



**Milwaukee**  
**Water Works**

*Safe, Abundant Drinking Water.*

**City of Milwaukee  
Department of Public Works  
Milwaukee Water Works**

**Specifications for**

**Official Notice No. 93-1-2016**

**Howard Water Treatment Plant**

**HP-184: COAGULATION BASIN #4 FLOCCULATOR UPGRADES**



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Management Engineer

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Superintendent

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## GENERAL REQUIREMENTS

- PART 1 DEPARTMENT OF PUBLIC WORKS – GENERAL SPECIFICATIONS  
(NOTE: The Department of Public Works General Specifications applies to all contracts. These specifications are in a separate booklet but are part of these contract documents.)
- PART 2 SPECIFIC OFFICIAL NOTICE AND GENERAL OFFICIAL NOTICE  
The Specific Official Notice as it appears in The Daily Reporter and the General Official Notice are part of these contract documents.
- PART 3 SPECIFICATIONS  
HP-184: COAGULATION BASIN #4 FLOCCULATOR UPGRADES

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## JOB REQUIREMENTS

### HP-184: COAGULATION BASIN #4 FLOCCULATOR UPGRADES

**JR-1** FORM OF BID

Contractor shall submit a lump sum bid for furnishing the complete job in accordance with plans and specifications.

**JR-2** JOB LOCATION

The Howard Water Treatment Plant is located at 3929 South 6<sup>th</sup> Street, Milwaukee, WI 53221.

**JR-3** GENERAL DESCRIPTION OF WORK

The work to be performed under the provisions of this contract and as set forth in these documents consists of the supply and installation of all materials, labor, supervision, inspection, and rentals for all work involved and described below:

Coagulation Basin #4 Flocculator Upgrades

The complete removal and disposal of the existing flocculator system for Coagulation Basin #4 and the furnishing and installation of a new flocculator system (paddles & paddle bracing to be re-used).

Interior “dry” inspection of idler shaft sprocket bearing sleeve assemblies for the longitudinal and cross sludge collector system in Sedimentation Basin #4.

**JR-4** CONTRACT DRAWINGS

The contract drawings upon which the proposal is to be based are listed hereunder:

HP-184-G1                      Coagulation Basin #4 Flocculator Upgrades  
Title Sheet & Drawing Index

HP-184-M1                      Coagulation Basin #4 Flocculator Upgrades  
Flocculator System Details

The above drawings are general in nature and are intended to indicate the relative locations of the equipment specified in the space provided. It shall be the responsibility of the successful bidder to verify all dimensions and ascertain the suitability of the specific equipment to be furnished in regards to the space allotted.

**JR-5** REFERENCE DRAWINGS

Reference drawings relating to the project will be available for viewing at the Milwaukee Water Works Linnwood Water Treatment Plant located at 3000 North Lincoln Memorial Drive, Milwaukee, WI 53211, by appointment only. To schedule an appointment email both [philip.greuel@milwaukee.gov](mailto:philip.greuel@milwaukee.gov) and [anthony.aquila@milwaukee.gov](mailto:anthony.aquila@milwaukee.gov).

Note that reference drawings are for general information only. The drawings are assumed to be accurate, however, the contractor is responsible for field verification of any dimensions essential to the work.

JR-6 PRE-BID MEETING

A **MANDATORY** Pre-Bid Meeting is scheduled for **Thursday, September 22, 2016 at 10:00 a.m.** in the Howard Water Treatment Plant Conference Room; 3929 South 6<sup>th</sup> Street, Milwaukee, WI 53221. The City of Milwaukee (City) will **ONLY** receive bids from prospective bidders who are in attendance at the **MANDATORY** Pre-Bid Meeting. The official envelope for submitting a bid will be available at the **MANDATORY** Pre-Bid Meeting. **All attendees are required to e-mail anthony.aquila@milwaukee.gov and philip.greuel@milwaukee.gov at least 24 hours in advance of the Pre-Bid Meeting to be placed on the visitor list for access to the Howard Water Treatment Plant.**

Site Visit: A site visit will take place at the conclusion of the **MANDATORY** Pre-Bid Meeting.

JR-7 PRE CONSTRUCTION MEETING

Within ten (10) business days after Notice to Proceed is issued, a pre-construction (pre-submittal) meeting will be held at the job site. The meeting will include discussion of design and equipment function and system operation details of the project.

JR-8 PRE-INSTALLATION MEETING

No less than ten (10) business days prior to the start of construction, a meeting will be held at the job site to discuss security requirements, scheduling of work, equipment delivery and storage, and other construction details of the project.

