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To: WB-RB5S-CentralValleySacramento; Farhad, Mohammad@Waterboards
Cc: Stanley, Jeff@CDCR; Vasconcellos, Edward@CDCR; Elliott, Tom@CDCR; Rodriguez, Jaime (DVI)@CDCR; Yessen, Teri@CDCR; Perri, Laurie@CDCR
Subject: DVI - R5-2015-0704, Mandate #7, Third Party Selection Report
Attachments: DVI WWTF Third Party Evaluation 9 30 15.pdf

The California Department of Corrections & Rehabilitation, Facility Planning, Construction, and Management is submitting the Third Party Selection Report on behalf of Deuel Vocational Institution.

Date of Title of Submittal	September 30, 2015 – R5-2015-0704 – Mandate #7 – Third Party Selection Report
Regulatory Program	NPDES
Unit	Compliance and Enforcement
Regulated Party (Discharger)	California Department of Corrections and Rehabilitation
Facility Name	Deuel Vocational Institution – CIWQS ID 642462
County	San Joaquin

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Section 1

Introduction

The Central Valley Regional Water Quality Control Board (CVRWQCB) required CDCR to conduct an independent third party evaluation of operations and maintenance of the DVI Wastewater Treatment Facility (WWTF). The third party evaluation will identify factors which cause or contribute to discharge permit non-compliance and identify corrective actions needed to eliminate discharge permit violations. The independent review shall be completed by the individual identified in this Third Party Selection Report. Results of the independent evaluation will be summarized in a technical report which will be submitted to CVRWQCB.

Potential Factors Contributing to WWTF Permit Violations

The WWTF effluent exhibited chronic toxicity on several occasions in 2012, 2013, and 2014. In addition, the WWTF effluent exceeded the 4° F temperature rise limitation in the receiving stream on five occasions during 2014.

The discharge permit violations for total nitrate, chronic toxicity, and temperature limitations have been attributed to several factors including deferred equipment maintenance, lack of redundant equipment, procurement process delays in obtaining replacement components and equipment, potential insufficient capacity of some treatment processes or equipment, high concentrations of total dissolved solids (TDS) (reflected by high electrical conductivity) in the WWTF influent, and potentially insufficient number of personnel to operate and maintain the WWTF.

The WWTF currently has four operations staff positions but currently only two full time positions are filled. When necessary, CDCR has the ability to hire additional contract operators on a temporary basis to supplement permanent staff positions and to perform all necessary functions during the absence of an operator due to illness, vacations, during off-site training, testing, and certification activities, or other personal activities.

The CVRWQCB has required CDCR to evaluate these issues and develop corrective actions to operate and maintain the WWTF in compliance with discharge permit limitations.

Third Party Selection

The California Department of Corrections and Rehabilitation (CDCR) selected Dewberry to perform the Third Party Evaluation of the WWTF at the Deuel Vocational Institute. Dewberry was selected based on the company's proposed project team, relevant experience, and performance on previous CDCR projects. This Third Party Selection Report presents the qualifications and relevant experience of the company and the individuals selected to perform the evaluation of the WWTF.

Section 2

Firm Qualifications

The California Department of Corrections and Rehabilitation (CDCR) selected Dewberry to perform the Third Party Evaluation of the wastewater treatment facility at the Deuel Vocational Institute (DVI). Dewberry was selected based on the company’s proposed project team, relevant experience with correctional facilities and wastewater engineering, and performance on previous CDCR projects.

CDCR has contracted with Dewberry since 2007 to provide master planning and design services for multiple projects. CDCR selected Dewberry for the Architectural/Engineering Design Services for Institutional Design Services in 2013. Dewberry has five California offices located in Sacramento, Pasadena, Long Beach, Costa Mesa, and Roseville which support the work performed for CDCR. Dewberry provides specialized expertise for drinking water, wastewater, and storm water engineering services from other offices nationwide for CDCR projects.

Dewberry’s Justice Architecture group has extensive experience with design of correctional facilities for more than a dozen states and the Federal Bureau of Prisons (FBOP) and the General Services Administration (GSA). Dewberry currently provides design services for correctional facilities for several California counties, including Calaveras, Sutter, and Riverside.

National Rankings

Dewberry has more than 40 offices and 2,000 employees nationwide which provide the technical resources required to perform multiple CDCR projects simultaneously. As shown in Table 2.1, Dewberry ranks nationally among the top architectural and engineering firms with relevant expertise in design of correctional facilities and drinking water treatment, wastewater treatment, and storm water facilities.

Table 2.1 Dewberry 2015 Rankings by Engineering News Record

4th	Top 10 in Correctional Facilities	22nd	Top 100 Pure Designers
14th	Top 25 in Government Offices	41st	Top 500 Design Firms
16th	Top 25 in Water Supply	24th	Top 50 in General Building
18th	Top 25 in Sanitary and Storm Sewers	85th	Top 150 Global Design Firms
20th	Top 25 in Transmission Lines & Aqueducts	26th	Top 50 in Transportation
37th	Top 50 in Sewerage and Solid Waste	26th	Top 50 in Telecommunications

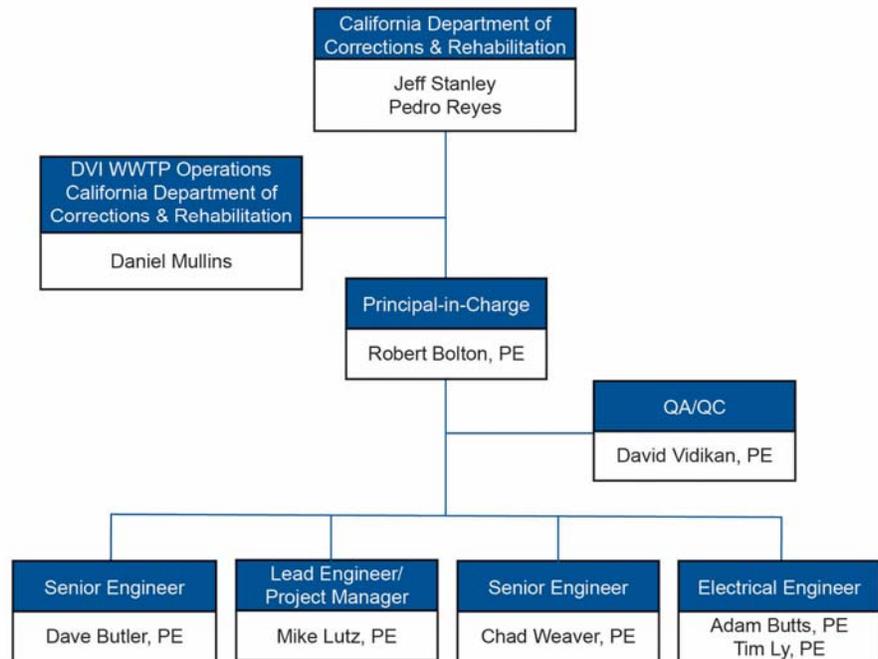
Financial Condition

Dewberry is financially stable with combined gross revenue over \$374 million in 2014. The company has a history sustained growth since it was established in 1956. The firm carries architects and engineers professional liability insurance coverage issued by Beazley Insurance and Lloyd’s of London. Dewberry also carries general liability, automobile liability, excess liability, and worker’s compensation coverage through Travelers Insurance Companies.

Section 3 Project Team & Organization

The Third Party Evaluation will be performed by a project team with extensive experience in planning, design and construction phase services for wastewater treatment facilities. Members of the project team are familiar with the DVI WWTF and other CDCR facilities from their work on previous CDCR projects. The project team has design experience with all of the wastewater treatment processes currently used at the DVI WWTF. The project team understands the environmental, regulatory, and water resources issues that affect drinking water and wastewater systems in California.

The project team organization is shown on the adjacent chart. The project team is located in Dewberry's Denver office which specializes in drinking water and wastewater engineering services. The Denver office has full service in-house design capabilities including civil, mechanical, structural, electrical, instrumentation and control, CAD, and GIS services. The Denver office currently has 46 professionals.



Relevant Team Member Project Experience

Deuel Vocational Institute Water Treatment Plant Evaluation Tracy, CA

Team Members: Mike Lutz, Bob Bolton, Chad Weaver

Evaluated operation and performance of the 0.8 mgd reverse osmosis (RO) and zero liquid discharge (ZLD) systems to improve reliability of the drinking water system. Conducted on-site observation of the RO and ZLD treatment systems, chemical feed systems, evaporation ponds, and related equipment to assess their existing condition. Evaluate water quality of the brackish groundwater source. Evaluated ZLD performance, reliability, water recovery, chemical and electrical power consumption, equipment maintenance requirements, and operational procedures compared to the original equipment specifications and performance. Identified probable causes of equipment wear, scale formation, corrosion, and other operational factors which adversely affected ZLD system reliability. Evaluated treatment alternatives to upgrade or replace ZLD process equipment including VSEP, and Salttech systems. Developed recommendations to provide redundant backup equipment for critical components

to enhance ZLD system reliability. Developed capital costs, O&M costs, and present value or life cycle costs for feasible treatment optimization and upgrade alternatives.

Deuel Vocational Institute Wastewater Treatment Plant Toxicity Reduction Evaluation Tracy, CA

Team Member: Mike Lutz

Conducted a Toxicity Reduction Evaluation (TRE) for the DVI wastewater treatment facility to identify causes of permit violations including chronic toxicity for *Ceriodaphnia dubia* and the green algae *Selenastrum capricornutum*, high effluent nitrate concentrations, and excessive surface water temperature increase downstream of the effluent discharge point. Evaluated operation and performance of the wastewater treatment facility to identify trends that could potentially upset the wastewater treatment process or affect effluent toxicity. Evaluated membrane bioreactor (MBR) filter capacity and identified transfer of dissolved oxygen from an aerated sludge storage tank into the anoxic zones in the MBR process as a cause of decreased denitrification capacity and increased effluent nitrate concentrations. Identified limited capacity range of effluent cooling towers as the cause of non-compliance with the permit temperature rise limitation. Evaluated TDS concentrations, electrical conductivities, and ion imbalances in the wastewater influent as potential causes of chronic toxicity in the WWTF effluent. Determined that high TDS concentrations in the drinking water supply (from the brackish groundwater source) cause chronic toxicity in the WWTF effluent when the reverse osmosis (RO) and zero liquid discharge (ZLD) systems which supply drinking water are out of service. Developed corrective actions to reduce or eliminate violations of permit limits.

Jackson Hole Airport, Wastewater Treatment Plant, Jackson Hole, WY

Team Member: David Vidikan

Design and bidding services for a new MBR wastewater treatment facility to treat on-site wastewater from the airport terminal and surrounding hanger and airport support facilities. The package plant MBR treatment facility was designed and housed in a metal building. Related facilities included new wastewater collection system piping, lift station, flow equalization tanks, emergency power generation, chemical feed, UV disinfection, potable water wells, and ground water discharge wells.

WWTF Process Model and Performance Evaluation Colorado Springs Utilities, CO

Team Member: Mike Lutz, Bob Bolton

Evaluated capacity of the existing Las Vegas Street (LVS) Wastewater Treatment Facility and alternatives to increase capacity from 47 to 62 mgd and meet new effluent ammonia limits ranging from approximately 1.6 to 2.7 mg/L. The LVS facility was modeled using the BioWin computer simulation program, with two new aeration basins at 60 mgd flow to replace the existing trickling filter - solids contact (TF/SC) process. Future permit limits for nitrate, TIN, or phosphorus were evaluated. Evaluated reduced hydraulic and organic loads to achieve nitrification in the TF/SC process. Evaluated dissolved oxygen in the anoxic zones that prevented denitrification in the existing activated sludge process and a shift in denitrification to the sludge blanket in the secondary clarifiers. Evaluated hydraulic capacity of existing chlorine contact basins. Evaluated capacity of existing primary sedimentation tanks and primary sludge pumps to remove increased quantity of waste solids from the new Northern WRF that were to be discharged into the interceptor to the LVS facility. Analyzed blower and diffuser capacity for current

and future organic loads. Prepared net present worth analysis to compare upgrade the existing aeration basins to membrane bioreactors or IFAS (Anox Kaldnes). Recommended expansion of the existing activated sludge process to provide future buildout capacity and increase nitrification, denitrification, and biological phosphorus removal for the LVS facility.

Preliminary Treatment Systems Improvements Colorado Springs Utilities, CO

Team Member: Dave Butler, Bob Bolton

Design and construction phase services for improvements to the headworks processes of this 65 mgd treatment plant. Improvements included replacement of the existing conventional grit classifiers with new forced vortex grit washers. The existing scum concentrator was reinstalled to improve operation and maintenance access and new pumping equipment installed to blend the scum with treatment process sludge for conveyance to the City's remote sludge processing and disposal complex.

California Correctional Facility Projects

Northern California Re-Entry Facility, Stockton, CA

Dewberry is the planner, designer and architect-of-record for the 500-capacity renovation of the existing buildings for the re-entry conceptual program at the existing former Northern California Women's Facility in Stockton, CA. A new Medical, Mental Health, and Dental building will be added to meet the needs of the new population. Perimeter security improvements include three new guard towers and a new "E" (electrified) fence. The project is targeting a LEED Silver rating.

Calaveras County Adult Detention and Sheriff's Department San Andreas, CA

Dewberry designed a new adult detention facility to contain 160 inmates in double bunked cells and 80 inmates in dormitory style housing totaling 240-beds. The facility includes support and programming spaces, a Sheriff's Administration Building, 911 Dispatch Center and Emergency Operations Center. Services include architectural program validation, schedule and budget validation, pre-design engineering services, A/E design through construction administration.

East County Detention Center Riverside County - Indio, California

Dewberry, in association with The HOK Group, evaluated the existing facility and determined that a new facility would be the more cost effective than renovation of the existing buildings. The new building will result in a net gain of 1,250 new beds with support facilities. The new jail will be connected to the existing courthouse via an underground secure tunnel. The facility will be designed to achieve a LEED Silver certification.

Section 4

Scope of Work

Task 1 - Project Management

Develop a project management plan and provide monthly progress, schedule, and budget reports to CDCR. Participate in the project initiation meeting with CDCR staff. Conduct weekly internal project coordination/progress meetings with the project team throughout the project to ensure the project meets budget, schedule, and quality goals. Provide technical direction to project staff and conduct internal meetings as needed to resolve technical issues. Perform quality assurance and control reviews for all deliverables.

Task 2 - Evaluate WWTF Operations Staffing Levels

The WWTF currently has four operations staff positions but currently only two full time positions are filled. CDCR hires additional operators on a temporary basis to supplement permanent staff positions and to perform all necessary functions during the absence of an operator and when the WWTF must be operated manually.

Evaluate operations staffing levels and work schedules to assess the capability of current WWTF staff to adequately operate the facility. Review operating procedures implemented on daily, weekly, monthly, quarterly, and annual schedules including process and equipment monitoring, sampling and testing, equipment calibration and adjustments, and compliance reporting. Review written operating procedures and routine functions described in the equipment Operation and Maintenance Manuals for the WWTF. Evaluate the labor time required to perform routine operating procedures and functions. Evaluate the labor time required for the operators of the treatment facilities to supervise work performed by DVI inmates.

