

Operations Management Services



2015-2016 Annual Operations Report

# Village of Carol Stream





*Thomas R. Vinson*

**CAROL STREAM  
WATER RECLAMATION  
CENTER**

245 N. KUHN RD.

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# 2015-2016 Executive Summary

CH2M is pleased to present the Village of Carol Stream with this annual report, as an overview of activities related to the Village's wastewater facility in 2015.

Proudly serving Carol Stream since 1997, we take pride in the projects we deliver and are excited about taking the wastewater operations into the future. Our goal is to provide you with an overview of daily operations, facility capabilities, improvements, permit compliance, cost containment, and trends as compared with present treatment capacities.

CH2M leadership and dedication to quality service is evident by specific accomplishments found throughout the report. We will discuss specific actions CH2M employees in Carol Stream initiated to continue our exemplary service to the Village. Our support for the Water Environment Federation (WEF), American Water Works Association (AWWA), Illinois Environmental Protection Agency (IEPA), and Fox Valley Operators Association (FVOA) further demonstrates our focus on environmental issues in the state of Illinois.

We would like to convey our appreciation to the mayor, trustees, and Village officials for their support in 2015. CH2M understands the importance of being innovative, resourceful, and flexible partners with our clients in government operations, to provide the best solutions for their utility and environmental needs.

In 2015, CH2M worked closely with the Village, design engineers, contractors, and local industries on many projects involving the Water Reclamation Center (WRC) and Industrial Pretreatment Program (IPP). Below are several examples of this collaboration during the 2015 Capital Improvement Plan:

- Hoffman blower automation
- Kitchen improvements
- Screw pump variable frequency drive (VFD)
- LED lighting
- Supervisory control and data acquisition (SCADA) upgraded features
- New submersible transfer pump for digester
- Influent sand filter slide gates replacement
- Painting blower building and boiler room
- Aeration tank pipe repair
- Maintenance control building rehabilitation
- Upgraded sodium bisulfite (SBS) pumps
- Replacement of nine yard hydrants
- Phosphorus test equipment
- VFD circuit board replacement
- Garage door replacement
- New roofs on administration building and maintenance control building
- Digester valve replacement



The Carol Stream Team: Mike Idzior, Susan Ruta, Andy Liebmann, Dan Hughes, Eric Weberski, and Will King.

## Proudly serving Carol Stream since 1997

# Wastewater Treatment Facility

The Carol Stream WRC is a conventional activated sludge plant permitted to treat 6.5 million gallons per day (mgd) average daily flow. The WRC is staffed 7 days per week, and continually monitored 24 hours per day. The facility is equipped with an automatic dialing alarm (SCADA) system to notify plant personnel of any emergencies.

**6.5** mgd  
design average daily flow

## Repairs

In 2015, the WRC experienced many necessary repairs including:

- Secondary screw pump rehabilitation
- Sand filter gate replacement
- Replacement of yard hydrants
- Recirculation capabilities
- Strip replacement on clarifier sweeps
- Motor replacement on belt press
- Stainless brackets for belt conveyor

**1.76** billion gallons  
influent treated



Secondary screw pump rehabilitation.



Sand filter gate replacement.





Replacement of yard hydrants.



Recirculation capabilities.



Strip replacement on clarifier sweeps.



**In 2015, the WRC experienced many necessary repairs.**



Motor replacement on belt press.



Stainless brackets for belt conveyor.

# Wastewater Treatment Facility

## WRC Improvements

In 2015, we also completed projects to improve the WRC's appearance. Projects included:

- Garage door replacement
- Landscape enhancement and creation of wildlife habitat
- Maintenance control building repairs and rehabilitation (painted the shop, created a work space for fabrication, took out old equipment, etc.)
- Demolition of structures for bike path extension



Garage door replacement.



Landscape enhancement and wildlife habitat.



Maintenance control building repairs and rehabilitation.



Preparing to demolish structures for conversion of turf to native pollinator meadow.