JR-9 JOB SCHEDULE

Within ten (10) business days after Notice to Proceed is issued, the contractor shall submit a construction/submittal schedule for approval. The schedule shall be made in sufficient detail to indicate dates of each significant operation. The schedule shall be such that the entire job will be completed within the specified completion time. **Contractor shall submit the schedule in hard copy and electronic format using Microsoft Project 2010. However, if an electronic copy cannot be provided in this format, a copy shall be transmitted electronically in a pdf format and a hard copy of any updated schedules must be provided at all progress meetings.**

The contractor shall place all orders for materials promptly after award of the contract. With submittal of the construction schedule, contractor shall include a schedule of delivery of all major materials and equipment required for the job.

The contractor shall immediately notify the City, in writing, of any problems with meeting this schedule. If the construction schedule cannot be met because of materials or equipment deliveries, the contractor shall be required to submit purchase orders and

confirmations of delivery, showing the date the order was placed and the promised date of delivery.

JR-10 COMPLETION DATE

All work on this project shall be completed according to the following schedule:

No Construction Work Before:	Notice to Proceed
Substantial Completion:	January 31, 2017
Final Completion:	February 28, 2017

JR-11 CHARGE FOR INSPECTION

The contractor will be charged \$350.00 per day, per inspector, for each and every day inspection is required on this contract after the date allowed for completion or after such extension of time as may have been granted. This charge is further defined in Section 2.5.11 of the Department of Public Works (DPW) General Specifications.

JR-12 PROGRESS PAYMENTS

Within ten (10) business days after the Notice to Proceed is issued, the contractor shall submit to the City for approval a schedule showing the breakdown of the contract with quantities and prices as a basis for checking and computing progress estimates. The values shown in the approved breakdown shall be used for pay purposes only and shall not be used as a basis for additions to or deductions from contract work.

The contractor shall take note of the two (2) wage scales included with this bid - the Prevailing Wage Rate issued by the State of Wisconsin, and the Davis-Bacon Wage documents as issued by the U.S. Department of Labor Wage and Hour Division. The contractor is required to pay the **HIGHER** of the two (2) wage scales.

When the contractor proceeds properly and with diligence to perform and complete the work on this contract, the Commissioner of Public Works (Commissioner) may, from time to time as the work progresses, grant to the contractor an estimate of the amount already earned. In making such progress estimates, there shall be retained 5% of each progress estimate until final completion and acceptance of the work; except that after 50% of the work has been completed and the Commissioner finds that satisfactory progress is being made and all conditions complied with, the Commissioner may authorize any of the remaining progress payments to be paid in full to the contractor with no amount retained. Payment requests should be sent by U.S. mail to Carrie Lewis, Superintendent, Milwaukee Water Works, Room 409, Frank P. Zeidler Municipal Building, 841 North Broadway, Milwaukee, WI 53202.

In accordance with Charter Ordinance 7.26 as amended 6-1-72, payment for materials delivered to the work or storage site may be authorized by the Commissioner providing the following terms and conditions are met:

- A. The work is progressing properly and such materials as specified are properly stored and suitable for permanent incorporation in the work.

- B. Materials designated for pay in the next progress estimate after delivery shall be limited to fabricated or manufactured components which are assembled in final form ready for placement in the work.
- C. The following forms shall be submitted with requests for payment:
  - 1. Progress Estimate and Request for Payment for Fabricated Materials or Components Properly Stored (Field Engineer shall verify that material is as specified and properly stored).
  - 2. Certification of the contractor or his duly authorized representative.
- D. The contractor shall be responsible for the safeguarding of any such materials against loss or damage whatsoever, and in the case of any loss or damage, the contractor shall replace such lost or damaged materials at no cost to the City. The Commissioner shall reserve the right to deduct from ensuing progress estimates the value of any lost or damaged materials until the contractor restores such loss or damage.
- E. The Commissioner may limit processing progress estimates to those cases where the amount earned in any pay period for work and materials is \$5,000 or more.
- F. Any materials for which payment has been made shall not be removed from the work or storage site without the specific written approval of the Commissioner.

**JR-13 AMERICAN IRON AND STEEL REQUIREMENT**

All iron and steel products provided by the contractor shall be produced in the United States and shall comply with the American Iron and Steel Requirement (AIS). Contractor to provide AIS certification for all iron and steel products supplied for this contract.

**JR-14 FORMAL CORRESPONDENCE**

Formal correspondence shall be addressed to: Carrie M. Lewis, Superintendent, Milwaukee Water Works, 841 North Broadway, Room 409, Zeidler Municipal Building, Milwaukee, WI 53202. Formal correspondence includes:

- 1. Progress Payments
- 2. Request for Change Order
- 3. Request for extension of Completion Date
- 4. Disputes concerning Payment or Field Issues
- 5. Submittals

**END OF SECTION**

**SECTION 01010****SUMMARY OF WORK****PART 1 SCOPE OF THE CONTRACT****1.01 WORK COVERED IN THE CONTRACT DOCUMENTS****Coagulation Basin #4 Flocculator Upgrades**

