DIVISION 10
SPECIALTIES
(NOT APPLICABLE)

DIVISION 11
EQUIPMENT

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DIVISION 11 – EQUIPMENT

1. GENERAL

1.1 Description

.1 Unless otherwise specified, this section specifies general requirements common to all process and mechanical equipment included in Division 11 to Division 15, inclusive.

.2 Comply with all laws, ordinances, rules, regulations, codes, and order of all authorities having jurisdiction relating to this work.

1.2 Definitions and Interpretations

.1 Where the term "Provide" is used herein, understand to include labour, materials, and services necessary to supply items or work referenced.

.2 Where the terms "Instructions", or "As instructed", or "Where instructed" are used herein, understand to mean instruction by the Engineer, including supplementary instruction notices and all comments made regarding submittals of shop drawings and samples for review.

.3 Where the term "Listed" is used herein, understand to mean that the material or equipment have been tested in accordance with applicable standards and methods, have been approved and listed for the intended use by a testing authority which itself has been approved by the authorities having jurisdiction.

.4 Where the terms "Approved", or "Approval" are used herein, understand to mean approved by Authorities having jurisdiction as conforming to Codes, Standards, Bylaws, etc.

.5 Where the terms "Acceptable", or "Acceptance" are used herein, understand to mean acceptable to the Engineer as generally conforming to the requirements of the Contract Documents.

.6 Where the term "Submit for Review" is used herein, understand to mean submit to the Engineer.

.7 Where the term "Subject to Review", etc. is used herein, understand to mean work shall be laid out for review by the Engineer. Do not proceed with this work until instructions have been obtained from the Engineer. Submit further information, shop drawings, samples, etc. as specified and/or as may be reasonable requested by the Engineer.

.8 Where the term "Accessible" is used herein, understand to mean readily approachable by persons or tools as required and where obstacles may be removed and replaced without cutting or breaking out materials.

.9 Where working pressure or pressure ratings are specified, or shown on the drawings for valves, piping, fittings, equipment, etc., design and fabricate these items to be suitable for operating at specified pressures and corresponding temperatures unless noted otherwise.

1.3 Shop Drawings

.1 Refer to Section 01300 for the general requirements for shop drawings.

.2 In addition to the requirements of Section 01300, submit the following specific information with shop drawings for each item of equipment specified in Division 11.

.1 Assembly drawings showing details of connections and terminations of equipment for connection by others.

.2 List of materials of construction, detailing the component parts and reference specifications (ASTM, CSA, ANSI, etc.) and equipment weights.

.3 Motor operating data, including motor and insulation ratings, start-up and operating current ratings, operating voltage and amperage tolerances, and description of construction, complete with illustrative drawings.

.4 Gearbox and drive data, including AGMA/AFBMA ratings for components, materials of construction, tolerances, and description of construction.

.5 Control schematics, text, and wiring diagrams as required to describe control operations.

.6 Required ancillary services including, but not limited to electrical, non-potable water and drains.

.7 Installation instructions indicating assembly and mounting requirements, alignment and assembly tolerances, and point of connection for ancillary services.

.8 Start-up instructions including lubricant requirements, electrical requirements, etc.

.9 Details of coating systems to be applied.

.10 Details of insulation provided to prevent galvanic corrosion between mating surfaces constructed of dissimilar metals.

.11 A copy of the Contract Document mechanical layout drawings, control diagrams, and process and instrumentation diagrams, with addenda updates, that apply to the equipment marked to indicate special changes necessary for the supplied equipment. If no changes are required, mark the drawing(s) "no changes required".

.12 A copy of the related specification section with addenda updates, and all referenced sections with addenda updates, with each paragraph check-marked to show specification compliance or marked to show deviations.

1.4 Temporary Usage

.1 Temporary usage by the Owner of any process device, apparatus, machinery, or equipment prior to interim or final inspections is not to be construed as acceptance.

1.5 Owner Supplied Equipment

.1 Where indicated in the drawings or noted in the specifications, install, test, and commission equipment provided by the Owner.

.2 Review all information available for the Owner supplied equipment and ensure familiarity as to all requirements for storage, installation, testing, and commissioning.

.3 Hand over of Owner supplied equipment to the Contractor will be made according to a schedule agreed upon by the Contractor, the Engineer, and the Owner.

.4 Upon hand over, fully inspect the item of equipment in the presence of the Engineer. Where the equipment requires modification or repair to properly function, these items will be identified to and confirmed by the Engineer.

1.6 Design Standards, Acceptable Products, and Acceptable Manufacturers

.1 Equipment lists included in the specifications may be in two parts. The first part is the "Design Standard" equipment items. The second part of the list is comprised of "Acceptable Manufacturers" if the equipment of a specific vendor is specified.

