ADDENDUM #6
TO THE
SPECIFICATIONS AND CONTRACT DOCUMENTS

FOR

Camas TO4 Ultraviolet Disinfection Replacement
City Project No. SWR25004

May 28,2025

IMPORTANT: *This addendum must be signed and submitted with bid proposal.*

TO ALL PLANHOLDERS:

The following changes, additions, deletions and/or clarifications are made a part of the contract documents and bid specifications for the construction of the *Camas TO4 Ultraviolet Disinfection Replacement,* City of Camas Project No. SWR25004 as fully and completely as if the same were set forth therein:

PART 1 - GENERAL

1.01 SCOPE

A. This addendum forms a part of the Bidding and Contract Documents and modifies the Project Manual as described below.

B. Changes are made to Specification Section 46 43 23 – Plow Scraper Circular Primary Clarifier Equipment.

C. The Bid Opening date is revised to June 5, 2025. The location and time remain the same.

1.02 ACKNOWLEDGEMENT

A. All bidders are required to base their bid upon the information furnished in this Addendum and acknowledge receipt of this Addendum by signing and dating in the space provided in the Bid Form.

PART 2 - PROJECT MANUAL

2.01 DIVISION 46 – WATER AND WASTEWATER EQUIPMENT

A. Section 46 43 23 – Plow Scraper Circular Primary Clarifier Equipment
   1. Part 2.3 Materials
      i. Description of Change: The intent is for the clarifier mechanism to be 304L Stainless Steel. The Access Bridge, Center Column, Plates, Structural Shapes, Tubes, Turntable Base, and Dust Drive Shield are all changed to ASTM A276 304L Stainless Steel. Revised specification is attached.

PART 3 - PROJECT DRAWINGS

3.01 NO UPDATES

UPDATED SECTIONS

END ADDENDUM NO. 6

Receipt of this addendum is hereby acknowledged:

_____

Authorized Signature

SECTION 46 43 23
PLOW SCRAPER CIRCULAR PRIMARY CLARIFIER EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Furnishing and installing:
      a. Two circular primary clarifiers mechanisms.

B. Related Sections include but are not necessarily limited to:
   1. Section 01 61 03 - Equipment - Basic Requirements.

1.2 REFERENCES

A. Referenced Standards:
   1. Aluminum Association (AA):
      a. ASD 1, Aluminum Standards and Data.
   2. American Bearing Manufacturers Association (ABMA):
      a. 9, Load Ratings and Fatigue Life for Ball Bearings.
   3. American Gear Manufacturers Association (AGMA):
      a. 2001-D, Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth.
      b. 6034-B, Practice for Enclosed Cylindrical Wormgear Speed Reducers and Gearmotors.
   4. American Iron and Steel Institute (AISI).
   5. ASTM International (ASTM):
      a. A36, Standard Specification for Carbon Structural Steel.
      b. A48, Standard Specification for Gray Iron Castings.
      c. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
      d. A276, Standard Specification for Stainless Steel Bars and Shapes.
      e. A536, Standard Specification for Ductile Iron Castings.
      f. E18, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials.
   6. American Welding Society (AWS):
      a. D1.1, Structural Welding Code - Steel.
   7. American Water Works Association/American National Standards Institute (AWWA/ANSI):
      a. C110/A21.10, Ductile-Iron and Gray-Iron Fittings.
   8. NACE International (NACE).
   9. National Electrical Manufacturers Association (NEMA):
      a. MG 1, Motors and Generators.
   10. Occupational Safety and Health Administration (OSHA).
   11. Society of Automotive Engineers (SAE):
      a. AMS 6440M, Steel, Bars, Forgings, and Tubing 1.45Cr (0.98 1.10C) (SAE 52100) For Bearing Applications.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Comply with AWS D1.1 procedures and practices.
   2. Manufacturer experience:
      a. Minimum five similar clarifier mechanism installations with diameters greater than or equal to 90% of the diameter of this specified clarifier.
      b. Supplied similar equipment for the past 10 years.
      c. The mechanism shall be a standard production product of the manufacturer.

3. NACE inspector shall be a certified Level 3 inspector and have a minimum of five years experience performing inspections indicated.
    a. NACE inspector shall also be a certified coatings inspector and shall have a minimum of five years experience performing coating inspections.