Compare DVI current operations staffing levels to the number of staff normally employed for operations at other facilities with similar capacity, treatment processes, and discharge requirements. Identify and evaluate site specific factors which could increase or decrease staffing needs at the DVI WWTF compared to other similar treatment facilities. Evaluate differences in staffing levels required for wastewater treatment at correctional facilities compared to municipal and industrial treatment facilities.

Review historical records of significant abnormal operating conditions which required corrective actions. Evaluate the frequency of abnormal operating conditions and identify causes of these events. Identify trends in recurring abnormal operations, if any. Review responses to alarm conditions which might occur during unattended operation. Evaluate the labor time required to respond to abnormal conditions and to implement corrective actions. Evaluate the availability and effectiveness of cross-trained staff assigned to assist with emergency responses at both the WWTF and the RO-ZLD system.

Identify abnormal operating conditions when additional temporary operators might be needed to maintain reliable performance of the WWTF within discharge permit limits.

Task 3 - Evaluate WWTF Maintenance Staffing Levels

Review scheduled maintenance procedures implemented on daily, weekly, monthly, quarterly, and annual schedules. Evaluate the labor time required to perform routine maintenance functions and to respond to equipment failures. Compare current maintenance staffing levels for the WWTF with benchmark levels at other similar treatment facilities.

Evaluate current procedures and systems to monitor inventories of consumable commodities used at the WWTF including process chemicals and laboratory supplies. Evaluate procedures and control systems to monitor and replace reagents and laboratory standards prior to their expiration dates.

Task 4 - Evaluate Process and Equipment Redundancy

Evaluate standby equipment for critical components and redundant process capabilities which might be needed to maintain continuous operation of the WWTF. Evaluate on-site storage of spare parts for critical equipment for the WWTF to minimize time needed for repairs and to minimize delays for long-lead time delivery and procurement procedures. Recommend equipment and spare parts for critical equipment. Recommend specific equipment upgrades to provide redundant process capabilities if needed to maintain reliable operation of the WWTF. Evaluate the capacity of the emergency generator to maintain operation of all critical equipment during a disruption of the public utility power supply.

Task 5 - Evaluate WWTF Treatment Capacity

Evaluate the capacity of the WWTF to comply with tertiary standards at maximum projected flows in the summer and winter. Evaluate hydraulic and organic waste loads at maximum month, maximum day, and peak hour conditions. Consider the impacts of increased inmate water demand for hydration, bathing, and cooling during dry summer weather and drought conditions. Evaluate the capacity of the existing treatment processes and equipment to maintain compliance with discharge standards under maximum loading conditions. Evaluate factors which might reduce capacity of the membrane bioreactor (MBR) filters and which might limit denitrification capacity. Evaluate current use of the sludge storage basin for flow equalization on treatment process performance and capacity. Evaluate the capability of the existing screening system to protect the MBR filters from solid debris in the influent wastewater. Evaluate impacts of recycle loads from intermittent dewatering operations on treatment capacity and performance. Evaluate effluent cooling capacity to achieve compliance with the temperature rise limitation of 4° F in the receiving stream.

Task 6 - Evaluate Backlog of Maintenance Work Orders

Review the backlog of corrective and preventive maintenance work orders. Evaluate the average and maximum time required to complete maintenance work orders. Compare the ratio of preventive maintenance work to corrective maintenance and assess the potential to minimize corrective work by optimizing scheduled preventive maintenance. Determine factors which impact time to complete maintenance work including identification of the work needed, procurement procedures for replacement parts and equipment, availability of spare parts for critical components, delivery schedules for parts and equipment, scheduling of specialty services performed by contractors, and availability of the operations staff to perform or coordinate corrective and preventive maintenance work.

Task 7 - Evaluate Permitting Requirements for Industrial Storm Water Impacts

Determine if industrial activities, including vocational training programs, occurring at DVI are subject to or require coverage under the Industrial Storm Water General Permit.

Task 8 - Third Party Selection Report

Assist CDCR to prepare a report to describe the qualifications and professional experience of the registered professional engineer(s) selected to conduct a Third Party Evaluation of the Operation and Maintenance of the WWTF and RO facility. The report shall identify the individual registered professional engineer who shall lead the evaluation.

Task 9 – WWTF Third Party Evaluation Report

Prepare a report to document the results of the independent third party evaluation of the WWTF. The report will document the treatment capacity, control systems, staffing requirements, procurement processes, causes of abnormal operating conditions, and corrective actions required to maintain compliance with the WWTF discharge permit requirements. The report shall provide recommendations for any needed improvements.

Provide quality assurance review of work products. Review comments from CDCR on the draft document and incorporate responses into the final technical memorandum. Provide the final technical memorandum to CDCR in both printed paper and in electronic pdf format. The final report may be submitted by CDCR to the CVRWQCB to document compliance with permit benchmark limits.

Schedule

The project shall be completed within 180 days after execution of the agreement. The time may be extended if information to be provided by CDCR or to be obtained from other sources is delayed. However, the project shall be completed by June 1, 2016 as required by the CVRWQCB.

SECTION 5
RESUMES



Robert J. Bolton PE

Vice President, Principal-in-Charge

Bob has over 35 years of experience and is an accomplished project manager and design engineer who is regularly involved in project execution. His technical expertise focuses on municipal water and wastewater treatment, pumping systems, lift stations, and pipelines. Bob has performed quality control and assurance on over \$30 million of water facilities in the last 15 years and has designed over \$100 million of infrastructure projects in Colorado.

EDUCATION:

BS, Civil & Environmental Engineering, Clarkson University, 1980

REGISTRATIONS:

PE: CO (24981)

PE: KS (13044)

YEARS OF EXPERIENCE: 35

AFFILIATIONS:

American Water Works Association

Water Environment Federation

PROJECT EXPERIENCE

Design of Diffuser Upgrades, Town of Superior, CO. Designed fine bubble diffuser system for the aeration basins and coarse bubble diffuser system for the aerobic digesters at the Town's Rock Creek Wastewater Treatment facility. The WWTF's aeration basin trains consist of two reactors in series; modeled the reactors Biowin to determine proper diffuser arrangement for the two reactors. Designed control system to maximize oxygen delivery and minimize energy consumption. Upgraded diffusers are projected to pay for themselves in less than five years.

Preliminary Treatment Systems Improvements, Colorado Springs Utilities, CO. Design and construction phase services for improvements to the headworks processes of this 65 mgd treatment plant. Improvements included replacement of the existing conventional grit classifiers with new forced vortex grit washers. The existing scum concentrator was reinstalled to improve operation and maintenance access and new pumping equipment installed to blend the scum with treatment process sludge for conveyance to the City's remote sludge processing and disposal complex.

Primary Sedimentation Basin Rehabilitation, Colorado Springs Utilities, CO. Modified existing primary clarification facilities for the 75 mgd Las Vegas Street WWTP to reduce odors, improve scum collection and pumping, and update primary sludge pumping facilities. Worked closely with the client to select improvements, including changing the six rectangular primary clarification basins from submerged launders to surface weirs. Project included design and construction management services.

Wastewater Treatment Plant Upgrades, Mountain Water & Sanitation District, CO. Wastewater treatment upgrades included primary and secondary and sludge treatment modifications. The secondary treatment system was upgraded with modifications to the existing RBC secondary process and the addition of a solids contact process to enhance secondary treatment and nitrification. Solids contact process improvements included the addition of fine bubble aeration equipment. All new facilities will be constructed within existing building and tankage minimizing construction costs.

Wastewater Treatment Plant, City of Northglenn, CO. Designed a new 4.5 mgd, three-stage Biological Nutrient Removal process. Existing aerated lagoons were converted into flow equalization basins. Designed a headworks building with spiral screw screens and vortex grit separators, covered rectangular primary clarifiers, aeration basins with anaerobic, anoxic, and aerated zones, pumping systems, circular secondary clarifiers, and UV disinfection system. Designed a secondary pump station that contains 16 pumps with total pumping capacity of 46.9 mgd. Designed two new Turblex single-stage centrifugal blowers with porous membrane diffusers to optimize aeration system energy efficiency. Effluent is pumped to a 4,000 acre-foot reservoir that supplies agricultural irrigation water, stream augmentation source, and future non-potable reuse system. Existing waste sludge stabilization ponds were retained. The aeration basins and secondary pump station have structural floors bearing on drilled piers to accommodate expansive soils. Designed new laboratory, offices, locker rooms, kitchen, and maintenance shop within the existing 6,000 sq ft Service Building. Designed an innovative geothermal heat exchange system that extracts heat from the aeration basins in the winter and dissipates excess heat to the basins in the summer. All buildings in the facility are heated and cooled by the geothermal heat exchange system which reduces net operating costs by approximately 40 percent compared with conventional HVAC systems.

Advanced Wastewater Treatment Plant, Colorado Springs Utilities, CO. The project scope consisted of upgrading the Las Vegas Street Wastewater Treatment Plant capacity from 60 to 100 mgd. The project replaced mechanical aerators with fine bubble diffusion equipment, and 2,000 hp single stage blowers and associated air piping. Other facility improvements included addition of final clarifiers, return activated sludge, waste activated sludge pumping stations, non-potable pumping station, and chlorination/ dechlorination system modifications. Process modifications included the addition of an anoxic zone to the activated sludge process for denitrification.

Septage Receiving Station, Colorado Springs Utilities, CO. Designed and provided construction management services for a new Septage Receiving Station and the Stratton Meadows lift station at the Las Vegas Street Wastewater Treatment Plant. The septage facility receives 30,000 gallons of septage per day during the peak month of July. The new system provides automated truck access control, data collection, and automatic invoicing of facility users. The new station minimizes peak organic loads on the wastewater treatment process. The operations staff can retain septage in storage tanks for several hours and release the concentrated waste into the plant during low flow periods. The Septage Receiving Station records septage quantities discharged to the treatment facility. Septage storage tank within the Receiving Station has the capability to intercept, hold, and transfer contaminated septage to another treatment and disposal site. The concrete tankage of the new facility is protected from hydrogen sulfide corrosion with a PVC liner.

Stratton Meadows Lift Station, Colorado Springs Utilities, CO. This project consisted of replacement of the Stratton Meadows Lift Station. The existing station

was replaced with an 8.6 mgd below ground packaged lift station. Pumps are equipped with 60 hp constant speed motors. The new lift station is the last of nine lift stations within the Department to be replaced with a packaged type station. The project included new power controls and radio SCADA system to communicate with the centralized control panel.

Wastewater Treatment System, Duo Dairy Ltd., CO. Assisted in design of wastewater treatment and stormwater control facilities for a 160 acre dairy with 5,400 head of cattle. The wastewater treatment system consists of three earthen lagoons with aspirating aerators and a subsurface flow artificial wetland. Conducted ground survey to establish controls for topographic aerial mapping.

Biosolids Management Facilities, City of Wichita, KS. The \$23 million project included a major rehabilitation of the solids handling facilities for two wastewater treatment plants. The design consisted of modifications to primary sludge, primary scum, intermediate sludge, and waste activated sludge pumping systems, addition of a new sludge screening facility, new dissolved air flotation thickening process and major digester rehabilitation. Digester rehabilitation consisted of new boilers, gas handling equipment, mixing equipment, and submerged fixed covers. The project also implemented a three-pronged biosolids reuse program consisting of agricultural land application, landfill reclamation and production of a sidestream Class A product for distribution to the public.

WWTP Phase 1B Expansion, City of Boulder, CO. Responsibilities included the design and construction management of the expansion and upgrade of the 75th Street Wastewater Treatment Plant. Facility improvements included conversion of the secondary process to solids contact, the addition of new secondary clarifiers, chlorination and dechlorination facilities, and the addition of nitrifying trickling filters for ammonia removal.

Base Capacity Improvements, Colorado Springs Utilities, CO. Responsible for the design of the expansion and upgrade of the Las Vegas Street Wastewater Treatment Plant. Facility improvements included addition of a new solids contact process, return secondary sludge pump station, chlorination and dechlorination facilities, and a 39,000 cfm atomizing mist odor control facility for the headworks.

Industrial Wastewater Treatment, WestPlains Energy, KS. Design and construction of wastewater pipeline, lagoons, and flow measurement for cooling tower blowdown wastewater. Facilities were designed to meet or exceed the Kansas Department of Health and Environment's Minimum Design Standards.

Industrial Wastewater Treatment, Panhandle Eastern Pipe Line Company, KS. Evaluation and design of on-site irrigation facilities for wastewater produced from cooling tower blowdown. Facilities were designed to meet or exceed the Kansas Department of Health and Environment's Minimum Design Standards.



David Vidikan PE

Associate Vice President, QA/QC

David has worked for more than 30 years in the water and wastewater industry. He is highly technical and proficient in all areas of civil engineering and related disciplines including architectural, structural, hydraulic, mechanical, electrical, instrumentation, controls, SCADA, geotechnical, treatment process and equipment design. David has successfully delivered over 150 water and wastewater projects.

David's extensive experience includes program management, planning, master planning, preliminary design, detailed design, bid document preparation (drawings and specifications), studies and evaluations, bidding services, construction management, contract administration and construction inspection and oversight on municipal, industrial and commercial water and wastewater infrastructure.

David is an expert in design and construction for water and wastewater pipeline projects, including both new pipe installations and rehabilitation of existing pressurized water and gravity flow sewer in-ground pipeline installations; potable and non-potable water pumping station projects, wastewater lift station projects; water treatment plant facilities, wastewater treatment plant facilities, and water distribution and sewer collection systems.

EDUCATION:

BS, Civil Engineering University of Akron, 1984

REGISTRATIONS:

PE: CO (26430)

YEARS OF EXPERIENCE: 30

AFFILIATIONS:

Project Management Professional (PMP) – Project Management Institute (PMI)

OHSA Certified

Member - American Water Works Association (AWWA)

Member - Water Environment Federation (WEF)

Member - Rocky Mountain Water Environment Association (RMWEA)

PUBLICATIONS/PRESENTATIONS:

The Right Pipe and the Right Time, WEFTEC WE&T, Water Environment and Technology magazine, November 2009

Chemical Addition for Control of Corrosion and Odors from Hydrogen Sulfide Gas Developed in a Wastewater Pumping Station Force Main, Paper and Presentation at the Rocky Mountain AWWA WEA Joint Annual Conference, 2003

A New Water Supply for Hays and Russell, Kansas, Paper and Presentation at the Rocky Mountain AWWA WEA Joint Annual Conference, 2001

WASTEWATER

Metro Wastewater Reclamation District, Northern Treatment Plant (NTP), Brighton, CO. Manager of project. As part of the Owner's Advisor team, providing oversight for program management, planning, surveying and mapping, alternatives evaluation, design, construction management and permitting services for the pipelines associated with the District's new \$475-million Northern Treatment Plan program. Program responsibilities include assistance with preparation of permitting documents, solicitation documents, and alternatives analysis document; review of design documents; and design team coordination. The program was established so that the Metro District could plan and implement construction and operation of a new 24-mgd treatment plan capable of providing biological nutrient remove. Pipeline components of the program include 7 miles of interceptors from 30- to 78-inch diameter to convey flow to the new NTP and 11 miles of 30-inch force main to convey effluent back upstream on the South Platte River. Both pipelines include multiple trenchless installations.