.2 The design has been based on the Design Standard. Quality of workmanship, dimensions, operating protocol, basic materials, and ancillary services have been defined on this basis and incorporated in the design.

.3 Where Acceptable Products or Acceptable Manufacturers have been listed after a Design Standard, these products or ranges of products have been accepted by the Engineer as being capable of meeting the basic functional requirements of the equipment, but may not be the same as the Design Standard in detail. Provide all ancillary services, material upgrades, etc. as necessary to satisfy the functional and quality requirements defined by the Design Standard. Make all changes in fabrication, arrangement, piping, and/or electrical connections, etc. as necessary to suit the requirements of the Acceptable Products or Acceptable Manufacturers. Costs for any re-design or evaluation by the Engineer to assess the impact of the Acceptable Product or Manufacturer will be borne by the Contractor.

.4 Where Acceptable Products or Acceptable Manufacturers have been listed, but no Design Standard is listed, these products or ranges of products have been accepted by the Engineer as being capable of meeting the basic functional requirements of the equipment. Provide all ancillary services and modifications to arrangement, piping, and/or electrical connections, etc. as necessary to suit the functional requirements of the equipment.

.5 Modify standard products as necessary to provide the specified features and to meet the specified operating conditions.

.6 No additional payment will be made for revisions or alterations made to accommodate the equipment supplied.

1.7 Abbreviations

.1 The following abbreviations are found in the Division 11 specifications:

AFBMA	-	Anti-Friction Bearing Manufacturers Association
AGMA	-	American Gear Manufacturers Association
AISI	-	American Iron and Steel Institute
ANSI	-	American National Standards Institute
AMCA	-	Air Movement and Control Association
ASCE	-	American Society of Civil Engineers
ASTM	-	American Society for Testing and Materials
AWS	-	American Welding Society
BS	-	British Standard
CEMA	-	Conveyor Equipment Manufacturers Association
CGA	-	Canadian Standards Association
CGSB	-	Canadian Government Standards Board
CSA	-	Canadian Standards Association
DIN	-	Deutsche Instustrie Norm
EEMAC	-	Electrical Equipment Manufactures Association of Canada
ISA	-	Instrumentation Society of America
ISO	-	International Standards Organization
MSS	-	Manufacturers Standardization Society of the Valve and Fittings Industry.
NACE	-	National Association of Corrosion Engineers
NBC	-	National Building Code
NEC	-	National Electrical Code
NEMA	-	National Electrical Manufacturers Association
NFC	-	National Fire Code
NPC	-	National Plumbing Code
NSF	-	National Sanitation Foundation
SSPC	-	Structural Steel Painting Council

1.8 Coordination

.1 Coordinate the requirements of the equipment supplied with piping, structural supports, drainage, ventilation/cooling, electrical service, instrumentation and control interface, and other ancillaries specified in other Divisions.

1.9 Shipment, Protection, and Storage

.1 Ship and store equipment in accordance with Section 01600 unless otherwise specified.

.2 Prior to installation, protect all equipment store on or off site against corrosion. Provide blanks, plugs, packing grease, special covering, moisture absorbing material, and/or other appurtenances necessary to preclude moisture from equipment interior spaces. Take special care with electrical and control panels.

.3 During storage, turn shafts as required, run as necessary, and/or undertake all other special maintenance activities required to ensure that rotating equipment bearings are not subjected to excess wear.

1.10 Tagging Instructions

.1 Tag loose items associated with a particular unit with the equipment number. Make tagging materials of aluminum or stainless steel (no plastic) and securely attach to each item.

2. PRODUCTS

2.1 Spare Parts

.1 As required in the various specification sections, supply spare parts required for the various items of equipment. The lists in these sections are intended to include all parts that normally would be required within the warranty period for normal preventative maintenance and where fabrication requirements for special parts would delay delivery and could keep an item of equipment out of service for a period exceeding one week.

.2 Identify any spare parts not listed that would be required to meet this criteria, with a price list.

.3 In addition, provide a list of all spare parts, not including lubricants, which normally would be required through the first five (5) years of operation. Provide prices for each part, guaranteed for six (6) months.

.4 Assume responsibility to replenish the spare parts used within the warranty period at the end of the warranty period for the related item(s) of equipment.

2.2 Welding

.1 Conform to Section 05500 and 15050.

2.3 Flanges and Pipe Threads

.1 Provide flanges on cast iron equipment and appurtenances that conform in dimension and drilling to ANSI B16.1, Class 125 and flanges on steel equipment and appurtenances that conform in dimension and drilling to ANSI B16.5, Class 150 unless otherwise specified.

