SECTION 462113 - CHAIN-AND-RAKE BAR SCREENS

Note that this section has only been edited for NYSOGS standardization and has not been technically edited. The designer shall make all technical edits specific to the project for this section.

This Section specifies channel-mounted, mechanically cleaned, chain-and-rake bar screens for collection and removal of coarse solids from wastewater.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes: Mechanically cleaned, chain-and-rake bar screens.
          2. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 055000 - Metal Fabrications: Miscellaneous metalwork and fasteners as required by this Section.

Section 262923 - Variable-Frequency Motor Controllers: Variable-speed drives, as required.

Section 400593 - Common Motor Requirements for Process Equipment: Electric motors and accessories normally supplied as part of equipment assemblies.

Section [**407213 - Ultrasonic Level Meters (Continuous and Point Type)**] [**407223 - Radar Level Meters**] [**407233 - Capacitance Type Level Meters (Continuous and Point Type)**] [**407243 - Pressure and Differential Pressure Type Level Meters**]: Differential level measurement as required by this Section.

* + - 1. DEFINITIONS

Limit list of definitions to terms unique to this Section and not provided elsewhere.

* + - * 1. PLC: Programmable logic controller.
        2. SCADA: Supervisory Control and Data Acquisition; computer system that monitors and controls industrial, infrastructure, or facility-based processes.
        3. UHMWPE: Ultra-high molecular-weight polyethylene.
      1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

* + - * 1. ASTM International:

ASTM A320 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service.

* + - * 1. National Electrical Manufacturers Association:

NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

* + - 1. PREINSTALLATION MEETINGS
         1. Convene minimum [**one week**] [**<\_\_\_\_\_\_\_\_> weeks**] prior to commencing Work of this Section.
      2. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        2. Manufacturer’s installation instructions shall be provided along with product data.
        3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
        4. Product Data: Submit manufacturer information for system materials and component equipment, including performance characteristics.
        5. Shop Drawings:

Indicate system materials and component equipment, including detailed wiring and control diagrams.

Indicate complete information concerning fabrication, installation, anchoring, fasteners, and other details.

Indicate component materials, connections, and supports.

* + - * 1. Manufacturer's Certificate:

Certify that products meet or exceed specified requirements.

Certify that installation has been completed according to manufacturer instructions and that screens have been properly installed and tested and are ready for operation.

Include separate Paragraphs for additional certifications.

Include following Paragraph when Contractor is responsible for designing products or assemblies. List affected products when Section specifies more than one product.

* + - * 1. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for seismic restraints.
        2. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures, anchoring, and layout.
        3. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
        4. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        5. Qualifications Statements:

Coordinate following Subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer, installer, and licensed professional.

Submit manufacturer's approval of installer.

* + - 1. CLOSEOUT SUBMITTALS
         1. Project Record Documents: Record actual locations and final orientation of equipment and accessories.
      2. MAINTENANCE MATERIAL SUBMITTALS
         1. Spare Parts:

Furnish [**one set**] [**two sets**] of manufacturer's recommended spare parts.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Furnish:

[**One set**] [**<\_\_\_\_\_\_\_\_> sets**] of bearings.

[**Two**] <**\_\_\_\_\_\_\_\_**> sets of sprockets.

[**One set**] [**<\_\_\_\_\_\_\_\_> sets**] of rollers and bushings.

[**Two**] <**\_\_\_\_\_\_\_\_**> sets of limit switches.

[**One**] <**\_\_\_\_\_\_\_\_**> wiper blade[**s**].

[**One set**] [**<\_\_\_\_\_\_\_\_> sets**] of spray nozzles.

[**One set**] [**<\_\_\_\_\_\_\_\_> sets**] of solenoid valves.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. QUALITY ASSURANCE

Include this Article to specify compliance with overall reference standards affecting products and installation included in this Section.

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Perform Work according to <**\_\_\_\_\_\_\_\_**> standards.

Include following Paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain <**\_\_\_\_\_\_\_\_**> [**copy**] [**copies**] of each standard affecting Work of this Section on Site.
      1. QUALIFICATIONS

Coordinate following Paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
        2. Installer: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience [**and approved by manufacturer**].
        3. Licensed Professional: [**Professional engineer**] <**\_\_\_\_\_\_\_\_**> experienced in design of specified Work and licensed in the State ofNew York.
      1. DELIVERY, STORAGE, AND HANDLING
         1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
         2. Store materials according to manufacturer instructions.
         3. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
         1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

* + - 1. WARRANTY

This Article extends warranty period beyond one year. Extended warranties may increase construction costs and Director’s Representative enforcement responsibilities. Specify warranties with caution.