B. Independent Design Evaluation of Drive:
1. Clarifier manufacturer to submit the following information for the proposed drive unit to an independent AGMA member engineer for design evaluation:
    a. Complete drive assembly fabrication drawings.
    b. Drive component drawings and/or brochures for all drive components.
    c. Manufacturer and model of all drive components.
    d. Gear and pinion interval specifications, including all heat-treating procedures.
    e. AGMA calculations for drive components.
    f. Additional information needed to completely evaluate proposed drive assembly.

C. Provide single source coordination responsibility through the manufacturer for the complete sludge collection system.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:
1. Shop Drawings:
    a. Product technical data including
        1) Acknowledgement that products submitted meet requirements of standards referenced.
        2) Manufacturer, model, and type.
        3) Complete erection, installation, operation and maintenance information provided by the manufacturer.
        4) Complete construction details, materials of construction, drawings of mechanisms, gears, gear reducers, bridge, electrical wiring diagrams, control wiring diagrams, and other pertinent information.
        5) Catalog cutsheets for purchased subcomponents.
        6) Submit evidence of compliance with Article 2.7 requirements, including:
            a) Reference standards.
            b) Independent evaluation of drive.
            c) Structural design requirements.
        7) Main drive speeds.
        8) Size, make, and type of electric motors and drive systems.
        9) AGMA rated alarm, stall, and ultimate torque capabilities.
        10) Details of any revision necessary to adapt the piping, structural, electrical and instrumentation design to the equipment proposed.
        11) Manufacturer, model and certification of compliance to ABMA 9 bearing life.
        12) NACE inspector qualifications.
        13) Certification report from AGMA engineer confirming that equipment design meets referenced AGMA standards.
        14) Statement signed by a registered professional Civil or Structural Engineer that all members have been designed to support the loadings as specified.

B. Informational Submittals: Submit the following:
1. For-information-only calculations as follows:
    a. Center column and bridge support calculations.
    b. Complete sludge transport calculations substantiating the plow blade design, rake tip speed, and floor slope.
    c. Complete process calculations substantiating the size of the center column and ports, and the energy dissipating inlet (EDI) and outlet ports, and the flocculating center well.
2. Calculations and details must bear the stamp of a professional engineer.
3. Manufacturer's certification regarding installation and start-up.
4. Submit copy of field torque test results to Engineer.

5. Submit copy of report verifying completion of start-up and related field services.
    a. NACE certification of surface preparation and paint application at factory.
6. Source Quality Control Submittals: Results of required source quality control activities. If none are specified, submit results of manufacturer's typical factory tests and inspections.
7. Field Quality Control Submittals: Submit results of required field quality control activities.
8. Supplier Reports: Submit written report of each visit to the Site by Supplier.

C. Closeout Submittals: Submit the following:
1. Operation and Maintenance Data:
    a. Comply with Section 01 78 23 - Operation and Maintenance Data, for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
2. As-built drawings (general arrangement and general arrangement details).
3. Erection drawings.
4. Complete bill of materials for the equipment, including the weights of all structural steel components.
5. Installation and maintenance instructions for the specific equipment including:
    a. Erection sequence.
    b. Maintenance and trouble-shooting check points.
    c. Complete lubrication procedures with recommended grades of lubricants.
6. Cut sheets for all equipment items purchased from sub-vendors.
7. Clarifier manufacturer's recommended spare parts in compliance with Section 01 78 43 – Spare Parts and Extra Materials, specifically denoting:
    a. Wear items.
    b. Long-delivery items.
    c. All items convenient for stock as optional replacement items.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Factory Assembly:
1. Assemble each mechanism in factory to ensure proper fit of parts.
2. Mark parts with erection marks.
3. Disassemble mechanism into largest sections allowed by carrier regulations for shipment.

1.6 PROJECT CONDITIONS

A. Clarifiers: Equipment suitable for installation in raw sewage.

B. Wastewater Temperature: 65 to 95 DEGF.

C. Average Ambient Temperature: 35 to 83 DEGF.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Evoqua.
2. Ovivo.
3. WesTech.

2.2 PERFORMANCE AND DESIGN CRITERIA

A. Primary Clarifier Requirements:
1. Tank dimensions: 60 feet DIA.
2. Effective sidewater depth: 10 feet.
3. Side wall depth: 15 feet 5 inches.
4. Inboard launder.
5. Center column inside diameter: 24 inches.