.2 Provide pipe threads that conform in dimension and limits of size to ANSI B1.1, coarse threaded series, Class 2 fit.

.3 Provide flange assembly bolts that are heavy pattern, hexagonal head, carbon steel machine bolts with heavy pattern, hot pressed, hexagonal nuts conforming to ANSI B18.2.1 and B18.2.2. Provide threads that conform to Unified Screw Threads, Standard Coarse Thread Series, Class 2A and 2B, ANSI B1.1.

2.4 Bearings

.1 Unless otherwise specified, provide oil or grease lubricated, ball or roller type equipment bearings, designed to withstand the stresses of the service specified. Rate each bearing in accordance with AFBMA Methods of Evaluating Load Ratings of Ball and Roller Bearings.

.2 Provide equipment bearings that have a minimum L-10 rating life of 50,000 hours, as determined using the maximum equipment operating speed, unless otherwise specified.

.3 Fit grease lubricated bearings, except those provided factory-sealed and lubricated, with easily accessible grease supply, flush, drain, and relief fittings. Use extension tubes where necessary. Provide standard hydraulic alemite type grease supply fittings.

.4 Ensure that all grease fittings on the project are the same size, North American standard.

.5 Extend grease fittings to an accessible location.

.6 Equip oil lubricated bearings with either a pressure lubricating system, or a separate oil reservoir type system. Provide each oil lubrication system to be of sufficient size to absorb the head energy generated in the bearing under a maximum ambient temperature of 40°C.

.7 For pressure lubricating systems or oil reservoirs, provide a filler pipe and an external level indicator gauge. Provide a cap, complete with retention chain, for the oil inlet.

2.5 Critical Speed

.1 For rotating equipment, ensure that operating speed is no more than 80 percent of the first critical speed unless otherwise specified.

2.6 V-Belt Assemblies

.1 Select belt for not less than 150 percent of rated driver power. Where two sheave sizes are specified, ensure belt sizing is appropriate for both sets.

.2 For explosion-proof equipment, use anti-static type belts.

.3 Statically balance sheaves and bushings. Where sheaves and bushings are to operate at peripheral speeds greater than 1650 m/min., dynamically balance the assembly.

.4 Separately mount sheaves on their bushings by means of three pull-up grub or cap tightening devices. Key seat bushings to the drive shaft.

2.7 Couplings

.1 For equipment with drives over 0.375 kW and less that 120 kW, and where the driver is directly connected to the driven unit, provide a flexible coupling. Couplings shall accommodate angular misalignment, parallel misalignment, and end float and shall cushion shock loads and dampen torsional vibrations.

.2 The flexible member of flexible couplings shall consist of a tire, with synthetic tension members bonded together in rubber. Attach the flexible member to flanges by means of clamping rings and cap screws, and attach the flanges to the stub shaft by means of taperlock bushings. Provide the equivalent of a shrunk-on fit. There will be no metal-to-metal contact.

.3 For larger couplings, provide continuous sleeve flexible gear type, forged steel couplings.

.4 Size each coupling as recommended by the coupling manufacturer for the specific application, considering applied power, speed of rotation, type of service, and other pertinent details.

2.8 Guards

.1 On moving parts, provide sheet steel guards in accordance with workplace safety regulations. Fabricate of galvanized 14 gauge steel.

.2 Paint guards after fabrication to the same standard as the attached equipment.

.3 Guards shall be removable to facilitate maintenance of moving parts.

.4 Make provision for extension of lubrication fittings through the guards.

2.9 Equipment Installation

.1 Provide nameplate for all equipment in accordance with Section 11910.

.2 Provide nameplates for all electrical and control panels supplied with equipment, in accordance with Section 11910, Division 16, and Division 17 requirements.

2.10 Caution Signs

.1 For caution signs, use vinyl stick-on type decals placed onto clean, smooth surface of equipment to be posted.

.2 Where sufficient space exists, use decal applied to galvanized mild steel, fibreglass, or plastic sheet fastened to equipment.

.3 Provide signs that read "CAUTION – AUTOMATIC EQUIPMENT MAY START AT ANY TIME".

.4 Make letters 25 mm in height, red, on a yellow background.

.5 Provide mounting posts and hardware and mount close to guarded moving parts.

2.11 Gauge Taps and Test Plugs

.1 Refer to Section 15050 and 11300 for general requirements.

.2 Provide gauge taps on the suction and discharge side of pumps, blowers, and compressors.

.3 Install gauges at each location indicated.

.4 Tap and install plugs at locations indicated in the drawings and as required to practically complete testing of piping and equipment.

2.12 Concrete Pads

.1 Coordinate location of concrete pads for equipment.