South Adams County Water and Sanitation District, Williams Monaco Wastewater Treatment Plant Phase 2 Expansion. Commerce City, CO. Project Engineer. Performed site development design and oversaw the entire project design of a 2.6-mgd expansion to District's existing Williams Monaco Wastewater Treatment Plant. Site development included layout and design of all

Build It and They Will Come, Installation of Water and Wastewater Infrastructure Spurs Development in Commerce City New Lands Area, Paper and Presentation at the Rocky Mountain AWWA WEA Joint Annual Conference, 2000

Contaminated Ground Water Near the Rocky Mountain Arsenal, a Case Study in Cooperation to Protect the Public, 1999, Paper and Presentation at the Rocky Mountain AWWA WEA Joint Annual Conference

new plant site pipelines and utilities, buildings, roads, walks, parking, site grading, storm water control and drainage, and coordination with all plant site process. The expansion of the treatment plant included a new secondary digester, conversion of an existing secondary digester to a primary digester, a new Moving Bed Biofilm Reactor (MBBR) biological treatment basin, a new Blower Building, plant site flow splitting, Administration Building expansion, Garage expansion, new influent bar screen, modifications to existing chlorine and sulfur dioxide chemical feed facilities, and a new plant operator control SCADA system.

Southwest Metropolitan Water and Sanitation District , A-Line Interceptor Sewer Rehabilitation. Littleton, CO. Project Manager. Design, bidding and construction engineering services for the condition assessment and design for rehabilitation of approximately 11,000 feet of 42-inch through 60-inch sanitary sewer interceptor. Responsibilities include manhole inspections, coordination with property owners for temporary access agreements, design calculations, generation of plans and specification, bidding support, and engineering support during construction.

Southwest Metropolitan Water and Sanitation District, D-Line Interceptor Sewer Rehabilitation. Littleton, CO. Project Manager. Project includes rehabilitation of approximately 16,000 feet of 33 and 36-inch RCP sewer using CIPP lining and manhole rehabilitation. Duties included manhole inspections and condition assessment, review of sewer inspection videos, coordination with land owners for acquisition of temporary construction easements, preparation of plans and specifications, bidding assistance, and construction contract administration.

JBS, Industrial Wastewater Force Main Replacement, Greeley, CO. Manager of Project. Over a four-year period, managed the replacement of an existing 18-inch wastewater force main under a design-build approach. The project is approximately 5.6 miles in length and was designed and built in five separate phases. Challenges during design were private easement acquisitions, stream crossings, crossing the Union Pacific Railroad's tracks, crossing the Cervi Cattle Stockyards, and crossing US 85.

JBS, Industrial Wastewater Treatment Plant Upgrade, Greeley, CO. Manager of Project. Administered a construction contract between the owner and contractor for the construction of nitrification improvements to an existing wastewater treatment plant. Work included the installation of two secondary clarifiers, blower, membrane aerators, anoxic mixers, chemical dosing systems, and a WAS/RAS pump gallery. Engineering services included shop drawing review, conducting bi-weekly progress meetings, addressing constructability issues, coordination of subconsultant inspection and testing services, administering change orders, and issuing supplemental information necessary to construct the project.

Jackson Hole Airport, Wastewater Treatment Plant. Jackson Hole, WY. Project Manager. Managed design and bidding services for a new wastewater treatment facility to treat on-site wastewater from the airport terminal and surrounding hanger and airport support facilities. Package plant MBR treatment facility was designed and housed in a metal building. Related facilities included new wastewater collection system piping, lift station, flow equalization tanks, emergency power generation, chemical feed, UV disinfection, potable water wells, and ground water discharge wells.

World Headquarters Lift Station Upgrade, Ken-Caryl Ranch Water and Sanitation District, CO. Project Manager. Administered the construction contract for a new lift station and demolition of an existing lift station. Duties included submittal review, interpretation of contract documents, site inspection, pay application review, and evaluation of change order requests.

South Adams County Water and Sanitation District North Range Wastewater Collection System, Section I-Wastewater Pumping Stations, Section II-Sanitary Sewer Pipelines. Commerce City, CO. Project Engineer. For Section I, designed and performed contract administration services for one 2.9-mgd wastewater pumping station, one 3.2-mgd wastewater pumping station, one 3.4-mgd wastewater pumping station. For Section II, designed and performed contract administration for 78,200 feet of 15-, 18-, 21-, 24-, and 30-inch gravity sewer pipelines and 17,700 feet of 14-, 16-, and 18-inch force main pipelines.

South Adams County Water and Sanitation District Lift Station No 2 Expansion. Commerce City, CO. Project Manager. Managed design, bidding and construction contract administration and inspection services for the pump station building expansion and the installation of 5 new 1,100 gpm sanitary sewer pumping units which replaced two existing 2,200 gpm pumping units. The firm wastewater pumping capacity of the pump station was increased from 3.2 mgd to 6.3 mgd.

South Adams County Water and Sanitation District Williams Monaco Wastewater Treatment Plant Operations Model. Commerce City, CO. Project Manager. Managed the creation of a wastewater treatment plant operations model that could be used by the plant operations staff. The model was capable of simulating treatment in the plant's existing moving bed biological film reactors (MBBR). The model can also be used to determine treatment capacities and limitations, treatment performance, treatment optimization, operator training, and what-if scenarios.

South Adams County Water and Sanitation District East 104th Avenue Parallel Sanitary Sewer Phase 3A and 3B. Commerce City, CO. Project Manager/Project Engineer. Performed sewer line route and sizing study and designed 7,800 feet of 30-inch diameter gravity interceptor sanitary sewer. The

project included new precast concrete manholes and three tunnel bores under US Highway 85, the Union Pacific Railroad tracks and Interstate Highway 76 with 42-inch diameter steel casing pipe.

South Adams County Water and Sanitation District Wastewater Collection System Rehabilitation Cured-in-Place Pipe (CIPP) Lining Project. Commerce City, CO. Project Manager. Managed design, bidding, and construction contract administration and inspection services for the rehabilitation of 4,900 feet of existing 30- and 21-inch diameter concrete sanitary sewer pipe by lining with cured-in-place pipe (CIPP) and the replacement of 13 manholes.

South Adams County Water and Sanitation District Collection System Rehabilitation Replacement Project, Hutchings Street Lift Station Outfall Sewer and Brighton Road at East 80th Avenue Sewer. Commerce City, CO. Project Manager. Managed design, bidding and construction contract administration and inspection services for the removal and replacement of 1,000 feet of 30- and 24-inch diameter sanitary sewer pipe and the replacement of six manholes.

Ken-Caryl Ranch Water and Sanitation District Sanitary Sewer Replacements in the Plains Phase 3. Littleton, CO. Project Manager/Project Engineer. Managed design, bidding and construction contract administration and inspection services for the removal and replacement of 3,900 feet of existing 8-, 10- and 15-inch sanitary sewer and the rehabilitation of 1,630 feet of existing 10- and 15-inch concrete sanitary sewer pipe by lining with Cured-in-Place Pipe (CIPP). The project included 7 new precast concrete manholes and a wastewater flow metering and flow recording installation.

City of Boulder 75th Street Wastewater Treatment Plant Levee Certification. Boulder, CO. Project Manager. Managed the investigation and certification of the existing levee system that encircles and provides flood protection to the City's 75th Street Wastewater Treatment Facility as required by the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA).

South Adams County Water and Sanitation District Williams Monaco Wastewater Treatment Plant Biosolids Handling Study. Commerce City, CO. Project Manager. Managed study to identify and review solutions for dewatering, stabilization and disposal of biosolids removed from the wastewater as part of the treatment process at the District's wastewater treatment plant.

South Adams County Water and Sanitation District Video Inspection and Condition Assessment of the Existing Wastewater Collection System. Commerce City, CO. Project Manager. Developed a program to evaluate the condition of aging sanitary sewer infrastructure located within the District's wastewater collection system. The project included the development of repair and replacement program for the rehabilitation of the infrastructure. The condition

David Vidikan PE
Associate Vice President,
QA/QC

assessment program was developed to inspect by closed circuit video camera approximately one third of the District's older core city service area wastewater collection system over each of the next three years. The collection system included over 474,000 linear feet (90 miles) of 12 inch and smaller sanitary sewer mains and another 40,100 linear feet (8 miles) of 15 inch and larger interceptor sewers. The evaluation verified the need for replacement and upsizing of sewer lines. The condition assessment also included a detailed inspection and evaluation of each manhole on the sewer lines. The project summarized findings, conditions and locations of problems within the existing wastewater collection system, recommendations for improvements to problem areas, estimated repair costs, and prioritized repairs from most to least critical.

South Adams County Water and Sanitation District Williams Monaco Wastewater Treatment Plant Miscellaneous Plant Improvements. Commerce City, CO. Project Manager. Managed design, bidding and construction contract administration and inspection services for miscellaneous plant wide improvements to the District's wastewater treatment plant. Improvements included the design and construction of a new Digester Heater Building, installation of a new pump in the Thickened Sludge Pump Station, installation of a hydrogen sulfide removal system at the Raw Water Pump Station, installation of a new plant effluent metering parshall flume, miscellaneous valve and piping modifications in the Primary Sludge Pump Station, and the installation of a new sludge loading area concrete apron.

South Adams County Water and Sanitation District Williams Monaco Wastewater Treatment Plant Moving Bed Biological Film Reactor (MBBR) Treatment Capacity Study. Commerce City, CO. Project Manager. Managed study for the evaluation of the treatment capacity of the existing moving bed Biological Film Reactors to meet future plant effluent limits.

South Adams County Water and Sanitation District East 104th Avenue Parallel Sanitary Sewer- Phase 3. Commerce City, CO. Project Manager/Project Engineer. Performed sewer line route and sizing study and designed and performed contract administration services for 2,600 feet of 21-, 18- and 15-inch diameter gravity interceptor sanitary sewer.

South Adams County Water and Sanitation District Wastewater Facilities Update to the District's Design and Construction Standards for Water and Wastewater Facilities. Commerce City, CO. Project Manager/Project Engineer. Performed review and update to the District's Design and Construction Standards for Water and Wastewater Facilities.

South Adams County Water and Sanitation District Wastewater Collection System Rehabilitation. Commerce City, CO. Project Manager. Managed design, bidding, and construction contract administration and inspection services

for the removal and replacement of 7,800 feet of 24-, 21-, 10- and 8-inch diameter sanitary sewer pipe and the replacement of 36 manholes.

South Adams County Water and Sanitation District 6th Avenue and Holly Street Lift Station Upgrade. Commerce City, CO. Project Manager. Managed design and construction contract administration and inspection services for a new 1.73-mgd sanitary sewer pumping stations replacing an existing 0.5-mgd pumping station.

South Adams County Water and Sanitation District Wastewater Flow Metering Installations. Commerce City, CO. Project Manager. For design and construction contract administration and inspected for three wastewater flow metering stations on existing 21 , 24 , and 36 inch sanitary sewer lines.

Ken-Caryl Ranch Water and Sanitation District Sanitary Sewer Replacements in the Plains Phase 2. Littleton, CO. Project Manager/Project Engineer. Managed and performed design, bidding and construction contract administration and managed inspection services for the removal and replacement of 6,200 feet of existing 8- and 15-inch sanitary sewer and the rehabilitation of 400 feet of existing 18-inch concrete sanitary sewer pipe by lining with Cured-in-Place Pipe (CIPP).

South Adams County Water and Sanitation District East 104th Avenue Parallel Sanitary Sewer- Phase 1 and 2. Commerce City, CO. Project Manager/Project Engineer. Performed sewer line route and sizing study and designed and performed contract administration services for 5,500 feet of 24-inch diameter gravity interceptor sanitary sewer.

South Adams County Water and Sanitation District Dupont Phase 3, Section I-Sewer Main Rehabilitation and Section 2-Water Service Line Replacement. Commerce City, CO. Project Manager. For Section I, managed design, bidding, and performed contract administration and construction inspection oversight services for rehabilitation of 15,900 feet of existing 8-inch diameter concrete sanitary sewer pipe and 54 manholes by lining with cured-in-Place Pipe (CIPP). For Section II, managed design, bidding, and performed construction contract administration and construction inspection oversight services for removal and replacement of 149 existing residential and commercial potable water service lines and installation of 16 fire hydrants.

South Adams County Water and Sanitation District Williams Monaco Wastewater Treatment Plant Laboratory Renovation. Commerce City, CO. Project Manager. Managed design of expansion and remodel of existing wastewater treatment plant water quality laboratory.

David Vidikan PE
Associate Vice President,
QA/QC

South Adams County Water and Sanitation District Williams Monaco Wastewater Treatment Plant Capacity Re-rating Study. Commerce City, CO. Project Manager. Managed study and permitting process with Colorado Department of Public Health and Environment to increase rated total treatment capacity of the Williams Monaco Wastewater Treatment Plant from its present maximum month treatment capacity rating of 7 mgd to 8 mgd.

South Adams County Water and Sanitation District Prairie Gateway Off-Site Sanitary Sewer Replacements Phases 1 and 2. Commerce City, CO. Project Manager. Performed sewer line route and sizing study and managed project design and contract administration services for Phase 1 - 10,300 feet of 21-inch gravity interceptor sanitary sewer and Phase 2 - 3,900 feet of 36-inch gravity interceptor sanitary sewer - Phase 2.

South Adams County Water and Sanitation District Section I- Williams Monaco Wastewater Treatment Plant Digester Improvements and Section II- Wastewater Lift Station No 2 Flow Equalization Basin. Commerce City, CO. Project Manager. For Section I, managed design and contract administration services for improvements and rehabilitation of existing treatment plant anaerobic digesters. Improvements included new mixing facilities, mechanical piping replacement and steel dome cover modifications and painting. For Section II, managed design and construction contract administration services for 412,000 gallon wastewater flow equalization basin.

South Adams County Water and Sanitation District Columbine Ranches Parallel Storm Water and Sanitary Sewers. Commerce City, CO. Project Manager/Project Engineer. Performed sewer line route and sizing studies and designed and performed contract administration services for 5,300 feet of 36-, 42-, 48-, and 54-inch gravity storm sewer pipelines and 5,100 feet of 24-inch gravity interceptor sanitary sewer.

Clear Creek Valley Sanitation District Wastewater Collection System Capacity Study. Arvada, CO. Project Manager. Managed evaluation of existing wastewater collection system capacity, evaluated the impacts on collection system from planned growth of developments within the District, and recommended improvements to address capacity issues in the existing collection system.

South Adams County Water and Sanitation District Primary Digester No 1 Inspection and Evaluation. Commerce City, CO. Project Manager/Project Engineer. Performed inspection and identified necessary improvements and their associated costs for the rehabilitation of an existing 45-foot diameter cylindrical concrete anaerobic sludge digester.