6. AGMA 20 year continuous rated running torque applied at output of drive unit: 16000 feet-LBS minimum.
7. Stall or motor cut-out torque: 15300 feet-LBS.
8. AGMA yield torque applied at output of drive unit: 37000 feet-LBS minimum.
9. EDI (Influent Feedwell):
    a. Diameter: 5.5 feet DIA by 2.83 feet high.
    b. Depth below water surface: 2 feet 4 inches.
    c. Number of outlets: 4 minimum.
    d. Feedwell Diameter: 12 feet 5 inches.
    e. Feedwell Depth: 4 feet 6 inches.
10. Scum blade:
    a. Length: Shall span the full length between the feedwell and scum box.
    b. Height: 5 inches.
    c. Supports: A-frame bolted to the truss arm at maximum of 15 feet spacing.
    d. Connections: 302 stainless steel.
    e. Coating: Hot dipped galvanized.
11. Scum Box Width: 4 feet.
12. Average influent flow: 5.3 MGD.
13. Maximum influent flow: 6.1 MGD.
14. Peak hour influent flow: 13.44 MGD.
15. Minimum turntable ball race diameter: 35 inches.
16. Minimum internal spur gear pitch diameter: 29.6 inches.
17. Minimum drive motor horsepower: 0.5 HP.
18. Maximum drive motor speed: 1800 RPM.
19. Drive output speed: 0.04 RPM (7.5 FPM tip speed).
20. Drive pinion: Single.
21. Minimum spur gear face width: 3 inches.
22. Equipment shall be suitable for installation in a Class I, Division 2 hazardous area.

B. Structural Design:
1. Maximum ratio of unbraced length to least radius of gyration (slenderness ratio):
    a. Compression members: 120. Slenderness ratio not to exceed 120 for any axis parallel to bending action.
    b. Tension members: 240 (for angle about Z-Z axis). Slenderness ratio not to exceed 240 for any axis parallel to bending action.
2. Maximum unit stress: 1.333 times AISI allowable stresses at all structural members when subject to twice the drive motor running torque. Unit stresses not to exceed 130% of AISI allowable stresses when subjected to cutout torque and/or field test torque, whichever is higher.

2.3 MATERIALS

A. Access Bridge: ASTM A276 304L Stainless Steel .

B. Center Column: ASTM A276 304L Stainless Steel .

C. Cycloidal Drive, ring gear and bearing: High carbon chromium bearing steel.

D. Plate: ASTM A240/240M, 304L Stainless Steel.

E. Structural Shapes: ASTM A276 304L Stainless Steel.

F. Tube: ASTM A276 304L Stainless Steel.

G. Main Spur Gear:
1. Ductile iron: ASTM A536, 80-55-06 or 80-60-03.
2. Cast iron: ASTM A48, Class 60 or 50A.

H. Main Bearings: SAE AMS 6440M, Rockwell C64, ASTM E18.

I. Worm, Worm Shaft:

1. Ductile iron: ASTM A536, 80-55-06.

J. Pinion and Pinion Shaft:
   1. Ductile iron: ASTM A536, 80-55-06.

K. Gear Housing:
   1. Gray iron, ASTM A48.
   2. Forged alloy hardened steel, ASTM A36.

L. Shear Pins: 2017-T4, AA ASD 1, aluminum screw machine stock.

M. Shear Pin Holes: Hardened steel, Rockwell "C" 62-64, ASTM E18.

N. Turntable Base:
   1. ASTM A276 304L Stainless Steel

O. Liner Strips: Steel, Rockwell "C" 38-42, ASTM E18.

P. Plow Squeegees: Brass or 316 stainless steel.

Q. Drive Dust Shield: ASTM A276 304L Stainless Steel.

R. Drive Seal: Felt or neoprene.

S. Lip Seals: Neoprene.

T. Submerged Fastening Hardware including Anchor Bolts: ASTM A276, 316 stainless steel.

U. Pipe: Ductile iron, Grade 60-42-10, Class 53 or steel, ASTM A53.

V. Pipe Flanges: AWWA/ANSI C110/A21.10 with neoprene gaskets.

W. Scum Skimmer Wiper: Neoprene.

X. Skimming Equipment.
   1. Skimmer blade: 16 GA 316 stainless steel or FRP.

2.4 FABRICATION

A. See Section 01 61 03.

B. See Section 05 50 00.

C. General:
   1. Welds on submerged or partially-submerged components shall be continuous.
   2. Dull sharp corners of cut or sheared edges by at least two passes of a power grinder.
   3. All structural shapes and flat plate connections shall be continuously seal welded.
   4. All welds shall be ground smooth prior to coating.