- A. This contract includes the furnishing of all equipment, labor, supervision, inspection, materials, and appurtenances for and in connection with the installation of a new flocculator system for Coagulation Basin #4 at the Howard Water Treatment Plant as shown on the contract drawings and further specified herein.
- B. The work to be performed, which is detailed in the contract specifications and drawings, shall include, but not be limited, to the following:
1. Removal and proper disposal of the existing carbon steel shafts, couplings, stuffing boxes, and Ultra High Molecular Weight Polyethylene (UHMWPE) & cast iron pillow block bearings.
  2. Furnishing and installation of new UHMWPE (submersible) bearings and cast iron (non-submersible) pillow block bearings.
  3. Furnishing and installation of new stainless steel shafts, hubs, and compression couplings.
  4. Furnishing and installation of new stuffing boxes.
  5. Removal, storage, and re-use of the existing flocculator paddles and paddle bracing.
  6. Modifications/adjustments to concrete pedestals, as needed to provide proper alignment of flocculator shafts. Replace bearing sub-baseplates, as needed to obtain a proper bearing alignment.
  7. Clean and restore worksite to original condition.
  8. Perform a “dry” interior idler shaft sprocket bearing sleeve assembly inspection of the longitudinal and cross sludge collector system in Sedimentation Basin #4. The work shall include the thorough inspection of all 20 lower cornershaft hub assemblies (10 influent and 10 effluent) of the sedimentation basin. Inspect each assembly (bearing sleeve body, sprocket halves, clamping bands, etc.) for signs of damage/wear, and

recommend measures (adjustment/repair/replacement) for extending useful life of the entire sludge collector system.

1.02 CONTRACTOR'S QUALIFICATIONS

- A. Contractor shall be thoroughly experienced and upon request be able to provide evidence of having at least five (5) years successful experience installing like systems.

1.03 CONTRACTOR'S REPRESENTATIVE

- A. The requirements of the contractor's representative are defined in Section 2.4.2 of the Department of Public Works General Specifications.

1.04 WORK HOUR RESTRICTIONS

- A. Work operations, including daily startup activities under this contract, shall be limited to the period from 7:00 a.m. to 3:30 p.m. daily. Work operations shall be limited to Monday through Friday, excluding City holidays.

1.05 SPECIFICATIONS AND STANDARDS

- A. All materials, general design, design loads, allowable stresses, joint design, shop fabrication and field construction shall conform to the requirements and recommendations of the following latest standard specifications of all technical societies, organizations, associations, and codes of local and state authorities which govern the type of work specified herein:
1. Technical society, organization, or association governing the type of work covered by this contract as listed in Section 2.1.2 of the Department of Public Works General Specifications.
- B. The contractor shall be familiar with the requirements of the listed agencies. Any conflict in the contract drawings, these specifications, the contractor's design or construction methods shall result in this contractor performing in a manner which conforms to the agency requirements.
- C. All workmanship and installation methods shall be according to industry standards, including, but not limited to the aforementioned.

1.06 EXISTING AND GENERAL CONDITIONS

The Howard Water Treatment Plant uses coagulation/settling basins as part of the water treatment process. Each coagulation basin has a number of flocculator paddle assemblies that push water/floc toward the Drive House to the basin drains for removal.

Coagulation Basin #4 (The basin furthest west) has inside dimensions of 92' x 99' and contains 5 flocculator paddle rows running east-west with 5 paddle assemblies in each row. The flocculator shafts rest on concrete pedestals containing UHMWPE block bearings.

Along the east side of Coagulation Basin #4 is the Drive Pit that contains the 5 electric motor drives that run the flocculator assemblies.

## **PART 2 SHOP DRAWINGS**

- 2.01 Within fifteen (15) business days after the Notice to Proceed, the contractor shall submit to the City for approval a minimum of four (4) copies of all shop, fabrication, assembly, and other drawings required by the specifications; all drawings of equipment and devices offered by the contractor; all drawings showing essential details of any change in design or construction proposed by the contractor; and all necessary layouts. Drawings of equipment and devices shall show sufficient detail to adequately depict the construction and operation of each item. Each shop drawing shall bear City, the name and location of the structure, job number, the name of the contractor, the date of the drawing, the date of each correction or revision, and the specification numbers and plan sheet numbers applicable thereto. The contractor shall allow a minimum of ten (10) working days for the City to review submittals, each time a drawing is submitted.
- 2.02 Three (3) revised copies of each drawing shall be submitted each time a drawing is returned to the contractor for revision. Upon final review of a drawing, six (6) copies shall be submitted to the City for record and distribution to authorized persons.
- 2.03 After review by the City, all such drawings shall become a part of the contract documents and the work or equipment shown thereby shall be furnished and installed as shown unless otherwise required by the City. No work shall be performed or equipment manufactured until drawings have been approved. The approval of drawings submitted by the contractor will be for, and will cover only general conformity to the plans and specifications and will not constitute a blanket approval of all dimensions, quantities, or details of the material or equipment shown by such drawings, nor shall such approval relieve the contractor of responsibility for errors contained therein.
- 2.04 At the completion of work and prior to final payment, the contractor shall provide the City with six (6) sets of "as-built" drawings for the completed job showing all new equipment and roofing. The contractor will be responsible for the accuracy of these drawings. Two (2) copies of the above "as-built" drawings shall be submitted in an electronic format compatible with the latest edition of MICROSTATION®.