South Adams County Water and Sanitation District Turnberry Meadows Wastewater Lift Station. Commerce City, CO. Project Manager/Project

Engineer. Managed design and performed contract administration services for a 2.6-mgd sanitary sewer wastewater pumping station.

Ken-Caryl Ranch Water and Sanitation District Sanitary Sewer Replacements in the Plains. Littleton, CO. Project Manager/Project Engineer. Managed and performed design, bidding and construction contract administration and managed inspection services for the removal and replacement of 7,300 feet of existing 8-inch sanitary sewer.

South Adams County Water and Sanitation District Section I - Wastewater Treatment Plant Interceptor Sewer, Section II Wastewater Pumping Station No 2 Odor Control Facilities. Commerce City, CO. Project Engineer. For Section I, designed and performed construction contract administration and construction inspection oversight for 6,400 feet of 36-inch gravity flow interceptor sewer pipeline, which replaced an existing deteriorated and undersized sewer. For Section II, designed and performed construction contract administration and construction inspection oversight for BIOXIDE nitrate chemical storage and feed facility for injection into wastewater pumping station force main for control of hydrogen sulfide (H₂S) in the force main. The project included the installation of a wastewater flow metering station on an existing 30-inch sanitary sewer line.

South Adams County Water and Sanitation District Wastewater Utility Plan, Williams Monaco Wastewater Treatment Plant. Commerce City, CO. Project Manager. Managed study and assisted in preparation of facilities report for required improvements and increased treatment capacity at the wastewater treatment.

South Adams County Water and Sanitation District Hazeltine Heights Lift Station Upgrade. Commerce City, CO. Project Manager. Managed design and construction contract administration and inspection services for a new 0.86-mgd sanitary sewer pumping station replacing an existing 0.26-mgd pumping station.

South Adams County Water and Sanitation District Wastewater Collection System Master Plan. Commerce City, CO. Project Engineer. Performed evaluation of existing and ultimate District wastewater collection system. Identified and recommended needed improvement to existing system now and in the future. Identified recommended improvements and facilities required to serve future growth areas in the District. Prepared cost estimates for all required capital improvement projects.

Ken-Caryl Ranch Water and Sanitation District North Ranch and North Plains Lift Stations Replacement. Littleton, CO. Project Manager. Managed design, bidding, and construction contract administration and inspection services

David Vidikan PE
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QA/QC

for a 0.58-mgd sanitary sewer pumping station and a 1.80-mgd sanitary sewer pumping station, which replaced existing aging pumping stations.

Ken-Caryl Ranch Water and Sanitation District Chatfield Green Lift Station No 1. Littleton, CO. Project Manager/Project Engineer. Managed and performed design, bidding and construction contract administration and managed inspection services for a 0.75-mgd sanitary sewer pumping station.

Crestview Water and Sanitation District Kidder Drive Lift Station. Denver, CO. Project Manager/Project Engineer. Designed and performed contract administration services for a 0.3-mgd sanitary sewer pumping station.

City of Cherry Hills Village Sanitation District Design Standards for Wastewater Collection Facilities. Cherry Hills Village, CO. Project Engineer. Prepared design standards and details for the District's wastewater collection facilities.

City of Scottsdale Water Campus Wastewater Treatment Plant. Scottsdale, Arizona. Project Engineer. Performed site development design on 100-acre site for new 24-mgd wastewater treatment plant. Site development included layout and design of all plant site utilities, including gravity sewer pipelines, plant process pipelines, potable and non-potable waterlines, gas pipelines and chemical feed pipelines in various pipe diameters, building and roads, parking, wells, site grading, stormwater control and drainage and coordination with all plant processes.

City of Cherry Hills Village Sanitation District Little Dry Creek Erosion Control Project. Cherry Hills Village, CO. Project Engineer. Designed five creek drop structures along Little Dry Creek. Drop structures were required to protect existing sanitary sewer line crossings of Little Dry Creek.

Town of Berthoud I-25 Lift Station and Force Main Pipeline. Berthoud, CO. Project Engineer. Designed a 1.4-mgd wastewater pumping station and 28,000 feet of 10-inch force main pipeline.

City of Cherry Hills Village Sanitation District Consolidation of Sanitary Sewer Service. Cherry Hills Village, CO. Project Engineer. Performed study to identify all independent sanitation districts operating within the Cherry Hills Village city limits, evaluate condition and life expectancy of existing sanitary sewer collection system, and recommended method of incorporating all independent sanitation districts into the Cherry Hills Sanitation District.

David Vidikan PE
Associate Vice President,
QA/QC

Cheyenne Board of Public Utilities Dry Creek Wastewater Treatment Plant O&M Manual. Cheyenne, WY. Project Engineer. Wrote operation and maintenance manual on improvements to Dry Creek Wastewater Treatment Plant.

Clark County Sanitation District Advanced Secondary Wastewater Treatment Plant. Las Vegas, NV. Project Engineer. Designed site development on 320-acre site for new 88-mgd secondary treatment wastewater treatment plant and improvements to existing plant. Site development included design and layout of site buildings, roads, parking, walks, utilities, including gravity sewer pipelines, plant process pipelines, potable and non-potable waterlines, gas pipelines and chemical feed pipelines in various pipe diameters, site grading, and stormwater control and drainage.

Clark County Sanitation District Support Facilities. Las Vegas, NV. Project Engineer. Designed site development on 320-acre site for new plant maintenance facilities. Site development included design and layout of site buildings, roads, parking, walks, utilities, site grading, and stormwater control and drainage.

Clark County Sanitation District Dechlorination and Flow Splitting. Las Vegas, NV. Project Engineer. Designed site development on 320-acre site for new 88-mgd sulfur dioxide dechlorination facility and 120-mgd flow-splitting structure. Site development included design and layout of site buildings, roads, parking, walks, utilities, site grading, and stormwater control and drainage.

City of Fort Collins Sludge Handling Facilities. Fort Collins, CO. Project Engineer. Designed sludge handling and drying facilities and a combination flow control and pressure-reducing sleeve valve and vault for a water treatment plant.

City of Boulder 75th Street Wastewater Treatment Plant Improvements and Cogeneration Facility. Boulder, CO. Project Engineer. Estimated project cost and quantities and performed contract administration services for wastewater treatment plant improvements project. Also wrote cogeneration facility and septage facility O&M manuals for project. The project included limited resident inspection trips, and supervising and aiding full-time resident.

Metro Wastewater Reclamation District Composting Buildings Sub-grade Infrastructure. Denver, CO. Project Engineer. Performed resident engineering construction inspection services for below grade infrastructure for the wastewater treatment plant composting facilities.

Snake River Wastewater Utility Wastewater Treatment Plant Facilities Plan. Summit County, CO. Project Engineer. Conducted study and prepared facilities report for required improvements and increased treatment capacity.

David Vidikan PE
Associate Vice President,
QA/QC

Metro Wastewater Reclamation District Clear Creek Parallel Interceptor Sewer, Denver, CO. Project Engineer. Performed resident engineering construction inspection services for 54,000 feet of 30-, 36-, 42-, 48-, 54-, 60- and 84-inch diameter gravity interceptor sanitary sewer.

Ken-Caryl Ranch Water and Sanitation District General Engineering Continuing Consultation Services, Littleton, CO. Project Manager/Project Engineering. Performed ongoing continuing engineering services to the District for; general assignments and meetings, development plan review, annual District budget development assistance, and any general engineering assignment task requested by the District.

South Adams County Water and Sanitation District General Engineering Continuing Consultation Services, Commerce City, CO. Project Manager/Project Engineering. Performed ongoing continuing engineering services to the District for general assignments and meetings, development plan review, wastewater treatment plant tasks, annual District budget development assistance, regional WWTP assistance and any general engineering assignment task requested by the District.

Adams County Board of County Commissioners Adams County Government Center Off-Site Potable Water and Sanitary Sewer Facilities, Adams County, CO. Project Manager for the Construction Contract Administration and inspection services for the construction of 800 feet of 12-inch waterline and 3,700 feet of 10-inch gravity sanitary sewer.

Adams County Board of County Commissioners Adams County Government Center Off-Site Potable Water and Sanitary Sewer Facilities, Section I Potable Water, Sanitary Sewer, and Force Main Pipelines, Section II Wastewater Lift Station, Adams County, CO. Project Manager for Section I, managed design and bidding services for approximately 6,100 feet of 10-inch gravity sanitary sewer, 3,930 feet of 6-inch force main, and 13,240 feet of 12-inch potable waterline. For Section II, managed design and bidding services for a factory built submersible pump wastewater lift station.

South Adams County Water and Sanitation District Buffalo Run Golf Course Water and Sewer Pipelines, Section I Wastewater Collection System, Section II Water Distribution System, Commerce City, CO. Project Manager/Project Engineer for Section I, managed and performed design and contract administration services for new wastewater collection system to serve existing golf course clubhouse and maintenance building complex, currently utilizing septic system, and convey wastewater to public sewer collection system. For Section II, managed and performed design and contract administration services for new water distribution system to serve existing golf course clubhouse and maintenance building complex, currently utilizing well water, and connect to existing public water distribution system.



Dave Butler PE, ENV SP

Senior Engineer

EDUCATION:

BS, Civil and Environmental Engineering, University of Colorado, 1976

Certificate, Sustainable Design & Green Building, University of Tennessee, 2011

REGISTRATIONS:

PE: CO (17854)

YEARS OF EXPERIENCE:

Dewberry: 16

Prior: 22

AFFILIATIONS:

American Water Works Association

Dave has more than 38 years of experience in the planning, design, and construction management of municipal infrastructure projects focusing on water and wastewater treatment facilities, pipelines and pump stations of all sizes. His experience includes facility planning, design, and construction for wastewater plants ranging in capacities from 0.035 mgd to 450 mgd. He has prepared master plans for the water treatment and distribution systems of the cities of Boulder, Fort Collins, and Thornton, Colorado. His experience also includes providing facility analysis, planning, final design and construction management for improvements to water treatment plants from 10 mgd to 280 mgd capacity.

PROJECT EXPERIENCE

Preliminary Treatment Systems Improvements, Colorado Springs Utilities, CO. Design and construction phase services for improvements to the headworks processes of this 65 mgd treatment plant. Improvements included replacement of the existing conventional grit classifiers with new forced vortex grit washers. The existing scum concentrator was reinstalled to improve operation and maintenance access and new pumping equipment installed to blend the scum with treatment process sludge for conveyance to the City's remote sludge processing and disposal complex.

Grease Processing Facility, Metropolitan Denver Water Reclamation District, CO. Project Engineer for design and construction phase services for a centralized facility to concentrate scum and grease skimmed from process clarifiers. Based on the dissolved air flotation process the design included custom designed heated hoppers for storage of the concentrated grease, static screening for removal of inert solids, rotary lobe transfer pumps and tank truck loading facilities.

Wastewater Treatment Plant Interim Improvements, Town of Carbondale, CO. Design, construction phase services and start up of 1.0 mgd Wastewater Treatment Plant. Specific improvements included restoration of a secondary clarifier that had been out of service for a number of years, modification of the clarifier flow splitter box to provide properly proportioned flow distribution to two different sized clarifiers, installation of two variable speed positive displacement sludge transfer pumps and restoration of a rotary drum sludge thickener to service to improve aerobic digester operations, and installation of control equipment for automatic flow pacing of the chlorination system.

South Water Reclamation Plant Improvements, Parker Water & Sanitation District, CO. Design, construction phase services and start up of a new dissolved air flotation (DAF) sludge thickening facility for the District's 2.5 mgd South

Water Reclamation Plant. In addition to the DAF thickening process, improvements included new waste sludge pumps, and rehabilitation of the aerobic digester aeration system, including new fine bubble air diffusion equipment and three new 125 horsepower rotary positive displacement blowers.

Wastewater Treatment Plant, City of Northglenn, CO. Provided construction management and field engineering services during construction of a new 4.5 million gallon per day wastewater treatment plant to replace the City's aging aerated lagoon system. Facilities included a 2.5 million gallon aeration basin complex capable of five stage biological nutrient removal, two 65 foot by 16 foot side water depth final clarifiers, UV disinfection building, separate buildings to house major electrical equipment and Turblex aeration blowers, and a process pump station housing return and waste activated sludge pumps, mixed liquor recirculation pumps, scum pumps, non potable water pumping system and three 5 mgd plant effluent pumps. The project also included significant yard piping ranging up to 30 inch diameter, more than a mile of 42 inch gravity effluent pipeline and an expansion and upgrade of the plant laboratory.

Wastewater Treatment Plant Improvements, City of Longmont, CO. Design-build construction of expansion of the City's wastewater treatment plant from 11.5 mgd to 17 mgd. Process improvements included a new structure to improve flow distribution among the four primary clarifiers, modifications to the flow equalization system to reduce energy consumption by minimizing influent pumping, a new primary effluent pumping station, new activated sludge facility to replace first and second stage trickling filters, and conversion of effluent disinfection from gaseous chlorine with sulfur dioxide dechlorination to ultraviolet light disinfection. In addition to design drawings and specifications, implementation of this project required preparation of a Utility Plan conforming with the requirements of the Denver Regional Council of Governments Metro Vision 2020 Clean Water Plan.

Wastewater Treatment Plant, Fountain Sanitation District, CO. Design, construction phase services and start up of a new 1.5 mgd extended aeration activated sludge wastewater treatment plant to replace the District's obsolete lagoon system. Included were process design, hydraulics, structures, solids handling facilities, site improvements and access roads.

Combined Sewer Pump Station Condition Assessment, City of Omaha, NE. Served as part of a multidisciplinary team that performed a condition assessment of 17 large combined sewer pumping facilities. Each of these pump stations lifted dry weather wastewater flow and combined storm water/wastewater flow from one of the collection system trunk sewers into an outfall interceptor sewer that conveyed the total flow to the City's wastewater treatment plant. Individual pump stations ranged in capacity up to 40 mgd and included mechanical screening and grit removal facilities to protect the pumps and prevent accumulation of material in the gravity interceptor. Recommendations were made for pumping, screening

and grit removal equipment replacements and upgrades and for control system improvements to extend facility life, increase capacity, reduce maintenance and enhance reliability with the objective of minimizing wet weather discharges to the Missouri River.

Sewer Construction Standards, Cherry Hills Village Sanitation District, CO. Developed design standards, standard specifications, and standard design details for sewer construction to assist the District with consolidation of 27 special districts within the City of Cherry Hills.

WWTP Expansion, Clark County Sanitation District, NV. Design of new DAF thickening facilities and rehabilitation of existing gravity thickeners as part of an expansion of the District's 80 mgd Central Plant.

Wastewater Pumping Facilities, Broward County, FL. Performed hydraulic analysis and pump selection for 11 major wastewater pumping stations as part of a county-wide wastewater collection and treatment consolidation program. Individual facilities ranged in size from 5 to 25 mgd and incorporated variable speed pump controls and hydraulically actuated surge control valves.

Industrial Waste Pretreatment, Proctor & Gamble, CA. Preliminary design of gravity separation facilities to remove catalyst from process waste stream.

