



CLACKAMAS

WATER ENVIRONMENT SERVICES

GREGORY L. GEIST | DIRECTOR

Water Quality Protection
Surface Water Management
Wastewater Collection & Treatment

November 5, 2026

BCC Agenda Item: _____

Board of County Commissioners
Acting as the governing body of Water Environment Services
Clackamas County

Approval of Contract #1921 with Trojan Technology Corp. for Ultraviolet Disinfection Equipment Upgrades at Kellogg Creek Water Resource Recovery Facility. Total Contract value is \$1,086,288.00 through June 30, 2028. Funding through WES Sanitary Sewer Construction Funds. No County General Funds are involved.

Previous Board Action/Review:

Performance Clackamas: 1. This project supports WES' strategic plan to upgrade WES' infrastructure to ensure the sustainable delivery of reliable, high-quality, and climate-resilient clean water services that support the growth and vitality of our communities, natural environment, and economy.

2. This project supports the County's Strategic Priorities of Strong Infrastructure, Vibrant Economy, and Safe, Secure and Livable Communities.

Counsel Review: Yes

Contact Person: Jeff Stallard

Procurement Review: Yes

Contact Phone: 503-278-2311

EXECUTIVE SUMMARY: The Kellogg Creek Water Resource Recovery Facility (WRRF) uses ultraviolet (UV) disinfection as the final treatment step before effluent is discharged to the Willamette River. The existing UV system has reached the end of its useful service life and requires replacement to maintain reliable treatment performance and regulatory compliance.

The Board previously approved a contract with Parametrix, Inc. to provide design services for replacement of the UV system and associated facility improvements. As design has progressed, early procurement of the UV equipment was identified as an important step to support final design and the project's construction schedule.

This contract authorizes the purchase of a new UV disinfection system and associated manufacturer services necessary to integrate the equipment into the existing disinfection facility. Procuring the UV equipment in advance of construction allows WES to secure the equipment, incorporate manufacturer-specific requirements into the final design, and reduce schedule risks associated with equipment procurement and delivery.

The contractor was selected through a competitive Request for Proposals (RFP 2026-44) process. The Willamette Facilities Plan and WES's 5-year Capital Improvement Plan identify replacement of the Kellogg Creek WRRF UV system as a necessary capital improvement. This purchase is included in WES's approved budget.

RECOMMENDATION: Staff recommends that the Board of County Commissioners of Clackamas County, acting as the governing body of Water Environment Services, approve Contract #1921 for UV system upgrades at the Kellogg Creek WRRF.

Respectfully submitted,

Greg Geist
Director, WES

For Filing Use Only

Attachment: Contract #1921, Trojan Technology Corp.



GOODS AND SERVICES CONTRACT Contract #0000001921

This Goods and Services Contract (this "Contract") is entered into between Trojan Technology Corp. ("Contractor"), and Water Environment Services ("District"), an intergovernmental entity formed pursuant to ORS Chapter 190 ("District"), for the purposes of providing UV Disinfection Equipment for Wastewater Applications.

ARTICLE I.

1. **Effective Date and Duration.** This Contract shall become effective upon the signature of both parties and shall remain in effect until June 30, 2028 or until completion of all obligations provided herein, whichever is later.
2. **Scope of Work.** The Contractor shall provide the goods and services detailed in RFP 2026-44 and the negotiated scope of work, which is attached hereto and incorporated by reference herein as Exhibit A (the "Work"). Work shall be performed in accordance with a schedule approved by the District.
3. **Consideration.** The District agrees to pay Contractor, from available and authorized funds, a sum not to exceed **One Million Eighty-Six Thousand Two Hundred Eight-Eight Dollars (\$1,086,288.00)** for performing the Work required by this Contract. Consideration rates are on a fixed fee basis in accordance with the rates and costs specified in Exhibit B. If any interim payments to the Contractor are made, such payments shall be made only in accordance with the schedule and requirements in Exhibit B.
4. **Invoices and Payments.** Unless otherwise specified, Contractor shall submit invoices on a milestone basis for Work performed. Invoices shall describe the milestone achieved. Invoicing shall follow the Preliminary Price Quote table submitted by Contractor to District on August 5th, 2026 (Exhibit B). The invoices shall include the total amount billed to date by Contractor prior to the current invoice. Payments shall be made to Contractor within forty-five (45) days from receipt following the District's review and approval of invoices submitted by Contractor. Contractor shall not submit invoices for, and the District will not be obligated to pay, any amount in excess of the maximum compensation amount set forth above. If this maximum compensation amount is increased by amendment of this Contract, the amendment must be fully effective before Contractor performs Work subject to the amendment. Payment information will be reported to the Internal Revenue Service ("IRS") under the name and taxpayer ID number submitted. (See I.R.S. 1099 for additional instructions regarding taxpayer ID numbers.) Information not matching IRS records will subject Contractor payments to backup withholding.

Invoices shall reference the above Contract Number and be submitted to:

5. **Travel Expense Reimbursement.** Authorized: ☐ Yes ☒ No
If travel expense reimbursement is authorized in this Contract, such expenses shall only be reimbursed at the rates in the Clackamas County Contractor Travel Reimbursement Policy, hereby incorporated by reference, in effect at the time the expense is incurred.
6. **Contract Documents.** This Contract consists of the following documents which are listed in descending order of precedence and are attached and incorporated by reference, this Contract, Exhibit A and Exhibit B.
7. **Contractor and District Contacts.**

<u>Contractor</u> Administrator: Thomaz Tropiano Neto, Thomaz Phone: 519-457-3400 Email: tneto@trojantechnologies.com	<u>District Contract Administrator</u> Administrator: Haakon Ogbeide Phone: 971-803-2955 Email: HOgbeide@clackamas.us
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ARTICLE II.

1. **Access to Records.** Contractor shall maintain books, records, documents, and other evidence, in accordance with generally accepted accounting procedures and practices, in the performance of this Contract. District and their duly authorized representatives shall have limited access to the books, documents, papers, and records of Contractor, which are directly pertinent to this Contract for the purpose of making audit, examination, excerpts, and transcripts. Contractor shall maintain such books and records for a minimum of six (6) years, or such longer period as may be required by applicable law, following final payment and termination of this Contract, or until the conclusion of any audit, controversy or litigation arising out of or related to this Contract, whichever date is later.
2. **Availability of Funds.** Any continuation or extension of this Contract after the end of the fiscal period in which it is written is contingent on a new appropriation for each succeeding fiscal period sufficient to continue to make payments under this Contract, as determined by the District in its sole administrative discretion.
3. **Captions.** The captions or headings in this Contract are for convenience only and in no way define, limit, or describe the scope or intent of any provisions of this Contract.
4. **Compliance with Applicable Law.** Contractor shall comply with all applicable federal, state and local laws, regulations, executive orders, and ordinances, as such may be amended from time to time.
5. **Governing Law.** This Contract, and all rights, obligations, and disputes arising out of it, shall be governed and construed in accordance with the laws of the State of Oregon and the ordinances of Clackamas County without regard to principles of conflicts of law. Any claim, action, or suit between District and Contractor that arises out of or relates to the performance of this Contract shall be brought and conducted solely and exclusively within the Circuit Court for Clackamas County, for the State of Oregon. Provided, however, that if any such claim, action, or suit may be brought in a federal forum, it shall be brought and conducted solely and exclusively within the United States District Court for the District of Oregon. In no event shall this section be construed as a waiver by the District of any form of defense or immunity, whether sovereign immunity, governmental immunity, immunity based on the Eleventh Amendment to the Constitution of the United States or otherwise, from any claim or from the jurisdiction of any court. Contractor, by execution of this Contract, hereby consents to the personal jurisdiction of the courts referenced in this section.
6. **Hazard Communication.** Contractor shall notify District prior to using products containing hazardous chemicals to which District employees may be exposed, which includes any hazardous, toxic, or dangerous substance, waste, or material that is the subject of environmental protection legal requirements or that becomes regulated under any applicable local, state or federal law, including but not limited to the items listed in the United States Department of Transportation Hazardous Materials Table (49 CFR §172.101) or designated as hazardous substances by Oregon Administrative Rules, Chapter 437, or the United States Environmental Protection Agency (40 CFR Part 302), and any amendments thereto. Upon District's request, Contractor shall immediately provide Safety Data Sheets for the products subject to this provision.

7. **Responsibility for Damages; Indemnity.** Contractor shall be responsible for all damage to property, injury to persons, and loss, expense, inconvenience, and delay which may be caused by, or result from, any act, omission, or neglect of Contractor, its subcontractors, agents, or employees. The Contractor agrees to indemnify and defend the District and Clackamas County, and their officers, elected officials, agents, and employees, from and against all claims, actions, losses, liabilities, including reasonable attorney and accounting fees, and all expenses incidental to the investigation and defense thereof, arising out of or based upon the negligent acts or omissions of Contractor, its subcontractors, anyone directly employed by them, or anyone for whose acts they may be liable in the performance under this Contract. Contractor shall have no obligation to indemnify the District for the negligence, willful misconduct, or breach of contract of any indemnified party.

However, neither Contractor nor any attorney engaged by Contractor shall defend the claim in the name of District or Clackamas County (“County”), purport to act as legal representative of District or County, or settle any claim on behalf of District or County, without the approval of the Clackamas County Counsel’s Office. District or County may assume their own defense and settlement at their election and expense.

8. **Independent Contractor Status.** The service(s) to be rendered under this Contract are those of an independent contractor. Although the District reserves the right to determine (and modify) the delivery schedule for the Work to be performed and to evaluate the quality of the completed performance, District cannot and will not control the means or manner of Contractor’s performance. Contractor is responsible for determining the appropriate means and manner of performing the Work. Contractor is not to be considered an agent or employee of District for any purpose, including, but not limited to: (A) The Contractor will be solely responsible for payment of any Federal or State taxes required as a result of this Contract; and (B) This Contract is not intended to entitle the Contractor to any benefits generally granted to District employees, including, but not limited to, vacation, holiday and sick leave, other leaves with pay, tenure, medical and dental coverage, life and disability insurance, overtime, Social Security, Workers' Compensation, unemployment compensation, or retirement benefits.
9. **Insurance.** Contractor shall secure at its own expense and keep in effect during the term of the performance under this Contract the insurance required and minimum coverage indicated below. The insurance requirement outlined below do not in any way limit the amount of scope of liability of Contractor under this Contract. Contractor shall provide proof of said insurance and name the District and Clackamas County as an additional insured on all required liability policies. Proof of insurance and notice of any material change should be submitted to the following address: Clackamas County Procurement Division, 2051 Kaen Road, Oregon City, OR 97045.

Required - Workers Compensation: Contractor shall comply with the statutory workers’ compensation requirements in ORS 656.017, unless exempt under ORS 656.027 or 656.126.
☒ Required – Commercial General Liability: Combined single limit, or the equivalent, of not less than \$1,000,000 per occurrence, with an annual aggregate limit of \$2,000,000 for Bodily Injury and Property Damage.
☒ Required – Professional Liability: Combined single limit, or the equivalent, of not less than \$1,000,000 per claim, with an annual aggregate limit of \$2,000,000 for damages caused by error, omission or negligent acts.
☒ Required – Automobile Liability: Combined single limit, or the equivalent, of not less than \$1,000,000 per accident for Bodily Injury and Property Damage.

The policies shall be primary insurance as respects to the District. Any insurance or self-insurance maintained by the District shall be excess and shall not contribute to it. Any obligation that District agree to a waiver of subrogation is hereby stricken.

10. Limitation of Liabilities. This Contract is expressly subject to the debt limitation of Oregon counties set forth in Article XI, Section 10, of the Oregon Constitution, and is contingent upon funds being appropriated therefore. Any provisions herein which would conflict with law are deemed inoperative to that extent. Except for liability arising under or related to Article II, Section 14 or Section 21, neither party shall be liable for (i) any indirect, incidental, consequential or special damages under this Contract or (ii) any damages of any sort arising solely from the termination of this Contract in accordance with its terms. The total liability of Contractor and its subsidiaries, affiliates, employees, directors, officers, and agents arising out of performance, nonperformance, or obligations in connection with the design, manufacture, sale, delivery, and/or use of Goods and/or Services in no circumstance includes any liquidated, penalty, incidental or consequential damages of any kind, nor shall exceed the total amount of compensation actually paid to Contractor under the Contract except only in the case of damages arising due to Contractor's negligence or willful misconduct.

11. Notices. Except as otherwise provided in this Contract, any required notices between the parties shall be given in writing by personal delivery, email, or mailing the same, to the Contract Administrators identified in Article 1, Section 6. If notice is sent to District, a copy shall also be sent to: Clackamas County Procurement, 2051 Kaen Road, Oregon City, OR 97045. Any communication or notice so addressed and mailed shall be deemed to be given five (5) days after mailing, and immediately upon personal delivery, or within 2 hours after the email is sent during District's normal business hours (Monday – Thursday, 7:00 a.m. to 6:00 p.m.) (as recorded on the device from which the sender sent the email), unless the sender receives an automated message or other indication that the email has not been delivered.

12. Ownership of Work Product. Contractor retains all rights in and to any intellectual property and confidential information created or procured by it or its representatives at any time and Contractor hereby grants to District a non-exclusive, worldwide, royalty-free, non-revocable license to use, compile, display, store, and process, such data as needed for operation and maintenance of the Work during its useful life. Notwithstanding the above, the District shall own all written deliverables created by Contractor for District pursuant to this Contract for which Contractor has received payment, regardless of whether the deliverables are complete, and any parts or equipment of the UV system supplied under the terms of this Contract for which payment has been made to Contractor. District hereby grants Contractor a non-exclusive, royalty-free, and non-revocable license to use and reproduce the deliverables created for District under this Contract.

13. Representations of Warranties. Contractor represents and warrants the following:

- A. Contractor has the power and authority to enter into and perform this Contract;
- B. This Contract, when executed and delivered, shall be a valid and binding obligation of Contractor enforceable in accordance with its terms;
- C. Contractor shall, at all times during the term of this Contract, be qualified, professionally competent, and duly licensed to perform the Work;
- D. Contractor is an independent contractor as defined in ORS 670.600.

If providing goods, all goods provided by Contractor under this Contract shall meet all standards and specifications set forth in Exhibit B, that the goods shall be as specified for District's intended use, described in Exhibit A and Exhibit B. As necessary, the District agrees to provide Contractor reasonable access to the goods for purposes of repair or replacement under this warranty. Failure of Contractor to promptly correct, or take meaningful action toward correcting problems pursuant to this warranty shall be deemed a material breach of this Contract.

- E.** If providing services, the services provided by Contractor under this Contract will be performed in a workmanlike manner and in accordance with the industry standards. Any design work shall be performed in accordance with the standard of professional skill and care required for a project of similar size, location, scope, and complexity, during the time in which the Work is being performed.
- F.** The Contractor shall be responsible for the technical accuracy of its services and documents resulting therefrom, and District shall not be responsible for discovering deficiencies therein. The Contractor shall correct such deficiencies without additional compensation except to the extent such action is directly attributable to deficiencies in information furnished by the District.
- G.** Contractor warrants the goods ordered pursuant to the Work during the period ending 18 months after the delivery date or 12 months after the start-up date, whichever occurs first. Goods which are manufactured by Contractor will be free from defects in material and workmanship and will function as specified. If Contractor breaches this warranty and the District notifies Contractor of such breach within 30 days of the end of the applicable warranty period, Contractor will, at its option, either replace or repair the nonconforming goods, or re-perform any nonconforming services.
- H.** Performance Guarantees. All product warranties and performance guarantees shall only be enforceable if (a) all equipment is properly installed and inspected regularly, (b) all operations are consistent with Contractor recommendations, (c) operating conditions at the job site have not materially changed and remain within anticipated specifications, and (d) no reasonably unforeseeable circumstances exist or arise.