D. Center Pier:
   1. Cylindrical steel, 24 inches DIA minimum by minimum 1/4 inches wall thickness.
   2. Flanged base for anchor bolting to concrete base of clarifier.
      a. Water-tight connection seal.
      b. Minimum of eight anchor bolts of at least 1 inch diameter.
   3. Provide flanged top and stiffeners for supporting the sludge collection mechanism, the drive mechanism, drive-mounting plate, access platform, and the access bridge.
   4. Provide a drive mechanism mounting plate set plumb with the centerline of the center pier.
   5. Provide center pier which serves as an influent pipe and has a minimum of 4 equally-spaced ports at the upper end to direct the flow into the EDI at a velocity less than 1 FPS.
   6. Provide easily accessible and removable plate near the bottom of the center pier for draining center pier.
      a. Opening shall be large enough to insert a submersible pump to dewater the clarifier influent pipe.

E. Center Drive Cage:

1. Drive cage shall transmit and/or carry all torques (including stall torque) without over stressing members.
    a. Do not transmit any torque to the access bridge.
2. Design drive cage to encompass center column.
    a. Design cage to withstand 200% of design torque.
3. Design adjustable connection between drive unit and drive cage to provide for proper alignment and allowance for structural tolerance.

F. Drive Mechanism:
1. Provide drive mechanism, completely factory assembled, consisting of a primary gear reduction unit, an intermediate reduction unit, plus a final reduction unit consisting of a pinion and internal gear enclosed in a turntable base.
2. Enclose all gearing in a cast iron ASTM A48, Class 40B housing.
    a. Exposed gearing is not acceptable.
3. Provide all bearings of anti-friction type and running in oil.
4. Provide totally enclosed motor of ample power for starting and continuously operating the mechanism without overloading.
    a. The motor shall conform to NEMA standards and be name plated for operation on 230/460 V, 3 PH, 60 Hz current.
    b. Motor shall be a minimum of 0.5 HP.
    c. Motor shall comply with NEMA MG 1, Design B, and shall be totally enclosed with Class B insulation designed for continuous duty outdoor service.
    d. Enclosure rating: Totally Enclosed Fan-Cooled (TEFC).
5. Speed reducing unit:
    a. Primary reduction unit:
        1) Chain and Sprocket Type:
            a) Provide a primary reduction unit which drives the intermediate reduction unit through a chain and sprocket arrangement.
            b) Furnish drive chain of #80L self-lubricated roller chain and OSHA approved removable chain guard of molded polyethylene.
            c) Provide an adjustable steel base mounted on the intermediate reduction unit for chain tension adjustments.
    b. Intermediate reduction unit:
        1) Worm Gear Speed Reducer Type:
            a) Provide an intermediate reduction unit consisting of a cast iron housed worm gear speed reducer, with grease and oil lubricated, anti-friction type bearings and service factor of 2.0.
            b) Mount the unit on a machined face on the top of the final reduction unit and properly aligned to maintain accurate centers for the final reduction gearing.
            c) Worm assembly: Worm and shaft of heat treated alloy and integral construction and the worm gear of cast manganese bronze or aluminum bronze.
    c. Fabricate drive components in accordance with AGMA 2001-D and AGMA 6034-B for 24 HRS continuous duty and 20 year design life based on rated AGMA torque.
    d. Design bearings for an L_{10} bearing life of 200,000 hours.
    e. Final reduction unit:
        1) Provide internal gear drive by a heat-treated pinion from the slow speed shaft of the primary gear reducer.
            a) Construct the main pinion of heat treated alloy steel, machined after heat treatment.
            b) Support pinion at both top and bottom by a taper roller bearing assembly.
            c) Use one-piece pinion shaft construction without an intermediate coupling.
    f. Provide ductile iron internal gear of AGMA quality seven minimum.
    g. Provide internal gear design to support center cage, collector and all other rotating components.
    h. Cycloidal Reduction Type (Alternate):

1) Provide a cycloidal reduction unit.
2) Refer to section 2.3 C for materials.
3) Minimum reducer efficiency shall be 90% per reduction stage.