## **PART 3 GUARANTEE**

- 3.01 Manufacturer's warranties shall be submitted to the City by the contractor.

- A. The contractor shall provide a five (5) year manufacturer's warranty for the stainless steel shafts, which shall cover both labor and material with no dollar limitations and shall commence from the date of final acceptance of the work covered by this contract.
  - B. The contractor shall provide manufacturer's warranty for the UHMWPE and cast iron pillow block bearings, which shall be for a period of one (1) year commencing from the date of final acceptance of the work.
  - C. During the materials and workmanship warranty period, the contractor shall make all needed repairs arising out of defective workmanship and/or materials that in the judgement of the Commissioner of Public Works (Commissioner) is deemed necessary.
  - D. Whenever defective equipment or materials are replaced, the equipment or materials shall be guaranteed for 5 (or 1) years from the date of satisfactory replacement/performance.
- 3.02 If after ten (10) business days of mailing a notice in writing to the contractor, or his agent, the said contractor has neglected to make, or undertake with due diligence to make, the aforesaid repairs, the City is hereby authorized to make such repairs at the contractor's expense in the case of an emergency, where in the judgment of the Commissioner, a delay would cause serious loss or damage. Repairs may be performed without a notice being sent to the contractor, and the contractor shall pay the cost thereof.

#### **PART 4 OPERATION AND MAINTENANCE DATA AND MANUALS**

- 4.01 Submit four (4) sets of manuals prior to final inspection, bound in 8-1/2 x 11-inch text pages, three D-side ring capacity expansion binders with durable plastic covers.
- 4.02 Prepare binder covers with printed title "OPERATION MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- 4.03 Internally subdivided the binder contents with permanent page dividers, logically organized as described below, with tab titling clearly printed under reinforced laminated plastic tabs.
- 4.04 Contents: Prepare a table of contents for each volume, with each product or system description identified, typed on 30-pound white paper.
- 4.05 The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered.
- 4.06 Manuals and other data shall be printed on heavy, first quality paper, 8 1/2 x 11-inch size with standard three-hole punching. Drawings and diagrams shall be reduced to 8 1/2 x

11-inches or 11 x 17 inches. Where reduction is not practicable, larger drawings shall be folded separately and placed in envelopes that are bound into the manuals. Each envelope shall bear suitable identification on the outside.

- 4.07 Material shall be assembled and bound in the same order as it appears in the specifications, and each volume shall have a table of contents and suitable index tabs.
- 4.08 All submittals shall be marked with contract identification, and inapplicable information shall be obliterated or deleted.
- 4.09 Directory, listing names, addresses, and telephone numbers of City, contractor, subcontractors, and major equipment suppliers.
- 4.10 Project documents and certificates, including the following:
  - A. Shop drawings and product data
  - B. Certificates
  - C. Photocopies of warranties and bonds, if required.
- 4.11 Copies will be returned after final inspection, with City's comments. Revise content of documents as required prior to final submittal.
- 4.12 Submit final volumes within ten (10) business days after receipt of City's comments.

**END OF SECTION**

**SECTION 01039****COORDINATION AND MEETINGS****PART 1 GENERAL**1.01 INDEX

- A. Coordination
- B. Alterations
- C. Cutting and Patching
- D. Pre-construction Meeting
- E. Pre-installation Meetings
- F. Progress Meetings

1.02 COORDINATION

- A. Coordinate scheduling, submittals, and work on the various specification sections to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify that the City of Milwaukee (City) requirement for operating equipment is compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical work. Follow routing shown for pipes and conduit, as closely as practicable; place runs parallel with line of structure. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.
- D. Coordinate completion and clean-up of work of separate sections in preparation for substantial completion.
- E. Coordinate correction of defective work and work not in accordance with contract documents to minimize disruption of the City's activities.

### 1.03 ALTERATIONS

- A. Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- C. Remove, cut and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to original condition.
- D. Refinish visible existing surfaces to original condition.
- E. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work should match existing adjacent work in texture and appearance.
- F. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to the City.
- G. Patch or replace portions of existing surfaces that are damaged, lifted or discolored, or showing other imperfections.
- H. Finish surfaces as specified in individual product sections.

### 1.04 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affects:
  - 1. Structural integrity of element.
  - 2. Integrity of weather-exposed or moisture resistant element.
  - 3. Efficiency, maintenance or safety of element.
  - 4. Visual qualities of sight-exposed elements.
  - 5. Work of City or separate contractor.