.2 Ensure that, unless otherwise shown, concrete pads are a minimum of 150 mm above finished floor elevation and extend a minimum of 100 mm outside of the equipment base.

.3 Ensure that pads drain way from base.

.4 Ensure that conduit, drains, piping, etc. required for the equipment, rise through the pad.

2.13 Equipment Bases

.1 Structural Steel Bases

.1 Make bases of structural steel shapes with thickened steel pads for dowelling.

.2 Fabricate bases in a rectangular pattern. "T" and "L" patterns may be used where required to accommodate the equipment drive and accessories.

.3 Make perimeter members of structural beams with a minimum depth equal to 0.10 of the longest dimension of the base. Beam depth need not exceed 350 mm provided that the deflection and misalignment is kept within the manufacturer's recommendations.

.4 Provide grout holes where vibration isolation is not specified.

.2 Cast Iron Bases

.1 Seal in accordance with the requirements of Section 09905 for bleeding surfaces, prior to grouting.

.2 Terminate fasteners requiring connection to the base by nuts welded to the bottom of the base and plugged with cork, plastic plugs or grease, or acorn nuts.

2.14 Anchor Bolts

.1 For all permanently or intermittently submerged services and for all exterior mounting locations, provide stainless steel anchor bolts conforming to Section 05500, and ASTM A320.

.2 For all other anchor bolts, provide cadmium plated or galvanized steel anchor bolts conforming to ASTM A307, unless noted otherwise.

.3 For rotating equipment over 35 kW, provide anchor bolts with sleeves and washers to permit adjustment during installation of the equipment.

.4 Do not use drilled expansion or adhesive anchors for anchor bolts unless submitted and reviewed by the Engineer.

.5 Design anchor bolts for lateral forces for both pullout and shear in accordance with the requirements of Section 05500.

2.15 Equipment Base Templates

.1 For rotating equipment where shown in the drawings, or specifically called for in the specifications for that equipment, provide an equipment base template for location of equipment anchor bolts to be embedded in concrete.

.2 Manufacture the equipment base template of structural steel with stops or holes placed for the anchor bolts.

.3 Shop finish the templates in accordance with Section 09905 for items to be embedded in concrete.

.4 Provide access holes for the placement of grout or concrete, as applicable.

2.16 Jacking Screws

.1 On all base mounted rotating equipment larger that 7.5 kW, provide jacking screws for the driver and the driven end to facilitate alignment.

.2 Provide jacking screws consisting of a 12 mm nut welded to the frame of the equipment with the hole in a horizontal plane.

.3 Provide a 12 mm bolt that fits through the nut and extends to the mounting feet.

.4 Two jacking screws are required at each end of the equipment, one parallel to the axis of the equipment and one perpendicular.

3. EXECUTION

3.1 Operator Training

.1 Arrange for the attendance of manufacturer's representative for training of the Owner's staff. As a minimum, training will include operating requirements, maintenance procedures, troubleshooting, and repair procedures for all electrical and mechanical components. Refer to Section 01650 for further details.

END OF SECTION

PROCESS EQUIPMENT INSTALLATION

1. GENERAL

1.1 Description

.1 Installation, including the supply of anchor bolts, and testing of equipment supplied under other sections in Division 11.

1.2 Definitions and Interpretations

.1 Testing: In this Division, testing is defined as the operation of a specific item of equipment under actual and/or simulated conditions for the purpose of ensuring the equipment satisfies its basic design criteria. Provide all materials, labour, power and equipment necessary to conduct all required tests.

.2 Commissioning: In this Division, commissioning is defined as the operation of equipment systems under actual and/or simulated conditions for the purpose of ensuring the system performs its intended functions.

1.3 Submissions

.1 Check all the shop drawings relative to the equipment and materials, dimensions, measurements, size of members, type of materials, controls, list of equipment being supplied, names of manufacturers, and other details to ensure that they are correct and conform to the requirements and intent of the Contract.

.2 Where the shop drawings are submitted with coordination information missing, such as dimensions of structures, the Engineer will return the submission as soon as practicable marked "Revise and Resubmit".

2. PRODUCTS

2.1 Equipment List

.1 Unless indicated otherwise, supply and install all equipment listed on the Equipment List (see list following this Section), detailed on the equipment specification sheets, or shown on the drawings.

.2 Determine the extent of equipment to be supplied from the specifications, list of equipment and materials and manufacturer's drawings covering the equipment. Furnish and install all additional materials necessary to complete the installation.

.3 Incorporate all ancillary devices in the installation including those providing for cooling water, seal water, lubricant supply, process drains, electrical connection, and instrumentation and control requirements.