# Wastewater Treatment Facility

## Innovations and Technology

This year also included upgrades in innovations and technology to improve operations at the WRC including:

- Updating the SBS pumps and back-up containment
- Setting gauges on bridges
- New laboratory equipment to test for Phosphorus
- Stainless hose reels fabrication



SBS pumps and back-up containment.



Upgrades to laboratory equipment.





Setting gauges on bridges.



Stainless hose reels fabrication.



This year included innovations and upgrades in technology.

# Wastewater Treatment Facility

## Training

CH2M places a high priority on safety and provides the necessary equipment and training to comply with federal and state regulations. This protects project personnel, the general public from injury, CH2M, and the Village from liability.

CH2M's formal training programs increased staff efficiency and levels of expertise. Our program uses individual training plans, correspondence courses, on-the-job training, and crosstraining, which results in a more versatile staff capable of performing a variety of tasks. Accomplishments in 2015 include:

- Lock out/tag out training
- Arc flash training
- Confined space training
- CPR/AED training
- Increase in certifications (Wastewater Operator Classes I and II)
- Fork lift training
- Welding/metals fabrication training
- Ethics and quality training
- CH2M Project Manager Leadership Summit
- Program of sustainability



Completing hands-on training for Arc flash.



Confined space training.

## Facility Performance

Exhibit 1 summarizes actual effluent plant performance May 2015 – April 2016.

As seen in Exhibit 1, average daily flow for 2015 was 5.38 mgd, or 83 percent of permitted capacity. The 5-day BOD was <3.25 mg/l, or 32 percent of permitted discharge. The TSS was <2.0 mg/l, or 17 percent of permitted discharge, and Ammonia-N was <0.3 mg/l, or 19 percent of permitted discharge.

Exhibit 2 depicts influent BOD and TSS concentrations for 2015-2016.

Exhibit 3 depicts effluent BOD and TSS concentrations for permit compliance for 2015-2016.

Statistical process control procedures were established to ensure continuous compliance with NPDES permit limitations. The mean cell residence time, sludge age, food to microorganism ratio, and sludge volume index are tracked daily to monitor plant performance. Upper and lower control limits have been established to provide guidance when approaching critical stages in the facility's operation.

Exhibit 1

National Pollutant Discharge Elimination System (NPDES) Permit Parameters

Parameter	Average	Limit
Flow (mgd)	5.38	6.5
5-day biochemical oxygen demand (BOD) (mg/L)	<3.25	10
Total suspended solids (TSS) (mg/L)	<2.0	12
Ammonia - N (mg/l)	<0.3	1.5 - 3.9