- C. Execute cutting, fitting and patching to complete work, and to:
1. Fit the several parts together, to integrate with other work.
  2. Uncover work to install or correct ill-timed work.
  3. Remove and replace defective and non-conforming work.
  4. Remove samples of installed work for testing.
  5. Provide openings in elements of work for penetrations of mechanical and electrical work.
  6. Execute work by methods which will avoid damage to other work, and provide proper surfaces to receive patching and finishing.
  7. Cut rigid materials using masonry saw or core drill.
  8. Restore work with new products in accordance with requirements of contract documents.
  9. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
  10. Maintain integrity of wall, ceiling, deck or floor construction; completely seal voids.
  11. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
  12. Identify any hazardous substance or condition exposed during the work to the City.

#### 1.05 PRE-CONSTRUCTION MEETING

- A. The City will schedule a pre-construction conference after Notice to Proceed.
- B. Attendance is required of City, contractor, manufacturer's representative, and installers whose work interfaces with the project. Attendees are required to contact Milwaukee Water Works at (414) 286-3630 and/or (414) 286-2428 at least 24 hours in advance for placement on that day's visitor list for access to the meeting site.

## C. Agenda

1. Submission of executed bonds and insurance certificates.
2. Submission of list of subcontractor, list of products, schedule of values, and progress schedule.
3. Designation of personnel representing the parties in contract.
4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, change orders and contract closeout procedures.
5. Scheduling and reports.
6. Use of premises by City and contractor.
7. Construction facilities and controls provided by City.
8. Temporary utilities and controls provided by City, if any.
9. Security and housekeeping procedures.
10. Procedures for testing.
11. Procedures for start-up of equipment.
12. Requirements for maintaining record documents.
13. Inspection and acceptance of equipment put into service during construction period.
14. Conflicts.
15. A review of contract documents shall be made, and deviations or differences shall be resolved.
16. Establish which areas on-site will be available for use as storage areas and working area.
17. Review of existing conditions including deck substrate conditions, structural loading limitations of roof deck, utility equipment to remain in service for duration of project that roof work must accommodate adequate ventilation of station, architectural elements to be reused.

**1.06 PRE-INSTALLATION MEETING**

- A. When determined by the City, the contractor shall convene a Pre-installation Meeting at worksite prior to commencing work.
- B. Require attendance of parties directly affecting, or affected by work of the specific section.
- C. Notify all parties four (4) days in advance of meeting date.
- D. Prepare agenda, preside at meetings, record minutes, and distribute copies within three (3) days after the meeting to participants, with one copy to the City.
- E. Review conditions of installation, preparation and installation procedures, and coordination with related work.

**1.07 PROGRESS MEETINGS**

- A. The City will schedule and administer meetings throughout progress of the work, as required.
- B. The City will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within three (3) days to the City, participants, and those affected by decisions made.
- C. Attendance Required: Contractor's general superintendent, major subcontractors and suppliers, City, as appropriate to agenda topics for each meeting.
- D. Agenda
  - 1. Review minutes of previous meeting.
  - 2. Review of work.
  - 3. Field observations, problems, solutions, and decisions.
  - 4. Review submittals, schedules.
  - 5. Maintenance of progress schedule.
  - 6. Planned progress during succeeding work period.
  - 7. Other business relating to work.

**END OF SECTION**

**SECTION 01500****JOB SITE SECURITY, UTILITIES AND FACILITIES****PART 1 – SCOPE**1.01 INDEX

- A. PART 1 - Scope
- B. PART 2 - Security and Safety
- C. PART 3 – City of Milwaukee Permits
- D. PART 4 - Occupancy During Construction
- E. PART 5 - Electrical Power and Telephone Service
- F. PART 6 – Heat and Ventilation
- G. PART 7 – Water
- H. PART 8 - Toilet Facilities
- I. PART 9 – Deliveries

1.02 GENERAL CONDITIONS

- A. All operations shall be carried on with a minimum of damage and disturbance. All damages shall be repaired to the original condition to the satisfaction of the Water Engineering representative.
- B. All removals become the property of the contractor and shall be disposed of off-site, unless otherwise specified.

1.03 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials, dissipate humidity and/or prevent accumulation of dust, fumes, vapors or gases.

1.04 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and protect existing facilities and adjacent properties from damage caused by construction operations and demolition.

- B. Protect non-owned vehicular traffic, stored materials, site and structures from damage.
- C. Utilize road plates to protect underground utilities and structures, and to minimize disturbances caused by construction traffic.

#### 1.05 PROGRESS CLEANING

- A. Waste materials, debris and rubbish shall be removed daily after work. Maintain site in a clean and orderly condition.
- B. Clean and repair damage caused by removals or installations.
- C. Restore existing facilities used during construction to original condition.