Wastewater System Planning, Camarillo Sanitary District, CA. Development of a master plan for collection and treatment of rapidly increasing wastewater flows. Alternatives for increasing system capacity from 5 mgd to 10 mgd included new facilities as well as expansion of existing facilities. Water reuse and changing regulatory issues were key considerations.

Wastewater Facilities Planning, City of Los Angeles, CA. Prepared an update to the facilities plan for the City's 600-square-mile wastewater service area. By 2010, city facilities will serve 4.2 million people and treat nearly 590 mgd. Also managed sub-consultant preparation of associated supplemental environmental impact report

Wastewater Treatment Plant Design, City of Los Angeles, CA. Prepared final conceptual design report for expansion of the Hyperion Wastewater Treatment Plant to 450 mgd. Prepared preliminary designs for a new centrifuge thickening facility to handle up to 13.5 mgd of waste-activated sludge and centralized chemical storage and feed facilities. Also completed final design for 36, 150-ft diameter final clarifiers including return and waste-activated sludge pumping.

Anaerobic Digester Alternatives Study, City of Los Angeles, CA. Conducted an evaluation of alternatives for expanding sludge digestion capacity as part of the Hyperion Wastewater Treatment Plant expansion project. Projections indicated

Dave Butler PE
Senior Engineer

that digester capacity would need to increase from 45 million-gallons to 97 million-gallons at ultimate design conditions. Options considered included replacement of the existing conventional anaerobic digesters with new conventional digesters or with egg shaped digesters. Alternatives for location of all or part of the digestion process off-site were also analyzed. The recommended plan provided for phased replacement of the 18 existing 2.5 million gallon digesters with 42-2.5 million gallon fabricated steel egg shaped digesters.

Industrial Waste System Improvements, Stapleton International Airport, CO.

Prepared pre-design report for improvements to the airport's combined storm/industrial waste sewer system to eliminate dry weather and first flush discharges. Also updated waste source identification and characterization data for all airport facilities.



Michael P. Lutz PE

Lead Engineer/Project Manager

EDUCATION:

BS, Civil Engineering, University of Colorado, 1982

REGISTRATIONS:

PE: CO (25753)

YEARS OF EXPERIENCE: 33

AFFILIATIONS:

American Water Works Association

Water Environment Federation

ACEC Colorado

Tau Beta Pi

Chi Epsilon

PRESENTATIONS & PUBLICATIONS:

"Closer to Sustainable – Reuse and Energy Efficiency of Rueter Hess Reservoir and WTP", presented at the AWWA 2014 Sustainable Water Management Conference, Denver, CO, March 2014

"Rueter-Hess Reservoir and WTP Promote Water Conservation and Reuse", Rumbles, July 2013

"Treatment of Reclaimed Water For Drinking Water Supply Using Powdered Activated Carbon and Ceramic Membrane Filters", presented at the South Carolina Environmental Conference, Myrtle Beach, SC, March 2013

"Treatment of Reclaimed Water For Drinking Water Supply Using Powdered Activated Carbon and Ceramic Membrane Filters", presented at the 92nd AWWA-WEA Annual Conference, Raleigh, NC, November 2012

"Treatment of Reclaimed Water Using Recirculating PAC and Ceramic Membrane Filters at the Rueter-Hess

Mike's varied career has focused on water and wastewater facilities and includes planning, pilot studies, design, and construction engineering services. Mike has a proven track record of out of the box thinking and analysis which has enabled him to design unique treatment processes to handle unusual treatment issues. He led the evaluation and design of the first ceramic membrane drinking water system in the U.S. He designed one of the first few ballasted sedimentation processes in the U.S. Mike has designed unique multi-stage odor control systems for severe odor sources. He designed one of the first systems to heat and cool buildings using wastewater as the heat source and heat sink. Mike served on committees which revised the Colorado Design Criteria For Wastewater Facilities adopted in 2002 and 2012. Mike served as the primary author of the Solids Treatment section of the Design Criteria developed in 2012. Mike's project designs have been awarded two Engineering Excellence Awards and a Grand Conceptor Award from the American Consulting Engineers Council (ACEC).

PROJECT EXPERIENCE

Toxicity Reduction Evaluation, Deuel Vocational Institution, Tracy, CA.

Conducted a Toxicity Reduction Evaluation (TRE) for the DVI wastewater treatment facility to identify causes of permit violations including chronic toxicity for *Ceriodaphnia dubia* and the green algae *Selenastrum capricornutum*, high effluent nitrate concentrations, and excessive surface water temperature increase downstream of the effluent discharge point. Evaluated operation and performance of the wastewater treatment facility to identify trends that could potentially upset the wastewater treatment process or affect effluent toxicity. Evaluated membrane bioreactor (MBR) filter capacity and identified transfer of dissolved oxygen from an aerated sludge storage tank into the anoxic zones in the MBR process as a cause of decreased denitrification capacity and increased effluent nitrate concentrations. Identified limited capacity range of effluent cooling towers as the cause of non-compliance with the permit temperature rise limitation. Evaluated TDS concentrations, electrical conductivities, and ion imbalances in the wastewater influent as potential causes of chronic toxicity in the WWTF effluent. Determined that high TDS concentrations in the drinking water supply (from the brackish groundwater source) cause chronic toxicity in the WWTF effluent when the reverse osmosis (RO) and zero liquid discharge (ZLD) systems which supply drinking water are out of service. Developed corrective actions to reduce or eliminate violations of permit limits.

Wastewater Preliminary Engineering Report, City of Durango, CO. Evaluated regulatory, environmental, and water quality issues to upgrade the 30- year old Santa Rita WWTF. Evaluated studies of the Animas River for excessive metals concentrations and the impact of historic mining on metals limits for the WWTF.

Michael P. Lutz PE

Lead Engineer/Project Manager

Water Treatment Plant", presented at the WaterReuse Conference, Miami, FL, November 2011

"Treatment of Reclaimed Water Using Ceramic Membrane Filters and Recirculating PAC at the Rueter-Hess WTP", presented at the AWWA Membrane Technology Conference and Exhibition, Memphis, TN, March 2009

"Odor Control Fundamentals", presentation at the annual Leadville Operator's School, Rocky Mountain Water Environment Association, Leadville, CO, August 2006

"Impact of Water Treatment Plant Residuals on Fixed Film Wastewater Treatment", presented at the 77th Annual Water Environment Federation Conference, New Orleans, LA, October 2004

"Optimizing the Trickling Filter Solids Contact Process for Nitrification", presented at the RMWEA / RMSAWWA Joint Annual Conference, Grand Junction, CO, September 2004

"Nitrification in Aerated Lagoons Coupled with Denitrification in Subsurface Flow Wetlands", presented at the Montana Water Environment Association Annual Conference, Butte, MT, April 2001

"Nitrification and Denitrification in Aerated Lagoons Coupled with Artificial Wetlands", presented at the 73rd Annual Water Environment Federation Conference, Anaheim, CA, October 2000

"Pulling Double Duty, A Colorado Plant's Trickling Filters Treat Odors while Reducing Wastewater Nitrogen Content", Operations Forum, Water Environment Federation, Alexandria, VA, July 1999

"Concurrent Nitrification and Biological Odor Control", proceedings of the Water Environment Federation 68th Annual Conference & Exposition, Miami, FL, October 1995

"Making Less Scents with Good Reason", Water Environment and Technology, Water Environment Federation, Alexandria, VA, June 1995

"Effect of Operating Variables on Nitrification Rates in Trickling Filters", proceedings of the Water

Evaluated Animas River hydrology, water quality, impacts of water supply diversions, effect of dilution during low flow, Special Botanical Areas, and threatened and endangered aquatic wildlife in the stream. Evaluated interim numerical effluent limits for total phosphorus, total nitrogen, and chlorophyll-a for discharges to Colorado surface waters (Regulation 31, Basic Standards and Methodologies for Surface Water). Evaluated impacts of Regulation 85 on effluent limits and Colorado requirements to implement new technology-based limits for total phosphorus and total inorganic nitrogen (TIN). Evaluated potential for future discharge limits for nonylphenol and several metals including arsenic, manganese, mercury, and sulfide.

Wastewater Treatment Plant, Plum Creek Wastewater Authority, CO.

Designed clarifier improvements and connecting channels between three parallel treatment trains to enhance operational flexibility. New effluent channels and gates between three oxidation ditches allow each ditch to discharge to either of two adjacent secondary clarifiers. Cylindrical telescoping weirs were designed to control the flow rate from the existing outlet pipe from each oxidation ditch to each clarifier. Submerged magnetic flow meters were installed in the vertical discharge pipe inside each oxidation ditch to meter flows into each secondary clarifier. To obtain uniform flow distribution to each clarifier, flow meters and Parshall flumes in open channels were evaluated. A new mechanical collector was designed for an existing unused clarifier tank. New return and waste pumps for the third clarifier were designed. A Site Application amendment was prepared for Colorado Department of Public Health and Environment approval.

Chemically Enhanced Primary Treatment Evaluation, Town of Avon, CO.

Evaluated a proposed Chemically Enhanced Primary Treatment (CEPT) system at the Avon WWTP. Evaluated the effects of chemical treatment using ferric chloride in primary clarifiers. Reviewed CEPT pilot tests at the Avon WWTP which showed that a ferric chloride dose of 30 mg/L or greater could reduce settled water orthophosphorus concentrations below 0.5 mg/L. Evaluated the effects of increased primary sludge loading to an existing ATAD (Autothermal Thermophilic Aerobic Digestion) digestion process, and increased hydraulic capacity due to decreased organic waste loading to the existing activated sludge process. Evaluated the effects of CEPT on the existing odor control systems. Evaluated the ability of the CEPT system to reduce odor generation in the primary clarifiers, ATAD reactors, and biosolids dewatering building. Developed recommendations for approval of CEPT by the Town for a 1041 Permit Application.

Wastewater Utility Plan, Central Clear Creek Sanitation District, CO.

Developed a Utility Plan to upgrade an existing 34 year old WWTF. Evaluated consolidation with existing wastewater treatment facilities. Using the Biowin computer simulation model, evaluated upgrade to 3-stage BNR activated sludge process, sequencing batch reactors, or membrane bioreactors and effluent filtration to comply with new more stringent permit limits for nitrogen and phosphorus. Evaluated the Clear Creek TMDL results for excessive metals

Michael P. Lutz PE

Lead Engineer/Project Manager

Environment Federation 67th Annual Conference & Exposition, Chicago, IL, October 1994

"Control of Odor Emissions at the Littleton/Englewood Wastewater Treatment Plant", proceedings of the Control of Odors and VOC Emissions Conference, Water Environment Federation, Alexandria, VA, April 1994

"Separate Stage Nitrifying Trickling Filters in Cold Climates", presented at the Water Environment Association of Ontario annual conference, Winsor, Canada, April, 1994

"Liquid Chemical Disinfection: A Cost-Effective Alternative to Toxic Gases", proceedings of the Control of Odors and VOC Emissions Conference, Water Environment Federation, Whippany, NJ, May 1993

"High Rate Nitrifying Trickling Filters, Water Science and Technology", Vol. 29, Number 10-11, presented at the Second International Specialized Conference on Biofilm Reactors, Paris, France, October 1993

"New Trickling Filter Applications in the U.S.A.", Water Science and Technology, 1990

"Full Scale Performance of Nitrifying Trickling Filters", presented at the 63rd Annual Conference of the Water Pollution Control Association, Washington, D.C., October 1990

"Evaluation of a Municipal Laboratory's Computer Needs", Water Environment and Technology, Water Environment Federation, Alexandria, VA, February 1990

"Enhancing Reaction Rates in Nitrifying Trickling Filters Through Biofilm Control", Journal of the Water Pollution Control Federation, Washington, D.C., May 1989

concentrations and the impact of historic mining on metals limits for the WWTP. Evaluated Clear Creek hydrology, water quality, impacts of water supply diversions, effect of dilution during low flow, and threatened and endangered aquatic wildlife in the stream. Evaluated replacement of inefficient or obsolete mechanical and electrical equipment due to age of the facility. Recommended addition of parallel or standby equipment to provide standby capability for each treatment process which consisted of a single unit or basin. Recommended new 3-stage BNR activated sludge process, new screenings and grit removal systems, upgrade of aerobic digesters, and new ultraviolet (UV) disinfection system. Developed a phased construction plan for the recommended upgrades to spread costs over several years and reduce cost impacts on residents.

Wastewater Treatment Facility Plan, City of Brush, CO. Developed a Facility Plan for a new 1.68 mgd biological nutrient removal (BNR) system to remove ammonia, nitrate, and phosphorus. Evaluated three-stage BNR activated sludge process, TF/SC process, sequencing batch reactors, and membrane bioreactors using the Biowin computer simulation model and State Point Analysis of secondary clarifiers. Evaluated waste sludge loads and new sludge stabilization processes including mesophilic and thermophilic anaerobic digesters, and composting to produce Class A biosolids. Evaluated dissolved air flotation thickening, and biosolids dewatering processes including belt filter presses and centrifuges. Evaluated septage receiving regulations and septage treatment alternatives. Evaluated odor control alternatives. Evaluated capital cost, O&M cost, and total life cycle cost for each alternative.

Wastewater Treatment Facility Plan, Town of Carbondale, CO. Conducted a Comprehensive Performance Evaluation to evaluate each process and existing equipment. Developed a Facility Plan for a new 1-mgd Biological Nutrient Removal (BNR) system to remove ammonia, nitrate, and phosphorus. Evaluated three-stage BNR activated sludge process, sequencing batch reactors, and membrane bioreactors using the Biowin computer simulation model and State Point Analysis of secondary clarifiers. Evaluated waste sludge loads and sludge stabilization processes including aerobic digesters and thermophilic anaerobic digesters. Evaluated dissolved air flotation thickening, and biosolids dewatering processes including belt filter presses and centrifuges. Evaluated odor control alternatives. Evaluated capital cost, O&M cost, and total life cycle costs.

Wastewater Treatment Plant, City of Northglenn, CO. Design of 6 mgd three stage biological nutrient removal wastewater treatment plant including headworks, primary clarifiers, aeration basins, pump stations, secondary clarifiers, and an ultraviolet disinfection system. Performed process design on plant hydraulics, pumping systems, primary and secondary clarifiers, and aeration. Process evaluation included utilizing BioWin to determine aeration basin size. Prepared technical memorandum evaluating aeration diffuser systems, sources for pump seal and plant wash water, and multistage vs. single stage blower

technologies. Prepared Construction bidding drawings and specification for 300 sheet design.

Wastewater Treatment Plant Utility Plan, City of Northglenn, CO. Developed a Utility Plan for a new 6 mgd Biological Nutrient Removal system to meet new discharge limits for ammonia, nitrate, and phosphorus. Evaluated several potential sites for the treatment facility and consolidation with other treatment facilities. Evaluated impact of consolidation and relocation of discharge point on water rights, water exchanges, and potential effluent reuse alternatives. Evaluated condition and capacity of 7 existing lift stations and associated force mains and inverted siphons. Developed an alternative interceptor route to minimize wastewater pumping requirements and deliver most of the wastewater to the treatment facility by gravity flow. Developed odor control solutions for several force mains. Using the Biowin computer simulation model, evaluated treatment alternatives including, 3-stage BNR process, sequencing batch reactors, and oxidation ditches. Evaluated waste sludge loads and sludge stabilization processes including aerobic digesters, anaerobic digesters, lime pasteurization, and autothermal thermophilic aerobic digestion. Evaluated dissolved air flotation thickening, and biosolids dewatering processes including belt filter presses and centrifuges. Assisted the City with negotiation of new discharge permit.