Exhibit 2

2015-2016 Influent BOD and TSS Concentrations

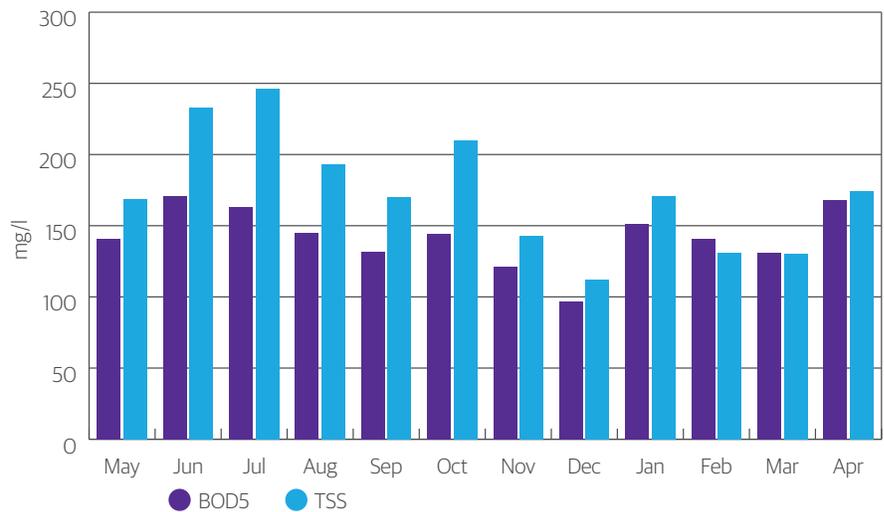
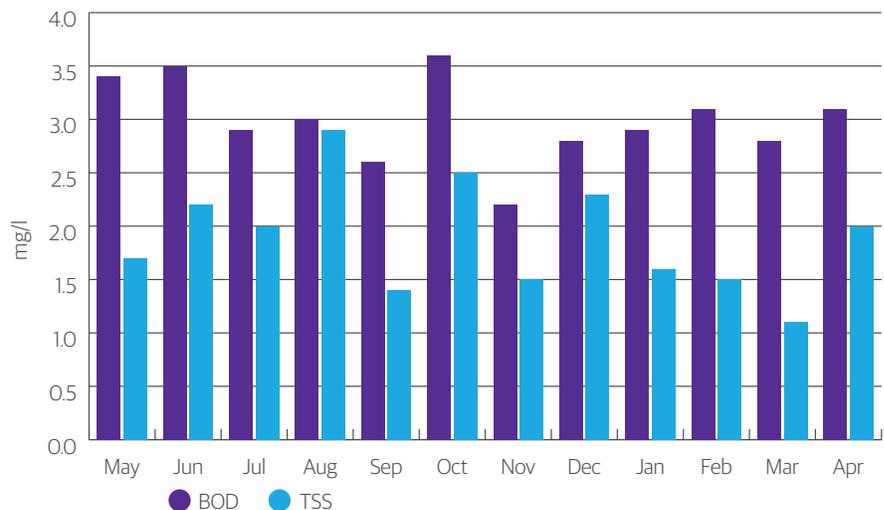


Exhibit 3

BOD and TSS Concentrations for Permit Compliance



# Wastewater Treatment Facility

## Certifications, Awards, and Accomplishments

CH2M employees at the Carol Stream project received new certifications in 2015. Mike Idzior received his Class 2 Wastewater Treatment Works Operator certificate from the IEPA, along with Susan Ruta receiving her Class 1 Wastewater Treatment Works Operator certificate.

The team also took home a coveted Teamwork Award during CH2Ms Leadership Summit, in the Empower Employees category for their inspired work in the community of Carol Stream, and the partnership with the Village. The Summit is our premier leadership learning and networking event where we conduct critical training, share useful information, recognize outstanding achievements, and network in order to better support CH2M projects across the country.

A **Compliance Evaluation Inspection** was conducted at the Carol Stream WRC NPDES Permit No. II 0026352 by Maureen Brehmer from the IEPA. All records were maintained as required by the NPDES Permit and in good operating condition and **no findings**.



Mike and Susan's new certifications from the IEPA.



Mike Idzior and Dan Hughes accepting the Teamwork Award at the 2016 Leadership Summit.



# New NPDES Permit

A new discharge permit was issued for the wastewater treatment plant effective October 1, 2015 and included changes in the required sampling of influent and effluent from five days down to three days. Added to effluent monitoring requirements were copper, zinc, and phosphorus. Participation in the Dupage River Salt Creek Watershed Study Group for phosphorus reduction is a requirement. Phosphorus reduction and optimization is being addressed with an initial study including sampling and Pro2D modeling. Klein Creek flow gauges have been installed in preparation for an excess flow dissolved oxygen and ammonia-nitrogen mixing study plan required by the new permit. Sampling for a metals translator has been completed for Klein Creek impact, and hardness studies continue.



A new discharge permit was issued for the wastewater treatment plant effective October 1, 2015.

