

**PUBLIC WORKS DEPARTMENT
MEMORANDUM #52-2018**

DATE: September 10, 2018
TO: Honorable Mayor Carol Dodge and City Council Members
THROUGH: Heather Geyer, City Manager *HMG*
Robert Webber, MBA – Acting Director of Public Works *RW*
Kent Kisselman, PE, Engineering Manager *KHK*
FROM: Daniel Martinez, PE, Civil Engineer II *DM*
SUBJECT: CR-106 – UV System Upgrade for Wastewater Treatment Plant

PURPOSE

Request for City Council approval for the purchase of a new UV System channel and upgrade to the existing located at the Wastewater Treatment Plant.

BACKGROUND

W2 Engineers, LLC were retained in December 2017, to assess the City's existing UV System and to help implement the installation of Channel 2 to meet CDPHE requirements for the approval of the Headworks and Clarifier project. Per the attached UV System Expansion Memo submitted by W2E the following recommendations were made by William Raatz, P.E.:

Assessment for Channel 1 UV Disinfection System

- Currently, Channel 1 is only rated for 10 million gallon per day (MGD), but the City is required by our permit to be capable of treating 11 MGD.
- The existing Automatic Level Control (ALC) cannot operate past 10 MGD and will require modification.
- The System Control Center (SCC), Power Distribution Centers (PDCs) and Hydraulic System Centers (HSC) have become obsolete.

Upgrades Recommended for Channel 1 UV Disinfection System

- Upgrades are required to Channel 1 to meet design capacity of 11 MGD and to meet the City's CDPHE Site Application Requirements.
- These upgrades include: Replace UV lamps and appurtenances, ALC ramp replacement, HSC replacement, PDCs replacement and integration of a new SCC.

Completing these upgrades concurrently with the installation of the Channel 2 UV Disinfection System (a 2018 CIP Project currently in progress) gives the City a redundant UV System that meets our site application requirements, as well as lowers the cost of the Channel 1 upgrade, through discount pricing in conjunction with the Channel 2 expansion, rather than paying a higher price for the upgrades and engineering cost at a later time.

BUDGET IMPLICATIONS

The budgeted amount for the UV Upgrades Project is \$850,000 in the 2018 Wastewater Fund. With Council approval the City will issue a purchase order for the UV Upgrades to Channel 1 along with the installation of the new Channel 2 UV Disinfection System.

2018 Wastewater Fund Appropriation	\$850,000.00
Previously Spent	(\$31,344.00)
Channel 2	(\$436,100.00)
Channel 1 Upgrade	(\$130,673.09)
Remaining Balance	\$251,882.91

SCHEDULE/TIME IMPLICATION

Pending Council approval a purchase order will be sent to the vendor.

STAFF RECOMMENDATION

When considering the make/model, staff examined functionality, integration with existing system and equipment ability to meet necessary performance.

Staff recommends approval of CR-106.

STAFF REFERENCE

Kent Kisselman, PE, Engineering Manager kkisselman@northglenn.org 303.450.4077
Daniel Martinez, PE, Civil Engineer II danmartinez@northglenn.org 303.450.8839

ATTACHMENTS

1. W2 Engineers, LLC UV System Memo
2. Trojan Technologies Quote
3. Trojan Technologies Sole Source Letter



UV System Expansion Memo

W2 Engineers, LLC (W2E) has reviewed the ultraviolet light disinfection system (UV system) expansion alternatives for the Northglenn Wastewater Treatment Plant. During the evaluation of existing conditions, W2E discovered several important details regarding the existing UV system equipment in Channel 1. A brief summary of those details and the recommended upgrades are presented below.

The existing UV system in Channel 1 is rated for 10 million gallons per day (MGD) and does not meet the required design capacity of 11 MGD peak hour flow as approved in the Process Design Report (PDR). The existing automatic level control (ALC) cannot operate at this flow rate either. Other existing equipment including the system control center (SCC), power distribution centers (PDCs), and hydraulic system center (HSC) are now obsolete and no longer supported by the manufacturer, and also have no user serviceable parts due to proprietary and/or outdated components. Additionally, the existing UV system would not be compatible with the new UV system.