Central Treatment Plant Facility Plan, Metro Wastewater Reclamation District, CO. Developed facility plan to expand and upgrade the 185 mgd Central Treatment Plant to meet more stringent discharge limits for ammonia, nitrate, and TOC. Evaluated 25-mgd sequencing batch reactors for flow equalization to discharge uniform effluent flow rate to protect wildlife in the South Platte River. Evaluated hydraulic analysis software and developed plant hydraulic profile. Evaluated impact of water treatment sludge discharges to the sewer system on wastewater process performance and cost of solids stabilization and beneficial use of biosolids.

Nitrification Alternatives Evaluation, City of Northglenn, CO. Evaluated nitrification potential of an existing 4 mgd aerated lagoon treatment system and process alternatives to meet new ammonia discharge limits. Determined proportion of flow requiring a nitrified effluent based on flow augmentation requirements in the receiving stream. Upgrade of the existing lagoons into a nitrifying activated sludge process was compared with addition of tertiary nitrifying trickling filters, aquatic treatment systems, submerged fixed film units installed in the aeration basins, and biological aerated filters (BAFs). Because less than half of the influent wastewater required nitrification to augment flow in the South Platte River, addition of a tertiary BAF process proved more cost effective than conversion of the entire lagoon system to an alternative process.

Central Treatment Plant Digesters 11 & 12, Metro Wastewater Reclamation District, CO. This project included planning and design of two new 100 foot diameter digesters at the 210 mgd Central Treatment Plant. Evaluated solids

loads, digestion process alternatives, mixing systems, alternative digester shapes, and gas management systems. Evaluated effects of mixing on volatile solids reduction, gas production, foaming, and pathogen reduction. Evaluated mixing systems including hydraulic jet nozzles, gas cannon mixers, and mechanical draft tubes. Evaluated egg-shaped, silo-shaped, and conventional digesters with submerged fixed covers. Evaluated factors that contribute to foam development and directed testing of chemical de-foaming agents. Evaluated effect of de-icing fluids used at Denver International Airport and on highways on digester operation. Evaluated production of surfactants in the activated sludge process and effect on digester operation.

Disinfection Technology Evaluation, Metro Wastewater Reclamation District, CO. Evaluated feasibility, costs and benefits of several disinfection alternatives for the 185 mgd Central Treatment Plant. Analyzed ultraviolet disinfection technology, ozone disinfection, sodium hypochlorite and bisulfite, on-site hypochlorite and mixed oxidant generators, containment system with gas scrubbers for 90-ton rail cars of chlorine and sulfur dioxide, and gamma irradiation. Surveyed large wastewater treatment plants with alternative disinfection systems to determine actual capital and operating costs and maintenance experience. Evaluated operational variables including energy use, health and safety, environmental impacts, Uniform Fire Code compliance, chemical storage, and equipment maintenance. Developed capital, annual, and life cycle costs for each alternative.

WWTF Process Model & Performance Evaluation, Colorado Springs Utilities, CO. Using the BioWin computer simulation model, evaluated capacity of the existing Las Vegas Street (LVS) Wastewater Treatment Facility and alternatives to increase capacity from 47 to 62 mgd and meet new effluent ammonia limits ranging from approximately 1.6 to 2.7 mg/L. The LVS facility was modeled with two new aeration basins at 60 mgd flow to replace the existing trickling filter - solids contact (TF/SC) process. Future permit limits for nitrate, TIN, or phosphorus were evaluated. Evaluated reduced hydraulic and organic loads to achieve nitrification in the TF/SC process. Evaluated dissolved oxygen in the anoxic zones that prevented denitrification in the existing activated sludge process and a shift in denitrification to the sludge blanket in the secondary clarifiers. Evaluated hydraulic capacity of existing chlorine contact basins. Evaluated capacity of existing primary sedimentation tanks and primary sludge pumps to remove increased quantity of waste solids from the new Northern WRF that were to be discharged into the interceptor to the LVS facility. Analyzed blower and diffuser capacity for current and future organic loads. Prepared net present worth analysis to compare upgrade the existing aeration basins to membrane bioreactors or IFAS (Anox Kaldnes). Recommended expansion of the existing activated sludge process to provide future buildout capacity and increase nitrification, denitrification, and biological phosphorus removal for the LVS facility.

Dewatering Centrifuge Evaluation, Metro Wastewater Reclamation District, CO. Prepared a feasibility study to evaluate costs and benefits of new high-torque dewatering centrifuges for this 185 mgd treatment plant. Project included analysis of cost impacts of several operational variables including energy and polymer use, dewatered cake solids content, hauling distance, storage capacity, and maintenance impacts.

Trickling Filter & Nitrifying Trickling Filter Optimization, City of Boulder, CO. Evaluated performance of a trickling filter - solids contact process (TF/SC) and a nitrifying trickling filter (NTF) at the 19 mgd 75th Street Wastewater Treatment Plant. The study determined that failure of whole effluent toxicity tests was caused by increasing effluent ammonia concentrations due to lower than expected ammonia oxidation rates in the nitrifying Trickling Filter (NTF). The effect of several process variables on nitrification were evaluated, including diurnal ammonia loads, hydraulic loading rate, centrate loads, alkalinity, biofilm predators, and solids retention time (SRT) in the solids contact basins. Nitrification in the TF/SC process was simulated using a mathematical model developed by Daigger (1993). The model indicated that the TF/SC process could reliably sustain nitrification if a minimum SRT of three days was maintained and partial nitrification was maintained in the rock TFs. Bench-scale tests were performed to evaluate the effects of WTP residuals on the TF/SC and NTF processes. Biofilm samples grown in the rock TF maintained constant soluble COD removal rates when exposed to iron concentrations up to 14.2 mg/L. Acute iron toxicity was not observed in the biofilms. The potential to use the existing rock media TFs for denitrification was determined to be feasible.

Biosolids Evaluation & Digester and Cogeneration Facilities, City of Longmont, CO. Evaluated the City's biosolids land application program in light of decreasing public acceptance and increasing urban development near existing land application sites. The evaluation considered regulatory compliance, cost effectiveness, reliability, location of disposal sites, and trucking costs. Purchase of agricultural land was evaluated to ensure availability of an application site and minimize transportation costs. Evaluated the condition and performance of the existing 40 year old anaerobic digesters including digester covers and tanks, and mixing and heating equipment. Evaluated waste loads, methane gas production, electrical and heat energy potential for the plant and determined a financial payback for a cogeneration system. Evaluated conversion of existing anaerobic digesters to a Class A sludge treatment technology to provide an alternative to land application of Class B biosolids. To reduce pathogens, Class A technologies evaluated included aerobic thermophilic pretreatment (ATP) followed by anaerobic digestion, thermal pasteurization, and autothermal thermophilic aerobic digestion (ATAD). Designed improvements for two existing 45 foot diameter anaerobic digesters including new fixed and floating digester covers, a new external pump mixing system, new external heating jackets installed around sludge piping, and acid metering system to control digester pH. The digester gas system includes a new gas foam separator, new gas filters to remove hydrogen

sulfide, and new gas compressors. Designed new cogeneration system consisting of two digester gas-fired engine driven generators with a capacity of 180 kW each, heat recovery exchangers, hot water pumps, boiler, and associated controls.

Wastewater Treatment Plant, City of Longmont, CO. Evaluated treatment alternatives to expand the existing treatment plant from 11 to 17 mgd. Process alternatives included a coupled trickling filter and solids contact system, activated sludge, biological aerated filters, and oxidation ditches. Evaluated flow equalization and pumping system capacity. Evaluated cost effectiveness of upgrading an existing anaerobic digester system and potential for a new cogeneration system. Evaluated impacts of cogeneration on future production of Class A biosolids.

Wastewater Treatment Plant, Cities of Littleton & Englewood, CO. Design of \$32 million improvements and additions to the existing 35 mgd regional plant. This project received the Colorado 1994 Engineering Excellence Award for water projects and a 1994 national honor award from the American Consulting Engineers Council. Managed design and construction of headworks upgrade, primary clarifier upgrades, conversion of pure oxygen activated sludge system to TF/SC process, new nitrifying trickling filters, new 45 feet diameter dissolved air flotation thickeners, new digester cover, septage receiving station, chlorine contact tank expansion and conversion of chlorine and sulfur dioxide to sodium hypochlorite and sodium bisulfite systems, biological and chemical odor scrubbers, and 8,000 square feet administration, maintenance and laboratory building. Headworks improvements included one new 21 mgd (14,665 gpm) vertical centrifugal raw sewage pump and new variable frequency drives for 5 existing raw sewage pumps with similar capacity (126 mgd total). The new trickling filter (TF) lift station has two variable speed vertical column pumps that pump primary effluent and have a capacity of 16,680 gpm (24 mgd) each (48 mgd total). The new nitrifying trickling filter (NTF) lift station consists of three variable speed vertical column pumps with a capacity of 16,680 gpm (24 mgd) each (76 mgd total). The five TF and NTF pumps are equipped with right-angle gear drives that allow standard 3600 rpm motors to be used with the slow speed pumps (460 to 880 rpm) and also allow the pump column and mechanical components to be removed for maintenance or repairs without removing the 250 hp motors. Directed planning studies for odor control, sludge management, and site drainage. Prepared a 201 Facilities Plan for subsequent upgrade and expansion of the plant to 60 mgd ultimate capacity.

Anaerobic Digester Improvements, City of Englewood, CO. Managed design of anaerobic digester improvements for the Littleton/Englewood WWTP including a customized steel fixed cover, floating cover rehabilitation, new mechanical mixers and gas compressors, and reconfiguration of digester gallery piping. As part of the Phase 1B Facility Plan, evaluated solids loads, digester performance, heating and mixing systems, digester configuration, co-generation, and aerobic thermophilic pretreatment to achieve future Class A pathogen reduction. The plan

recommended a hybrid digester design with submerged fixed covers to minimize foaming potential and maximize digester volume.

Sludge Management Plan, City of Englewood, CO. Developed a sludge management plan for the Littleton/Englewood WWTP. Evaluated impacts of revised pollutant limits, pathogen and vector reduction requirements, and hazardous wastes under state and federal regulations. Evaluated sludge treatment alternatives including composting, aerobic thermophilic pretreatment, heat and lime pasteurization, multiple effect evaporation (Carver-Greenfield), heat drying, incineration in a coal fired power generation plant, aqueous phase oxidation, and land application. Recommended purchase of 3,000 acre site for agricultural land application program.

North Water Reclamation Facility, Parker Water & Sanitation District, CO. Designed treatment process for integrated biological nutrient removal system with two mgd capacity expandable to eight mgd. The process consists of nitrifying activated sludge with variable volume anoxic zones for denitrification and anaerobic zones for biological phosphorus removal. Project design and construction engineering services included a headworks facility, two new final clarifiers, advanced chemical treatment and effluent filtration for additional phosphorus reduction, dissolved air flotation thickening for waste activated sludge, aerobic digestions, biosolids dewatering facility and a 20,000 square foot administration and maintenance complex with a 4,000 square foot laboratory.

Fraser Area 201 Facilities Plan, Grand County Water & Sanitation District, CO. Developed wastewater upgrade and expansion plan for Fraser Sanitation, Grand County Water and Sanitation, and Winter Park West Water and Sanitation districts. Developed treatment alternatives to add nitrification capacity in extreme cold weather conditions for both consolidated and separate treatment facilities. Developed life-cycle cost estimates for several process configurations including lagoons, wetlands, nitrifying trickling filters, sequencing batch reactors, activated sludge, extended aeration, oxidation ditches, and submerged biological contactors.

Wastewater Treatment System, St. Mary's Glacier Water & Sanitation District, CO. Designed a new activated sludge process that operates in contact stabilization mode to treat 0.6 mgd high infiltration flow. During normal flow, the plant operates in an extended aeration mode. Wastewater temperatures are very low, ranging from 3.5 to 9 degrees Centigrade. The plant is equipped with porous diffusers and mechanical mixers in each basin to allow operation with anoxic or anaerobic zones for denitrification and biological phosphorus removal. Developed a new Site Application for the facility. Assisted District to obtain construction loans and grants. Managed construction and startup of the new facility. Developed operation and maintenance manual.

Infiltration and Inflow Investigation, St. Mary's Glacier Water & Sanitation District, CO. Evaluated infiltration and inflow (I/I) into 47,500 feet (9 miles) of

vitrified clay sewer pipe (VCP). Evaluated closed circuit television (CCT) inspections of 28 percent of the system. Directed inspections of 117 manholes to evaluate structural condition, corrosion, and seepage through manhole walls. Measured flows for two years during spring and summer using portable open channel flow meters (Marsh-McBirney Flo-Totes) installed in manholes along the main sewer through the service area. Installed a trapezoidal flume with ultrasonic level indicator/recorder at the wastewater treatment plant. Flow data indicated that infiltration was uniformly distributed through the system, steadily increasing in direct proportion to pipe length. Wastewater flow was correlated with the flow pattern in the natural streams in the area. Infiltration was highest in the pipe segment along the valley floor parallel to Silver Creek and peak flows for wastewater and the natural streams occurred simultaneously in early June. Evaluated pipeline repair methods including chemical grouting, vacuum sewers, pipe insertion (slip lining), and pipe replacement. Developed a program was to systematically replace sewer pipelines over several years.

Biosolids Facilities, City of Wichita, KS. The \$23 million project included rehabilitation of eight anaerobic digesters and solids handling facilities for two wastewater treatment plants. Designed a new dissolved air flotation thickening process and digester rehabilitation including new mixing equipment and submerged fixed covers. Designed raw wastewater screening system, centrate equalization, and mechanical sludge screening system. Designed a unique and innovative sludge storage and discharge container with a built-in hydraulic ram that eliminated the need for separate conveyors and loading equipment. Evaluated anaerobic digester gas production rates and potential recoverable energy for this 50 mgd treatment plant. Developed alternatives for digester gas utilization and evaluated life cycle costs for cogeneration, gas scrubbing for vehicle fuel, in-plant heating, and fuel wheeling through gas utility pipelines.

Central Valley Water Reclamation Facility, Salt Lake City, UT. Responsible for concurrent design, start-up, and construction management for this 75 mgd, \$130 million plant. This project received the Grand Conceptor Engineering Excellence Award in 1989 from the Consulting Engineers Council of Utah. Directed several studies and design tasks including a 12-month pilot plant program to develop high rate nitrifying trickling filters; a 10,000 sq ft laboratory and office facility; laboratory information management system, sludge management plan; and design of gravity belt thickening system.