# Solids Handling

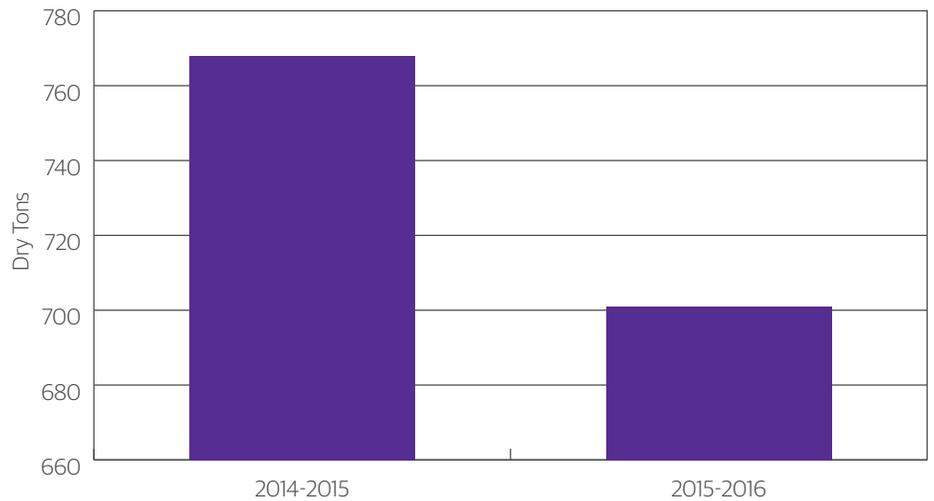
We operate our biosolids treatment processes to reduce volume, facilitate handling and transport, destroy pathogens, and control odor. Exhibit 4 represents the amount of biosolids in dry tons that were removed and pressed from the system; the solids were then hauled to the landfill for disposal. Through plant optimization, a drier sludge is being produced, thus reducing the amount of annual dry solids being transported and reducing costs.

Exhibit 5 highlights our 13 percent reduction in transporting of solids to the landfill due to efficient plant operations.

**Exhibit 4**  
Biosolids Removed



**Exhibit 5**  
Reduction in Dry Solids Transportation from Previous Contract Year



# Laboratory

Measuring the environmental impact of treated wastewater to the receiving waters is our main laboratory objective. All sampling we conduct for state and federal permit requirements are performed inhouse or sent to a state-certified laboratory for analysis. Our inhouse laboratory services perform process control analysis of the activated sludge process and are an integral part of our overall operation of the wastewater treatment system. Our goal is to provide regulatory agencies with reliable, accurate, and up-to-date information to enhance their ability to serve our clients and protect the environment. In 2015 there were 2,120 samples taken and tested for compliance with the daily limits of the NPDES permit. Additionally, semi-annual metals samples for effluent, influent, and sludge were collected and tested, as well as priority pollutants. All permitted industries were tested for their individual permits as required by industrial pretreatment regulations.

Statistical analysis for each parameter is analyzed and graphed, showing upper and lower control limits. Operations personnel are responsible for entering daily laboratory data into a computerized operational database. The data is transferred into a computerized NPDES form for reporting to IEPA. Being intimately familiar with daily analytical data, the laboratory is the first line of defense in identifying potential problems associated with permit compliance.

The Carol Stream laboratory is a part of our internal quality control program. We pride ourselves in the quality control measures we take to validate and corroborate our analytical data.

The following list reflects routine minimum standards for CH2M laboratories:

- Adherence to CH2M's comprehensive quality assurance/quality control (QA/QC) program for all permit-required analyses, including, but not limited to, precision and accuracy results and corresponding control charts
- Chain of custody documentation for all samples entering or leaving the facility (internal or external), which are kept in CH2M bound and numbered books
- A Chemical Hygiene Plan, including Safety Data Sheets (SDSs) for all chemicals and reagents, emergency response, training sign-off sheets, and any site-specific requirements
- Segregation of existing chemical stock according to chemical compatibility; all chemicals and reagents exceeding the expiration date are discarded according to state and local guidelines
- Standard operating procedures for all chemical and physical analyses
- A comprehensive computerized preventive maintenance (PM) program for all laboratory equipment

# Maintenance

Cost control through effective preventive and corrective maintenance (CM) is a hallmark of our success. Our ability to provide effective maintenance management is well known and can be confirmed by viewing equipment records.

CH2M's approach to maintenance involves three functions: PM, repair (scheduled and unscheduled), and predictive maintenance (PdM). We have found that by concentrating on PM and PdM activities, we can control costs because warranties are protected.