The existing UV system can be upgraded to meet the design capacity of 11 MGD and provide redundancy and improved serviceability. These upgrades include replacement of the lamps with new high-efficiency lamps (i.e. the same used in Channel 2), however, the existing UV modules and racks will be reused. The upgrades would also include replacement of the ALC, SCC, PDCs, and HSC, which would make Channel 1 UV system nearly identical to the new Channel 2 UV system. The matching UV system would allow either HSC to be used for both channels if one of them should fail. The PDCs construction now has user serviceable components that could be repaired with locally available parts. With two SCCs, each channel is a separate, fully functional UV system, providing complete redundancy, and these are also user serviceable items. In addition, the manufacturer has offered discount pricing on the SCC, HSC, and PDCs in conjunction with the Channel 2 UV system. For these reasons, W2E recommends that Northglenn proceed with a complete UV system upgrade of Channel 1 along with the new UV system in Channel 2.

W2E has reviewed the additional engineering costs associated with the proposed upgrades to the existing UV system in Channel 1. For design/permitting, an additional \$5,000 has been estimated primarily to address the electrical design work required for Channel 1. For construction administration, an additional \$1,000 may be required due to additional site visits during installation of the additional equipment. These values assume that work occurs concurrently with the new UV system for Channel 2 and total \$6,000.

W2E has also reviewed the additional construction costs for the proposed upgrades to the existing UV system in Channel 1 and developed a separate cost opinion. The equipment subtotal is \$251,850, which includes new UV lamps and appurtenances (\$114,000 plus \$16,500 for installation assistance by manufacturer), ALC ramp removal/replacement (\$3,000), HSC replacement (\$14,100), PDC replacement (2 @ \$14,000 each), SCC replacement (\$30,000), electrical supplies (\$36,250), and controls integration (\$10,000), with a 10% contingency (\$25,185). The equipment costs are based on procurement in conjunction with the new UV system for Channel 2 and total \$277,660.

The total cost opinion for the proposed upgrades to the existing UV system in Channel 1 is \$283,000 (rounded). The cost opinion does not include installation as this will be performed by Northglenn staff. For comparison, the cost opinion for the new UV system in Channel 2 is \$482,000 (rounded).

Please contact me if you have any questions regarding the above summary.

Thank you,



William A. Raatz, P.E.



**SCOPE OF SUPPLY FOR NORTHGLENN WASTEWATER TREATMENT PLANT
ULTRAVIOLET DISINFECTION EQUIPMENT – TROJAN SYSTEM UV3000Plus™**

Prepared for: City of Northglenn WWTP, CO
Project Name: Northglenn WWTP Second Channel Expansion
Submitted by: Tim Proctor, Regional Manager
Trojan Quote: LBG1320-REV1

Design Criteria: Current Peak Design Flow: Fourteen (14) MGD(US)
UV Transmission: 65 % minimum
Total Suspended Solids: 30 mg/l (30 Day Average, grab sample)
Discharge Limit: 126 E.coli, 30 Day Geometric Mean

We are pleased to submit the following scope of equipment based on the above criteria.

The purchaser is responsible for reading all information contained in this Supply Contract. Trojan will not be held accountable for the supply of equipment not specifically detailed in this document. Supplemental Terms and Conditions are attached to this document. Detailed installation instructions are provided with the shop drawings and are available earlier upon request. Changes to this Scope of Supply that affect selling price will be handled through a change order.

Please refer all inquiries to Trojan Manufacturer's Representative:

Jason Morgan
Coombs Hopkins
Phone: (303) 477-1970
Fax:

This proposal has been respectfully submitted by,
Trojan Technologies

Tim Proctor

Regional Manager
Trojan Technologies

Unless otherwise indicated in this proposal all conduit, conductors, local disconnects and transformers (if required) are the responsibility of the CONTRACTOR and are not included in this Scope of Supply.

ULTRAVIOLET MODULES

Trojan's Responsibility:

Each module supplied shall be completely assembled containing lamps, quartz sleeves and be electrically wired to each electronic ballast. Modules are shipped in a support rack and crated.