2.2 Mounting Requirements

.1 Provide all supports, anchorage, and mounting of all equipment in accordance with the manufacturer's recommendations, the NBC, and industry standard requirements.

.2 Design and provide all elements required to resist the calculated forces described herein or required by the element manufacturer.

3. EXECUTION

3.1 Coordination

.1 Coordinate the work specified under this Section with the work of other Sections to produce a complete and workmanlike job.

.2 Coordinate the placement of equipment bases and housekeeping pads with Division 3.

.3 Coordinate the arrangement of conveyance equipment with Division 14.

.4 Coordinate the routing of ancillary piping with Division 15.

.5 Coordinate the routing of electrical and control wiring and conduit with Division 16 and Division 17.

3.2 Preparation

.1 Before commencing installation of the work, inspect and take field measurements and ensure that work conducted previously in the area is not prejudicial to the proper installation of the works.

.2 Refer to the equipment specifications and specification sheets for assistance in determining the form in which equipment is to be shipped and the extent of field assembly required.

.3 Dimensions shown on the Contract Documents for equipment bases, piping connections, etc., are approximate. Correct to suit the exact dimensions of the equipment provided for each application. Arrange any necessary modifications to piping connections, pipework, or other ancillaries at no cost and after acceptance by the Engineer.

.4 Schedule the visits to the site of the manufacturer's representative for the times and periods specified in other sections. Cooperate in his supervision of the installation and start-up. Follow all reasonable instructions of the manufacturer's representative. Should the Contractor require the manufacturer's representative to attend for longer or more frequent periods, he shall arrange this, at his own expense, with the manufacturer.

3.3 Installation of Equipment

.1 Install all equipment specified in other sections, detailed on the equipment specification sheets, or shown on the drawings.

.2 Supply and install all necessary shims, gaskets, etc., required to complete the installation.

.3 Provide for the use of all necessary lifting and loading equipment and all tools required to complete the installation.

.4 Comply with the specific requirements for installation noted in other sections of this specification and with the instructions of the Manufacturer. Where there is a conflict in these requirements, identify the conflict to the Engineer and proceed as directed.

3.4 Equipment Bases and Anchorage

.1 For rotating equipment of 7.5 kW or above and for equipment requiring structural anchoring, set anchor bolts in advance. Where required, set anchor bolts in sleeves to permit minor adjustment during installation. Use machine base templates where shown. Tie anchor bolts to reinforcing steel to resist tensile forces, as shown.

.2 Prepare grout as specified in Division 3 and provide full contact with the equipment bases unless otherwise recommended by the equipment manufacturer and accepted by the Engineer. Neatly bevel, form, or trim the grout.

.3 Where equipment is supplied with a plate steel base, provide access holes in the top of the plate and use a pour grade, non-shrink, non-metallic grout as specified in Section 03300 to fill the entire void under the base.

3.5 Alignment

.1 Set and align all rotating equipment in accordance with the more stringent requirements of either the manufacturer's requirements or the following:

.1 Level base, use machinists level on all machined bases.

.2 Align couplings to satisfy the following criteria:

Allowable Coupling Speed Misalignment	Allowable Angular Misalignment	Parallel
Under 100 rpm, below 50 hp	4'00"	0.25 mm
Under 100 rpm, 50 hp and over	3'00"	0.12 mm
100 to 600 rpm	2'00"	0.12 mm
600 to 1800 rpm	1'00"	0.10 mm
1800 to 3600 rpm	0'35"	0.5 mm

.3 Check for soft foot, maximum permissible 0.002 mm.

.2 Where equipment undergoes a substantial differential temperature rise (equal to or exceeding 30°C between driver and driven unit), provide precision benchmarks in foundation and on equipment. Perform alignment at operating temperatures.

.3 Demonstrate the final alignment to the Owner, Engineer, and Manufacturer's Representative.

3.6 Lubricants

.1 Extend any inaccessible lubrication points and lubrication drains to convenient locations.

.2 Remove storage lubricant and provide the initial fill of new lubricants for the equipment. Lubricant grade to be as recommended by the manufacturer.

3.7 Vibration Survey

.1 Conduct a vibration survey under normal operating conditions for all equipment with a motor size exceeding 37 kW and for smaller units where specified.

.2 Use a calibrated vibration sensor, accepted by the Engineer, and capable of measuring unfiltered vibration velocities and peak-to-peak amplitudes. Select a sensor capable of measuring velocities at a precision of 0.1 mm/s and an accuracy of plus or minus 0.2 mm/s.

.3 Monitor vibration in all three dimensions at the head and tail end of both the driver and driven units, at intermediate bearing points, and at other critical locations that may be specified by the Engineer.