The Carol Stream maintenance team utilizes Maintenance Connection<sup>®</sup>, an enterprise asset-management program. The program allows us to better meet the needs of the project and to facilitate efforts to support additional asset-management functions. The Carol Stream maintenance program consists of audits and analyses of equipment condition, warranty status, and repair records. The information gathered from our analysis is used to populate Maintenance Connection<sup>®</sup> and establishes baselines for ongoing maintenance activities and inventory control. The computerized maintenance management system (CMMS) serves as the pivotal tool for guiding and tracking all onsite corrective, preventive, general, and emergency maintenance activities.

From May 2015 through April 2016, we completed 3,034 total work orders, 1,572 PM tasks, and 116 corrective repairs at the Carol Stream WRC. A breakdown of maintenance work orders are located in Exhibit 5.

Several PdM activities performed by the operations staff included using infrared detectors, vibration analyzers, temperature probes, and power/amperage meters. This data is tracked to aid the prediction of possible equipment problems. By taking a proactive maintenance approach, we can prevent breakdowns or the loss of major components. For example, infrared scanners allow us to detect hot spots in electrical equipment that can result from frayed wiring, loose connections, corroded connections, or failing parts. Detecting and repairing these problems, usually at a slight cost, can prevent the total failure of an expensive electrical device. Vibration analyzers allow us to detect and record vibration histories for high speed pumps and motors.

A CMMS is an integral part of the Carol Stream facility. It keeps the staff fully informed of the facility's maintenance and repair status, and ensures that proper maintenance is being performed to protect the Village's capital investment. Presented below is a brief description of our capabilities using the CMMS. Part of the CMMS is the PM and CM management system. The program includes the following main areas of information handling, which are necessary for effective maintenance management:

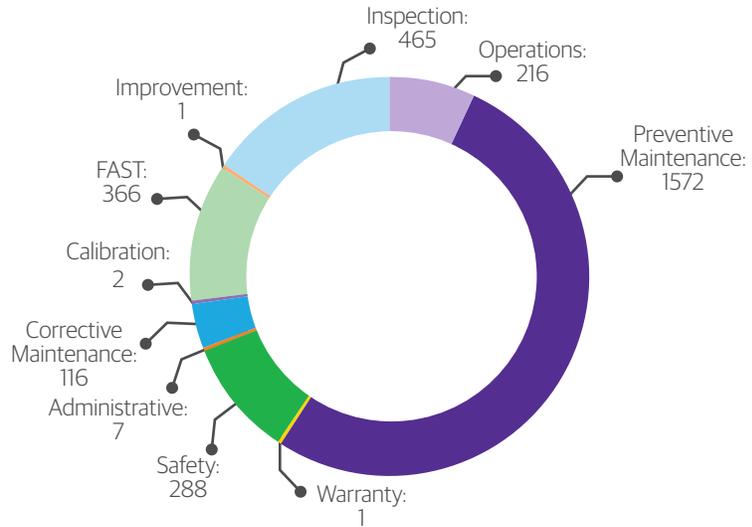
- **Equipment and facility item information.** This includes location, manufacturer, model and serial numbers, replacement cost, startup data, meter readings, supplier information, nameplate data, recommended spare parts, and notes.
- **Documentation of PM procedures.** This module includes estimated time to perform work; craft or job skill required; budget identification for the work; associate assigned to perform the work; tools, materials, and spare parts needed; and instructions for proper and safe repair procedures.
- **PM scheduling.** This program allows the user to assign appropriate intervals for PM of each piece of equipment according to the manufacturer's standards. The program lists all work to be performed, identifies the due date, and continues to note the PM work until it has been completed. The program also automatically calculates costs based on the labor and materials estimated for the procedures.
- **CM tracking.** This furnishes the user with a method for tracking performance and cost of CM. Work orders are used in conjunction with this program.
- **Staffing information.** Employee information regarding name, craft, pay rate, and shift schedules are stored in this program, allowing effective scheduling for PM tasks.