The warranties set forth in this section are in addition to, and not in lieu of, any other warranties provided.

14. Delivery and Inspections.

A. All deliveries shall be F.O.B. destination with all transportation and handling charges paid by the Contractor, unless specified otherwise in this Contract. Responsibility and liability for loss or damage shall remain with the Contractor until final inspection and acceptance, when responsibility shall pass to the District except as to latent defects, fraud and Contractor's warranty obligations.

B. Goods furnished under this Contract will be subject to inspection and test by the District in accordance with the agreed schedule and testing requirements. If the District finds the goods furnished to be incomplete or not in compliance with the Contract, the District, in its sole discretion, may either reject the goods, require Contractor to correct any defects without charge, or negotiate with Contractor to sell the goods to the District at a reduced price. If Contractor is unable or refuses to cure any defects within a time deemed reasonable by the District, the District may reject the goods, terminate the Contract, and pursue any and all rights and remedies available to District at law, in equity, or under this Contract. Nothing in this paragraph shall in any way affect or limit the District's rights as a buyer, including the rights and remedies relating to rejection under ORS 72.6020 and revocation of acceptance under ORS 72.6080.

15. Survival. All rights and obligations shall cease upon termination or expiration of this Contract, except for the rights and obligations set forth in Article II, Sections 1, 5, 6, 7, 10, 12, 13, 15, 16, 17, 18, 21, 22, 23, 27, and 31, and all other terms and conditions which by their context are intended to survive termination of this Contract.

16. Severability. If any term or provision of this Contract is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular term or provision held to be invalid.

17. Subcontractors and Assignments. Except for Contractor's preselected and vetted subcontractors,

and subject to advance notice to the District, Contractor shall not enter into any subcontracts for any of the work required by this Contract, or assign or transfer any of its interest in this Contract by operation of law or otherwise, without obtaining prior written approval from the District. District's consent to any subcontract shall not relieve Contractor of any of its duties or obligations under this Contract.

18. Successors in Interest. The provisions of this Contract shall be binding upon and shall inure to the benefit of the parties hereto, and their respective authorized successors and assigns.

19. Tax Compliance and Certifications. The Contractor shall comply with all federal, state and local laws, regulation, executive orders and ordinances applicable to this Contract. Contractor represents and warrants that it has complied, and will continue to comply throughout the duration of this Contract and any extensions, with all tax laws of this state or any political subdivision of this state as they may apply, including but not limited to ORS 305.620 and ORS chapters 316, 317, and 318. Any violation of this section shall constitute a material breach of this Contract and shall entitle District to terminate this Contract, to pursue and recover any and all damages that arise from the breach and the termination of this Contract, and to pursue any or all of the remedies available under this Contract or applicable law.

20. Termination. This Contract may be terminated for the following reasons: (A) by mutual agreement of the parties or by the District (i) for convenience upon thirty (30) days written notice to Contractor, or (ii) at any time the District fails to receive funding, appropriations, or other expenditure authority as solely determined by the District; or (B) if Contractor breaches any Contract provision or is declared insolvent, District may terminate after thirty (30) days written notice with an opportunity to cure.

Upon receipt of written notice of termination from the District, Contractor shall immediately stop performance of the Work. Upon District's request, Contractor shall surrender to anyone District designates all written deliverables, works-in-progress, equipment or goods paid for by District under the terms of this Contract.

21. Remedies. If terminated by the District due to a breach by the Contractor, then the District shall have any remedy available to it at law, in equity, or under this Contract including, but not limited to, any remedy available under ORS Chapter 72. If this Contract is terminated for any other reason, Contractor's sole remedy is payment for the goods and services delivered and accepted by the District, less any setoff to which the District is entitled.

22. No Attorney Fees. In the event any arbitration, action or proceeding, including any bankruptcy proceeding, is instituted to enforce any term of this Contract, each party shall be responsible for its own attorneys' fees and expenses.

23. No Third Party Beneficiaries. District and Contractor are the only parties to this Contract and are the only parties entitled to enforce its terms. Nothing in this Contract gives, is intended to give, or shall be construed to give or provide any benefit or right, whether directly, indirectly or otherwise, to third persons unless such third persons are individually identified by name herein and expressly described as intended beneficiaries of the terms of this Contract.

24. Time is of the Essence. Contractor agrees that time is of the essence in the performance of this Contract.

25. Foreign Contractor. If the Contractor is not domiciled in or registered to do business in the State of Oregon, Contractor shall promptly provide to the Oregon Department of Revenue and the Secretary of State, Corporate Division, all information required by those agencies relative to this Contract. The

Contractor shall demonstrate its legal capacity to perform these services in the State of Oregon prior to entering into this Contract.

- 26. Force Majeure.** Neither District nor Contractor shall be held responsible for delay or default caused by fire, terrorism, riot, acts of God, or war where such cause was beyond, respectively, District's or Contractor's reasonable control. Contractor shall, however, make all reasonable efforts to remove or eliminate such a cause of delay or default and shall upon the cessation of the cause, diligently pursue performance of its obligations under this Contract.
- 27. Waiver.** The failure of either party to enforce any provision of this Contract shall not constitute a waiver by the party of that or any other provision.
- 28. Public Contracting Requirements.** Pursuant to the public contracting requirements contained in Oregon Revised Statutes ("ORS") Chapter 279B.220 through 279B.235, Contractor shall:
- a. Make payments promptly, as due, to all persons supplying to Contractor labor or materials for the prosecution of the work provided for in the Contract.
 - b. Pay all contributions or amounts due the Industrial Accident Fund from such Contractor or subcontractor incurred in the performance of the Contract.
 - c. Not permit any lien or claim to be filed or prosecuted against District on account of any labor or material furnished.
 - d. Pay the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.
 - e. As applicable, the Contractor shall pay employees for work in accordance with ORS 279B.235, which is incorporated herein by this reference. The Contractor shall comply with the prohibitions set forth in ORS 652.220, compliance of which is a material element of this Contract, and failure to comply is a breach entitling District to terminate this Contract for cause.
 - f. If the Work involves lawn and landscape maintenance, Contractor shall salvage, recycle, compost, or mulch yard waste material at an approved site, if feasible and cost effective.
- 29. Cooperative Contracting.** Pursuant to ORS 279A.200 to 279A.225, other public agencies may use this Contract resulting from a competitive procurement process unless the Contractor expressly noted in their proposal/quote that the prices and services are available to the District only. The condition of such use by other agencies is that any such agency must make and pursue contact, purchase order, delivery arrangements, and all contractual remedies directly with Contractor; the District accepts no responsibility for performance by either the Contractor or such other agency using this Contract. With such condition, the District consents to such use by any other public agency.
- 30. Reserved.**
- 31. Merger.** This Contract constitutes the entire agreement between the parties with respect to the subject matter referenced herein. There are no understanding, agreements, or representations, oral or written, not specified herein regarding this Contract. Contractor, by the signature hereto of its authorized representative, acknowledges having read and understood this Contract and Contractor agrees to be bound by its terms and conditions.
- 32. Execution and Counterparts.** This Contract may be executed in several counterparts (electronic or otherwise), each of which shall be an original, all of which shall constitute the same instrument.
- 33. Amendment.** This Contract may only be modified in writing signed by the parties.

Signature Page Follows

By their signatures below, the parties to this Contract agree to the terms, conditions, and content expressed herein.

Trojan Technologies Corp
839 State Route 13
Cortland NY, 13045

Water Environment Services

Josh
Richardson

Digitally signed by Josh
Richardson
Date: 2026.10.19
11:24:32 -04'00'

Authorized Signature Date

Josh Richardson VP of Sale

Name / Title (Printed)

1762980-90
Oregon Business Registry #

FBC/DE
Entity Type / State of Formation

Signature Date

Name: _____

Title: _____

Approved for Legal Sufficiency:

Amanda
Keller

Digitally signed by
Amanda Keller
Date: 2026.10.20
15:16:36 -07'00'

County Counsel Date

EXHIBIT A SCOPE OF WORK

Clackamas Water Environment Services (WES) issued a Request for Proposals (RFP) 2026-44 for a new ultraviolet (UV) disinfection system (UV System) while the Kellogg Creek WRRF Disinfection Project (the Project) was at a 30% engineering design phase. Trojan Technologies (Trojan) responded to this RFP with a Proposal that included a Preliminary Price Quote. That Proposal was selected by WES's Proposal Review Committee. The RFP, Proposal, and all associated addenda and clarifications for the basis of this Scope of Work.

Services During Design:

In the first phase of work, Trojan will work with WES and WES's designated Consultant to provide design services that finalize engineering design and fully detail the UV System. The Supplier will be compensated for their services in developing Final Design on a not-to-exceed basis.

Supply of Goods:

The Preliminary Price Quote (most recent revision, submitted via clarifying questions on August 5th, 2026) and fully designed and detailed UV System will form a basis for WES and Trojan to negotiate a Final Price Quote and initiate a purchase order for goods. With this purchase order WES intends to purchase the UV System from Trojan, new, complete, and delivered to site.

Services During Construction:

The Scope of Work does not include installation of the UV System but does include services during construction to aid installation by a third-party construction contractor, not yet selected.

All Work, including Services During Design, Supply of Goods, and Services During Construction, are all defined further in Section 3 the RFP.

Schedule:

The delivery of the KC WRRF Disinfection Project is expected to be completed over the course of the following stages:

Supplier Selection and Final Design Development:

Estimated Spring 2026 – Summer 2026

WES selects Supplier. Consultant develops Final Design around selected UV Supplier's System with Supplier's support.

Contractor Selection and Final Price Quote Negotiations:

Estimated Fall 2026

WES negotiates a Final Price Quote with the Supplier based on the Preliminary Price Quote and the Final Design. WES places an order for UV Equipment and selects Construction Contractor through public bid solicitation.

Construction: Submittals, Paperwork, and Lead Time:

Estimated Fall 2026 – Spring 2027

Supplier prepares the equipment package and delivers it to KC WRRF ahead of the dry-weather construction season (May through September). Contractor performs necessary paperwork and other on-site work.

Construction: Equipment Installation:

Estimated Spring 2027 – Summer 2027

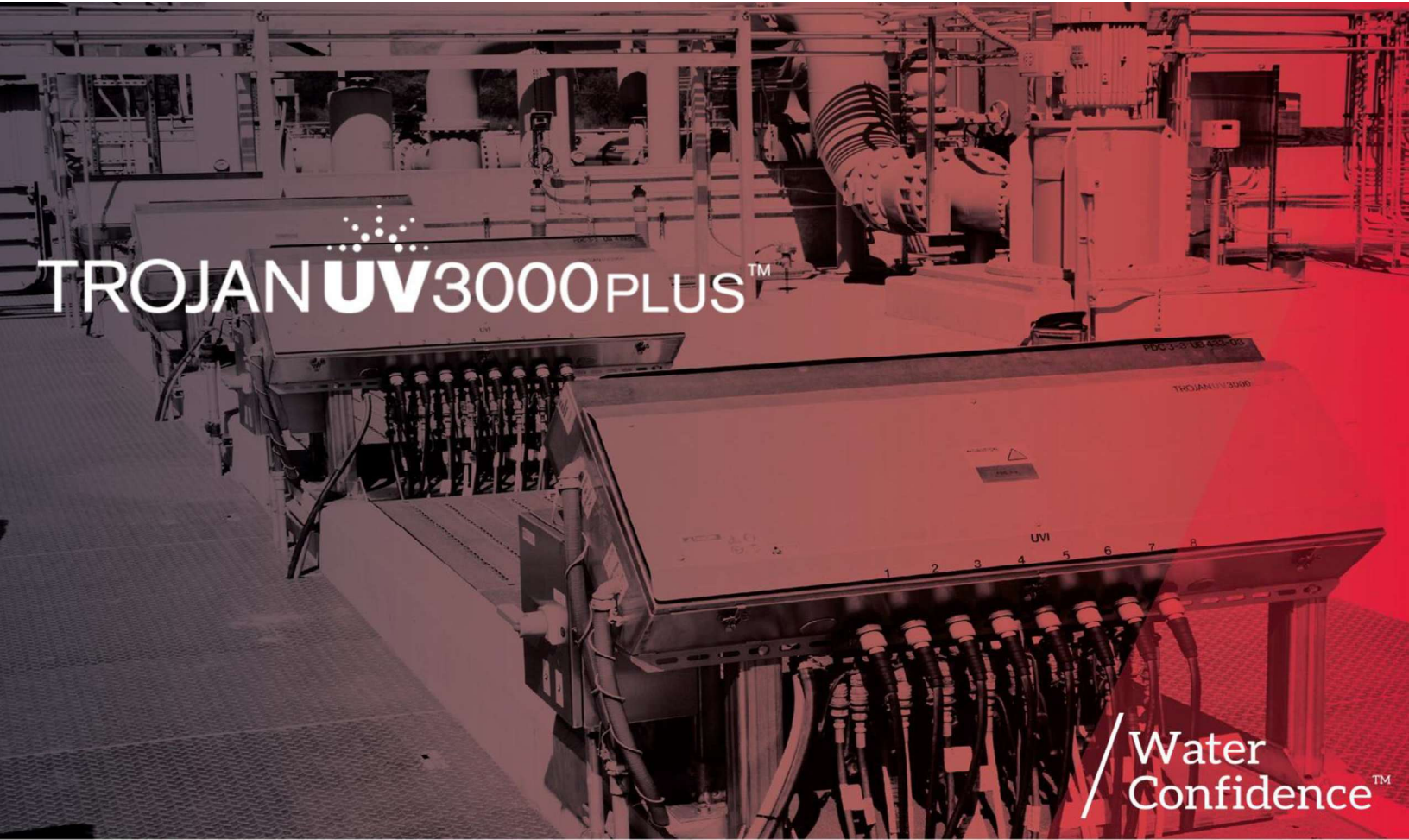
Contractor installs equipment with Supplier's support during the dry-weather season.

Construction: Startup, Testing, Operations, and Maintenance:

Estimated Fall 2027 - onward

All parties work together to ensure the well-functioning and reliable long-term operation of new UV system.

EXHIBIT B
CONTRACTOR'S PROPOSAL



TROJAN UV3000PLUS[™]

Water
Confidence[™]

RESPONSE TO THE REQUEST FOR PROPOSALS (RFP NO. 2026-44)

UV DISINFECTION EQUIPMENT FOR WASTEWATER APPLICATIONS

Submitted by Trojan Technologies

June 24th, 2026

Jackie Corlett, Trojan Technologies
(519) 457-3400, jcorlett@trojantechnologies.com
www.trojantechnologies.com

Bill Reilly, Wm. H. Reilly & Co.
(503) 314-8386, bill@whreilly.com
www.whreilly.com

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June 22nd, 2026

**Subject: RFP #2026-44 – UV Disinfection Equipment for Kellogg Creek WRRF
Clackamas Water Environment Services**

Attention: Thomas Candelario – Contract Analyst

Trojan Technologies appreciates the opportunity to submit our Proposal Package in response to the Request for Proposal (RFP) from Clackamas County for the UV Disinfection Equipment for the Kellogg Creek Water Resource Recovery Facility (WRRF). Our proposal is based on the **TrojanUV3000Plus®** system energy-efficient, low-pressure high-output lamp horizontal system.

During our 49-year history, Trojan Technologies has led global innovation in UV. Trojan introduced the UV3000Plus product into the market in 1999 and it has been our flagship UV system; it has been continuously improved with numerous updates. The latest generation product released in 2022 continues to enhance and focus on the features our customers value. Disinfecting over 17 billion gallons a day, the UV3000Plus system has become the reference standard in the municipal wastewater industry.