Model and Make:	Standard System UV3000Plus™
Quantity:	Eighteen (18) UV modules will be supplied each containing 8 Lamp - 4.0" Spacing (2007)
Material of Construction:	316 stainless steel frame
Approximate Weight:	112 lbs / 51 kg per 8 Lamp module

SYSTEM CONTROL CENTER

Trojan's Responsibility:

One (1) System Control Center (SCC) shall be supplied to monitor and control the UV System. Trojan will provide a PLC I/O and soft address map to aid the Contractor with integration of the UV PLC and WWTP SCADA system. The UV SCC shall consist of the following:

Quantity Supplied	Two (2) SCC will be supplied
Location:	Wall mounted
Controller Type:	CompactLogix
Operator Interface:	AB Panelview 1000+ (10")
Panel UPS:	15 Min on 24VDC (PLC)
Material of Construction:	304 Stainless Steel - Type 4X (IP66)
Enclosure Rating:	Type 4X
Approximate Weight:	200 pounds

Installation Contractor's Responsibility:

The Installation Contractor to be responsible for mounting the SCC as indicated on the drawings. The Installation Contractor to be responsible for the supply, installation and connection of the following at the SCC:

1. One (1) 120V 1 Ph, 2 Wire + Gnd, 60 Hz power supply
2. One (1) 4 – 20 mA DC analog signal from plant flow meter
3. One (1) Ground Link , 14 gauge minimum type TWH stranded, daisy chained to the HSC and PDCs.
4. One (1) serial communication link consisting of one (1) shielded twisted pair, 18 gauge maximum from the HSC and other PDCs (daisy chained).
5. Discrete signals from Plant SCADA for remote monitoring (or serial communication link to SCADA – Ethernet

POWER DISTRIBUTION CENTERS

Trojan's Responsibility:

The Power Distribution Center (PDC) distributes power to the UV Modules and shall consist of the following:

Quantity Supplied:	Total of 4 PDC(s) will be supplied
Material of Construction:	304 Stainless Steel - Type 4X (IP66)
Enclosure Rating:	Type 4X
Approximate Weight:	220 pounds (100 Kg) each

Installation Contractor's Responsibility:

The Installation Contractor to be responsible for setting in place and bolting the Power Distribution Centers to the top of channel. The Installation Contractor to be responsible for the supply, installation and connection of the following at the Power Distribution Center(s):

1. One (1) 460-480V / 60Hz, 18 kVA power feed with local disconnect to each of 2 PDC(s)
2. One (1) Ground Link, 14 gauge minimum, TWH stranded single wire from the HSC.
3. One (1) communication link consisting of one (1) shielded twisted pair from the SCC and daisy chained to other PDC's.
4. One (1) pair of 12Volt DC, 18 gauge minimum discrete signal to the Water Level Sensor from PDC closest to the sensor.
5. One (1) pair of 24Volt DC, 18 gauge remote I/O to the HSC.
6. Connection of communication, power cables and hydraulic lines from the UV Modules

HYDRAULIC SYSTEM CENTER

Trojan's Responsibility:

The Hydraulic System Center (HSC) houses the ancillary equipment required to operate the quartz sleeve cleaning system.

Quantity Supplied:	Two (2) HSC will be supplied
Materials of Construction:	304 Stainless Steel - Type 4X (IP66)
Enclosure Rating:	Type 4X
Approximate Weight:	300 Pounds

Installation Contractor's Responsibility:

The Installation Contractor to be responsible for setting in place and bolting the HSC and manifold as shown on the contract drawings. The HSC should be located within 50 feet (15 meters) from the farthest PDC. The Installation Contractor shall be responsible for the supply, connection and installation of the following at the HSC:

1. One (1) Powered by PDC, 5 Amp power feed with local disconnect
2. One (1) ground link of, 14 gauge minimum, TWH stranded from the PDC(s).
3. Connection of the hydraulic hoses from PDC(s). Hoses and connections will be supplied by Trojan.
4. One (1) serial communication link of one (1) twisted, shielded pairs, 18 gauge maximum cable from the SCC and daisy chained to the PDC's.
5. One (1) pair, 18 gauge minimum, 24Volt DC remote I/O from the closest PDC.

SUPPORT RACKS

Trojan's Responsibility:

Support racks are provided to support UV modules in the effluent channel.