Maintenance Connection® has a very powerful customizable reporting capability, including reports that examine and track all costs associated with maintenance activities, making it easy for us to identify our savings. Each report includes:

- Equipment identification and descriptive report
- Equipment task report
- CM work order history and summary report
- Equipment data report
- PM procedures report
- Tools report
- Employee report
- CM work order status report
- CM performance report

All reports can be reviewed on screen or printed, and each can be manipulated to suit the user's needs. These reports can be printed quickly and easily if a question arises concerning a particular piece of equipment or the program in general.

**Exhibit 6**  
Maintenance Work Order Activity Summary 2015-2016



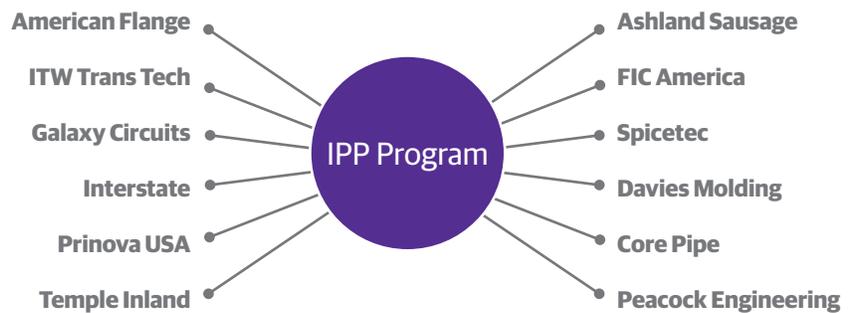
From May 2015 through April 2016, we completed **3,034** total work orders, which included **1,572** PM tasks and **116** corrective repairs.

# Industrial Pretreatment Program

The Village of Carol Stream's IPP currently is comprised of 10 significant industrial users with five being categorical users. Exhibit 7 is a summary of the IPP activity for May 2015 - April 2016:

- Spicetec hauls all process wastewater and has been classified a "No Discharge" industry, therefore has been removed from the program
- The Authority performed semi-annual metals testing on effluent, influent, and sludge from the POTW
- The Authority performed annual inspections and sampling for the permitted industrial sites
- The Authority updated industrial fact sheets for each permitted industry
- The Authority participated in sponsoring a summer concert series at Carol Stream which included an informative session with the people of Carol Stream regarding wastewater and sustainability
- Peacock Engineering stopped manufacture of the product line which had a permitted process, therefore has been removed from the program
- Participation in the DuPage River Salt Creek Watershed Study Group
- Surcharge billing calculations were submitted quarterly for BOD; TSS; and fats, oils, and grease (FOG)
- The Authority met with Blackhawk Corrugated, LLC and DeVanco Foods in advance of requiring a permit for discharge
- The Authority performed phosphorus testing at each of the permitted industries
- A total of 865 work hours and \$38,381.28 was devoted to managing the pretreatment program in 2015

Exhibit 7  
IPP Customers



Industrial inspections.



Electronic industrial survey.

# Safety

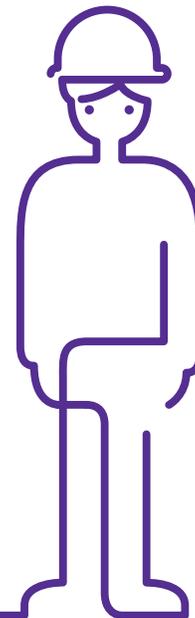
CH2M places a high priority on safety and provides the necessary equipment and training to comply with federal and state regulations, which protects project personnel and the general public from injury, and CH2M and the Village from liability.

During 2015, employees at the Carol Stream project implemented the following improvements as part of our safety action plan:

- Updated the facilities site-specific safety plan
- Expanded and updated the emergency response plan
- No Occupational Safety and Health Administration (OSHA) recordable incident
- Weekly staff safety meetings and quarterly site inspections ensure OSHA regulations are followed.