The UV3000Plus equipment uses a preassembled, factory sealed 250-Watt amalgam lamp and quartz sleeve unit with variable output electronic ballasts to provide dimming capability. Trojan's ActiClean® system is the industry's only automatic chemical and mechanical quartz sleeve cleaning system, and that means plants' operations are uninterrupted by offline cleans and can rely on consistent UV dose delivery with the ActiClean system.

Purchasing a UV system from Trojan Technologies offers the following advantages:

- The largest installed base of municipal systems in the world. In fact, nearly 8 out of 10 wastewater plants in North America using UV use Trojan equipment.
- Today, the TrojanUV3000Plus system is operating in over 3,200 municipal wastewater plants around the world. Over, 70 plants in North America have UV3000Plus installations with > 300 amalgam lamps.
- The UV3000Plus system relies on an extended lamp warranty with a validated end-of-lamp-life of 98% output after 12,000 hours and our unique ActiClean system that is validated to maintain 95% of sleeve transmittance.
- Trojan's proposed UV3000Plus design with a total of 432 lamps requires no concrete modifications to the existing UV channels wide or height or length. Significant savings in overall construction costs.
- UV equipment has been independently third-party bioassay validated using the NWRI guidelines.
- The UV3000Plus system Power Distributions Center (PDC) panels will have stretched legs to ensure all components are above the 100 year flood elevation. The lamp driver extrusion rating is Type 6P (IP67) and is located 2 feet above the 25 year flood elevation.
- Used lamp recycling at an EPA approved lamp recycling facility. This service is provided to Clackamas WES free of charge for the life of the system.
- A simple disinfection performance guarantee is provided, at no extra cost, and is valid for the life of the UV system. Our lifetime disinfection guarantee is significantly higher than 2 years from the date acceptance as stated in section 46 56 00 – 1.05 B.1.b.
- Trojan offers a toll-free number with qualified Technicians available 24 hours per day / 7 days per week for emergency support.
- Trojan installations are supported by a network of over 30 factory trained certified technicians in North America. The nearest local certified technicians for the Kellogg Creek WRRF are in Portland and Roseburg, Oregon.

Trojan Technologies would like to thank the Board of County Commissioners for considering our UV3000Plus system proposal as the very best UV solution for Kellogg Creek WRRF.

About Manufacturer

Trojan Technologies: Who We Are

Our Vision: To be a custodian of global water by engineering low-risk, innovative water technologies to ensure everyone has access to clean water.

Our Mission: We serve performance-driven municipal, industrial, and residential water treatment professionals by engineering solutions that enable our customers to meet their water quality objectives and improve the lives of more than one billion people globally.

As a wholly-owned subsidiary of Veralto Corporation, Trojan Technologies designs, manufactures and sells UV systems for municipal wastewater and drinking water facilities, as well as for the industrial, commercial and residential markets. The company also provides UV treatment for the removal of certain chemicals from water. Headquartered in London, Ontario, Canada, the company also has offices in the U.K., Germany, Netherlands, Spain, and the U.S.

Our products and services play vital roles in making the various stages of the water treatment process more effective and efficient. Applications and markets served include municipal wastewater, drinking water, environmental contaminant treatment; residential water treatment; ultra-purification of water used in food and beverage manufacturing, pharmaceutical processing and semiconductor applications; filtration and solids separation. **Product brands include:**



Quick Facts:



Key Individuals:

1. **Jackie Corlett** – Regional Sales Manager (RSM) and **Yiru Wen** – Municipal Designer (MD)

Trojan's RSM and MD will be the main contacts through the final design development.

2. **Thomaz Neto** – Project Manager (PM)

Trojan's PM will be the main point of contact through project execution (i.e. submittals, approval and lead time). The PM will work with others in our Project Engineering Teams (i.e. Controls, Electrical and Mechanical).

Past Installations

Trojan Response: With more than 3,200 installations worldwide, TrojanUV3000Plus is one of the most widely deployed UV disinfection systems in the municipal wastewater industry. Trojan has extensive experience delivering UV disinfection solutions for facilities comparable to KC WRRF in terms of capacity, treatment requirements, and operational conditions.

Representative U.S. reference installations, including facility contact information, are provided in the Confidential Appendix Section 11.

System Description

System Control Center (SCC)

The SCC monitors and controls all UV functions. Designed by Trojan engineers the TouchSmart® line of controllers offer a full suite of features and functionality. Large, outdoor-rated screens are easy to navigate for rapid monitoring, diagnosis and adjustment of UV system operation. TouchSmart controllers offer SCADA connectivity, dose-pacing control, and data logging for trending and analysis (flow, power, UV-T, UV intensity, and dose). Programmable Logic Controllers (PLCs) are also available.



TouchSmart controllers feature large and outdoor rated screens allowing user-friendly and easy to navigate system monitoring and control.

Power Distribution Center (PDC)

The PDC powers each bank of modules. Its ergonomic, angled design provides easy access to module power cables and fuses for the ActiClean cleaning system. The robust stainless steel enclosure is mounted across the channel, with module fuses and interlock relays visually aligned with module receptacles for fast diagnostics. Modules are individually overfused protected for safety. Like all Trojan UV 3000PLUS components, the PDC can be installed outdoors and requires no shelter, heating, ventilation or air conditioning.

UV Intensity Sensor

The UV intensity sensor continually monitors UV lamp output. The ActiClean system automatically cleans both the lamp and sensor sleeves simultaneously.



The variable-output (60-100%) covert electronic lamp driver is mounted in its own TYPPE 99 IP67 rated enclosure within the module frame. Features "quick connect" electrical connectors. Cooling is by convection and requires no air conditioning.

Electronic Lamp Drivers

ActiClean Sleeve Cleaning System

The system consists of two components:

1. Hydraulic System Center (HSC)

The HSC is mounted close to the channel in a stainless steel enclosure. It contains the pump, valves and ancillary equipment required to operate the cleaning system and links to the extend/retract hoses of the module wiper drives via a manifold located on the underside of the PDC.

2. ActiClean Wiper Assembly

A submersible wiper drive on each UV module drives the wiper carriage assembly along the module. Attached wiper canisters surround the quartz sleeves and are filled with ActiClean Gel. The gel uses food grade ingredients and contacts the lamp sleeves between the two wiper seals. Cleaning takes place while the lamps are submerged and while they are operating.



Water Level Sensor

The system includes an externally powered electrode low water level sensor for each channel. If effluent levels fall below defined parameters, an alarm will be activated.

Integra Lamp Assembly

Lamps and sleeves are pre-assembled and factory sealed together into a watertight assembly. This allows operators to remove and replace these components as a single unit. O-rings and seals are permanently built-in preventing water from gelling inside the assembly.

Water Level Controller

A fixed weir, motorized weir gate, or Automatic Level Control gate (shown), is required in the channel to maintain the appropriate water level over the lamps. Trojan engineers will work with you to select the appropriate level control device for your application.

System Data

Trojan Response: For detailed, quantifiable proposed system data, including installed power (kW), lamp count, and other information demonstrating compliance with the design parameters, please refer to the Confidential Appendix:

Section 1 – Trojan Scope of Supply for Clackamas County Kellogg Creek Water Resource Recovery Facility

Section 2 – Dose Calculation

Section 3 – O&M Calculation

Mechanical Layout Drawings

Trojan Response: Please refer to the Confidential Appendix: The proposed TrojanUV3000Plus system minimizes modifications to the existing UV channels and does not require major channel reconstruction, thereby reducing overall civil construction costs and complexity.

The proposed TrojanUV3000Plus modules are positioned above the 25-year flood water level based on the hydraulic profile provided for this project. In addition, the modules are rated NEMA Type 6P (IP67), providing protection against water ingress during prolonged submersion at a limited depth. NEMA Type 6P enclosures are typically tested for submersion at approximately 6 feet of water depth for 24 hours.

All electrical equipment, including the PDC, HSC, and SCC panels, are located a minimum of 24 inches above the top of the UV channel wall elevation and therefore complies with the specified flood protection requirements.

For the proposed layout drawing, please refer to the Confidential Appendix:

Section 4 – Layout drawing for Clackamas County Kellogg Creek Water Resource Recovery Facility

Section 5 – P&ID for Clackamas County Kellogg Creek Water Resource Recovery Facility

Electrical and Control Drawing

Trojan Response: Please refer to the Confidential Appendix:

Section 6 – Electrical Drawing for Clackamas County Kellogg Creek Water Resource Recovery Facility

Section 7 – TrojanUV3000Plus Sample Control Philosophy

Guaranteed Treatable Flowrates Table

2.03 UV PERFORMANCE REQUIREMENTS

- A. The UV System Supplier shall provide a system of three banks per channel. When two channels are in service, it can be assumed the total flow will split equally between them. A guaranteed treatable flowrate (in MGD) and associated headloss shall be provided by the Supplier for each of the following scenarios:

Channel s in service	Banks in Service	Guarantee d treatable flowrate (MGD)	Total Headloss at guaranteed treatable flowrate, including all banks in channel and any flow conditioners if	Indicate whether guaranteed flowrate is set by headloss or by dose
1	1	2.5	0.22 in	Dose
1	2	6.8	1.65 in	Dose
1	3	12	5.00 in	Dose
2	2 (1 per channel)	5	0.22 in	Dose
2	4 (2 per channel)	13.6	1.65 in	Dose
2	6 (3 per channel)	24	5.00 in	Dose

UV System Validation

Trojan Response: TrojanUV3000Plus system is validated in accordance with NWRI 2012 because it is the most widely recognized validation guideline for wastewater and water reuse applications. Please refer to the Confidential Appendix:

Section 8 – TrojanUV3000Plus Third Party Validation Test Certification

Section 9 – TrojanUV3000Plus End of Lamp Life Factor Third Party Validation Letter

Section 10 – TrojanUV3000Plus Fouling Factor Third Party Validation Letter

Deviations from County Documents

Trojan Response: Trojan appreciates the opportunity to submit this proposal. Our proposal is submitted subject to and based on Trojan's standard terms and conditions, which we have attached as part of our proposal. We believe these terms and conditions are customary in the trade and respectfully reserve the opportunity to negotiate, fair and reasonable contract terms acceptable to both parties, if Trojan is selected for this project.

Trojan Technologies is able to meet the RFP insurance requirements for: 1. Professional Liability, 2. Commercial General Liability, and 3. Automobile Liability.

Deviations from Technical Documents

SECTION 46 56 00
UV EQUIPMENT AND CONTROL

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This section specifies the supply of equipment and control system for an ultraviolet disinfection system (UV System) and associated services. Furnish all labor, materials, equipment, and appurtenances required to provide an open channel, gravity flow, low pressure high intensity ultraviolet (UV) lamp disinfection system complete with an automatic cleaning system and variable output lamp drivers. The UV System shall be complete and operational with all control equipment and accessories as shown and specified herein. The UV System and all associated components will be installed outdoors at the Kellogg Creek WRRF in Milwaukie, Oregon. This system will be capable of disinfecting effluent to meet the water quality standards listed in this section. Mechanical and electrical equipment furnished shall include but not be limited to the following equipment:
1. UV banks, supports, and in-channel box/frame or configuration to prevent flow bypassing banks.
 2. Automatic lamp cleaning system.
 3. UV Power Distribution Panels.
 4. UV System Control Panel.
 5. Ancillary System panels or modules (if needed for cleaning mechanism or other).
 6. Flow conditioners/straighteners as required by manufacturer to meet performance requirements under all flow conditions.
 7. Level control devices to maintain the water surface elevations that are required by manufacturer for each channel.
 8. All instrumentation for above equipment.
- B. The UV System shall be designed based on the layout provided in the Kellogg Creek WRRF UV Upgrades drawings, including channel length, width, and depth. The UV System manufacturer shall modify the flow control through the channels as needed for a fully functional system.

1.02 QUALITY ASSURANCE

- A. The UV System manufacturer shall be regularly engaged in the design, manufacture, and servicing of UV systems for municipal wastewater disinfection. Manufacturer to submit evidence of a proven track record with at least ten UV Systems operating in wastewater treatment installations.

- B. For evaluation, the manufacturer shall submit a reactor (bioassay) validation report and calculation justifying the sizing for the proposed reactor, without exception. The bioassay shall have been completed by an independent third party and have followed applicable sections and protocols described in the NWRI Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse (2003, 2012) and NWRI Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse and 2006 USEPA Ultraviolet Disinfection Guidance Manual (UVDGM). The bioassay must demonstrate that the proposed UV system design and number of lamps will deliver the specified Reduction Equivalent Dose (RED) based on the water quality and operating conditions specified herein. **Deviation:** The UV3000Plus equipment has been validated in accordance with the NWRI/AwwaRF guidelines, but we do EPA document section 7.3.3.1 Bioassay Procedure to define intensity and UV dose.
- C. Documentation of UV System manufacturer's service capabilities during and after installation, including service office location and experience. UV System shall be as manufactured by Trojan Technologies; De Nora Water Technologies, LLC; ULTRAAQUA, LLC, or equal.

1.03 SUBMITTALS PROVIDED UNDER PROFESSIONAL SERVICES CONTRACT (SUBMITTAL DURING ENGINEERING DESIGN)

- A. After the Contract is signed with the UV System Supplier, preliminary shop drawings shall be developed for Kellogg Creek WRRF Disinfection Project and submitted in detail sufficient to allow the Engineer to design the UV mechanical, piping, and power and instrumentation wiring and modify channel dimensions if necessary. Preliminary shop drawings shall be in color and of sufficient detail to completely identify the UV manufacturer's scope of supply. Preliminary shop drawings (submittals) shall include a Process and Instrumentation Diagram, panel layouts (control, electrical, and hydraulic/equipment), elementary control diagrams, dimensioned equipment layout drawings, and a list of all electrical power loads. Mounting requirements, minimum access requirements, and the approximate total weight of each piece of equipment shall be submitted. Refer to Section 01 33 00, "Submittals," regarding index reference for submittal requirements.
- B. Preliminary shop drawings shall be submitted and will be reviewed per the requirements of Section 01 33 00. The Supplier shall then revise the preliminary shop drawings per the review comments and resubmit for approval to the Engineer. Because these documents will be used for construction bidding, the Supplier will be responsible for coordinating any UV supply changes after bidding with the Contractor and negotiating and paying any related costs.
- C. Copies of the reviewed preliminary shop drawings will be returned with comments. This submittal shall then be revised and finalized by the Supplier and then submitted ready for review by the Owner.
- D. Detailed drawings and description of all items of equipment, showing all dimensions, operating conditions, parts, construction details, installation requirements, electrical schematics, layout, and materials of construction:
1. Include in submittal equipment space requirement for performing typical maintenance on the UV System lamps. Identify workspace for replacing UV lamps.