Quantity Supplied:	Two (2) racks will be supplied
Material of Construction:	304 Stainless Steel
Approximate Weight:	< 100 pounds each

Installation Contractor's Responsibility:

The Installation Contractor to be responsible for setting in place and bolting the support racks to the channel walls. The Contractor will be required to supply eight (8) 1/2" Diameter x 5 1/2" Long expansion anchor bolts per rack.

Install approved (engineered) anchor points for personnel to use as part of their fall restraint system around the open channels. The anchor points must be positioned so that the preferred retractable lifeline of 8 feet is of sufficient length to access the work at the channel. Refer to local safety regulation.

LEVEL CONTROLLER

Trojan's Responsibility

A level control device is required per channel to maintain and control the effluent level, regardless of flow rate.

Description:	ALC
Quantity Supplied:	Two (2) level controller(s)
Material of Construction:	304 stainless steel, lexan and galvanized steel weights

Installation Contractor's Responsibility:

The Installation Contractor to be responsible for setting in place, grouting and sealing the level control device.

WATER LEVEL SENSOR KIT

Trojan's Responsibility:

The water level sensor is located downstream of the UV System and provides a digital signal to shut down & protect the UV System if the water level is too low.

Quantity Supplied:	One (1) low water level sensor to be supplied
Enclosure Rating:	Type 4X
Approximate Weight:	10 pounds (panel)

Installation Contractor's Responsibility:

The Installation Contractor to be responsible for setting in place and bolting the water level sensor panel to the effluent channel wall. The Installation Contractor shall also be responsible for the supply of mounting hardware, watertight conduit and supply and connection of one discrete signal (pair of 12V DC, 14 gauge) from the water level sensor probe to each PDC.

SPARE PARTS AND SAFETY EQUIPMENT

Trojan's Responsibility:

The following spare parts and safety equipment will be supplied with the UV system:

- Eight (8) UV lamps
- Eight (8) Quartz sleeves
- Eight (8) Wiper Seal Kit
- Eight (8) Lamp holder seals

NOTES AND CLARIFICATIONS TO SPECIFICATION

Scope of Supply solely based on Proposal for the City of Northglenn Second Channel, Colorado Quote LBG1320 (12/21/2017)

DOCUMENTATION (SHOP DRAWINGS AND O & M MANUALS)

Trojan's Responsibility:

The following documentation will be supplied to the contractor by Trojan per the following schedule:
One(1) Electronic copy of submittal shop drawings Four(4) to Six(6)weeks after receipt of written purchase order.
One (1) Electronic copy of Trojan Standard O&M manuals at time of equipment delivery.

DELIVERY, START-UP AND TRAINING

Equipment shipped Ten(10) to Twelve(12) weeks after approval of Shop Drawings.

Installation Contractor's Responsibility:

The Contractor is responsible for:

- Un loading of the components supplied by Trojan, storage of all components, if required in a clean dry environment

- Installing the equipment outlined in the scope of Supply in accordance with contract drawings, Trojan's shop drawings, instructions and installation checklist.
- Supplying all conduits and conductors and components per the sites state regulations and components indicated as supplied by others,
- Completing the Checklist and returned at least two (2) weeks prior to date requested for commissioning.

The following start-up services will be provided by Trojan-certified technicians:

- Installation assistance as required by phone or fax. Technical Assistance Center 1-866-388-0488 or tac@trojanuv.com
- Start-up and testing of the installed UV equipment.
 - If the Trojan's Certified Service Technician determines the Contractor work is not complete and the start-up cannot be completed in the allotted time a return visit will be scheduled at the Contractors expense.
- Classroom and/or jobsite training for operations staff
 - If trainees are not available a return visit will be scheduled at the Contractors expense.

WARRANTY

Trojan's Responsibility:

Trojan Technologies will warrant the equipment and parts for 12 months after start-up or 18 months after shipment, whichever comes first. Refer to attached Terms and Conditions for additional details.

SELLING PRICE FOR THE ABOVE LISTED EQUIPMENT

Total Capital Cost: \$436,100(USD)(P.O. to Trojan)

This price excludes any taxes that may be applicable and is valid for 90 days from the date of this letter.