To remain accident free from known safety hazards, our team also participated in the following:

- Hold weekly safety team meetings
- Correct all safety review findings by the end of the contract year
- Hold at least 40 tailgate sessions, totaling 10 hours of safety training for each employee
- Identify unsafe conditions with monthly inspections by the safety team, and make
- all project employees aware of unsafe conditions during safety training sessions
- Complete or review 20 job safety analyses
- Maintain 100 percent permit compliance
- Increase state certifications
- Minimum of 12 hours technical training per employee



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CH2M places a high priority on safety.

# Community Involvement

Our goal is to continue our growth in the Village of Carol Stream as a civic-minded organization, sensitive to the needs of our community. Our concept is to support local projects and embrace the community as it has so graciously embraced us.

The following list shares several ways our employees have supported organizations, schools, and local groups with environmental efforts and community involvement programs during 2015:

- Participated in the 18<sup>th</sup> Annual Pond and Stream Sweep Cleanup initiative for Klein Creek
- Conducted educational tours for several area schools and community groups
- Participated and provided sponsorship for Carol Stream 2015 Summer Concert Series
- Participated in Adopt-a-Highway (Birchbark Trail) and have adopted the bicycle path on the northeast side of the wastewater treatment plant
- Joined Fox Valley Operator's Association. Susan Ruta, laboratory supervisor, is acting vice-president
- Christmas sharing program
- Annual Open House in October for residents including guided plant tours, hay rides, touch-a-truck, exhibits from the Conservation Foundation and the Carol Stream Public Library, and free pumpkins and balloons for children



Annual Village of Carol Stream WRC Open House in October.



Elementary school students learn about the WRC.



Christmas sharing program.

# Financial Review

This section is an overview of the wastewater treatment system and a summary of rebateable expenditures. We are committed to continuing the same degree of cost containment achieved in 2015-2016 going forward.

- The total budgeted amount for Labor and Benefits during 2015-2016 was \$625,302; actual expenditures were \$614,099.37
- The total budgeted amount for repairs during 2015-2016 was \$60,000; actual expenditures were \$60,349.21
- The total budgeted amount for utilities during 2015-2016 was \$243,198; actual expenditures were \$221,515.99
- The total budgeted amount for biosolids processing and disposal during 2015-2016 was \$160,940; actual expenditures were \$148,438.73

CH2M is pleased to have performed our operations under budget, thus saving the Village of Carol Stream \$45,385.91 in the aggregate of repairs, electrical, and solids disposal costs. By contract this is split 50/50. A rebateable check to the Village will be \$22,692.96.

CH2M understands the importance of cost containment.

Exhibit 8 differentiates our actual expenditures in regard to repairs, utilities, solids disposal, and labor costs.

CH2M employees at the Carol Stream project actively participated in the establishment of goals for our 2015-2016 Annual Project Business Plan. Our mission is focused on exceeding the Village's expectations, providing a safe working atmosphere for our employees, and preservation of the environment.