- E. Submit preliminary shop drawings which shall include a typical electrical one-line drawing depicting how the electrical equipment is typically connected for power distribution of the Supplier-provided equipment.
- F. Submit preliminary shop drawings which shall include the electrical, instrumentation, and control connections for instrumentation and control elements provided by the Supplier or that are required to interface with the provided equipment.
- G. Submit shop drawing depicting which wiring is provided by the UV System Supplier.
- H. Submit electrical loads for each electrical equipment provided by the UV System Supplier.
- I. Submit preliminary shop drawing which shall include an interface schematic depicting how the instruments associated with the specific UV system to be provided will be connected for the UV System manufacturer's UV control system.
- J. Complete submittals for the instrumentation and control (I&C) system, including hardware submittals, test outline, installation details, storage requirements, recommendations for spare parts and expendables, and documentation. Submit complete list of the PLC system components, including specific manufacturer and part number of the CPU and all I/O modules, communications modules, operator interface modules, etc. Include elementary control diagrams that detail the electrical, fiber optic, hydraulic, pneumatic, and any other alternative media connections to and from the PLC system, relays and pilot devices, instruments, and controlled devices.
- K. Submit a narrative and diagrammatic (function block, ladder logic, pseudo-code, etc.; select function blocks or proprietary dosing calculation formulas may be provided as password protected functions or code blocks) control strategy description for the control and operation of the UV System. This shall form the basis of the programming for the PLC control system. If needed, a reasonable disclosure agreement can be executed between the supplier, the Owner, the Engineer, and the integrator.
- L. Submit field and installation information, including mounting requirements, minimum access requirements, and approximate total weight of each piece of equipment (including instruments). Include seismic anchoring requirements for western Oregon per Section 13 05 41.
- M. Submit a complete description of all interface links between the system components including the following:
 - 1. Number, size, and type of all process and connections.
 - 2. Number, size, and type of instrumentation and control signals.
 - 3. Number, size, and type of electrical power wires.
 - 4. Control panel envelope dimensions, mounting requirements, and access requirements (doors, louvers, etc.).
 - 5. Operating temperature range and humidity percentage range.

- N. Copies of the manufacturer's disinfection performance and equipment guarantees.
- O. Independent bioassay validation and dosage calculations demonstrating compliance with the specified Reduction Equivalent Dose (RED) requirements.
- P. Hydraulic calculations demonstrating compliance with the required head loss hydraulic characteristics.
- Q. Certification that all equipment provided includes all necessary permanent safety devices required by the State of Oregon and Federal (OSHA) industrial authorities and applicable local and national codes.
- R. Provide a listing of the signals for data interchange with the Plant PLC control system. This listing shall be subject to change and coordination as the plant system is finalized. Provide certification of a willingness to provide connection interface(s) suitable for this purpose.
- S. Submit pdf and CAD electronic copies of final programs and device configurations. Provide 3D Autodesk Revit drawing of UV banks. Provide the following documentation:
 - 1. Human-Machine Interface (HMI) application source code.
 - 2. PLC application source code (Include descriptive tag names, as well as tag descriptions, and rung comments to clarify).
 - 3. All passwords and any other required information to configure any system component. See Paragraph 1.03.K for information on potential exceptions.
 - 4. All source codes should be written clearly using concise logic and math and annotated with clear comments in a well-organized format.
- T. After the first submittal by UV System Supplier during design, UV System Supplier shall allow time for two (2), 2-1/2-hour conference calls with Owner and/or Engineer to discuss controls requirements and options. UV equipment manufacturer shall provide the services of engineering or technical staff fully versed in the details of the control system.
- U. Construction Ready Submittal: Refer to Section 01 33 00, "Submittals," paragraph 1.01 B.2.
- V. Re-submit pdf and CAD electronic copies of final programs and device configurations per paragraph S above, after incorporating all changes made during start-up, testing, and commissioning.

1.04 REDUNDANCY AND OPERATIONAL FLEXIBILITY

- A. Reliable operation of the UV system is essential to the Owner. To ensure reliable operation, the following redundancy shall be included in the UV System:
 - 1. The UV System shall have equipment installed in two UV channels. The UV System shall meet the requirements of Paragraph 2.03. The two UV channels shall be identical in function, capacity, and equipment.

2. Failure of any bank, or the controls associated with any bank, shall not impact the remaining banks' functionality, performance, or control, in either channel.
 3. The plant's existing chlorine disinfection system will provide ultimate redundancy if failures in the UV system render it inoperable.
- B. Operational flexibility is reflected in the design and preselection as follows: Rather than specifying a pre-determined maximum flow, the Supplier shall determine and provide values for the maximum flow a single channel can treat to the required reduction with one, two, and up to three identical banks in series at the specified water quality while remaining within the specified hydraulic grade line limits. For the purposes of this specification, a "bank" refers to an array of horizontal bulbs arranged evenly across the channel's width and depth, in which each bulb is connected to and powered from a common panel. A "rack" is a single column of evenly spaced, horizontally mounted bulbs with the number of bulbs selected to meet the depth and treatment requirements. Several racks make up a single bank.

1.05 WARRANTY

- A. These warranty requirements supplement Clackamas County's Terms and Conditions defined in the Request for Proposals, Section 3.
- B. Warranty for replacement of defective equipment is to include labor and materials. Warranty durations listed below begin from the date of Owner's acceptance of the UV installation unless otherwise specified.
1. System Performance:
 - a. The Supplier shall guarantee that the performance of the UV System will meet the effluent criteria specified in Paragraph 2.03. See performance testing requirements in Paragraph 3.03 that shall be met as part of warranty.
 - b. The disinfection guarantee shall be in effect for 2 years from the date of acceptance of the UV installation by the Owner.
 2. General Equipment:
 - a. The equipment furnished under this section shall be free of defects in material and workmanship, including damages that may be incurred during shipping for a period of 12 months.
 3. UV Lamps:
 - a. UV lamps shall be fully warranted for a minimum of 9,000 hours when operated in automatic mode. Between 9,000 and 12,000 hours, this warranty shall be prorated from full bulb price to \$0. The on/off cycles are limited to an average of four (4) per day over the guaranteed life of the lamp.
 4. Lamp Drivers:

- a. Lamp drivers shall be fully warranted for 1 year. Between 1 year and 10 years, this warranty shall be prorated from lamp drive price to \$0.
- 5. UV Intensity Sensors:
 - a. UV Intensity Sensors shall be fully warranted for 10 years.
- 6. UV Transmissivity Sensors:
 - a. UV transmissivity sensors shall be fully warranted for 5 years. **Exception: Hach offers a 3-year extended warranty for the monitor only; sensors are warranted for 1 year.**
- 7. Level Control Gate Actuators:
 - a. Actuators on Level Control Gates shall be fully warranted for 5 years.

PART 2 – PRODUCTS

2.01 UV EQUIPMENT AND CONTROL SYSTEM

- A. The UV System proposed for the Kellogg Creek WRRF will be installed to replace the existing UV system in the Disinfection Facility as part of a construction project.
- B. The UV System shall consist of two channels and meet disinfection and hydraulic requirements as guaranteed by the UV System manufacturer in accordance with Paragraph 2.03.
- C. The process shall be configured such that either channel can be taken out of service for maintenance without impacting the operation of the other channel. Similarly, the UV system shall be configured such that any single bank can be taken out of service without impacting the operation or performance of the other banks.

2.02 UV FACILITY ENVIRONMENTAL CONDITIONS:

- A. Outdoor temperature extremes range from -3 to 116 degrees F, with normal expected range of 36 to 82 degrees F. **Deviation: Operational temperature range for the UV3000Plus: Non-wetted components -4°F to 113°F.**
- B. Humidity can range from 25% to 99%. All components shall remain fully operational through extended periods of rain, freezing rain, snow, hail, and ice storms.
- C. The Kellogg Creek WRRF altitude is approximately 40 feet.
- D. Seismic Requirements: The equipment and major components shall be suitable for and certified to meet all applicable seismic requirements of the Oregon Structural Specialty Code (OSSC) and the Site Seismic Criteria specified in Section 13 05 41. The equipment manufacturer shall certify that the equipment can withstand; that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes. The selected supplier shall provide seismic calculations (per Section 13 05 41) during final design development for all in-channel equipment. All equipment exterior to the channels shall meet seismic requirements without anchor

modifications.

- E. The UV channels are expected be under water if the nearby Willamette River floods. The 100-year flood elevation is 6 inches (0.5 feet) above the top of the UV channel wall. All equipment located less than 12 inches (1.0 feet) above the top of the UV channel wall must be designed for operation while submerged. Any equipment, connections, fittings, or appurtenances not suitable for submergence shall be elevated at least 24 inches (2.0 feet) above the top of the UV channel wall elevation.

2.03 UV PERFORMANCE REQUIREMENTS

- A. The UV System Supplier shall provide a system of three banks per channel When two channels are in service, it can be assumed the total flow will split equally between them. A guaranteed treatable flowrate (in MGD) and associated headloss shall be provided by the Supplier for each of the following scenarios:

Channels in service	Banks in Service	Guaranteed treatable flowrate (MGD)	Total Headloss at guaranteed treatable flowrate, including all banks in channel and any flow conditioners if needed.	Indicate whether guaranteed flowrate is set by headloss or by dose
1	1			
1	2			
1	3			
2	2 (1 per channel)			
2	4 (2 per channel)			
2	6 (3 per channel)			

- B. The existing UV system is rated to treat 18 mgd but successfully treats up to 24 mgd for short durations with all six banks in service (two channels x three banks per channel). The proposed UV system should, at a minimum, match this performance. When Kellogg Creek WRRF receives flows above 24 mgd, additional flow gets disinfected with chlorination through the adjacent Chlorine Contract Basin.
- C. The UV System Supplier shall submit minimum flow requirements for lamp cooling.
- D. The UV system shall be designed to treat conventional activated sludge secondary treatment flows with the following characteristics:

1. Effluent Temperature Range: 33 to 85 degrees F (1 to 30 degrees C).
 2. Ultraviolet Transmittance @ 253.7 nm: 55%, minimum.
 3. Minimum UV dosage at each guaranteed treatable flowrate: 24 mJ/cm² T1.
 4. Total Suspended Solids:
 - a. 30 mg/L, max 30 day mean.
 - b. 50 mg/L, max instantaneous.
 5. Effluent standards to be achieved: Effluent standards shall be guaranteed regardless of influent count to UV system. Testing shall be per Standard Methods for the Examination of Water and Wastewater, 21st Ed.
 - a. 126 *E. coli*/100 mL based on a 30-day Geometric Mean of daily samples for the effluent standard as specified in Paragraphs 2.03 A and 2.03 C.
 - b. 406 *E. coli*/100 mL based on a single sample max for the effluent standard as specified in Paragraphs 2.03 A and 2.03 C.
- E. The UV System is to be installed in two existing open channels. Channel dimensions are shown on the Drawings.
- F. The System shall be designed to accommodate upstream water surface elevations in the influent channel as identified in the Drawings. The UV system manufacturer shall set the downstream water surface elevation per UV System operational requirements to meet the criteria in Paragraph 2.03 A.
- G. System configuration:
1. The UV System banks must fit within the length, width, and depth of the existing UV channels.
 2. The UV system configuration will be as follows:
 - a. Number of Channels: Two.
 - b. Number of Banks per Channel: baseline case three (3).
 - c. Number of System Control panels: One.
 - d. Number of UV Intensity Sensors: One per bank.
 - e. Number of Power Distribution panels: As required by Supplier.
 - f. Number of UV Transmissivity Sensors: Two in common area upstream of UV channels.
 - g. Number of Level Controllers: One per channel.

3. Site Elevation: 40 +/- feet.

- H. Provide a horizontal-bulb UV disinfection system complete with, at a minimum, UV Banks with automatic bulb cleaning system, a System Control Panel, Power Distribution Panels with electrical disconnect switches, and Water Level Controllers, as specified in this section.
- I. The UV system shall be designed to deliver a minimum T1 bacteriophage Reduction Equivalent Dose (RED) of 24 mJ/cm² at peak flow, in effluent with a UV Transmission of 55% at end of lamp life (EOLL) after accounting for reductions for quartz sleeve fouling. The RED shall be adjusted using an end of lamp life factor of 0.5 to compensate for lamp output reduction over the time period corresponding to the manufacturer's lamp warranty. The RED shall be adjusted using a quartz sleeve fouling factor of 0.8 to compensate for quartz sleeve transmission reduction due to wastewater effluent fouling. A higher lamp aging factor and quartz sleeve fouling factor could be considered based on independent verification per protocols in the NWRI Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse.
- J. Conduct Validation Testing. Two challenge organisms will be used in the validation testing. One challenge organism with low UV resistance (e.g., T1 with resistance of ~5 mJ/cm² per log inactivation) and a second challenge organism with higher UV resistance (e.g. MS2 with resistance of ~20 mJ/cm² per log inactivation).

2.04 DESIGN, CONSTRUCTION AND MATERIALS

A. General:

- 1. All UV System metal components in contact with secondary effluent shall be Type 316 stainless steel.
- 2. All wiring exposed to UV light shall be Teflon™ (or other suitable long-term UV resistant material) coated.

B. Lamp Array Within Each UV Bank:

- 1. The lamp array configuration shall be in a horizontal arrangement in parallel rows.
- 2. The system shall be designed for complete submersion of the UV lamps under all flow conditions including both electrodes and the full length of the lamp arc.

- C. UV Bank: **Deviation:** Item C is in reference to a Signa2 Row product. For a UV3000Plus, it should be noted as follows:

C. UV Module:

- 1. Each UV module will consist of UV lamps with an electronic ballast enclosure mounted on a Type 316 stainless steel frame. To be considered as an alternate, ballasts housed in a separate enclosure located external to the channel will be equipped with a suitable air conditioning system, supplied by the UV manufacturer, to maintain internal enclosure temperatures below 80°F (26°C). No forced air ventilation will be allowed.

2. Each lamp assembly will be enclosed in its individual quartz sleeve, one end of which will be closed and the other end sealed by an integrated lamp connector. To be considered as an alternate, lamp quartz sleeves that are open at both ends will be supplied with twice the amount of specified spare seals and lamps.
3. The closed end of the quartz sleeve will be held in place by means of a retaining O-ring. The quartz sleeve will not come in contact with any steel in the frame.
4. The ends of the lamp sleeve will not protrude beyond the stainless steel frame of the UV Module.
5. Lamp wires will terminate in the electronic ballast enclosure located at the top of the UV Module.
6. All lamp to ballast connections will be made by and tested by the UV Manufacturer.
7. The electronic ballast enclosure will contain the electronic ballasts and addressable lamp status monitoring systems.
8. Each UV Module will be connected to a receptacle on the Power Distribution Center.
9. At the point of exit from the UV Module frame the multi conductor cable will pass through a waterproof strain relief.
10. Each UV module will have a rating of Type 6P

1. Each UV bank shall consist of UV lamps, quartz sleeves and an automatic cleaning system mounted in a Type 316 stainless steel frame.
2. Each lamp shall be enclosed in its individual quartz sleeve, one end of which shall be closed and the other end sealed by a lamp end seal.
3. Each UV bank shall prevent short circuiting and bypassing around and over the top of the lamps and maximize disinfection efficiency.
4. Rack lifting system must be provided by the UV manufacturer to enable lifting a complete bank of lamps from the channel for inspection and/or servicing. Overhead hoisting device (by others) will have a single point connection; Supplier shall provide all needed straps, spreader bars, and accessories, pre-rigged, to allow single-point lifting without damaging the bulbs.

D. UV Lamps:

1. Lamps shall be high intensity low pressure amalgam design.
2. The filament shall be significantly rugged to withstand shock and vibration.
3. Lamp wiring shall be UV insulated stranded wire.
4. Each lamp shall withstand an average of four (4) on/off cycles per day without reducing lamp life, warranty or causing any damage to the lamp.