Co-Generation Evaluation, City of Greeley, CO. Evaluated anaerobic digester gas production rates and potential recoverable energy for the 11 mgd Greeley Water Pollution Control Facility. Evaluated life cycle costs to use digester gas in an engine driven generator with a nominal capacity of 450 kilowatts (kW) to produce electricity and recover waste heat. Evaluated digester heating demand, heat recovery equipment, gas compressors, and generator controls. Evaluated impact of scheduled engine shutdowns for routine maintenance on the potential to reduce electrical demand charges in addition to direct energy savings. Evaluated

generators driven by 30 to 60 kW gas turbines (microturbines) as an alternative to conventional reciprocating engine generators.

Chemical Storage Building, City of Greeley, CO. Designed a 2,500 sq ft chemical storage building for odor control at the 11 mgd Greeley Water Pollution Control Facility. Designed steel and HDPE chemical storage tanks for ferric chloride and magnesium hydroxide, chemical mixers, and metering pumps. Designed secondary containment for chemical leaks, emergency eyewash, fire sprinkler system, and HVAC system with un-interruptable power supply. Designed masonry building with offices, meeting room, kitchen, and washroom. Designed connections to the plant SCADA, intercom, and telephone systems. Evaluated impact of 100 year flood event on the plant site.

Advanced Wastewater Treatment, Colorado Springs Utilities, CO. Designed new dissolved air flotation thickening process for the 60 mgd Las Vegas Street municipal treatment facility. Project included demolition of existing centrifuge system, reuse of existing gravity thickener tanks and gallery space, building structural modifications, and new ventilation system.

Nitrification Pilot Study, Malmö, Sweden. Designed 24 month long pilot plant program to evaluate reuse of existing trickling filters for a tertiary high-rate, fixed-film nitrification process. Developed operating strategies to achieve a high nitrification rate (2 g N/m²-d). Developed a detailed work plan and testing procedures to investigate effects of biofilm predation, flushing intensity, alternating double filtration, and flooding sequences on biofilm development and process stability.

Papillion Creek Wastewater Treatment Plant, City of Omaha, NE. Responsible for construction phase engineering and start-up services for this 55 mgd plant. Responsibilities included construction management, quality control, development of trickling filter/solids contact (TF/SC) process section of the plant Operation and Maintenance (O&M) manual, and plant operator training.

Wastewater Treatment Plant, Municipality of Metropolitan Seattle, WA. Responsible for design of four new 55 feet diameter dissolved air flotation thickeners for mixed primary and secondary sludge for the 96 mgd Renton plant operated by the Municipality of Metropolitan Seattle. Designed flat aluminum covers to enclose the DAFT units, ventilation system, and a packed-bed chemical scrubber followed by eight activated carbon filters.

75th Street Wastewater Treatment Plant, City of Boulder, CO. Advised on design of a nitrifying trickling filter with split-stream treatment to meet partial and seasonally variable nitrification permit requirements at this 16 mgd treatment plant. This project received an Engineering Excellence Award in 1990 from the American Consulting Engineers Council of Colorado.

Trickling Filter & Nitrifying Trickling Filter Optimization, City of Boulder, CO. Evaluated performance of a trickling filter - solids contact process (TF/SC) and a nitrifying trickling filter (NTF) at the 19 mgd 75th Street Wastewater Treatment Plant. The study determined that failure of whole effluent toxicity (WET) tests was caused by increasing effluent ammonia concentrations due to lower than expected ammonia oxidation rates in the NTF. The effect of several process variables on nitrification were evaluated, including diurnal ammonia loads, hydraulic loading rate, centrate loads, alkalinity, biofilm predators, and solids retention time (SRT) in the solids contact basins. Nitrification in the TF/SC process was simulated using a mathematical model developed by Daigger (1993). The model indicated that the TF/SC process could reliably sustain nitrification if a minimum SRT of three days was maintained and partial nitrification was maintained in the rock TFs. Bench-scale tests were performed to evaluate the effects of WTP residuals on the TF/SC and NTF processes. Biofilm samples grown in the rock TF maintained constant soluble COD removal rates when exposed to iron concentrations up to 14.2 mg/L. Acute iron toxicity was not observed in the biofilms. The potential to use the existing rock media TFs for denitrification was determined to be feasible.

Wastewater Treatment Plant Improvements, City of Victor, CO. Designed upgrades of the existing 0.086 mgd facility with a Schreiber activated sludge process. Designed a new trapezoidal influent flume, new automatic bar screen, replacement of existing UV equipment, a new equalization basin to store and manage septic waste from the CC&V mine, new telescoping valve to control RAS screw pump recycle rate, new covers on existing aerobic digesters, and aeration blower controls. Developed a process design report which summarized design concepts and details of the project for review by the Colorado Department of Public Health and Environment (CDPHE).

Rules & Regulations Update, Central Clear Creek Sanitation District, CO. Developed new Rules and Regulations to reflect new environmental regulations, revisions to the Uniform Plumbing Code and other building codes. Evaluated user charges, system development fees, and other service charges and recommended increased charges and fees to fund capital investments and O&M of the facilities. Reviewed architectural plans for a proposed 5,450 sq ft animal shelter and evaluated the waste load and the number of single-family equivalent residential units from the animal shelter.

Rules & Regulations Update, Chicago Creek Sanitation District, CO. Developed new Rules and Regulations for the District which reflected current environmental regulations, current construction standards and plumbing and building codes. The new Rules and Regulations addressed conditions of service, sewer system operation and maintenance, application for service, rates and charges, main line extensions, dispute resolution procedures, cross-connection control and developed schedules of fees, charges, and rates for district customers.

Wastewater Treatment Plant Update, Mountain Water & Sanitation District, CO. Upgraded the existing wastewater treatment plant by adding a new solids contact process downstream of an existing RBC secondary process to enhance secondary treatment performance and increase nitrification capacity. A corroded buried circular steel tank used as a primary clarifier, secondary clarifier and aerobic digester was rehabilitated using pneumatically placed structural concrete (shotcrete) over new reinforcing bars inside the tank which minimized cost by eliminating concrete formwork.

Wastewater Treatment Facility, Calhan Sanitation District, CO. Evaluated wastewater treatment alternatives suitable for this town of 500 people. Directed design and construction of new mechanically aerated lagoons followed by one acre subsurface flow wetland for effluent polishing. The modified facility achieves effluent BOD₅ and TSS concentrations of less than 10 mg/L each. Developed the plant O&M manual, training program, and Plan of Operations.

Wastewater Treatment Plant, Hi-Land Acres Water & Sanitation District, CO. Evaluated wastewater treatment capacity and developed modifications to improve effluent quality from an existing aerated lagoon system. Designed modifications to divide existing lagoons into smaller cells followed by a subsurface flow artificial wetland for effluent polishing. Designed new floating aspirating aerators and new hydraulic control structures. The modified facility achieves effluent BOD₅ and TSS concentrations of less than 10 mg/L each and removes 75 percent of total nitrogen. Developed the plant Operation and Maintenance manual.

Fairways Wastewater Treatment Plant, City of Boulder, CO. Prepared a Utility Plan and designed improvements for an aerated lagoon system. One of the existing lagoons was divided into two smaller cells with a baffle curtain to decrease algae growth by reducing the hydraulic retention time. Designed new floating aerators to increase aeration and mixing. Designed a subsurface flow artificial wetland to filter algae and particulates produced in the aerated lagoon process. Designed a new chlorine contact tank.

Sanitary Sewer Master Plan, Southgate Sanitation District, CO. For the 2004 update of the 1998 Master Plan, reviewed and verified land-use and population density assumptions, evaluated new development plans, zoning, land use, and population increases within the service area. Developed plans and details for a flow monitoring station.

Ellicott School Wastewater Evaluation, El Paso County School District, CO. Evaluated wastewater treatment alternatives for this rural school district, including a force main or gravity sewer to an existing treatment plant, on-site evaporation ponds, an artificial wetland treatment system and recirculating sand filters.

Wastewater Collection and Treatment Facilities, Town of Saguache, CO.

Evaluated pipeline repair and wastewater treatment alternatives to accommodate seasonal groundwater infiltration into the existing collection system for this town of 600 residents located in the northern San Luis Valley of Colorado. Flows were measured at several manholes using portable open channel flow meters (Marsh-McBirney Flo-Totes). Flow rates were calculated based on measured velocity, depth of flow, and pipe diameter. Evaluated costs for pipeline repair including slip lining, chemical grouting, vacuum sewers, and pipeline replacement. Evaluated performance of existing wastewater lagoon treatment system and alternatives to accommodate high infiltration flows. Assisted Town to obtain grant funding.

Wastewater Treatment Plant, City of Louisville, CO. Responsible for detailed design of a 2 mgd wastewater treatment plant expansion. Designed an extended aeration activated sludge system, mechanical grit and screenings removal equipment, and vacuum sludge dewatering facilities.

Sewer CIPP Lining Project, City of Englewood, CO. Designed 1,310 linear feet of cured-in-place pipe (CIPP) rehabilitation for three segments of deteriorated vitrified clay sewer pipelines. The repairs included 310 feet of 15-inch diameter CIPP in the 3200 block of south Floyd-Delaware streets, and 1,000 feet of 8-inch diameter CIPP located in an alley in the south 2900 block of Bannock-Cherokee streets and the 3900 block of south Fox Street. Evaluated the condition of the existing sewer lines observed on the CCTV videotapes. Developed a hydraulic analysis, bypass pumping requirements, pipeline plan and profile drawings, specifications, contract documents, and cost estimates. Prepared solicitation letters for pre-qualified contractors and evaluated bids received. Provided construction observation and project summary report.

Highway 285 Sewer CIPP Lining, City of Englewood, CO. Designed cured-in-place pipe (CIPP) repair for a deteriorated vitrified clay pipeline under U.S. Highway 285 which is a major 4-lane divided arterial highway. A collapsed segment of pipe had formed a 5 feet deep void under the highway over the collapsed pipe. A temporary point repair consisting of 8-inch diameter PVC pipe attached with sleeve couplings to the existing VCP pipe was constructed. Evaluated pipe condition by review of closed circuit television (CCT) inspection videotape which showed longitudinal and circumferential cracking and pipe joint offsets up 2 inches in the existing VCP pipe. Designed 320 feet of 8-inch sanitary sewer cured-in-place pipe (CIPP) lining including hydraulic analysis, pipeline plan and profile drawings, bypass pumping, and lateral reconnections. Developed a traffic control plan and obtained a permit from the Department of Transportation for construction starting at the upstream manhole located in the median of the divided highway. Prepared contract documents, cost estimate, and evaluated bids received. Provided construction observation and prepared construction observation reports.

Sanitary Sewer CIPP Pipeline Rehabilitation, City of Englewood, CO.

Designed CIPP sewer rehabilitation for Jackson's Subdivision and White's Subdivision to minimize disruption of traffic, interference with utilities, construction impacts on residents, and replacement of pavement and other surface improvements. The Jackson's Subdivision segment consisted of 525 lineal feet of 8-inch diameter vitrified clay pipe (VCP) sewer located in an alley between Elati and Delaware streets. Seventeen existing service laterals were reconnected to the CIPP lined sewer main. The White's Subdivision segment consisted of CIPP lining of 306 lineal feet of 8-inch diameter vitrified clay pipe (VCP) sewer located in an easement through the back of several residential lots with no alley or street access between South Fox and South Galapago streets. Six existing service laterals were reconnected to the new sewer main. Project included video inspections, lateral tie-ins, and manhole sealing. Developed pipeline plan and profile drawings, hydraulic analysis, pipe rehabilitation alternatives, specifications for pipe lining materials, connection details, flow bypass requirements, and traffic control requirements. Prepared specifications, contract documents, cost estimates, and provided construction observation and project report.

Vista Heights CIPP Sewer Improvements, City of Englewood, CO.

Designed CIPP sewer rehabilitation for 271 feet of 8-inch diameter CIPP lining to repair vitrified clay pipe located on South Zuni Street, including. Selected trenchless CIPP rehabilitation method to minimize disruption of traffic, interference with utilities, construction impacts on residents, and replacement of pavement and surface improvements. Performed hydraulic analysis, pipeline rehabilitation alternatives, reconnection of 3 service laterals, piping specifications, engineering contract documents, and cost estimate. Developed solicitation letters for pre-qualified contractors and evaluated bids received. Provided construction observation and project report.

Harper Lake Pipeline & Pump Station, City of Louisville, CO. Designed a new raw water pumping station and 42-inch diameter pipeline to transfer raw water from Harper Lake to the Louisville Water Treatment Plant.

Willow Creek Storm Drainage, Arapahoe County, CO. Design and construction of three parallel, 66-inch diameter storm drainage culverts and headwalls for the Willow Creek crossing on Arapahoe Road at Holly Street. Drainage culverts required an open cut across Arapahoe Road, a four-lane divided highway. Project was constructed in three days over a holiday weekend to minimize disruption of street traffic on the arterial road. New culverts cross a 13,000 volt buried electrical power line, natural gas line, telephone lines, water mains, storm sewers, and sanitary sewer lines. Project required re-routing existing water and sewer lines and installation of new sewer manholes.



Chad Weaver PE

Senior Engineer

Chad is a project design engineer with experience in water and wastewater treatment facilities, sewer rehabilitation, water distribution and transmission mains, and sewer collection systems. His pipe rehabilitation experience includes pipe bursting, UV cured-in-place, and sliplining. Chad's work has included planning and modeling reports, construction plans, specifications, permits, and construction support and inspections on multiple projects. He has been responsible for the planning, scheduling, and management of resources to complete projects within budget and on schedule while satisfying client requirements.

EDUCATION:

MS, Environmental Science and Engineering, Colorado School of Mines, 2012

BS, Engineering with Specialty in Environmental Science and Engineering, Colorado School of Mines, 2006

REGISTRATIONS:

PE: CO (45017)
PE: WY (15029)

YEARS OF EXPERIENCE: 8

MEMBERSHIP:

AWWA Rocky Mountain Region

PROJECT EXPERIENCE

Interceptor Sewer Rehabilitation Projects, Southwest Metropolitan Water and Sanitation District, Littleton, CO. Project Engineer, Project manager. Completed D-Line and A-Line Interceptor Sewer Rehabilitation Projects in 2012 and 2013, respectively. Completed projects included installation of over five miles of 33-inch through 60-inch diameter cured-in-place pipe and rehabilitation of approximately 90 manholes and vaults. Project role began as Project Engineer and transitioned to Project Manager in 2013. Responsibilities included preliminary planning, coordination with private land owners and public design of CIPP and manhole rehabilitation systems, preparation of plans and specifications, and construction contract administration. Completed design and bidding engineering services on the C-Line Interceptor Sewer Rehabilitation Project in the Spring of 2014.

Ridgeway Sanitary Sewer Lift Stations Site Application, Coventry Development Corporation, City of Lone Tree, CO. Project Engineer. Developed population and wastewater flow projections for 2,800 acre planned development. Prepared site location application for two lift stations and associated force mains.

Buffalo Wastewater Treatment Plant Expansion and Improvements, Buffalo, WY. Project Engineer. Provided office engineering support for construction of improvements to the City of Buffalo Wastewater Treatment Plant including new aeration basins, secondary clarifiers, return/waste-activated sludge pumping system, UV disinfection system, and ancillary equipment. Responsibilities included submittal review, responding to requests for information, preparing change proposal requests, interpretation of contract documents, and startup assistance. Also designed and provided construction support for an aerobic digester and sludge storage lagoon.