.4 Record the vibration velocities for each item of equipment and submit a report to the Engineer detailing the findings. Include a description of the measuring equipment, identification of equipment on which vibration monitoring was completed, description of conditions under which the test was conducted, and a listing of all of the collected data.

.5 Unless specified otherwise, use unfiltered velocities as the vibration criteria. Unfiltered velocities less than 5 mm/s shall be considered acceptable. Correct unfiltered velocities that exceed 5 mm/s.

3.8 Noise Survey

.1 Conduct a noise survey for all equipment over 37 kW and for smaller units where specified.

.2 Use a calibrated noise meter, accepted by the Engineer, and capable of measuring noise in the A Scale at a precision of 0.5 dBA and an accuracy of 1.0 dBA.

.3 Measure noise levels at an elevation similar to the major noise emitter from the equipment (bearing housing, muffler, etc.) and at a horizontal distance of 1.0 metres.

.4 Record the noise levels for each item of equipment and submit a report to the Engineer detailing the findings. Include a description of the measuring equipment, identification of equipment on which noise level monitoring was completed, description of conditions under which the test was conducted, and a listing of all of the collected data.

.5 Equipment is to operate at a noise level less than 85 dBA, when measured in free field at 1.0 metre. Noise requirements may be more stringent in areas where more than one item of process equipment is intended to operate concurrently. Specific requirements for equipment that differ from 85 dBA are listed in the sections related to those items of equipment.

.6 Noise abatement features (acoustic panels, acoustic insulation, etc.) are specified in other sections.

.7 In any process area, recommend whatever measures necessary to maintain a composite noise level below 90 dBA. Where directed by the Engineer, undertake those corrective actions.

3.9 Quality Assurance Forms

.1 Test all process equipment to ensure it operates in accordance with the basic design criteria listed in the specification sections or equipment specification sheets. Complete the series of forms that attest to the proper installation and functioning of the equipment. Refer to Section 01650 for the Forms.