5. Lamps shall be rated to produce zero levels of ozone. **Exception: This is a Signa 2 Row language, not applicable to the UV3000Plus.**
 6. Lamps shall be operated by electronic lamp drivers with variable output capabilities ranging from 60% (or lower) to 100% of nominal power. The lamp assembly shall incorporate active filament heating to maintain a minimum lamp efficiency of 35% across varying water temperatures and between the minimum and maximum stated lamp power levels.
- E. Lamp Plugs: **Exception: This is a Signa 2 Row language, not applicable to the UV3000Plus.**
1. Each lamp rack shall be accessible from the top of the UV bank to facilitate lamp removal without moving the UV banks or any other components.
 2. An integral safety interlock in the lamp plug shall prevent removal of energized lamps.
- F. Lamp Drivers: **Exception: This is a Signa 2 Row language, not applicable to the UV3000Plus.**
1. Each lamp driver shall independently power one or two UV lamps. Failure of one lamp shall not affect operation of the other lamp. The lamp driver shall be UL, and RoHS compliant.
 - a. The lamp driver shall have a power factor correction circuit to ensure minimum 98% power factor and less than 5% total harmonic distortion (THD) current at the maximum power level and nominal input voltage.
 - b. The lamp driver electrical efficiency shall be minimum 95% at the maximum power level.
 - c. A ground fault in the output circuit shall be detected and communicated as a warning to the external controls system while the corresponding lamp operates undisturbed.
 - d. Local visual diagnostic shall be provided with LEDs for lamp driver status, lamp status (on, idle, preheat, fault), power and communication status.
 - e. For reliability and to facilitate troubleshooting, at a minimum, the following external indicators (protections, status, warnings, and alarms) shall be provided: lamp status, driver status, ground fault, and communication time-out.
- G. Quartz Sleeves:
1. Quartz sleeves shall be clear fused quartz circular tubing containing 99.9% silicon dioxide.
 2. Sleeves shall have minimum UV transmittance at 254 nm of 87% (1 mm wall thickness).
- H. Cleaning System:
1. An automatic in-situ cleaning system shall be provided to clean the quartz sleeves.

Wiping sequence shall be automatically initiated with capability for manual override. All cabling, hoses, drives, and power systems associated with cleaning and lifting systems shall be included in the UV System. **Exception: For a UV3000Plus, a lifting device is provided to remove the modules from the channel.**

2. The cleaning system shall be fully operational while UV lamps and modules are submerged and in operation.
 3. If UV System contains chemical cleaning, it shall be designed such that cleaning solution replacement can be performed while the UV Bank and lamps are in place and operational in the channel. **Exception: For a UV3000Plus, for cleaning solution replacement, the module must be removed from the channel.**
 4. The wiping system shall include instruments and logic to detect and alarm if the wiper is jammed. Similarly, if the wiper fails to reach the fully retracted position, the system shall also annunciate an alarm.
 5. Cleaning sequence frequency shall be field adjustable.
 6. Cleaning system operation shall be automatic (default) or manual.
 7. The wipers shall travel the full length of the UV lamp arc.
- I. Effluent Level is preferred to be controlled via a passive, constant level gate. If an actively controlled weir is required, submit a motorized weir gate meeting the following requirements. The currently anticipated maximum upstream level is noted on the Drawings and will be finalized during the submittal review process.
1. Motorized Weir Gate – may or may not be awarded or included with UV system:
 - a. Motorized stainless steel weir gates will be designed to maintain the minimum channel effluent level required to keep lamps submerged at all times and evenly split flow to active UV channels.
 - b. The entire length of the lamp arc will remain submerged to maximize UV dose delivered to the effluent and to prevent any UV exposure above the water free surface.
 - c. Gate Electric Operators: See paragraph 2.07.
- J. Effluent Level Sensors:
1. Level Sensors (by others) will be located downstream of each channel of UV banks. Sensors and transmitters will be provided by others to provide a 4-20 mA signal or IO Link to the SCP PLC proportional to the level in each channel. The manufacturer shall provide the necessary I/O cards and appurtenances to allow these level signals to be integrated by the manufacturer into panel and programming.
- K. Electrical:
1. All applicable electrical components shall be UL-listed.

2. Each UV lamp within a bank shall be powered from a Power Distribution panel (PDP).
3. UV Manufacturer to supply all cabling between lamps and drivers.
4. Each electronic lamp driver shall power one or two lamps.
5. Power factor shall not be less than 98% leading or lagging.
6. Electrical supply to each Power Distribution panel (PDP) shall be 480/277 V, 60 Hz, 3 Phase, 4 Wire + GND.
7. If applicable, electrical supply to any Ancillary System panel(s) (for cleaning or bank lifting systems) shall be 480 V, 60 Hz, 3 Phase, 3 Wire + 1 GND.
8. Electrical supply to the System Control Panel (SCP) shall be via two 110 V, 60 Hz, 1 Phase, 2 Wire + 1 GND Wire.
9. Electrical supply for the channel low-water level sensors, UV Intensity sensors, and UV Transmissivity monitor shall be provided by the UV SCP.

L. Power Distribution Panel (PDP):

1. PDP enclosure material shall be 304 Stainless Steel NEMA-Type 4X (IP66) with Air Conditioning or housed within an air-conditioned electrical shelter. **Deviation: The UV3000Plus PDC enclosure does not require an air conditioner.**
2. All internal components shall be sealed from the environment.
3. All PDPs to be UL approved, no substitutions allowed.
4. The PDP enclosure shall be an environmentally controlled space. The PDP manufacturer shall provide a thermostat-controlled air conditioner to control the temperature within the PDP enclosure. When the PDP is in standby or not powering UV lamps, the equipment within the PDP enclosure shall be protected from condensation within the PDP enclosure.
5. See the Drawings for locations of the PDPs. See the Drawings for coordination of the mounting location of the PDP enclosure air conditioner.

6. Each PDP shall be protected with a line side circuit breaker housed in an existing indoor electrical room located 100 to 200 feet from the Disinfection Facility. Each PDP shall be equipped with a disconnect switch located on the PDP. Each PDP shall be able to electrically isolate each bank of lamp drivers and safely replace a lamp driver without de-energizing any other operating banks.
7. The PDP shall have bottom entry for the following wiring:
 - a. Power input wiring from the Switchboard.
 - b. Control wiring from the SCP.
8. The PDP shall have bottom entry for UV lamp wiring and any other wiring associated with the UV channels.

M. Ancillary System panels (if needed):

1. Ancillary Systems include components required to operate the automatic cleaning system or other Manufacturer-specific systems.
2. Any separate enclosure material shall be 304 Stainless Steel (NEMA Type 4X).
3. All enclosures shall have bottom entry for conduit and wiring.

2.05 CONTROL AND INSTRUMENTATION

- A. The treatment process for the UV System shall be designed with redundancy. The control system shall control both channels.
1. System Control Panel (SCP):
 - a. The monitoring, operation and control of the UV system shall be managed at the System Control Panel (SCP) by PLC and associated touch screen and switches as detailed below. See paragraph 2.06.
 - b. Alarms (audible, visual, and those relayed back to the Plant Control System [PCS]) shall be provided to notify Plant operators that attention is required or to indicate an extreme alarm condition in which the disinfection performance may be jeopardized. The alarms shall include the following in addition to alarms indicated by the Plant during submittal review, factory acceptance testing, and during start-up.
 - 1) Individual Lamp Failure.
 - 2) Multiple Lamp Failures.
 - 3) Low UV Intensity.
 - 4) Communication Alarms.

- c. The 100 most recent alarms shall be recorded in an alarm history register and be displayed when prompted. All alarms shall be relayed back to the Plant Control System and recorded within the plant SCADA Historian.
 - d. The UV banks shall be able to be operated in "Local Off", "Local On", or "Automatic" Control Modes.
 - e. Elapsed time of each bulb and bank shall be recorded and displayed on the display screen when prompted and tracked within the PCS via the shared register located within the SCP PLC.
 - f. The SCP enclosure shall be an environmentally controlled space. The SCP manufacturer shall provide a thermostatic controlled air conditioner to control temperature within the SCP enclosure. The SCP enclosure shall be protected from condensation within the SCP enclosure.
 - g. See the Drawings for location of the SCP.
 - h. Where possible, instrumentation and control components shall operate on 12 or 24 Vdc power to facilitate safe troubleshooting and maintenance. Control panels shall be clearly marked to indicate all present voltages and where multiple voltage sources are present. Required power supplies shall be provided by the system supplier. Max voltage in SCP is 120V AC.
 - i. When operating in automatic mode, all control logic, except for hardwired interlocks, shall be contained with the SCP PLC.
 - j. The power and control wiring for the SCP shall enter the bottom of the enclosure.
2. Low Water Level Sensor:
- a. The UV Manufacturer shall provide one low water level sensor for each UV channel. Level sensors shall be conductivity type, hardwired to the associated PDP.
 - b. During all modes of system operation (manual and automatic), the water level sensor shall ensure that lamps extinguish automatically if the water level in the channel drops below an acceptable level.
 - c. Sensor shall provide a dry contact rated for use with the applicable control system components and shall be provided with all required mounting hardware and any necessary interposing relays.
3. UV Intensity Sensors:
- a. A UV sensor shall continuously monitor the UV intensity produced within each UV Bank.
 - b. The sensors shall measure only the germicidal portion of light emitted by the lamps.

- c. The UV sensor shall be factory-calibrated to US National Institute for Standards and Technology (NIST).
 - d. The sensor shall be digitally calibrated to ensure calibration accuracy.
 - e. The sensor shall be accessible without shutting down the system, lifting a bank/module, or removing lamps.
 - f. For systems using UV intensity to control dose, Sensors shall be designed to provide UV intensity data for dose monitoring and control functions. Dose pacing program shall enable use of measured UV intensity along with flow rate and UVT to determine the delivered dose during operation.
 - g. The UV system shall contain a function for users to override the UV intensity or UV transmittance sensors' outputs by manually entering a user-defined value. Alternatively, if the UV intensity sensor faults, the UV system shall use a theoretical calculated UV intensity value. For systems not relying on UV intensity for control, an intensity sensor fault shall be an alarm condition.
 - h. Sensors shall be designed such that reference sensor readings can be taken without interrupting disinfection and without removing UV lamps, banks/modules or sleeves.
4. Dose-Pacing:
- a. A dose-pacing system shall be supplied to modulate the lamp UV output in relationship to a primary flow provided via a 4-20 mA dc signal from a new Plant flow meter (supplied and installed by Others) or in the event this network connection is lost, a secondary flow signal provided via the network connection to the PCS and the individual UV intensity sensors provided within each bank.
 - b. The system shall be dose-paced such that as the flow and effluent quality change, the design UV dose is delivered while conserving power.
 - c. The dose-pacing system shall allow the operator to vary the design dose setting. Logic and time delays shall be provided to regulate UV Bank ON/OFF cycling.
5. On-Line UV Transmission Monitor:
- a. An on-line UVT monitor shall be provided to automatically and continuously track the UV transmission of the effluent at the 254 nm wavelength. UVT monitor shall be UVAS as manufactured by Hach Company, or approved equal.
 - b. The UVT monitor shall measure transmittances from 25% to 100%.
 - c. A shielded twisted pair cable will be provided by others for connecting the UVT monitor (4-20 mA signal) to the System Control Panel. The SCP shall modulate the lamp intensity in response to the effluent UV Transmission.

- d. Power feed of 100 – 230 Vac $\pm$ 10%, 50/60 Hz, 1 phase, 2 wire (plus ground), 50 VA to be provided to the sensor located at the UV channel as shown on the Drawings.

B. UV Bank and Module Lifting:

1. UV Banks and Modules shall be equipped with lifting loops or lugs for connection to lifting device supplied by others.
2. Lamps shall be removable without lifting the bank out of the channel. Sufficient cabling shall be provided such that a rack can be lifted from the channel and placed adjacent to the channel for maintenance. **Exception:** This is a Signa 2R language, and it is not applicable to UV3000Plus. To replace the UV lamps in the UV3000Plus, the modules must be removed.

2.06 DISINFECTION CONTROL PANELS AND HARDWARE

- A. A UV disinfection system control panel shall be provided to monitor and control the UV disinfection, influent gates, flow control weirs (if utilized), and related items for the UV system. The control panel shall also provide status of system and equipment and control for the Wastewater Treatment Plant Control system.
- B. Provide System Control Panel (SCP) with pre-wired controls housed in an enclosure consisting of but not limited to the following:
 1. NEMA 4X Free-Standing Enclosure:
 - a. Panel shall be sized as required to provide ample working space for field connections and contain all of the specified equipment.
 - b. Constructed of 16-gage or 14-gage (depending on size), Type 304 stainless steel with seams that have been continuously welded and ground smooth without holes or knockouts on any side, body flange trough to exclude liquids and contaminants, gasketed and continuously hinged doors with three-point latching and sealing padlockable handle, hidden stainless steel hinges for clean, aesthetic appearance, unpainted, smooth No. 4 brushed finish. Back panel for mounting of devices and components to be unpainted Type 304 stainless steel. Door and body stiffeners are required in enclosures over 30 inches wide and/or high. Swing-out panels for mounting of special devices where specified or required.
 - c. Acceptable Manufacturers: Hoffman, Hammond, Rittal, Eldon, or approved equal.
 2. Programmable Logic Controller (PLC):
 - a. Processor Unit: With a working memory of 1 MB for program and 4.5 MB for data, with two interfaces for network connections: 1st interface: PROFINET IRT with 2-port switch, 2nd interface: PROFINET RT, 6 ns bit performance. Provide with a SIMATIC S7 2 GB SD card memory back-up (Secure Digital Card). Processor shall be by Siemens and shall be SIMATIC S7-1500 Controller, Product Number/Type SIMATIC S7-1500, CPU 1515-2 PN, no substitutions allowed as this is Owner's the standard PLC Processor with stocked spares.