### **PART 2 – SECURITY AND SAFETY**

#### 2.01 GENERAL

- A. The Milwaukee Water Works (MWW) consists of a number of facilities to treat and deliver drinking water to the City of Milwaukee (City) and surrounding suburban communities. To ensure the safety and security of drinking water, the MWW has instituted protocols for visitors and contractors to control entry to these facilities. It is essential that contractors strictly comply with the security policy outlined in the specification section.
- B. For this project, the contractor shall continuously coordinate building and site security measures, including accessing the site, with the designated Water Engineering representative or Michael Schaefer, Water Security Manager, at (414) 286-3465, or facsimile: (414) 286-2672.

#### 2.02 SCOPE

- A. Any and all City agencies and contractors engaged for work at MWW facilities shall be required to attend a "Pre-Construction Security Briefing" before any contracted work can be initiated. At this meeting, the contractor and subcontractors shall have a detailed briefing with discussions regarding the following items:
  - 1. MWW site security policies and procedures
  - 2. Contractor and subcontractor obligations
  - 3. Permit system

## 2.03 POLICIES

- A. During the "Security Briefing" portion of the Pre-Construction Meeting, MWW Security staff shall provide the contractor with site polices to be reviewed by the contractor and subcontractors. These documents may include:
1. Lock-out/Tag-out Policy
  2. Confined Space Entry Procedures
  3. Evacuation Procedure for Propane, Lox, and Ammonia Releases
  4. Personal Protective Equipment Guidelines
  5. No Smoking Policy
  6. Prohibited Materials
- B. Additionally, the contractor will be provided:
1. Contact phone numbers for MWW staff
  2. On-site parking location and designated construction entrance
  3. Site security policy and procedures
- C. The contractor shall be required to review these documents and is responsible for conveying the contents of these submittals to their employees, subcontractors, and any other parties working directly or indirectly for them. These policies apply equally to all contractors. Failure to comply with established policies and procedures may result in access privileges being withdrawn.
- D. MWW staff shall provide a "walk-through" session with the contractor to review area layout and site plans as part of the orientation process and to establish the specific work areas necessary for the contractors to perform their scope of work. Topics covered in this session include site overview with hazards, Material Safety Data Sheets (MSDS), fire extinguisher placement, and the storm water protection policy.

## 2.04 CONTRACTOR RESPONSIBILITIES

- A. Contractors shall provide the following documents **no less than seven (7) business days prior** to the start of contracted work:
1. Scope of work to be performed.
  2. Name of primary contractor's onsite representative.

3. Names of all companies subcontracted to do work on the project.
4. Completed "Contract Firm Registration Form" (see Attachment 'A') for prime contract firm and every subcontract firm.
5. A "Contractor Employee Registration Form" completed for the contractors and every employee who needs to be granted site access (see Attachment 'B').
6. List of items to be stored on-site.
7. MSDS for all chemicals to be used/stored on-site.

NOTE: It is the responsibility of the contractor to facilitate gathering and submittal of the "Contractor Employee Registration Form" for all subcontractors working on the project. A subcontractor is defined as an individual or firm hired by the primary contractor to perform a specific task as part of the overall project. This would not include an organization making deliveries of supplies or equipment to the job site; procedures for these firms are covered under Part 8, "DELIVERIES".

- B. In the event it is necessary for the contractor to add additional employees to the list of approved personnel, a minimum of 72 hours, or three (3) business days must be allowed for processing of the request. Site access will be denied to the additional personnel until processing is complete.
- C. Contractor firms are obligated to notify MWW in a timely manner of any site-authorized staff that leaves the employ of the contractor.
- D. At no time should anyone but the contractor be contacting MWW employees with issues or access requests. If a request for site access does not come from the contractor, the request will not be processed.
- E. During the time period the contractor is on-site, they must agree to:
  1. Notify the Water Plant Manager immediately of any significant chemical spills or leaks.
  2. Maintain normal non-toxic breathable air quality, through adequate ventilation at their work site.
  3. Perform no equipment isolations or tie-ins without the signed approval of site management.
  4. Restrict movement to the specific work areas within the site to perform contractor's scope of work.

## 2.05 CONTRACTOR SPECIAL WORK PERMITS

- A. Contractors must notify Engineering/site management staff of any welding, torching, or potentially hazardous or operational impact request prior to commencing such operations. Special work permits shall be issued to the contractor and these must also be displayed at the work site.
- B. Failure to comply with the terms of the special work permits or provisions that provide for MWW employee safety shall be cause for revocation of such permits, and the contractor may be forced to discontinue activities at the site.