6. Turntable base:
   a. Provide turntable base with annular raceway to contain balls on which the internal gear rotates.
   b. Bearings:
      1) Ball bearings:
         a) Furnish ball race without guide shoes and steady bearings.
         b) Furnish ball bearings of alloy steel, bearing vertically and horizontally on four removable liner strips pressed into annular raceways in turntable base and internal gear.
         c) Liner strips shall be minimum 3/8 inches thickness.
         d) Alternate: Furnish ball bearings of high carbon chrome alloy steel as part of a precision gear/bearing set.
   c. Protect internal gear, pinion and ball race by a seal and dust shield.
   d. Internal gear, pinion and ball race is to run in oil bath.
   e. Furnish turntable base bolted to the center column and designed to support the internal gear with rotating mechanism, access platform, and one end of the access bridge.
   f. Provide a pipe attached to bottom of turntable base for condensate removal.
   g. Furnish plugged or capped oil piping which terminates within the center of the base.
      1) Provide oil level sight glass and oil drain.

   h. Underwater bearings carrying any part of the load are not acceptable.

G. Access Walkways:
   1. Minimum 8 feet by 8 feet.
      a. 3 feet minimum clearance around drive unit assembly for maintenance and service, and access from walkway.
   2. Fabricate for uniform live load of 100 pounds per SQFT.
   3. Construct of 1-1/4 inches deep serrated aluminum grating attached to minimum 1/4 inches structural steel frame, with any necessary stiffeners and supports.
   4. Include lift-out sections where required for routine maintenance of equipment.
   5. Provide walkway, access platform and handrail in full compliance of federal, state, and local safety standards.

H. Walkways:
   1. Provide beam-type access bridge setting on operating platform to support walkway.
      a. Provide 3 feet wide walkways constructed from 1-1/4 inches deep serrated aluminum grating.
   2. Provide at locations and orientations shown on Drawings.
   3. Walkway fabrication:
      a. Fabricate walkways with a uniform live load of 150 pounds per LF with a maximum deflection of 1/360 of the span.
      b. Walkway shall be braced against lateral movement using wind load of 50 pounds/SQFT.
   4. Provide handrail and toe plate on each side of walkway and around access platform.
      a. Fabricate handrail of triple rail, 1-1/2 inches diameter Schedule 40 aluminum, 42 inches in height.
      b. Fabricate toe plate of 3/16 inches thick by 4 inches high aluminum.
   5. Walkway shall extend to center of clarifier.
   6. Support steel beams on steel or ultra-high molecular weight (UHMW) slide plates at the tank wall.
   7. Provide aluminum mounting plate for controls and necessary mounting brackets to support electrical conduit.
   8. Provide 10 feet high extension of handrail posts for mounting lights.

a. One at access platform.
b. One at end of walkway (both ends if bridge extends across entire clarifier).
c. Size posts to support specified light fixtures.

I. Anchorage:
1. Provide ASTM A276 316 stainless steel anchor bolts complete with nuts and washers for equipment installation.
2. Bolts shall be 1 inch diameter minimum.

J. Fasteners:
1. All fasteners shall be Type 316 stainless steel.
2. Bolts shall be 1/2 inches diameter minimum.

K. Shop or Factory Finishing:
1. Surface preparation and shop painting is required for all ferrous metals, equipment and accessories and shall be as specified under Section 09 91 00.
2. Apply a heavy application of a rust-resistant coating to gears, bearing surfaces, and other unpainted surfaces.
a. Maintain coating during storage and until the equipment is placed into operation.
3. All aluminum in contact with dissimilar materials shall be coated with Koppers Hi-guard, two coats, 2.0-3.0 dry mils per coat.

2.5 CONTROLS

A. Overload Monitoring and Protection System:
1. Furnish an electrical-mechanical overload control system for each clarifier drive mechanism, including:
a. Factory calibrated torque switches rated 5 amps at 120 VAC minimum.
b. Field adjustable over the full torque range of the unit.
c. Alarm switch set at 100% of AGMA rated drive torque capacity in case of an impending overload.
d. Second alarm switch set at 120% of AGMA rated drive torque capacity to shut down drive motor.
e. Amperage and current sensing devices shall not be acceptable for the overload sensing system.
2. Mechanism loading indicator:
a. Separate device, suitable for outdoor mounting.
b. Mechanism loading indicated on a 0-130% graduated scale at all times during operation.
c. Oriented so that torque may be read from access bridge side.

B. Shear Pins:
1. Shear pin device: Set for 125% of AGMA rated torque.
2. Provide straight, non-tapered shear pins with bushings.

2.6 SOURCE QUALITY CONTROL

A. Provide evidence of compliance with PART 1 requirements for the following:
1. Referenced standards.
2. Independent design evaluation of drive.