- 1) First Network Interface: Plant-side PROFINET communication.
 - 2) Second Network Interface: Field-side PROFINET communication.
- b. Discrete Input Modules: Modules shall be provided with 16 isolated inputs and shall be by Siemens, Product Number/Type SEMATIC S7-1500, DI 16x24VDC HS (24VDC).
 - c. Analog Input Modules: Modules shall be provided with 8 isolated inputs capable of receiving 0/1-5VDC and/or 0/4-20mA inputs, and shall be by Siemens, Product Number/Type SEMATIC, S7-1500, AI 8xU/I HF.
 - d. Relay Output Modules (Isolated): Modules shall be provided with 8 isolated relay outputs rate for 24 V DC to 120 V DC and/or 24 V AC to 230 V AC continuous load at 5A maximum. Relay output module shall be by Siemens, Product Number/Type SEMATIC S7-1500, DQ 8x230 V AC/5 A ST (relay).
 - e. Analog Output Modules: Modules shall be provided with 8 isolated outputs capable of communicating via 0-20mA, 4-20mA, or 0-10VDC and shall be by Siemens, Product Number/Type SEMATIC S7-1500, AQ 4xU/I HF.
 - f. Power Supply: Power Supply shall be 24VDC power supply, 60W for use with the provided Siemens, SIMATIC S7-1500 Controller. Power supply shall be by Siemens, Product Number/Type S7-1500, PS 60W 24/48/60V DC HF.
 - g. DIN Rail: Space shall be provided for all IO cards with one spare card for each IO type and space to allow for installation of up to 4 additional IO cards.
 - h. IO Card and Field Terminations: Where available by the manufacturer, IO cards shall be provided with fully modular system cabling via up to 16-pin push-in connectors at the IO cards, shielded connecting cable, and fused terminal block with LED indicators for termination of the field IO. Terminal blocks shall be provided for all IO cards, including spares. Space shall be provided for field terminals for up to 4 additional IO cards.
 - i. Wireways: Separate covered wire channels shall be provided in the control panel to allow for organization of the panel wiring and field wiring. Separate channels shall be provided for field wiring and discrete wiring. Analog and discrete terminals shall be located to avoid a channel containing both analog and discrete IO running in parallel. Minimum 3" of clearance shall be provided between the cable channel for field IO and the terminal blocks, and a minimum of 2" of clearance shall be provided between the panel wiring cable channel and terminal blocks.
3. Human Machine Interface (HMI):
 - a. Acceptable Manufacturer: TFT multitouch HMI display with PROFINET interface, 18.5-inch diagonal, IP65/NEMA 4X rated (front), IP2- (rear) by Siemens, Product Number/Type *SIMATIC HMI MTP1900*.
 4. Power Supplies, UPS units, and Redundancy Module(s) shall be DIN rail mounted and provided as detailed below:

- a. Unless otherwise specified, power for instrumentation and UV controls shall be obtained from two 120-volt, 60 hertz circuits of the appropriate amperage.
 - b. Cabinet shall be designed to accept dual 120 VAC power feeds. Each power feed shall be equipped with a 120 VAC main power disconnect circuit breaker. Each cabinet shall include power distribution circuit breakers. The circuit breakers shall be rated at 250VAC maximum with a short circuit rating of 10,000 amps for all breaker ratings. The circuit breakers shall be mounted on a standard DIN rail, and shall be Allen-Bradley Channel Mounting Type, or approved equal.
 - c. Each 120VAC power feed shall be provided with separate Transient Voltage Surge Suppression (TVSS) units. TVSS units shall be equipped with a dry contact wired to a PLC input to indicate TVSS unit failure or alarm.
 - d. AC to DC Power Supplies: Redundant AC to 24 VDC Power Supplies shall be provided. Power supplies shall be sized so that a single power supply can provide 150% of the cabinet load.
 - e. Uninterruptible Power Supplies (UPS): Single battery backup units with bypass switch. UPS unit shall be sized to provide 150% of the cabinet load for 45 minutes. UPS units shall provide emergency backup power to the PLC in the event that both the primary and secondary 120VAC power feeds are lost. Each UPS unit shall be equipped with dry contacts wired to PLC inputs to indicate UPS unit failure and UPS on battery.
 - f. Active Current Balancing (ACB) Redundancy Module shall be provided to ensure equal load is placed on the 24VDC power supplies and UPS modules to extend the life of the system components. Redundancy modules utilizing diodes only are not acceptable.
 - g. Components shall be QUINT POWER, QUINT UPS, and QUINT ORING with ACB devices as manufactured by Phoenix Contact or approved equal and shall be compatible with the provided PLC components.
5. Network Equipment:
- a. Network switches shall be provided within the SCP cabinet. Two copper network connections will be provided from the Plant network cabinet, located within the chemical and maintenance building, to be used as detailed below. The connections detailed below shall be terminated at DIN rail mounted RJ-45 ports within the SCP cabinet to allow for connection to the copper network cables provided by the Contractor.
 - 1) Connection of the SCP switch to the Plant PLC network.
 - 2) Installed spare.
 - b. Plant PROFINET Network Switch: For aggregation of the network connections between the SCP PLC (1st interface), SCP HMI, and the plant control network.

- 1) DIN-rail mounted, managed Gigabit Profinet switch with conformal coating.
 - 2) Network Connections: Four 10/100BaseT(X) ports with RJ45 connectors and 2 combo 10/100/1000BaseT(X) or 100/1000BaseSFP+ slots for adding Series Gigabit/Fast Ethernet fiber or copper SFP modules.
 - 3) Operating Temperature: 0 to 75°C.
 - 4) Power Supply: Two removable 4 contact terminal blocks for redundant 12/24/48VDC inputs.
 - 5) Manufacturer & Model Number: MOXA model EDS-P506E-4PoE-2GTXSFP-T.
- c. Field PROFINET Network Switch: For aggregation of the network connections between the SCP PLC (2nd interface) and new field devices with PROFINET compatible network connections.
- 1) DIN-rail mounted, managed Gigabit Ethernet switch with conformal coating.
 - 2) Network Connections: Fourteen 10/100BaseT(X) ports with RJ45 connectors and 4 combo 10/100/1000BaseT(X) or 100/1000BaseSFP+ slots for adding Series Gigabit/Fast Ethernet fiber or copper SFP modules,
 - 3) Operating Temperature: 0 to 75°C.
 - 4) Power Supply: Two removable 4 contact terminal blocks for redundant 12/24/48VDC inputs.
 - 5) Manufacturer & Model Number: MOXA model EDS-518E-SS-SC4GTXSFP-T.
- d. Provision of a courtesy/programming port shall be on the exterior of the SCP. Port shall be NEMA 4X rated and shall be provided with a convenience outlet for use with and connection of a laptop for troubleshooting and programming. A 16-inch deep stainless-steel flip up shelf shall be provided below the courtesy port.
6. Single pole DIN-rail mounted miniature circuit breakers shall be provided for power supply to field instruments and devices.
 7. Fused DIN-rail mounted terminal blocks with LED indicators, shall be provided for termination of all I/O and external wiring at the SCP. Terminal blocks shall finger-safe with separation plates, end barriers, and end anchors as required.
 8. Surge protection shall be provided for 20% of I/O to protect the following: analog and discrete signals from field instruments, power supplies, and communications not under canopy cover OR devices provided with separate power supplies.
 9. Panel-mounted alarm horn, selector switches, push buttons, push-to-test LED pilot lights, and other operator devices.
 10. Intrinsically safe relays as required.

11. Plug-in blade type control relays with number of Form C contacts and timers as required. Provide integral indication lamp on relay to indicate when relay is energized.
12. Closed loop cooling thermal management system to maintain components below rated equipment temperature and humidity without introducing outside contaminants. Enclosure of cooling system to be NEMA 4X and side or top mounted to control panel enclosure.
13. Lighting package with remote mounted door switch. Light operation is to turn-on when enclosure door is opened. Two convenience outlets shall be provided, one located within the panel and one, NEMA 4X rated outlet, located on the exterior of the panel to provide power to a laptop for troubleshooting and programming. The interior lighting and convenience outlets shall be powered via a circuit that is separate from the other cabinet components to allow them to be used when the panel is de-energized for troubleshooting and maintenance.
14. Industrial corrosion inhibitors of a quantity to protect electrical components within enclosure for a minimum of one year.
15. Door-mounted data pocket for storage of laminated panel documents.
16. The SCP enclosure shall be an environmentally controlled space. The SCP manufacturer shall provide a thermostat-controlled and humidistat-controlled air conditioner to control temperature and humidity within the SCP enclosure. The SCP enclosure shall be protected from condensation within the SCP enclosure.
17. The power and control wiring for the SCP shall enter the bottom of the enclosure.

C. PLC for integration of I/O within the Ancillary Systems panel (if applicable):

1. The manufacturer's standard PLC shall be provided within the Ancillary Systems to allow for monitoring and control of the associated devices. This PLC shall communicate with the PLC in the SCP via IO link if available or serial Modbus RS-485 if it is not available.

D. Assemble and wire all panels in factory or shop:

1. Provide UL-listing (UL 508A) for each control panel.
2. Provide color-coded wiring in accordance with applicable codes and laws to facilitate maintenance and repair of control panel. Post color-coding schedule inside the control panel.
3. Provide minimum 18 AWG stranded copper control wires and provide spiral wrap, tie wrap, fasteners, and wire duct as required.
4. Label all wiring at each end with numbers corresponding to the wiring schematics. Show numbering on the as-built drawings. Use tubular heat shrink-type or self-laminating vinyl wire markers printed using thermal printer.

5. Label all terminal blocks with numbers corresponding to the wire numbers.
 6. Segregate wiring of different voltage levels.
 7. Provide nameplates for enclosure, instruments, devices, and components. Descriptions on the nameplate to agree with the descriptions on the as-built drawings.
- E. Perform a factory or shop operational test on each panel. Test shall be performed to show the operational status of the system software and hardware prior to shipment. A certificate of test completion shall be provided to the Owner. This test will be performed using the actual control software and hardware to be shipped to the jobsite, and not on similar or alternate systems. All control panel and computer components included in the control system shall be tested. Failure of each type of motorized valve and piece of equipment shall be simulated, as well as high water alarm conditions. Coordinate schedule with Owner who may want to witness the testing. All relevant test reports shall be forwarded to the Owner.
- F. Provide programming of PLC and HMI as required by equipment manufacturer, per the Specifications, and as follows:
1. General:
 - a. Provide programming to control, sequence, and monitor the UV as follows:
 - 1) Regulation of the process UV up to the Guaranteed Treatable Flowrate for the installed (baseline or alternate) system.
 - 2) Component Monitoring: The monitoring of components for fault conditions and the orderly alarming and logging of the fault.
 2. PLC Programming:
 - a. Provide time delays for motors, valves, alarms, etc., as follows:
 - 1) To prevent motors or devices from starting at the same time when power is restored from power outage.
 - 2) To prevent false starts/stops or false alarm due to process spikes or input "bouncing."
 - b. Provide monitoring of analog signals to determine if the signals are out of range, and alarm the out-of-range conditions.
 - c. Provide programming to retain the timing, control, and alarm setpoints in the event the HMI goes offline.
 - d. Annunciate and indicate UV process alarms, UV equipment alarms, failures, PLC faults, and mechanical equipment failures at HMI and transmit to the existing plant control system (PCS). See the P&IDs for the type and number of I/O between the UV system PLC and the PCS.

- e. Alarm acknowledgement shall be programmed by the manufacturer as determined by the Owner during the Submittal process. **Exception:** The majority of alarms are automatically cleared and do not require acknowledgement. The few latched alarms must be cleared at the OIT.
 - f. Provide programming to annunciate PLC fault, communication loss, and low-battery alarm. **Exception:** PLC faults and communications losses will be noted to the HMI/SCADA. This PLC does not have a battery and thus, no low battery alarm.
 - g. PCS shall read and write to a common register within the PLC so that alarms and modifications to the process system are synchronized between both the PLC and PCS. In development of this table and associated communication scheme, the manufacturer shall work with the Owner to develop contiguous data block transfers to prevent excessive network loading.
 - h. The manufacturer shall include within their base bid package, time for up to two, half-day workshops during manufacturing and construction to review, coordinate, and implement the PLC programming logic with the PCS system. Additionally, the manufacturer shall maintain continuous coordination with the Owner programming staff, during installation and startup, to allow both parties to maintain awareness of modifications that may impact communication between the two systems.
 - i. Remote access to the system for troubleshooting or programming updates is not currently allowed.
 - j. UV Manufacturer shall configure the inputs and outputs and incorporate basic remote and location operation of this equipment and shall provide programming for automatic controls of the influent slide gates. The PLC code shall be made available to the Owner to allow them to reload the programming if needed and allow the Owner to incorporate any automation associated with field equipment not provided by the UV manufacturer.
3. HMI Programming:
- a. HMI graphics shall be constructed in a way that is similar to the PCS graphics in visuals, functionality, and navigation.
 - b. Provide simple and consistent navigation system to branch to other screens, including but not limited to the following:
 - 1) Process status screen.
 - 2) Control/setpoint entry screens.
 - 3) Alarm status screen.
 - 4) Alarm history screen.
 - c. Provide graphic screens to display the process status.

- d. Provide color scheme consistent with Owner's standards to indicate equipment status as follows:
 - 1) Red = "On" or "Open."
 - 2) Green = Deenergized, Off or Closed.
 - 3) Blink Yellow = unacknowledged alarm.
 - 4) Solid Yellow = acknowledged alarm.
- e. Provide consistent color scheme to distinguish between operator adjustable control setpoints and view-only value displays.
- f. Provide data entry and control parameter adjustment screens to enter alarm setpoints, control setpoints, and select control sequence and disinfection parameters.
- g. Provide screen to indicate solid state motor overload relay over-current setting and storing of the setpoint adjustment values via password protected screen. Provide security passwords for access to control and data entry screens.
- h. Indicate if data setpoints entered are out of range and do not change setpoint.
- i. Display the alarm conditions on the following alarm screens at the HMI:
 - 1) Alarm history screen.
 - 2) Alarm status screen (showing active alarms only).
 - 3) Pop-up alarm message window. **Exception:** There are alarm banners in UV3+22, there are alarm graphics at each screen and for each piece of equipment along with alarms tab. Additionally, device communication loss (to Banks, etc) will be displayed as a popup at the relevant screens
- j. Provide alarm indication with the following detail:
 - 1) Time alarm occurred.
 - 2) Time alarm was acknowledged.
 - 3) Time alarm cleared.
 - 4) Location and/or equipment name.
 - 5) Alarm description.
- k. UV Manufacturer shall configure the HMI or local and remote control of all IO shown on the P&IDs. The HMI graphics and code shall be made available to the Owner to allow them to reload the programming if needed and allow the Owner to incorporate any future changes associated with field equipment not provided by the UV manufacturer.

2.07 ELECTRIC OPERATORS FOR WEIR GATES

- A. Provide Rotork, IQ series, digital electric operators, or equal, for level control weir gates complete with gear train in cast aluminum housing, motor, declutchable hand-wheel operator, two-piece bronze stem nut, nonintrusive integral control components, and mounting hardware.
- B. Provide motor (insulation class H), gear train, and control components prewired and mounted in a NEMA 4 enclosure, including a 480 V reversing starter with three thermal overloads, a stepdown transformer to power any lower voltage components, a three position local stop-remote selector switch, open-close pushbuttons, local position indicator, adjustable open and close limits, adjustable torque limits, a space heater, and valve indicator lights.
- C. Modulating Duty Valve Operator: **Exception: Not a part of Trojan Scope**
 - 1. Operation: Disinfection flow control.
 - 2. Duty Cycle: Minimum of 1,200 starts per hour.
- D. Provide pre-wired terminal blocks to allow status and control signals listed below to be hardwired to PLC/DIO:
 - 1. Fully Closed.
 - 2. Fully Open.
 - 3. Remote control selected.
 - 4. Local stop selected.
 - 5. Local control selected.
 - 6. Actuator failure.
 - 7. Remote Open command.
 - 8. Remote Close command.
 - 9. Valve position percent open command (4 to 20 mAdc). Note: Required only for modulating duty operators.
 - 10. Valve position percent open feedback (4 to 20 mAdc). Note: Required only for modulating duty operators.

2.08 STAINLESS STEEL

- A. Stainless steel, ASTM A276, Grade 316 or 304.

2.09 SPARE PARTS

- A. One UV Lamp per bank.

- B. One Quartz Sleeve per bank.
- C. One Lamp Wiper Seal per bank.
- D. One Operators Kit that includes UV-resistant face shield, gloves and cleaning solution.

PART 3 – EXECUTION

3.01 OPERATION AND MAINTENANCE MANUALS

- A. Operations and Maintenance Manuals with equipment installation instructions shall be provided in accordance with Section 01 78 23, "Operation and Maintenance Information."

3.02 FIELD SERVICES DURING INSTALLATION, TESTING, AND START-UP

- A. The UV supplier shall provide the services of factory trained representatives to provide field services in accordance with Section 01 50 00, "UV Supplier Services During Installation, Testing, Start-up, and Training."

3.03 PERFORMANCE TESTING AFTER INITIAL START-UP

- A. Performance testing will be performed as a part of the Construction Contract. Within 2 months of substantial completion the Owner will begin a 2-day performance test of the system. The Owner will operate the UV system as per written instructions from the Supplier. The Supplier shall be given a 14-calendar-day notice prior to the beginning of the performance test. The Supplier's attendance at the performance test is not required.
- B. Performance testing and sampling will be performed by the Owner to verify that the UV effluent is at or below the limits given in Paragraph 2.03, UV Performance Requirements.
- C. If the UV System is unable to attain the required effluent quality during the 2-day testing period, the Supplier shall supply additional technical assistance in the form of a site visit, at no cost to the Owner, to make a determination of modifications, which it considers necessary to improve performance. If the Supplier determines that modifications to the UV System or operation strategies are necessary, such modifications shall be made, and the test described above will be repeated. All costs associated with making the modifications shall be borne by the Supplier.
- D. If the Supplier is unable to make the necessary corrections, modifications, or changes to the equipment in order to meet the disinfection requirements, the Supplier shall be responsible for all costs to supply and install additional UV modules to meet the disinfection performance requirements.
- E. Meeting the requirements of this section does not relieve the Supplier of the requirements of Paragraph 1.05, "UV Warranty."