END OF SECTION

EQUIPMENT LIST

Equip. Number	Equip. Description	P&ID	Area	Location	Existing or New (E or N)	Operating Mode	VFD	kW	Phase	Volts	Hz	Standby Power	Electrical Classification
AREA 100 HEADWORKS													
BSCR-101	Basket Screen	I3-01	100	Raw Wastewater Lift Station	N	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Class 1/Div 2
P-102	Raw Wastewater Pump	I3-01	100	Raw Wastewater Lift Station	N	Lead	Yes	11.25	3	600	60	y	Class 1/Div 2
P-103	Raw Wastewater Pump	I3-01	100	Raw Wastewater Lift Station	N	Lag	Yes	11.25	3	600	60	y	Class 1/Div 2
P-104	Raw Wastewater Pump	I3-01	100	Raw Wastewater Lift Station	N	Standby	Yes	11.25	3	600	60	y	Class 1/Div 2
SSCR-105	Screw Screen	I3-01	100	New Headworks Room	E	n/a	no	1.5	3	600	60	y	Class 1/Div 2
SSCR-106	Screw Screen	I3-01	100	New Headworks Room	E	n/a	no	1.5	3	600	60	y	Class 1/Div 2
MSCR-107	Manual Bar Screen	I3-01	100	New Headworks Room	E	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Class 1/Div 2
PFT-108	Primary Filter	I3-01	100	New Headworks Room	N	n/a	n/a	10.1	3	600	60	y	Class 1/Div 2
AREA 200 BIOREACTORS													
Bioreactor 1													
MXR-201	Anoxic 1 Cell Mixer	I3-02	200	Bioreactor 1	E	n/a	n/a	1.875	3	600	60	y	unclassified
P-203	Nitrified Mixed Liquor Recycle Pump	I3-02	200	Bioreactor 1	E	Duty	Yes	5.625	3	600	60	y	unclassified
FBD-208	Fine Bubble Diffuser	I3-02	200	Bioreactor 1	E	n/a	No	n/a	n/a	n/a	n/a	n/a	unclassified
FBD-209	Fine Bubble Diffuser	I3-02	200	Bioreactor 1	E	n/a	No	n/a	n/a	n/a	n/a	n/a	unclassified
FBD-210	Fine Bubble Diffuser	I3-02	200	Bioreactor 1	N	n/a	No	n/a	n/a	n/a	n/a	n/a	unclassified
P-205	WAS Pump	I3-02	200	Bioreactor 1	N	Duty	Yes	2.25	3	600	60	n	unclassified
MXR-220	Aerobic 3 Cell Mixer	I3-02	200	Bioreactor 1	N	n/a	n/a	2.3	3	600	60	y	unclassified
Bioreactor 2													
MXR-202	Anoxic 1 Cell Mixer	I3-02	200	Bioreactor 2	E	n/a	n/a	1.875	3	600	60	y	unclassified
P-204	Nitrified Mixed Liquor Recycle Pump	I3-02	200	Bioreactor 2	E	Duty	Yes	5.625	3	600	60	y	unclassified
FBD-211	Fine Bubble Diffuser	I3-02	200	Bioreactor 2	E	n/a	No	n/a	n/a	n/a	n/a	n/a	unclassified
FBD-212	Fine Bubble Diffuser	I3-02	200	Bioreactor 2	E	n/a	No	n/a	n/a	n/a	n/a	n/a	unclassified
FBD-213	Fine Bubble Diffuser	I3-02	200	Bioreactor 2	N	n/a	No	n/a	n/a	n/a	n/a	n/a	unclassified
P-206	WAS Pump	I3-02	200	Bioreactor 2	N	Duty	Yes	2.25	3	600	60	n	unclassified
MXR-221	Aerobic 3 Cell Mixer	I3-02	200	Bioreactor 2	N	n/a	n/a	2.3	3	600	60	y	unclassified
B-214	Aeration Blower	I3-05	200	Blower Room	E	Duty	Yes	18.75	3	600	60	y	unclassified
B-215	Aeration Blower	I3-05	200	Blower Room	E	Duty	Yes	18.75	3	600	60	y	unclassified
B-216	Aeration Blower	I3-05	200	Blower Room	E	Duty	no	18.75	3	600	60	n	unclassified
B-217	Aeration Blower	I3-05	200	Blower Room	E	Standby	Yes	37.5	3	600	60	y	unclassified
B-218	Aeration Blower	I3-05	200	Blower Room	E	Duty	Yes	37.5	3	600	60	y	unclassified
B-219	Aeration Blower	I3-05	200	Blower Room	E	Standby	no	37.5	3	600	60	n	unclassified
LFS-207	Hydrated Lime System	I3-06	200	Above Bioreactors	N	Standby	n/a	30	3	600	60	y	unclassified
AREA 300 SECONDARY CLARIFIERS 1 & 2													
CM-301	Secondary Clarifier Mechanism	I3-03	300	SC Room- 2nd Floor	N	n/a	n/a	1.5	3	600	60	y	unclassified
CM-303	Secondary Clarifier Mechanism	I3-03	300	SC Room- 2nd Floor	N	n/a	n/a	1.5	3	600	60	y	unclassified
P-305	RAS Pump	I3-03	300	SC Room-1st Floor	N	Duty	Yes	2.25	3	600	60	y	unclassified
P-306	RAS Pump	I3-03	300	SC Room-1st Floor	N	Duty	Yes	2.25	3	600	60	y	unclassified
P-307	RAS Pump	I3-03	300	SC Room-1st Floor	N	Standby	Yes	2.25	3	600	60	y	unclassified
AREA 400 THICKENING & DEWATERING													
DAF-402	Dissolved Air Flotation Thickener Package	I3-04	400	2nd Floor of Existing Building	N	n/a	n/a	4.5	3	600	60	n	unclassified
T-408	Thickened WAS Vault	I3-04	400	SC Room-1st Floor	N	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unclassified
FBD-409	Fine Bubble Diffuser	I3-04	400	Thickened WAS Tank	N	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unclassified
P-404	TWAS Pump	I3-04	400	SC Room-1st Floor	E	Duty	Yes	2.25	3	600	60	n	unclassified
P-405	TWAS Pump	I3-04	400	SC Room-1st Floor	N	Standby	Yes	2.25	3	600	60	n	unclassified
BFP-407	Belt Filter Press	I3-04	400	2nd Floor of Existing Building	N	n/a	n/a	9	3	600	60	n	unclassified
P-411	Polymer Dosing Pump	I3-06	400	2nd Floor of Existing Building	N	Duty	no	0	0	0	0	n	unclassified
P-412	Polymer Dosing Pump	I3-06	400	2nd Floor of Existing Building	N	Standby	no	0	0	0	0	n	unclassified
P-406	Booster Pump	I3-04	400	2nd Floor of Existing Building	N	Duty	0	0	0	0	0	n	unclassified
AREA 500 EFFLUENT WATER SYSTEM													
P-501	Effluent Water Pump	I3-03	500	SC Room-1st Floor	N	Duty	no	1	3	600	60	y	unclassified
P-502	Effluent Water Pump	I3-03	500	SC Room-1st Floor	N	Standby	no	1	3	600	60	n	unclassified
STR-503	Automatic Self-Cleaning Strainer	I3-03	500	SC Room 2nd Floor	N	n/a	n/a	0.188	1	120	60	y	unclassified
T-505	Filtered Effluent Water Storage Tank	I3-03	500	Below 2nd floor of Bioreactor Room	E	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unclassified
T-506	Filtered Effluent Water Storage Tank	I3-03	500	Below 2nd floor of Bioreactor Room	E	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unclassified
P-509	Sodium Hypochlorite Dosing Pump	I3-06	500	SC Room-1st Floor	E	Duty	no	<1	1	115	60	y	unclassified
P-510	Sodium Hypochlorite Dosing Pump	I3-06	500	SC Room-1st Floor	E	Standby	no	<1	1	115	60	n	unclassified
AREA 600 SERVICE AIR													
COMP-601	Air Compressor	I3-07	600	Blower Room	E	Duty	no	5.6	3	600	60	y	unclassified
COMP-602	Air Compressor	I3-07	600	Blower Room	E	Standby	no	5.6	3	600	60	n	unclassified
AD-603	Refrigerated Air Dryer	I3-07	600	Blower Room	E	n/a	no	0.656	3	600	60	y	unclassified