* + - * 1. Furnish [**five**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for screens and components.

1. PRODUCTS
   * + 1. CHAIN-AND-RAKE BAR SCREENS
          1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=9587&mf=04&src=wd):

Designer to provide two manufacturers and approved equivalent for all listed products.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Subparagraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Channel-mounted bar screens cleaned by chain-driven rake arm, which meshes with bar rack and travels up rack, cleaning and collecting trapped material.

Configuration: Front-cleaning, to prevent rake from sliding over accumulated material.

Replaceable Rake Arm: Capable of carrying trapped material up and out of sewage channel, across a [**shelf**] [**deadplate**] [**beaching plate**] to discharge [**onto conveyor**] [**into hopper**].

Frame: Integral and self-supporting.

Bar Type: [**Rectangular**] [**Tapered**] <**\_\_\_\_\_\_\_\_**>.

Discharge Wiper:

Type: Pivoted, brushless, automatic, and self-positioning with return to rest.

Material: Replaceable [**polyester**] [**UHMWPE**] <**\_\_\_\_\_\_\_\_**>.

Foot Shaft Sprockets: Mounted on idlers without external lubrication.

Enclosure: Full covers and enclosed discharge chutes.

* + - * 1. Performance and Design Criteria:

No deflection, damage, or distortion by loads imposed by 5-foot water differential between upstream and downstream side of bar rack at maximum water depth in downstream channel.

No obstructions allowed in sewage channel except bar rack and rake arm.

Structural Supports and Fasteners: Located above maximum water level, except bar rack supports.

Inclination: [**80**] <**\_\_\_\_\_\_\_\_**> degrees from horizontal.

Peak Capacity: <**\_\_\_\_\_\_\_\_**> MGD.

Peak Flow Rate: <**\_\_\_\_\_\_\_\_**> MGD.

Average Flow Rate: <**\_\_\_\_\_\_\_\_**> MGD.

Minimum Flow Rate: <**\_\_\_\_\_\_\_\_**> MGD.

Channel Width: <**\_\_\_\_\_\_\_\_**> feet.

Channel Depth: <**\_\_\_\_\_\_\_\_**> feet.

Maximum Upstream Water Depth: <**\_\_\_\_\_\_\_\_**> feet.

Minimum Motor Size: <**\_\_\_\_\_\_\_\_**> hp.

Bar Rack Opening Size: <**\_\_\_\_\_\_\_\_**> inches.

Bar Size: <**\_\_\_\_\_\_\_\_**> inches.

Maximum Screen Height: <**\_\_\_\_\_\_\_\_**> feet [**above operating floor level**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Drive: Chain driven by top-mounted motor and head sprocket.
        2. Operation:

Electrical Characteristics:

As specified in [**Section 262923 - Variable-Frequency Motor Controllers**].

[**<\_\_\_\_\_\_\_\_> hp**] [**<\_\_\_\_\_\_\_\_> RLA**].

Voltage: <**\_\_\_\_\_\_\_\_**> V, [**single**] [**three**] phase, 60 Hz.

Maximum [**Fuse Size**] [**Circuit Breaker Size**] [**Overcurrent Protection**]: <**\_\_\_\_\_\_\_\_**> A.

Minimum Circuit Ampacity: <**\_\_\_\_\_\_\_\_**>.

Minimum Power Factor: <**\_\_\_\_\_\_\_\_**> percent at rated load.

Motors: As specified in Section 400593 - Common Motor Requirements for Process Equipment.

Control Panel:

Type:

[**Freestanding**] [**Wall mounted**] [**Screen mounted**].

[**Relay**] [**PLC**].

Surface-mounted manual alarm resets and audio alarm.

NEMA 250 Type [**1**] [**4**] <**\_\_\_\_\_\_\_\_**>.

Single-point power connection and grounding lug.

Controls:

Screen START-STOP: Manual and timers with differential level measurement device as specified in Section [**407213 - Ultrasonic Level Meters (Continuous and Point Type)**] [**407223 - Radar Level Meters**] [**407233 - Capacitance Type Level Meters (Continuous and Point Type)**] [**407243 - Pressure and Differential Pressure Type Level Meters**].

Motor Current Sensing Relays: De-energize motor if bar rack clogs and stalls.