END OF SECTION

Preliminary Price Quote

5.4. Preliminary Price Quote:

Provide a tabular summary of the proposed system by parts. The tabulation should be completed to a preliminary level of detail and broken down into, at minimum, the following categories:

Item	Description	Quantity	Price Each	Extended Price
1	Services to support design development to 100% detailed design. Services during design development phase may not exceed \$40,000.	1	\$0.00	\$0.00
2	Services during construction, including support for installation, start-up, testing, validation, O&M manual, record drawings, and three trips to site for pre-installation, installation, and start-up, and all other services described in the Technical Documents.	1	\$73,000.00	\$73,000.00
3	UV Bulbs plus required spares. Price per bulb.	440	\$393.00	\$172,920.00
4	Complete UV bulb bank assembly, excluding bulbs, but including Power Distribution Panels (PDP) and 'electronic ballast' assemblies that control and manage power supply to bulbs. Price per UV bulb bank assembly.	6	\$78,162.00	\$468,972.00
5	Complete System Control Panel (SCP) and associated control and instrumentation. Price for single complete unit.	1	\$107,000.00	\$107,000.00
6	Other line items representing components not listed above. These other line items must clearly identify what their cost is associated with.			
	6.1 Submittals	1	\$175,000.00	\$175,000.00
	6.2 Motorized Weir Gates	2	\$26,500.00	\$53,000.00
	6.3 Hydraulic Systems Center	1	\$13,096.00	\$13,096.00
	6.4 Flow Conditioners	2	\$5,100.00	\$10,200.00
	6.5 Seismic Calculation	1	\$13,100.00	\$13,100.00
7	PRELIMINARY PRICE QUOTE TOTAL			\$ 1,086,288.00

Proposal Certification Form

PROPOSAL CERTIFICATION

RFP #2026-44

Submitted by: Trojan Technologies Corporation

(Must be entity's full legal name, and State of Formation)

Each Proposer must read, complete and submit a copy of this Proposal Certification with their Proposal. Failure to do so may result in rejection of the Proposal. By signature on this Proposal Certification, the undersigned certifies that they are authorized to act on behalf of the Proposer and that under penalty of perjury, the undersigned will comply with the following:

SECTION I. OREGON TAX LAWS: As required in ORS 279B.110(2)(e), the undersigned hereby certifies that, to the best of the undersigned's knowledge, the Proposer is not in violation of any Oregon Tax Laws. For purposes of this certification, "Oregon Tax Laws" means the tax laws of the state or a political subdivision of the state, including ORS 305.620 and ORS chapters 316, 317 and 318. If a contract is executed, this information will be reported to the Internal Revenue Service. Information not matching IRS records could subject Proposer to 24% backup withholding.

SECTION II. NON-DISCRIMINATION: That the Proposer has not and will not discriminate in its employment practices with regard to race, creed, age, religious affiliation, sex, disability, sexual orientation, gender identity, national origin, or any other protected class. Nor has Proposer or will Proposer discriminate against a subcontractor in the awarding of a subcontract because the subcontractor is a disadvantaged business enterprise, a minority-owned business, a woman-owned business, a business that a service-disabled veteran owns or an emerging small business that is certified under ORS 200.055.

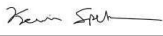
SECTION III. CONFLICT OF INTEREST: The undersigned hereby certifies that no elected official, officer, agent or employee of Clackamas County is personally interested, directly or indirectly, in any resulting contract from this RFP, or the compensation to be paid under such contract, and that no representation, statements (oral or in writing), of the County, its elected officials, officers, agents, or employees had induced Proposer to submit this Proposal. In addition, the undersigned hereby certifies that this proposal is made without connection with any person, firm, or corporation submitting a proposal for the same material, and is in all respects fair and without collusion or fraud.

SECTION IV. COMPLIANCE WITH SOLICITATION: The undersigned further agrees and certifies that they:

1. Have read, understand and agree to be bound by and comply with all requirements, instructions, specifications, terms and conditions of the RFP (including any attachments); and
2. Are an authorized representative of the Proposer, that the information provided is true and accurate, and that providing incorrect or incomplete information may be cause for rejection of the Proposal or contract termination; and
3. Will furnish the designated item(s) and/or service(s) in accordance with the RFP and Proposal; and
4. Will use recyclable products to the maximum extent economically feasible in the performance of the contract work set forth in this RFP.

Name: Kevin Spehr

Date: June 22, 2026

Signature: 

Title: Vice President, Global Sales

Email: kspehr@trojantechnologies.com

Telephone: (519) 457-3400

Oregon Business Registry Number: N/A

OR CCB # (if applicable): N/A

Business Designation (check one):

☒ Corporation ☐ Partnership ☐ Sole Proprietorship ☐ Non-Profit ☐ Limited Liability Company

☐ Resident Quoter, as defined in ORS 279A.120

☐ Non-Resident Quote. Resident State: _____

RFP 2026-44

UV Disinfection Equipment

Candelario, Thomas

From: Corlett, Jackie <jcorlett@trojantechnologies.com>
Sent: Wednesday, July 22, 2026 10:11 AM
To: Candelario, Thomas
Cc: Bill Reilly (bill@whreilly.com); Mike Reilly (mreilly@whreilly.com); Wen, Yiru
Subject: RE: RFP 2026-44 Proposal Clarifications
Attachments: 5.4 Preliminary Price Quote Page - Updated.pdf

Warning: External email. Be cautious opening attachments and links.

Hello Thomas,

Trojan Technologies has provided our responses below in [blue](#) to each of the items that the review committee requested clarification on.

If you have any additional items require clarification, please let me know.

Kind thanks,

JACKIE CORLETT P.Eng. | REGIONAL SALES MANAGER

TROJANUV

Vancouver, BC | (604) 754-8431 *mobile*

jcorlett@trojantechnologies.com

TROJAN TECHNOLOGIES

Confidential - Company Proprietary

From: Candelario, Thomas <TCandelario@clackamas.us>

Sent: July 20, 2026 9:47 AM

To: Corlett, Jackie <jcorlett@trojantechnologies.com>

Subject: RFP 2026-44 Proposal Clarifications

You don't often get email from tcandelario@clackamas.us. [Learn why this is important](#)

Hello Jackie,

Our review committee would like the following clarifications for your proposal:

- Provide power consumption information for both (1) 10 MGD and (2) maximum flow conditions. Include the number of lamps operating, number of banks operating, wattage per lamp, power level, and total power demand for each condition.

[Trojan: Power consumption for:](#)

[10 MGD](#)

[Number of the duty lamps operating: 216](#)

Lamp power: 250 W
Power level: 92%
Power consumption: 50.2 W

24 MGD Maximum Flow
Number of the duty lamps operating: 432
Lamp power: 250 W
Power level: 100%
Power consumption: 109.1 W

- Confirm Performance Guarantee covers the range of conditions stated in 2.03 D. including maximum instantaneous TSS.
Trojan: Yes, our Performance Guarantee covers 50 mg/L TSS, maximum instantaneous as per 45 56 00 – 2.03 D.4. b.
- Provide the operating range of water surface elevations in the channel across the full range of design flows. The project HGL profile in the drawing package establishes a maximum allowable upstream elevation of approximately 31 feet; please confirm whether or not your equipment operates below this limit at each condition provided in the guaranteed treatable flowrates table.
Trojan: Please clarify whether the UV system is required to meet the maximum upstream water level under all operating conditions. For the proposed UV system, the maximum upstream water level at 29 MGD (the hydraulic pass flow) is 28.56 feet, which is below the maximum allowable upstream water elevation.

The table below summarizes the maximum upstream water levels at the guaranteed treatable flow rates.

Flow per channel	Max upstream water level
2.2 MGD	28.18'
6.8 MGD	28.24'
12 MGD	28.39

- Please provide a pricing breakdown consistent with Section 5.4 of the RFP, including separate costs for Items 1, 3, and 5. If Trojan takes exception to the Item 1 fee cap of \$40,000, please clearly identify and explain that exception.
Trojan: Please see attached updated 5.4 Preliminary Price Quote – Updated pdf file.
- Please include pricing for the level control/automated gate scope under Item 6.1.
Trojan: Two (2) motorized weir gates have been included. Please see attached 5.4 Preliminary Price Quote – Updated pdf file.
- Provide the dimmability range per lamp as a percentage of full wattage.
Trojan: 250 Watt lamps dimmability range is from 100 to 60% in 4% increments. From 250 to 150 Watts.
- Update the quote to include a five-year warranty for the UVT sensors.

Trojan: Hach does not offer an extended warranty for the UVT sensors. Their standard warranty for the UVT sensor is 1 year. Hach can offer an extended warranty on the UVT monitor and a 3 year warranty on the UVT monitor was included in our equipment price quote.

- Please confirm the treatable flow for 4 banks in service is 13.6 MGD. The minimum guaranteed treatable flow per Section 40 56 00 2.03 B., is 18 MGD.

Trojan: Yes, the treatable flow for 4 banks in service is 13.6 MGD at 55% UV. The minimum guaranteed treatable flow for the proposed UV System is 18 MGD

- Clarify the frequency of chemical cleaning required in conjunction with mechanical cleaning.

Trojan: The TrojanUV3000Plus system is equipped with an automatic chemical/mechanical cleaning system to minimize quartz sleeve fouling and maintain UV performance. The ActiClean® wiper assembly cleans the quartz sleeves while the UV lamps remain submerged and in operation, eliminating the need to shut down the system during the cleaning cycle. The wiper carriage travels along each module, and the attached wiper canisters surround the quartz sleeves. Each canister is filled with ActiClean® Gel, a food-grade cleaning solution that contacts the quartz sleeves between the two wiper seals to remove fouling. Each wiper canister uses approximately 2 ounces of ActiClean® Gel, which typically only needs to be replaced once or twice per year, depending on operating conditions.

By default, the automatic chemical/mechanical cleaning system performs one automatic cleaning cycle per day. The cleaning frequency can be adjusted by the plant operator to suit site-specific water quality and operating conditions.

Please have these to us by the end of the week.

Thank You

Thomas Candelario, Procurement & Contract Analyst Sr, MPA
DEPARTMENT OF FINANCE. PROCUREMENT
2051 Kaen Road, Oregon City, OR 97045,
Hours of operation: *Monday-Thursday 7am to 6pm (closed Fridays)*
www.clackamas.us

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SCOPE OF SUPPLY FOR CLACKAMAS – KELLOGG CREEK WATER RESOURCE RECOVERY FACILITY
ULTRAVIOLET DISINFECTION EQUIPMENT – TROJANUV3000PLUS

Prepared for: Clackamas Water Environment Services (WES)

Consulting Engineer: Parametrix

Specification Section: 46 56 00 – UV Equipment and Control

Trojan Quote: 253314

Design Criteria:

Peak Design Flow:	24 MGD
Average Flow:	10 MGD
UV Transmission:	55% minimum
Total Suspended Solids:	30 mg/L (30 Day Average)
Minimum UV Dose:	24 mJ/cm ² T1 RED Reduction Equivalent Dose (RED)
Discharge Limit:	126 <i>E.coli</i> per 100 mL (30 Day Geometric Mean)
	406 <i>E.coli</i> per 100 mL (Daily Maximum)

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. 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 inquiries to Trojan Manufacturer's Representative:

Representative: Bill Reilly
Wm. H. Reilly & Co.
Phone: +1 (503) 223 – 6197
Email: bill@whreilly.com

This proposal has been respectfully submitted by,
Trojan Technologies

Jackie Corlett

Jackie Corlett
Regional Sales Manager

GENERAL CONFIGURATION

The TrojanUV3000Plus™ equipment described in this Scope of Supply consists of equipment for two (2) channels with three (3) duty UV banks in each channel.

Unless otherwise indicated in this proposal all anchor bolts, conduit, conductors, local disconnects and transformers (if required) are the responsibility of the Installation Contractor and are not included in Trojan's Scope of Supply. Specific cable types listed below are for reference only. Selecting cables that are appropriate for the installation environmental conditions and in compliance with local code is the responsibility of the Installation Contractor.

Fall Hazard – Anchor Points Required (not in Trojan Scope of Supply)

In areas where personnel are exposed to a fall hazard (which includes open channel installations), site is to provide approved engineered anchor points to use as part of a personal fall protection system. Anchor points must be positioned to allow safe movement and access around channel while minimizing fall hazards, in order to provide a safe working environment in compliance with applicable regulations. Failure to provide adequate anchor points may result in an interruption of project commissioning or other activities. All responsibilities and costs associated with anchor points to be borne by site and are not part of Trojan's scope of supply; Trojan is not responsible for any delay or costs associated therewith relating to inadequate anchor points.

ULTRAVIOLET MODULES

Trojan's Responsibility:

Each module supplied shall be completely assembled containing Integra™ Lamp Assemblies (lamps and sleeves which are pre-assembled, and factory sealed into a single unit with easy screw caps) each electrically wired to the associated electronic driver. Modules are shipped in a support rack and crated.

Model and Make:	TrojanUV3000Plus System
Quantity Supplied:	72 UV modules each containing 6 Lamp - 4.0" Spacing (2022)
Stretch:	Each UV module stretched by 24" (flood protection)
Material of Construction:	316 Stainless Steel frame
Approximate Weight:	98 lbs

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 Controller 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:	One (1) SCC
Location/Mounting:	Free-Standing
Enclosure Material / Rating:	304 Stainless Steel – Type 4X (IP66) - Hoffman
Controller Type:	Siemens S7-1500
Operator Interface:	Simatic HMI MTP1900
Panel UPS:	Eaton 9SX 1500 UPS (9SX1500)
SCADA Protocol:	On-board PROFINET
Surge Protection:	Yes
Approximate Weight:	700 lbs

Note: if Trojan is required to provide a managed switch in the SCC, the Plant's IT department or System Integrator will be responsible for configuring the switch to meet the Plant's security and traffic routing requirements.

Installation Contractor's Responsibility:

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

1. One (1) 120V 60Hz, 1 Phase, 2 Wire + Ground, 1.44 kVA power supply
2. One (1) 4 – 20 mA DC analog signal from plant flow meter
3. One (1) Ground Link , 14 gauge (2.5 mm²) minimum type TWH stranded, daisy chained to the HSC and PDCs
4. One (1) serial communication link consisting of one (1) shielded twisted pair communication line, 18 gauge (1 mm²) maximum from the HSC and other PDCs (daisy chained)
5. One (1) 4 – 20 mA DC analog signal from the On-Line UVT Monitor
6. One (1) 120 Volt, 1 phase, 2 wire + ground, 1 amp (28 W sensor load) power supply, to the UVT monitor
7. One (1) 24 VDC, 2.5 amp (20 W sensor load) power supply, to the UVT monitor
8. One (1) On-board PROFINET communication link to SCADA
9. One (1) discrete, 2 conductors, 20 gauge minimum, open command to each motorized weir gate
10. One (1) discrete, 2 conductors, 20 gauge minimum, close command to each motorized weir gate
11. One (1) discrete, 2 conductors, 20 gauge minimum, remote mode indication from each motorized weir gate
12. One (1) 4-20 mA analog shielded twisted pair, 20 gauge minimum, gate position indication from each motorized weir gate
13. One (1) 4-20 mA analog shielded twisted pair from the Level Sensor Monitor Panel
14. One (1) 24V DC, 2 conductors + ground, power to the Level Sensor Monitor
15. One (1) discrete, 2 conductors, 20 gauge minimum, open command from to each inlet isolation gate.
16. One (1) discrete, 2 conductors, 20 gauge minimum, close command to each inlet isolation gate.
17. One (1) discrete, 2 conductors, 20 gauge minimum, opened status from each inlet isolation gate.
18. One (1) discrete, 2 conductors, 20 gauge minimum, closed status from each inlet isolation gate.
19. One (1) discrete, 2 conductors, 20 gauge minimum, remote mode indication from each inlet isolation gate.