B. Provide evidence of compliance with PART 2 requirements, signed by a Registered Professional Civil or Structural Engineer, for the following:
1. Structural members and connections are designed so that unit stresses do not exceed 130 PCT of AISI allowable stresses.
2. Compression and tension member slenderness ratios do not exceed 120 and 240 respectively.

2.7 MAINTENANCE MATERIALS

A. Comply with the maintenance requirements in Section 01 78 43 – Spare Parts and Extra Materials.

B. For each drive furnished, provide:
   1. One set of all bearings and bearing seal rings for drive unit.
   2. Two sets of all gaskets.
   3. Two sets of spur gear felt seals and replaceable bearing races.
   4. Additional sprockets and chain links for tip speeds of 15 and 25 fpm.
   5. Two sets neoprene lip seals.
   6. One spare sight glass or oil gage.
   7. Two sets scum box seals for pipe trough connection.
   8. One set of all bearings for skimmer system.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install clarifier equipment according to manufacturer's written recommendations.
   1. Manufacturer's service technician shall observe and direct equipment installation.
   2. Manufacturer's representative shall certify that mechanism has been installed in accordance with manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

A. See Section 01 61 03 - Equipment - Basic Requirements.

B. Employ and pay for services of equipment manufacturer's field service representative(s) to:
   1. Inspect equipment covered by these Specifications.
   2. Supervise adjustments and installation checks.
   3. Provide test equipment, tools, and instruments necessary to accomplish equipment testing.
   4. Conduct initial startup of equipment, perform operational checks, and supervise acceptance testing.
   5. Provide through Contractor a written statement that manufacturer's equipment has been installed properly, started up and is ready for operation by Owner's personnel.
   6. Provide the following:
      a. For equipment inspections: As needed, but no less than 8 hours for each clarifier.
      b. For equipment startup and testing: 8 hours minimum for each clarifier.

C. Torque Test:
   1. Load test the entire collector mechanism by anchoring collector arms individually, one at a time.
      a. In successive tests, demonstrate the sludge collection mechanism's (including drive unit, cage, gears and structures) capability to withstand not less than 130% of the specified rated running torque.
   2. Field torque test the clarifier mechanism under the supervision of the equipment manufacturer's representative before the mechanisms are approved and placed into operation.
   3. The torque test shall consist of securing the rake arms by cables to anchor bolts installed by the contractor in the tank floor at locations recommended by the manufacturer and the Engineer.
      a. Apply a torque load to the scraper arm by means of a rachet lever and cylinder connected to the cable assembly.
   4. Measure the magnitude of the applied load by calculating the torque from the distance of the line of action of each cable to the center line of the mechanism.
      a. Readings shall be taken at 100% and 120% of the AGMA rated torque.
      b. The test load shall be applied and noted on the torque overload device.

5. The manufacturer's service representative shall certify that the alarm and motor cut-out torque of the drives as calibrated in the manufacturer's shop are in proper operation to shut down the units as specified.

D. Operation Test:
   1. Fill clarifier with water to its operating level and operate mechanism continuously at its maximum speed for a period of not less than 48 hours.
      a. At no time during the operating tests shall the equipment exceed the rated torque or exhibit indications of binding or uneven operation.
      b. Record torque values as registered on the drive mechanism torque indicator and motor amperage (all three phases) at 3 hour intervals.
   2. After successful completion of the fully submerged operating test, operate the mechanism at full speed with no more than 1.5 feet of water at the sidewall in the tank for a period of not less than 6 hours.
      a. Record data as described above.
   3. If the mechanism exceeds rated torque or the mechanism exhibits indications of binding or improper adjustment, then:
      a. Immediately halt the tests and remedy the problem.
      b. Repeat the tests after completion of necessary repairs or adjustments.
      c. Failure to successfully complete the test in three attempts is sufficient cause for rejection.
      d. Failure to complete the testing program as outlined in the preceding paragraphs is sufficient cause for the Owner to require that the equipment be removed from the Project.

E. Mechanism Speed Setting:
   1. After completion of the specified field tests, fit the drive mechanism with a sprocket set which shall provide the rake arms with a tip speed of 7.5 FPM (single speed).

3.3 CLOSEOUT ACTIVITIES

A. Training
   1. Provide training of Owner's personnel as specified in Section 01 79 23 – Instruction of Operations and Maintenance Personnel.
   2. Instruct Owner's personnel as specified in Section 01 79 23 at jobsite on operation and maintenance of furnished equipment.

END OF SECTION