MODIFICATION, RELOCATION AND REUSE OF EXISTING EQUIPMENT

1. GENERAL

1.1 Description

.1 This section specifies modification and relocation of existing plant equipment.

.2 Conform to the requirements of Section 11005.

.3 Conform to the requirements of Division 1.

1.2 Equipment List

Equipment Name	Existing Equipment No.	New Equipment No.
Screw Screens and channel	No previous tag no.	SSCR-105 and SSCR-106
Manual Bar Screen and channel	No previous tag no.	MSCR-107
Slide Gates	No previous tag no.	SG-101, SG-102, and SG-103
Sodium Hypochlorite Dosing Pumps	P-24-1 and P-24-2	P-509 and P-510
Submersible Pumps	P-34-1 and P-34-2	P-203 and P-204
Stainless Steel Tanks	TK-81 and TK-82	T-505 and T-506
Progressing Cavity Pump	No previous tag no.	P-404
Mixers	MX-38-1 and MX-38-2	MXR-201 and MXR-202
Knife Gate Valves	No previous tag no.	V-205, V-206, V-207 and V-208
Fine Bubble Diffusers	No previous tag no.	FBD-208, FBD-209, FBD-211, FBD-212 and FBD-409
Aeration Blowers	B-85-S, B-85-1, B-85-2, B-87-S, B-87-1 and B-87-2	B-214, B-215, B-216, B-217, B-218, and B-219
Air Compressors	AC-86A and AC-86B	COMP-601 and COMP-602
Refridgerated Air Dryer	DR-8682	AD-603

1.3 Submittals for Review

.1 Provide submittals for significant modifications or additions to existing equipment. Equipment which is relocated only requires no new submittals

.2 Provide submittals in accordance with Section 11005 and with Section 01300.

.3 Provide submittals for the modified aeration system.

2. PRODUCTS

2.1 Function

.1 The existing screw screens (2) will remove solids greater than 3 mm diameter from the wastewater. The existing manual bar screen (1) will be used as a bypass to the screw screens. The existing isolation slide gates (3) will be used to isolate the channels in which the screw screens and manual bar screen are located.

.2 The existing sodium hypochlorite dosing pumps (2) disinfect wastewater with 12.5% sodium hypochlorite.

.3 The existing submersible pumps (2) will be used to recycle the nitrified mixed liquor and to drain the bioreactors for maintenance/repairs.

.4 The existing stainless steel tanks (2) located adjacent to the bioreactors will be used for storage of filtered effluent water.

.5 The existing progressing cavity pump (1) located in the cake room will be used to pump thickened waste activated sludge.

.6 The existing mixers (2) will provide the mixing requirement for the Anoxic zones in both Biroeactors.

.7 The existing knife gate valves (4) will serve as isolation valves between the Anoxic and the Aerobic zone in both bioreactors

.8 The existing fine bubble diffusers will provide the aeration requirements in Aerobic 1 and Aerobic 2 cell in both Bioreactors and the mixing requirement in the TWAS tank. Refer to Section 11531 for further details on the requirements of the Fine Bubble Aeration system.

.9 The aeration blowers (6) will provide the airflow requirements to the aeration system in the bioreactors and the TWAS tank.

.10 The air compressors (2) will provide air to the flow control valves, the DAF unit, the BFP unit and to various locations in the plant that require compressed air. Refer to the drawings for exact locations.

.11 The Refrigerated air dryer (1) is required to dry the air prior to distribution to the flow control valves to eliminate any moisture getting into the valves.

.12 Refer to the drawings for location of all pieces of equipment.