Front Range Airport Wastewater Treatment Plant, Watkins, CO. Project Engineer. Designed and administered two construction contracts and one procurement contract for sanitary sewer collection system improvements and a new wastewater treatment plant using membrane bioreactor (MBR). Responsibilities included design of new sanitary sewer lines to connect several onsite septic systems together and route all flows to the new wastewater treatment plant, a packaged pump station for supply of treated effluent for irrigation reuse, and a non-potable irrigation main. Performed layout of equipment and piping, hydraulic calculations, sizing and equalization tanks, plan and specification preparation, submittal review, site inspection, and pay application review.

Oak Creek Wastewater Treatment Plant and Sewer Upgrades, Oak Creek, CO. Project Engineer. Provided design and construction administration for sewer rehabilitation and wastewater treatment plant improvements. Prepared sanitary sewer plans and specifications and was responsible for submittal review and pay application review. Also responsible for wastewater treatment plant submittal review, answering RFIs, processing change orders, pay application review, and site inspection. Project involved sewer rehabilitation to reduce or eliminate inflow and infiltration into the existing sewer collection system. Included plans to repair line or replace more than 30,000 feet of existing sewer lines and approximately 100 manholes. Also included rehabilitation of existing wastewater treatment plant, including conversion of two existing lagoons into five cells, addition of a new aeration system, and construction of moving bed biological reactor to provide nitrification for ammonia removal.

JBS USA (formerly Swift and Company) Wastewater Treatment Plant Upgrades, Greeley, CO. Engineer Intern. Responsible for hydraulic calculations, piping and equipment layout, site grading, plans and specification preparation, and assistance with submittal review for improvements at the wastewater treatment plant to meet stringent new ammonia limits. The improvements included addition of anoxic and aeration basins and secondary clarifiers.

World Headquarters Lift Station Upgrade, Ken-Caryl Ranch Water and Sanitation District, CO. Project Engineer. Administered the construction contract for a new lift station and demolition of an existing lift station. Duties included submittal review, interpretation of contract documents, site inspection, pay application review, and evaluation of change order requests.

EDUCATION:

BS, Electrical and Computer Engineering with Major Emphasis on Energy Systems., Oregon State University, 2010

BS, Business Administration, Northwest Nazarene University, 2005

BA, Philosophy, Northwest Nazarene University, 2005

REGISTRATIONS:

PE: OR (84368)

YEARS OF EXPERIENCE: 5**AFFILIATIONS:AMERICAN**

Society of Civil Engineers

American Water Works Association

Institute of Electrical and Electronics Engineers

National Society of Professional Engineers

Professional Engineers of Oregon

Adam Butts PE

Electrical Engineer

Adam has more than five years of experience as a diverse and multi discipline engineer and holds professional licenses in both Civil and Electrical Engineering. His design experience includes complete water and wastewater facility design, including civil, electrical and controls, mechanical, pump sizing, and distribution systems design. Additionally, he is well versed with planning, permitting, and all phases of construction and project management and oversight. With a diverse background, he is well informed and capable of cross-discipline coordination and is capable of understanding a multitude of requirements and needs from multiple disciplines. This knowledge and capability informs his abilities as a true multi-discipline engineer.

PROJECT EXPERIENCE

New Wastewater Treatment Facility, Columbia Helicopters, Aurora, OR.

Electrical Project Engineer. This project was a design-build to transition industrial campus domestic wastewater treatment from drainfield methodology to a new membrane bio-reactor facility. Performed complete electrical, control and instrumentation design, including drawings and specifications, for new facility in coordination with MBR vendor and contractor, including development and verification of control strategies, coordination of new electrical service, and compliance with NFPA 820 across the project. Additionally, provided EI&C design for four (4) new sewer lift stations to feed headworks of the new plant.

Cascadia Wastewater Treatment Plant at Tehaleh, Bonney Lake, WA.

Performed electrical, instrumentation and control design, including drawings and specifications, to 75% design for construction of new membrane bio-reactor wastewater treatment facility, including new 4000A 480/277VAC electrical service with standby generation and automatic transfer switch. Developed process and instrumentation diagrams (P&IDs) for facility, including headworks, grit removal, anoxic and aerobic zones, RAS and WAS, solids holding, chemical injection, effluent pumping, and utility water, among others.

Recycled Water Facility Upgrade, Woodland, CA.

Provided EI&C engineering, including drawings and specifications, for addition of two recycled water pumps to serve a four-mile pipeline, including verification of existing electrical service, conduit and conductor selection and routing, new flowmeter and pressure sensors, as well as upgrades to existing SCADA. Additionally, performed EI&C design for a new hypochlorite injection station for the pipeline, including new remote terminal unit (RTU) with a new PLC and fiber optic communication to main facility.

Well 11 Pump Station, City of Dundee, OR. Project Engineer and Construction Manager. Provided design oversight for installation of new submersible pump in existing groundwater well for potable water, including drawings and specifications. Performed all EI&C engineering. Provided contract administration and management, submittal review, and responses to RFIs. Additionally, project consisted of the addition of a new vertical turbine booster pump in existing clearwell necessitating the upsizing of the existing discharge manifold. Special consideration given to timing of construction projects (particularly shut-down time), as clearwell serves as the main hub for the City's water supply.

Polymer System Upgrade, Clean Water Services, Beaverton, OR. EI&C Engineer. This project went from conceptual design to construction in the matter of less than a month, necessitating a quick turnaround on all fronts. Project consisted of the replacement of two polymer makedown units for an existing wastewater treatment facility, including phasing to maintain one working unit at all times. Required new conduit and circuit runs for power, control, and instrumentation, as well as recommendations for upgrades to SCADA system to transition control of polymer makedown units from physical panel-mounted control and feedback to full SCADA.

Lacey Court Well, City of Keizer, OR. Project Engineer, Project Manager, Construction Manager. With oversight, provided all non-structural design (including all architectural, electrical, civil, mechanical, chemical, and instrumentation and control drawings and specifications) for new potable groundwater well. Due to location constraints, design of facility incorporated residential features, such as front windows made of Lexan, residential style siding and roofing, and residential style exterior lighting, among others. Complete submittal review for facility, contract management, daily construction site visits and contractor coordination.

Ammonia Removal Facility, City of Aumsville, OR. Project Engineer. With oversight, performed design for new ammonia removal facility for the City's potable water system to mitigate long-standing taste and odor complaints by citizens. Coordinated pilot testing of media, crafted request for proposal to select filter media vendors, and coordinated with selected vendor to ensure all systems performed to standard, including inlet/backwash valving, chemical injection of potassium permanganate and chlorine, and structural pad for new filter bank. Performed design for electrical, mechanical, civil and chemical systems, including valving to intercept influent water from various wells and run through treatment, ensuring well operation and production would not be harmed by addition of filters, upgrading existing motor control center, and the addition of a new flowmeter on inlet to filter building, among others. As a result of this project, the City was awarded "Best Tasting Water in Oregon" in March 2015 by the Oregon Association of Water Utilities.



Tim Ly PE

Electrical Engineer

Tim has over 21 years of experience working in the consulting engineering field, performing electrical, lighting, instrumentation and controls design for municipal, industrial and DoD water and wastewater facilities. He leads Dewberry's Instrumentation and Controls (I&C) group and is responsible for overall project management and design, project scoping and fee estimation, and quality assurance and quality control reviews. The constructed value of his projects ranges from \$100K to in excess of \$5M on projects that spanned from two weeks to two years. He has regularly participated in value engineering programs to enhance project designs, designed radio and telephone based supervisory control and data acquisition (SCADA) systems, and conducted facility assessments, analysis, with recommendation reports, and performed construction phase services.

EDUCATION:

BS, Electrical Engineering, Virginia Polytechnic Institute and State University, 1994

REGISTRATIONS:

PE: VA (402035243)

YEARS OF EXPERIENCE: 21

AFFILIATIONS:

Member of the Institute of Electrical and Electronic Engineers (IEEE)
Water Environment Federation

International Society for Measurement and Control (ISA)

PROJECT EXPERIENCE

Ballenger Creek WWTP Interim Improvements, Frederick County Division of Utilities and Solid Waste Management, Frederick, MD. Supervised and performed the instrumentation and control for the improvements. Design included installation of a 1.0 mgd pressure filtering system consisting of two filters at 10' diameter by approximately 11.5' long, various instruments, chemical feed systems, influent wells and filter backwash waste tank with variable speed submersible pumps. Installation also included integrating the filter system with the existing plant SCADA system for monitoring and controls.

Wastewater Treatment Plant Nutrient Removal Upgrade, Town of Warrenton Department of Utilities, Warrenton, VA. Supervised and performed the instrumentation and control for the upgrades. Design included increasing influent, internal nitrate recycle and effluent pumping capacities, various chemical feed systems and biological reactor modifications. Design also included integrating new equipment/systems with the existing plant SCADA system for monitoring and controls.

Massaponax Wastewater Treatment Plant Upgrade, Spotsylvania County Department of Utilities, Spotsylvania County, VA Performed electrical, instrumentation and control design tasks for the plant upgrade. Design included a new 13.2 KV, three phase incoming service and a new outdoor walk-in type medium voltage switchgear with automatic power transfer scheme to a new 2 MW medium voltage generator. Design also included various process instrumentation and control throughout the facility.

Opequon Water Reclamation Facility BNR Upgrade and Expansion, Frederick-Winchester Service Authority, Winchester, VA Performed electrical, instrumentation and control design tasks for the plant upgrade to incorporate additional treatment processes. Design included new pumps on VFDs, flow and

level monitoring used for control, modifications to existing control panels for various processes to incorporate new equipment. Design also included modifications to the existing plant graphics display and alarm panel to incorporate the new processes.

Sunnybrook Wastewater Pumping Station, Chesterfield Utilities Department, Chesterfield County, VA. Finalized the instrumentation and control for the project. Design included a new pumping station consisting of three variable speed influent pumps with solid state reduced voltage bypass starters, mixers and ventilation systems for the station and emergency standby generator room. Design also included a pumping station control system consisting of a programmable logic controller (PLC) with a hot standby PLC capable of communicating offsite via radio for remote monitoring and controls.

Meadows Booster Pump Station, Frederick County Division of Utilities and Solid Waste Management, Frederick, MD. Supervised and performed the instrumentation and control for the project. Design included a new pumping station consisting of four variable speed influent pumps, various instrumentation, and ventilation system for the emergency standby generator room. Design also included a pumping station control system consisting of a programmable logic controller (PLC) for controlling of the pump station and a radio system for offsite communications and controls.

Marlay Taylor WRF ENR Upgrade, St. Mary's County Metropolitan Commission (MetComm), Lexington Park, MD. The project includes three phases of work: 1) Analysis of Existing Plant; 2) Design of the Enhanced Nutrient Removal Upgrade; 3) Construction Management Support. The Dewberry Team will review (1) existing drawings of the Marlay-Taylor WRF including the upgrade to 4.5 MGD capacity in the mid-1980's, the BNR upgrade to 6.0 MGD capacity in the mid 90's and the more recent sludge treatment system upgrade; (2) technical memoranda and VE Analysis developed for the planned ENR upgrade to 6.0 MGD and future expansion to 7.5 MGD; and other relevant documentation.

TMUA APACHE LIFT STATION, Tulsa Metropolitan Utility Authority, OK. Design of a new mechanical bar screen facility, including grit washing compactors that will replace the existing basket bar screen. The new screening equipment will better protect the pumps while reducing operating costs and improving station reliability and operator safety. Professional fees: \$435,000.

City of Louisville WWTP, City of Louisville, City of Louisville, CO. Assisted the City of Louisville, CO maintain discharge permit compliance, including new criteria for ammonia as nitrogen, and develop an updated facilities plan to help meet these new criteria and keep current with safety, technology, and current practices. Provided design services for new headworks, secondary process including clarifiers, solids handling upgrades, UV disinfection systems, and more.

SCADA System Assessment DC Water, Washington, DC Performed evaluations on the existing SCADA system for both the water and sewer facilities. Evaluation included the most cost effective way to both upgrade the existing system and to expand the system to include other facilities. Recommendations included development of viable options for upgrade and expansion of existing system including detail construction cost estimates for each alternative and implementation phasing sequence such that the existing SCADA system remains operational during the upgrade.

Ballenger Creek WWTP Interim Improvements, Frederick County Division of Utilities and Solid Waste Management, Frederick, MD. Supervised and performed the instrumentation and control for the improvements. Design included installation of a 1.0 mgd pressure filtering system consisting of two filters at 10' diameter by approximately 11.5' long, various instruments, chemical feed systems, influent wells and filter backwash waste tank with variable speed submersible pumps. Installation also included integrating the filter system with the existing plant SCADA system for monitoring and controls.

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Opequon Water Reclamation Facility BNR Upgrade and Expansion, Frederick-Winchester Service Authority, Winchester, VA Performed electrical, instrumentation and control design tasks for the plant upgrade to incorporate additional treatment processes. Design included new pumps on VFDs, flow and level monitoring used for control, modifications to existing control panels for various processes to incorporate new equipment. Design also included modifications to the existing plant graphics display and alarm panel to incorporate the new processes.

Nitrification Facilities Upgrade Switchgear Replacement, Blue Plains AWWTP, DC Water, Washington, DC Replacement of two existing unit substations and 24 associated motor control centers (MCCs) while keeping the plant operational. Each

existing unit substations consists of three 4160V switchgears, six 4160V-480V oil filled transformers and three 480V switchboards. Responsible for the replacement of one of the unit substations which included one 4160V switchgear and two 4160V-480V cast coil transformers located outdoors and one 480V switchgear located indoors. The ten existing MCCs associated with the substation were consolidated into two MCCs and various power panelboards were provided to supply power to various loads. The other substation is of similar arrangement but with the 480V switchgear located outdoors in a walk-in enclosure and the 14 MCCs were replaced in kind. Instrumentation and Control design included modifications and expansion to the existing Emerson Ovation DCS system. Detailed construction sequences were developed for the project in order to keep the affected portions of the plant operational during the upgrade. Provided overall QA/QC for the project.

Sunnybrook Wastewater Pumping Station, Chesterfield Utilities Department, Chesterfield County, VA. Finalized the instrumentation and control for the project. Design included a new pumping station consisting of three variable speed influent pumps with solid state reduced voltage bypass starters, mixers and ventilation systems for the station and emergency standby generator room. Design also included a pumping station control system consisting of a programmable logic controller (PLC) with a hot standby PLC capable of communicating offsite via radio for remote monitoring and controls.

Neabsco Lift Station Replacement, Prince William County, VA. Performed construction phase services for the 40-mgd pump station design consisting of four 500HP dry pit submersible pumps operating on VFDs with RVSS bypass. The design included a new 3000A 480V electrical distribution system and an outdoor diesel-fueled 2000kW standby generator, in a weatherproof and sound attenuated enclosure, supplying power to various loads throughout the pump station.