ADDITIONAL PARTS AND LABOR TO REBUILD THE EXISTING SYSTEM

- 144 each part 794447-ORD, Lamp, GA64T6HE Angle Base
- 144 each part 316505-078X, Lamp Holder Angle Base, 78 inch
- 61 each part 912165P, Small Socket (10 per pack)
- 2 each part 912166P, Connector Cap, 9 Position (10 per pack)
- 1 each part 912192, Extractor, Mate-N-Lock
- 1 each part 319014-002, Level Sensor Kit, UV3+ Probe 2'
- 16 each part 327771-A8400, Wiper Kit, UV3+ G2 8L 40
- 2 each part 327771-A8401, Wiper Kit, UV3+ G2 8L 40 SNSR
- 1 part part 907384, Filter Assy, 10 micron, ABS Synthetic
- 1 each part 444295, Tellus Low Viscosity Oil, 5 gallon
- 10 each part 907632-04F071BK, Hose Kit, UV3+ MD RET F 71 Black
- 10 each part 907632-04M150BK, Hose Kit, UV3+ MD EXT M 150 Black
- 8 each part 907632-04F145BL, Hose Kit UV3+ Ret F 145 Blue
- 8 each part 907632-04M066BL, Hose Kit UV3+ EXT M 066 Blue
- 36 each part 326447, Nipple, UV3+ 1/4NPT x 1/16D (Manifold on PDC)
- 18 each part 914374-006GF, 6 Foot Power Cord Assembly
- 1 each part 901507, Acti Clean Gel (4x1 gallon bottles)
- 1 each Two technicians (40hrs each) to rebuild the existing equipment

Total Rebuild Cost: \$130,673.09(USD)(P.O. DC Frost and Assoc.)

Total Sum of Capitol and Rebuild: \$566,773.09(USD)
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PAYMENT TERMS

10% after approved submittal

85% upon delivery of equipment to site

5% upon equipment acceptance or 60 days after delivery (whichever occurs first)

Net 30 Days

If UV System Start-up is required within 30 days of shipment, Trojan requires 95% payment unless agreed upon in writing before authorizing system Start-up.

Freight included for all North American projects.

Selling price does not include any applicable duties or taxes.

July 31, 2018

City of Northglenn
Northglenn, CO

Re: City of Northglenn WWTP UV System Expansion

Dear Sir/Madam:

This letter is to confirm that the Trojan UV disinfection system installed and operating at the Northglenn WWTP is a highly specialized system containing specific hardware and software developed and tested by Trojan Technologies, and as such there are no other approved or qualified third party manufacturers that could expand or integrate this system. I would also like to note that the use of other parties not approved by Trojan will affect the reliability, performance, and disinfection of the system and as such we would not be able to honour our disinfection performance guarantee.

If you have any questions regarding the above please do not hesitate to contact me at (519) 457-3400.

Sincerely,
TROJAN TECHNOLOGIES

Tim Proctor
Tim Proctor
Regional Manager
519-457-3400

SPONSORED BY: MAYOR DODGE

COUNCILMAN'S RESOLUTION

RESOLUTION NO.

No. CR-106
Series of 2018

Series of 2018

A RESOLUTION TO AUTHORIZE THE CITY MANAGER TO ISSUE PURCHASE ORDERS FOR A TOTAL AMOUNT NOT TO EXCEED \$566,773.09 FOR UV SYSTEM UPGRADES AT THE WASTEWATER TREATMENT PLANT

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF NORTHGLENN, COLORADO, THAT:

Section 1. The City Manager is hereby authorized to issue the following purchase orders for Ultraviolet (UV) Disinfection System Upgrades at the Wastewater Treatment Plant:

- (a) A purchase order to Trojan Technologies in an amount not to exceed \$436,100.00 for the purchase of equipment for a new UV Disinfection System channel; and
- (b) A purchase order to DC Frost and Assoc. in an amount not to exceed \$130,673.09 for the purchase of parts and labor for upgrades to the existing UV Disinfection System.

DATED at Northglenn, Colorado, this ____ day of _____, 2018.

CAROL A. DODGE
Mayor

ATTEST:

JOHANNA SMALL, CMC
City Clerk

APPROVED AS TO FORM:

COREY Y. HOFFMANN
City Attorney