**Exhibit 8**  
2015-2016 Financial Overview

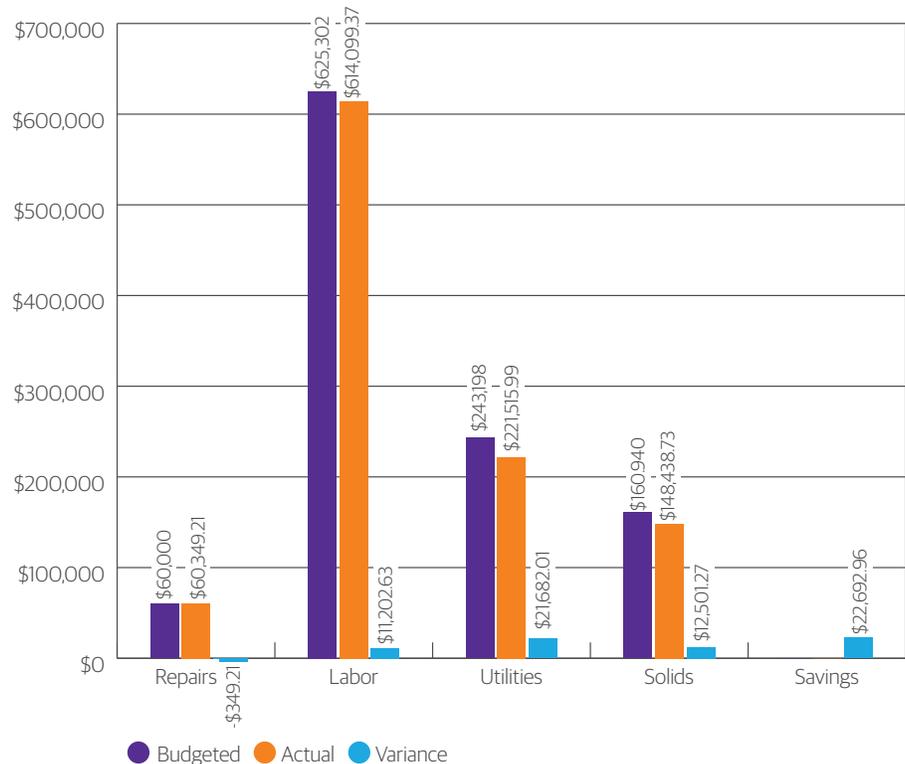


Exhibit 9 lists projects completed under the CapEx program.

**Exhibit 9**

Capital Improvement Projects May 2015-April 2016 with a Budgeted Amount of \$125,000

<b>Process Area</b>	<b>Project MC Project Code</b>	<b>Work Description</b>	<b>Project Total</b>
Aeration	Hoffman Blower Automation	PLC Connection and Programming of Hoffman Blowers for automatic or remote operation	\$2,390.00
Headworks	Screw Pump VFD	Bypass of VFD and Control Board replacement	\$890.00
SCADA	SCADA	SCADA improvement for OPIO	\$810.00
Tertiary	Influent Slide Gates	Purchase and install new influent slide gates for all four sand filters	\$15,375.00
Grounds	Kubota	Purchase of Kubota	\$12,342.00
Aeration	Pipe Repair Aeration Tank #3	Aeration basin #3 needs to have pipe ends realigned and filled with spool piece and welded (Labor)	\$14,310.00
Aeration	Pipe Repair Aeration Tank #3	Aeration basin #3 needs to have pipe ends realigned and filled with spool piece and welded (Materials and equipment)	\$8,865.45
Disinfection	SBS Pumps	Purchase of new SBS pumps	\$6,650.50
Lab	Phosphorus Test Equipment	Purchase of phosphorus testing equipment	\$6,267.09
Control Building	Building	Replace broken garage door	\$12,486.00
Digestion	Valve Replacement	Purchase and replace two air valves in digesters 3 and 4	\$6,630.50
Administration Building	Kitchen Improvements	Remodel kitchen in breakroom	\$5,049.38
Aeration	LED Lighting	Purchase and install LED light poles with outlets	\$15,409.92
Digestion	Transfer Pump	New pump purchase	\$5,140.44
Aeration	Blower Building #1	Clean and paint walls and ceiling	\$7,230.20
Headworks (Boiler Room)	Painting	Clean and paint walls and ceiling	\$2,500.00
			<b>\$122,367.48</b>

# Summary

In summary, 2015 and 2016 brought about many challenges for the Carol Stream team. We are excited about tough challenges and solving them in creative and innovative ways. We are also proud of the following accomplishments:

- We take pride in our outstanding track record with safety, known as one of the CH2M model facilities
- Working closely with the Village on monitoring the IPP, and exceeding our customers' expectations
- Proud of our proactive approach to PM and CM
- Working closely with the Village and consulting engineers on obtaining our new NPDES permit
- Plant appearance focused to protect the environment and provide natural areas
- Continuing with being a leader in Innovation and Technology
- Providing exceptional advanced wastewater treatment
- Continuing our team efforts with the Village on capital planning and O&M related issues affecting the wastewater treatment facility



Finished treated effluent to Klein Creek.

We fully understand the importance of the WRC as related to the future growth and development of the Village. We are excited about the challenges we tackle and inspired by the opportunities we see.