## 2.06 CONTRACTOR IDENTIFICATION AND DAILY REGISTRATION

- A. All contractors shall be required to show a valid picture ID card to sign-in at the start of every work day and to sign out at the end of every work day. A MWW employee or designated security representative shall be on-site to ensure compliance. Any identification tags or lanyards issued by MWW are to be worn while on-site and returned to site management upon completion of contracted work. A fee of \$50.00 each will be charged for any identification tags or lanyards issued by MWW that are not returned.

## 2.07 CONTRACTOR GATE ACCESS AND PARKING

- A. Contractors must comply with the terms of entry for the site and park only in the areas designated for parking by the MWW site representative.

NOTE: Parking privileges may be rescinded at any time as site operational requirements dictate.

## **PART 3 - CITY OF MILWAUKEE PERMITS**

### 3.01 GENERAL

- A. The contractor shall obtain the necessary permits for this project.

## **PART 4 - OCCUPANCY DURING CONSTRUCTION**

### 4.01 GENERAL

- A. The MWW facility shall be in continuous operation during this contract. Contractor and subcontractors are to take any and all necessary precautions to ensure there is no interference with daily operations or security. MWW personnel shall be continuously occupying the facility. All hours of contractor's operations shall be coordinated with the MWW site or Water Engineering representative.

**PART 5 - ELECTRICAL POWER AND TELEPHONE SERVICE**5.01 GENERAL

- A. On-site electrical service is NOT available for contractor use at the Linnwood Water Treatment Plant site. The contractor is required to request a dedicated service for job trailers from the electric utility.
- B. Contractor shall provide and maintain all necessary power cords and electrical lighting, and shall make all necessary connections in accordance with OSHA regulations.
- C. Contractor shall provide, maintain, and pay for his own wireless telephone and internet service.

**PART 6 – HEATING AND VENTILATION**6.01 GENERAL

- A. Contractor shall provide and maintain all necessary heating and ventilation equipment required for the contract. Contractor shall perform all air treatment procedures and make all necessary connections in accordance with OSHA regulations.

**PART 7 - WATER**7.01 GENERAL

- A. Water is available for the contractor at the site and may be obtained from the fixture(s) so designated by MWW staff or Water Engineering representative.
- B. Contractor and subcontractors must provide their own hoses, back-flow preventer and any other connection appurtenances required for the contract.

**PART 8 - TOILET FACILITIES**8.01 GENERAL

- A. On-site toilet facilities are NOT available for contractor use during project duration. Contractor shall furnish their own portable facilities. Contractor shall maintain these toilet facilities in a sanitary condition throughout the duration of the project and shall remove them from site at the end of the project. The placement and location of the temporary portable toilets shall be coordinated with the Water Plant Manager and Water Engineering representative.

**PART 9 - DELIVERIES**9.01 **GENERAL**

- A. Contractor shall coordinate the delivery of all equipment, materials, dumpsters, portable toilets (and their maintenance) and other required items required for the contract work with the MWW staff. A minimum of 24-hours prior notice in advance of the desired delivery date shall be transmitted to the designated Water Engineering representative.
  
- B. Contractor shall provide the following information in the notification:
  - 1. Trucking/Delivery company
  - 2. Driver name
  - 3. Truck license plate number
  
- C. The driver of the delivery vehicle is required to display picture identification as a prerequisite for entry to the MWW facility for the delivery. Failure to comply with the above will result in denial of project site access, requiring the contractor to reschedule delivery.

**END OF SECTION**

# Milwaukee Water Works

*Safe, Abundant Drinking Water.*

HP-184  
Attachment "A"

## FORM A

### CONTRACT FIRM REGISTRATION FORM

CONTRACTOR: \_\_\_\_\_

PLANT/SITE: \_\_\_\_\_

CONTRACT/SERVICE ORDER NO. \_\_\_\_\_

WATER ENGINEERING PROJECT NO. \_\_\_\_\_

PRIMARY CONTACT PERSON: \_\_\_\_\_

OFFICE PHONE NUMBER: \_\_\_\_\_

CELL PHONE NUMBER: \_\_\_\_\_

REQUESTED WORK HOURS (00am – 00pm): \_\_\_\_\_

NUMBER OF EMPLOYEES TO BE WORKING ON-SITE: \_\_\_\_\_

**Signature certifies receipt of the materials outlined in  
Contract Section 01500, Part 2 – Security and Safety, Section 2.04.**

SIGNATURE: \_\_\_\_\_

*PRIMARY CONTACT PERSON*

DATE: \_\_\_\_\_

***Accompanying this form should be a complete listing of all  
equipment to be stored on site for the duration of the project.***

# Milwaukee Water Works

*Safe, Abundant Drinking Water.*

HP-184  
Attachment "B"

## FORM B

### CONTRACTOR EMPLOYEE REGISTRATION FORM

Contract Firm: \_\_\_\_\_

Plant/Site/Project: \_\_\_\_\_

Employee Name (Printed): \_\_\_\_\_

This certifies that I have received the building site security and safety policies.