STREAM CONNECTION

Trojan's Responsibility:

Stream™ Connection is a digital support tool that provides our Technical Assistance Center with instant access to the UV system to quickly diagnose and resolve UV issues. The Stream connection is a free service to streamline technical support requests. Stream provides secure and encrypted connection external to the SCADA network and configured in the UV System Control Center.

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:	Six (6) PDCs
Stretch:	PCD legs stretched by 12" (100 year flood protection)
Enclosure Material / Rating:	304 Stainless Steel - Type 4X (IP66)
Surge Protection:	Yes
Approximate Weight:	450 lbs

Installation Contractor's Responsibility:

The Installation Contractor is responsible for setting in place and bolting the Power Distribution Centers to the top of channel. The Installation Contractor is also responsible for the supply, installation and connection of the following at each of the PDCs:

1. One (1) 480/277V 60Hz, 3 Phase, 4 Wire + Ground, 18.4 kVA power supply with local disconnect (provided by others)
2. One (1) Ground Link, 14 gauge (2.5 mm²) minimum, TWH stranded single wire from the HSC
3. One (1) communication link consisting of one (1) shielded twisted pair communication line, 18 gauge (1 mm²) maximum from the SCC and daisy chained to other PDCs
4. One (1) pair 24Volt DC, 2 conductor + ground, 16 gauge (1.5 mm²) minimum power supply from PDCs to the Level Control Panel (LCP) of each channel
5. One (1) pair of 24 VDC, 16 gauge minimum discrete signal from the LCP to each PDC per channel
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 ActiClean™ chemical/mechanical cleaning system.

Quantity Supplied:	One (1) HSC
Enclosure Material / Rating:	304 Stainless Steel - Type 4X (IP66)
Hydraulic Fluid:	Mineral Oil
Surge Protection:	Yes
Approximate Weight:	310 lbs

Installation Contractor's Responsibility:

The Installation Contractor is 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 from the farthest PDC. The Installation Contractor is also responsible for the supply, connection and installation of the following at the HSC

1. One (1) 480V 60Hz, 3 Phase, 3 Wire + Ground, 2.5 kVA power supply with local disconnect
2. One (1) ground link of 14 gauge (2.5 mm²) 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) shielded twisted pair communication line, 18 gauge (1 mm²) maximum cable from the SCC and daisy chained to the PDC(s).

SUPPORT RACKS

Trojan's Responsibility:

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

Quantity Supplied:	Six (6) Module Support Racks
Material of Construction:	304 Stainless Steel
Approximate Weight:	< 100 lbs each

Installation Contractor's Responsibility:

The Installation Contractor is 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.

WATER LEVEL CONTROLLERS (MWG)

Modulating Weir Gates (MWGs) shall be self-contained and shall be designed and manufactured by an experienced and reputable manufacturer, based on the AWWA C561 Standard for Fabricated Stainless Steel Slide Gates and AWWA C542 Standard for Electric Motor Actuators for Valves and Slide Gates in effect as of the date of this specification.

MWGs shall be designed for the following performance criteria:

- *MWG actuation speeds shall be between 10" (255 mm) and 14" (356 mm) per minute*
- *MWG maximum design rate of change of flow shall be limited to 25% of the Peak Design Flow/Channel per minute, or alternatively, flow shall be ramped up (zero to peak) or down (peak to zero) in no less than 4 minutes*
- *MWG actuators shall employ AWWA compliant, S4-50% duty class motors with a rated minimum 900 starts per hour capability*
- *MWG actuators shall employ AWWA compliant, Class B, solid-state Thyristor based switchgear capable of at least 5,000,000 modulating steps before overhaul; electromechanical type actuators and controls are not permitted*

It is the responsibility of the Plant designers to ensure the stated performance criteria are acceptable for the plant process or to modify the design accordingly.

Trojan's Responsibility:

Level control devices are required to maintain and control the effluent level in the channel, regardless of flow rate.

Quantity Supplied:	Two (2) Water Level Controllers
Description:	Motorized Weir Gate
Actuator:	AUMA SAR-07.2-16.2 Electric Actuator
Material of Construction:	316 Stainless Steel
Effective Weir Width:	48"
Mounting Anchors:	Supplied with each Gate
Approximate Weight:	830 lbs
Control Method:	Digital Pulsed Open/Close Position Signals from the UV SCC

Installation Contractor's Responsibility:

The Installation Contractor is responsible for setting in place, grouting and sealing the level control weir gate and the installation of the following connections:

1. One (1) 480 Volt, 3 Phase, 3 Wire, + Ground, 15 amp feed to each weir gate
2. Open command discrete output, two (2) conductors, 20 gauge min, from SCC to each weir gate
3. Close command discrete output, two (2) conductors, 20 gauge min, from SCC to each weir gate
4. Remote mode discrete input, two (2) conductors, 20 gauge minimum, to SCC from each weir gate
5. Gate position analog input, one (1) twisted shielded pair, 24 gauge minimum, to SCC from each weir gate

ULTRASONIC WATER LEVEL SENSOR

Trojan's Responsibility:

One (1) Echomax XPS-10/15 ultrasonic level sensor and Siemens Milltronics MR200 HMI monitor panel will be supplied per motorized weir gate (MWG), to monitor channel effluent levels specifically for the MWG control. The transducer will be supplied with a sufficient length of cable to distribute to the monitor panel.

Description:	Ultrasonic Sensor with monitor panel to be supplied per MWG
Quantity Supplied:	Two (2)

Installation Contractor's Responsibility:

The Installation Contractor is responsible for mounting the bracket and transducer in the UV channel and for mounting the monitor panel adjacent to the channel. Installation Contractor shall distribute the following cable/wiring between these two components and the SCC in appropriate conduit at each sensor:

1. One (1) 24V DC, 2 conductors + Ground, 36 VA power from the SCC to the Level Sensor Monitor
2. One (1) 4-20 mA analog shielded twisted pair from the Level Sensor Monitor to the SCC
3. One (1) communication link using 33 ft of cable (supplied by Trojan) from the Level Sensing Transducer to the Level Sensor Monitor

INLET ISOLATION GATES – BY OTHERS (CONTROLLER BY TROJAN)

Installation Contractor's Responsibility:

The Installation Contractor to be responsible for setting in place, grouting and sealing the Inlet Isolation gates and the installation of the following connections:

1. One (1) 380-480V, 50/60 Hz, 3 Phase, 3 Wire + Ground power supply
2. One (1) discrete, 2 conductors, 20 gauge minimum, open command from the SCC
3. One (1) discrete, 2 conductors, 20 gauge minimum, close command from the SCC
4. One (1) discrete, 2 conductors, 20 gauge minimum, opened status to the SCC
5. One (1) discrete, 2 conductors, 20 gauge minimum, closed status to the SCC
6. One (1) discrete, 2 conductors, 20 gauge minimum, remote mode indication to the SCC

LOW WATER LEVEL SENSORS

Trojan's Responsibility:

A Gems-Warrick discrete probe Low Water Level Sensor is required downstream of the UV System to generate a low water level signal that will shut down and protect the UV System if the water level in the channel drops too low.

Quantity Supplied:	One (1) of Electrode type water level sensor per UV channel
Approximate Weight:	10 lbs (panel)

Installation Contractor's Responsibility:

The Installation Contractor is responsible for setting in place and bolting the water level sensor panel to the effluent channel wall as per Trojan's and Engineer's drawings.

LEVEL CONTROL PANELS

Trojan's Responsibility:

Trojan will provide a wall mounted Level Control Panel to provide power and relays for level sensors.

Quantity Supplied:	One (1) Level Control Panel (LCP) per UV channel
Controller Dimensions:	24" x 14" x 6"
Materials / Rating:	304 Stainless Steel (Type 4X)
Approximate Weight:	40 lbs

Installation Contractor's Responsibility:

The Installation Contractor is responsible for mounting the Level Control Panel (LCP) as indicated on the drawings. The Installation Contractor is also responsible for supplying mounting hardware, watertight conduit and for the supply, installation and connection of the following at each LCP:

1. One (1) 24 VDC, 2 conductors + ground power supply from two (2) PDCs to the LCP
2. One (1) pair of 12 VDC, 16 gauge (1.5 mm²) minimum discrete signal per channel for low water level sensor to the LCP.
3. One (1) pair of 24 VDC, 16 gauge (1.5 mm²) minimum discrete signal from the LCP to each PDC per channel

ON-LINE UV TRANSMISSION MONITOR

Trojan's Responsibility:

An On-line UV Transmission Monitor will be supplied to provide a UVT measurement of the source water.

Description:	One (1) Hach UVT meter containing: <ul style="list-style-type: none">• one (1) submersible UVAS probe with multi-beam flash photometer,• one (1) 25' cable between the probe and the controller,• one (1) Hach SC4500 UV-254 Controller.
Enclosure Rating:	UL50E type 4X, IEC/EN 60529–IP 66, NEMA 250 type 4X Metal enclosure with a corrosion-resistant finish
Controller Dimensions:	5.7" x 5.7" x 7.6"
Altitude:	6,562 ft maximum
Operating Temperature:	35.6 to 104°F (Probe), -4 to 113°F (Controller)
Approximate Weight:	30 lbs (includes Probe and Controller)
Probe Immersion Depth:	Minimum 6"
Probe Mounting:	Pole mounting hardware provided includes wall mount bracket, hardware and 6.56 ft pole
Controller Mounting:	Pedestal provided

Installation Contractor's Responsibility:

The Installation Contractor is responsible for setting in place and mounting the Controller panel and the probe. The Installation Contractor is also responsible for the supply, installation and connection of the following at each Controller:

1. One (1) 120 Volt, 1 Phase, 2 Wire + Ground, 1 amp (28 W sensor load) power supply from Distribution Panel
2. One (1) 4-20mA DC Analog communications link between the Controller and the SCC
3. Installation of sensor communication cable between Probe and Controller (Cable supplied by Trojan)
4. Supply of the required bolts for mounting Controller to the pedestal and Probe to the channel edge

INDIVIDUAL UV MODULE LIFTING SLING WITH FRAME

Trojan's Responsibility:

In order to remove individual modules, by mechanical means, a 2 rope sling with frame shall be supplied to interface with the existing overhead crane.

Quantity:	One (1) Sling Kit
Materials of Construction:	316 Stainless Steel
Approximate Weight:	10 lbs

FLOW CONDITIONERS

Trojan's Responsibility:

In order to ensure flow distribution to the UV System flow conditioner(s) will be supplied.

Quantity Supplied:	Two (2) – One per channel
Material of Construction:	304 Stainless Steel
Head loss per Plate:	2 ³ / ₁₆ " at Peak Flow
Approximate Weight:	165 lbs

Installation Contractor's Responsibility:

Contractor is responsible for mounting L-frames to channel walls.

SPARE PARTS, SAFETY EQUIPMENT AND ADDITIONAL EQUIPMENT

Trojan's Responsibility:

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

Spares

Lamp/Sleeve Assembly	Qty Eight (8)
Operators Kit	One (1)
Wiper Seal Kit (10 canisters)	One (1)

Additional Standard Equipment

Operators Kit (including face shield, gloves and cleaning solution)	One (1)
ActiClean Drill Pump Kit	One (1)
UV Light Warning Signs	Two (2)

NOTES AND CLARIFICATIONS TO SPECIFICATION

See our exceptions and deviations as per marked-up copy included in RFP.

DOCUMENTATION (SHOP DRAWINGS AND O&M MANUALS)

The following documentation will be supplied by Trojan per the following schedule:

- One (1) electronic copy of Trojan Shop Drawing Submittals within a minimum 4 – 6 weeks after receipt of written purchase order. Note that Submittals will not be issued externally until PO is fully executed.
- One (1) electronic copy of Trojan Standard O&M manuals at time of equipment delivery (hardcopies available upon request)

DELIVERY, START-UP AND TRAINING

- Equipment shipment to be within **28 – 30** weeks after approval of Shop Drawings.

Trojan's Responsibility:

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@trojantechnologies.com
- Up to four (4) days in two (2) trips for:
 - Unloading inspection
 - start-up, testing of the installed UV equipment and classroom and/or jobsite training for operations staff
 - Note that 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.
 - If trainees are not available a return visit will be scheduled at the Contractors expense.

Installation Contractor's Responsibility:

The Contractor is responsible for:

- Unloading of the components supplied by Trojan, storage of all components, if required in a clean dry environment including ActiClean™ Gel. **Note the ActiClean Gel must be stored in a climate-controlled area to prevent freezing.**
- Installing the equipment outlined in the scope of Supply in accordance with contract drawings, Trojan's shop drawings, instructions and installation checklist(s).
- Supplying all conduits and conductors and components per the sites state regulations and components indicated as supplied by others.
- Completing and submitting the Checklist including site photos at least three (3) weeks prior to date requested for commissioning. Startup/commissioning cannot be scheduled without this information along

with up-to-date payment (according to the agreed upon terms). Trojan and/or our local representative cannot guarantee specified startup dates but will do our best to meet the requested dates.

Notice

- The receiver must review the packing list upon delivery to confirm all parts are present and undamaged. Contact Trojan Technologies immediately if any parts are missing or damaged.

WARRANTY

Trojan will warrant the equipment and parts for 12 months after UV equipment start-up or 18 months after equipment shipment, whichever comes first. Warranty does not cover labor, consumables and/or wear components. Refer to attached Terms and Conditions for additional details.

- UV lamps shall be warranted for 12,000 hours prorated after 9,000 hours, or 36 months after shipment, whichever occurs first.
- Lamp drivers shall be warranted for 10 years, prorated after 1 year.
- UV Intensity sensors shall be warranted for 10 years, prorated after 1 year.

<u>UV EQUIPMENT PRICE</u>	<u>\$</u>	<u>See Preliminary Price Table</u>	<u>USD</u>
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- Selling price does not include any duties or taxes that may be applicable.
- Freight included to site included.
- Price is valid for 180 days from the date of this letter.

PAYMENT TERMS AND INVOICING MILESTONE BREAKDOWN

~~Net 30 Days **~~

- 10% upon Award of PO
- 40% upon Completion of Submittal package by Seller
- 45% upon Shipment or 30 days after Notice to Ship (whichever comes first)
- 5% upon Equipment Acceptance or 180 days after Shipment (whichever occurs first)

~~** In the event payments are not made or not made in a timely manner, Trojan reserves the right to charge interest on the outstanding balance at a rate of 1.5% per month or the maximum rate permitted by law, if lower, for each month or part thereof that there is an outstanding balance plus applicable storage charges and/or inventory carrying charges.~~

TERMS AND CONDITIONS – ATTACHED

~~Trojan appreciates the opportunity to submit this proposal. Our proposal is submitted subject to and based on Trojan's standard terms and conditions, which we have attached as part of our proposal. We believe these terms and conditions are customary in the trade and respectfully reserve the opportunity to negotiate, fair and reasonable contract terms acceptable to both parties, if Trojan is selected for this project.~~