Screen Reversing: Allow reversal of bar rack to clean.

Alarm Lights [**and Buzzer**]:

RAKE ARM STALL.

OVER-TORQUE.

MOTOR HIGH TEMPERATURE.

HIGH CHANNEL-WATER LEVEL.

<**\_\_\_\_\_\_\_\_**>.

Status Lights:

RUN.

OFF.

[**READY.**]

<**\_\_\_\_\_\_\_\_**>.

Outputs:

Gang Alarm: Open contacts when alarm condition occurs, and close contacts after alarm conditions have passed and manual alarm reset button has been depressed.

Furnish dry set of contacts for each output.

Furnish manual alarm resets and alarm buzzers located on control panel.

Disconnect Switch: Factory mounted [**in control panel**] [**on equipment**].

Operation Sequences:

Screen controlled by HAND-OFF-AUTO and REVERSE-FORWARD switches.

In HAND, screen runs continuously.

In AUTO, screen activated by timer control with high-differential-level override.

Furnish 24-hour timer, adjustable to five-minute increments.

Timer controller overridden by differential controller to initiate operation of bar screen.

In OFF, screen is de-energized.

Manual and fully automatic operation through [**PLC**] [**SCADA**] <**\_\_\_\_\_\_\_\_**>.

* + - 1. MATERIALS
         1. Bar Rack: [**Type <\_\_\_\_\_\_\_\_> stainless steel; ASTM A320**] <**\_\_\_\_\_\_\_\_**>.
         2. Sprockets and Shaft: [**Type <\_\_\_\_\_\_\_\_> stainless steel; ASTM A320**] <**\_\_\_\_\_\_\_\_**>.
         3. Rakes: [**Type <\_\_\_\_\_\_\_\_> stainless steel; ASTM A320**] <**\_\_\_\_\_\_\_\_**>.
         4. Roller Chain: [**Type <\_\_\_\_\_\_\_\_> stainless steel; ASTM A320**] <**\_\_\_\_\_\_\_\_**>.
         5. Structure: [**Type <\_\_\_\_\_\_\_\_> stainless steel; ASTM A320**] <**\_\_\_\_\_\_\_\_**>.
         6. Connecting Arms: [**Type <\_\_\_\_\_\_\_\_> stainless steel; ASTM A320**] <**\_\_\_\_\_\_\_\_**>.
      2. FABRICATION
         1. Bar Rack and Apron:

Configuration: Extend from channel floor to operating floor.

Bar Attachment: Welded spacers at each end.

Apron: From floor level to discharge lip.

* + - * 1. Side Frames:

Configuration:

Reinforced to support required loads.

Spliced to facilitate installation.

Minimum Width: <**\_\_\_\_\_\_\_\_**> inches.

* + - * 1. Anchor Bolts: As specified in Section 055000 - Metal Fabrications.
        2. Spray System: Furnish washing spray system to wash screenings as rake travels up [**shelf**] [**deadplate**] [**beaching plate**].
      1. SOURCE QUALITY CONTROL
         1. Provide shop inspection and testing of completed assembly.

Include one or both of the following Paragraphs to require Director’s Representative’s inspection or witnessing of test at factory.

* + - * 1. Director’s Inspection:

Make completed screen assembly available for inspection at manufacturer's factory prior to packaging for shipment.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspection is allowed.

* + - * 1. Director’s Witnessing:

Allow witnessing of factory inspections and tests at manufacturer's test facility.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspections and tests are scheduled.

Include following Paragraph if reliance on manufacturer's approved quality-control program is sufficient for Project requirements.

* + - * 1. Certificate of Compliance:

If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

Specified shop tests are not required for Work performed by approved manufacturer.

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify layout, orientation, and connections.
       2. INSTALLATION
          1. According to manufacturer instructions.
          2. Provide unobstructed path for rack cleaning mechanism when installing side frames.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Installation Standards: Install Work according to <**\_\_\_\_\_\_\_\_**> standards.
      1. FIELD QUALITY CONTROL
         1. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than <**\_\_\_\_\_\_\_\_**> [**days**] [**hours**] on Site for installation, inspection, startup, field testing, and instructing Director’s Representative in operation and maintenance of equipment.
         2. Equipment Acceptance:

Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

Make final adjustments to equipment under direction of manufacturer's representative.

* + - * 1. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.
      1. ADJUSTING
         1. Adjust control functions as required.
      2. DEMONSTRATION
         1. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Director’s Representative.

END OF SECTION 462113