clarifiers. The building is heated and is convenient for the operator to check the RAS flow.

For the Manhattan, Montana 400,000 GPD wastewater treatment plant, the Bio-Wheel™ system was chosen for its modest initial cost and low operating cost. The control system is simple and presents few challenges to the operator. A detailed analysis of the oxygen transfer rate indicates that the combination of the fixed film and activated sludge system is considerably more efficient than an activated sludge process alone, approximating 45% more effective wastewater treatment for the same power consumption.

The Bio-Wheel™ provides for easy future expansion to 800,000 GPD by adding two additional three-wheel trains and clarifiers. Although the current permit limits do not call for denitrification, the plant has been designed to include this capability.



STAHLY ENGINEERING & ASSOCIATES, INC.

A Montana owned firm, Stahly Engineering & Associates, Inc., established in Helena, Montana in 1970, currently operates offices in Helena and Bozeman. Our 39 years of experience include survey, water and wastewater system design, structural design (bridges and buildings), site development, environmental assessment and permitting, and all elements of transportation engineering. SE&A is a moderate sized firm with a long history of serving state and local government entities in Montana. Our staff of approximately 34 employees has the experience and expertise needed for complex projects, yet is able to focus on providing personalized service to clients. We are known for accuracy, flexibility, innovation, and the ability to work with clients and contractors to produce successful projects.

The American Council of Engineering Companies (ACEC) of Montana recently announced the results of its 2009 Engineering Excellence Awards. Stahly Engineering & Associates, Inc. was awarded the Montana Grand Project Award for their work on the Town of Manhattan Wastewater Treatment Plant. The new system treats the Town's wastewater to levels well below permit requirements through the use of a biological nutrient removal treatment system that utilizes three separate bacterial communities. The project also received the Honor Award in the water and wastewater project category.

After an extensive planning and design process and 18 months of fast track construction, the new facility was completed in the spring of 2008. The facility is now fully operational. Stahly Engineering was responsible for all project phases including planning, permitting, design, construction management, start-up, and operation.



Corporate Office
3530 Centennial Drive
Helena, Montana 59601
Phone: (406) 442-8594
Fax: (406) 442-8557

Branch Office
7585 Shedhorn Drive
Bozeman, Montana 59718
Phone: (406) 522-9526
Fax: (406) 522-9528

JOHNSON-WILSON CONSTRUCTORS, INC.

Johnson-Wilson Constructors, Inc. is an employee owned construction company based in Helena, Montana. Johnson-Wilson specializes in Heavy-Civil projects including dam construction and rehabilitation, treatment plants, municipal utilities, and concrete structures. The principals of Johnson-Wilson have over 60 years of heavy-civil construction experience on projects located throughout the United States. Our goal is to provide a work environment where employees have the opportunity to prosper and grow with the company. The company is debt free and has maintained steady growth since starting business in 2002.

Representative projects include the Fort Peck Fish Hatchery Pump House and Intake Structure, Nevada Creek Dam Rehabilitation, Jessup Mill Pond Dam Modification, Creston National Fish Hatchery Treatment System, Durston Road Improvements, Anita and Dry Blood Dam Reconstructions, Manhattan Wastewater Treatment Plant, Hysham Water System Intake Structure, Harlem Water Treatment Plant Improvements, and the Pablo Wastewater Treatment Improvements Project. We focus on projects that have a higher degree of difficulty and require focused and hard-working employees.

H2O INNOVATION INC.

6840 Shingle Creek Parkway
Brooklyn Center, MN 55430
Tel: 763.566.8961
Fax: 763.566.8972
Email: info@h2oinnovation.com

VISIT OUR WEBSITE AT:
WWW.H2OINNOVATION.COM