EMPLOYEE  
SIGNATURE: \_\_\_\_\_  
*Required*

DATE: \_\_\_\_\_

### ONSITE PARKING

- I will always be driving a Company vehicle.
- I will always be a passenger in a vehicle.
- I will be driving my personal vehicle. (If checked, complete and sign the next section.)

### **Contractor Personal Vehicle Liability Waiver**

EMPLOYEE VEHICLE  
MAKE & MODEL: \_\_\_\_\_ LICENSE PLATE: \_\_\_\_\_

I, hereby agree to hold harmless the City of Milwaukee for any and all damage, loss or injury, which may occur as a result of utilizing the contractor onsite parking area.

EMPLOYEE  
SIGNATURE: \_\_\_\_\_  
*Required*

DATE: \_\_\_\_\_

**SECTION 01600****MATERIALS AND EQUIPMENT****PART 1 – GENERAL****1.01 PRODUCTS**

- A. Products: Defined as new material, machinery, components, equipment, fixtures and systems forming the work; does not include machinery and equipment used for preparation, fabrication, conveying and erection of the work.
- B. All materials that will be in direct contact with potable drinking water shall be in compliance with NSF Standard 61 Drinking Water System Components – Health Effects.
- C. Do not use materials and equipment removed from existing premises, except as specifically permitted.
- D. Assure standardization and uniformity in all parts of the work by providing like items of equipment or certain materials as products of one manufacturer.
- E. Uniformity in equipment items is required in order to provide the City with interchangeability capabilities, simplified spare parts inventories and standardized maintenance programs and manufacturers services.

**1.02 TRANSPORTATION AND HANDLING**

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

**1.03 STORAGE AND PROTECTION**

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.
- B. Provide off-site storage and protection when site does not permit on-site storage or protection.
- C. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- D. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

- E. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.
- F. Spare parts and special tools shall be properly marked to identify the associated equipment by name, equipment and part number. Delivery of spare parts and special tools shall be made prior to the initial test run of the associated equipment.

**END OF SECTION**

**SECTION 01700****CONTRACT CLOSEOUT****PART 1 - GENERAL**1.01 **SUMMARY**A. **INDEX**

1. Closeout Procedures
2. Final Cleaning
3. Adjusting
4. Project Record Documents
5. Operation and Maintenance Data
6. Guarantee
7. Spare Parts and Maintenance Materials

## B. Related Sections

1. Section 01010 – Summary of Work

1.02 **CLOSEOUT PROCEDURES**

- A. Submit written certification that contract has been reviewed, work has been inspected, and work is complete in accordance with the contract and is ready for City of Milwaukee (City) inspection.
- B. Provide submittals to City that is required by governing or other authorities.
- C. Submit final application for payment identifying total adjusted contract price, previous payments, and sum remaining due.

1.03 **FINAL CLEANING**

- A. Execute final cleaning prior to final inspection.
- B. Clean equipment and fixtures to a sanitary condition.
- C. Clean site, sweep paved areas, rake clean landscaped surfaces.

- D. Remove waste and surplus materials, rubbish, and construction facilities from the work site.

#### 1.04 ADJUSTING

- A. Adjusting operating products and equipment to ensure smooth and unhindered operation.

#### 1.05 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following record documents; record actual revisions to the work:
  - 1. Contract Drawings
  - 2. Specifications
  - 3. Addenda
  - 4. Change Orders
  - 5. Reviewed shop drawings, product data, and samples.
- B. Store record documents separate from documents used for construction.
- C. Record information concurrent with construction progress. Electrical boxes and conduit location determined in the field and not specifically shown on the drawings shall be recorded and documented.
- D. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number
  - 2. Product substitutions or alternate utilized.
  - 3. Changes made by addenda or change orders.
- E. Record documents and shop drawings: Legibly mark each item to record actual construction including:
  - 1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
  - 2. Field changes of dimensions and details.

3. Details not on original contract drawings.
- F. Delete consultant, City title block and Engineer's seal from all documents.
- G. Submit five (5) sets of documents with one (1) electronic version to City prior to final application for payment.
1. Accompany submittal with transmittal letter containing the following:
    - a) Date
    - b) Project title and number
    - c) Contractor's name and address
    - d) Title and number of each record document
    - e) Certification that each document as submitted is complete and accurate.
    - f) Signature of contractor, or his/her authorized representative.

#### 1.06 OPERATION AND MAINTENANCE DATA

- A. Submit six (6) sets prior to final inspection, bound in 8 ½ x 11-inch text pages, three D-side ring binder capacity expansion binders with durable plastic covers.
- B. Prepare binder covers with printed title "OPERATION MAINTENANCE INSTRUCTIONS", title of project, and subject of binder when multiple binders are required.
- C. Internally subdivide the binder contents with permanent dividers, logically organized as described below, with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a table of contents for each volume, with each product or system description identified, typed on 30-pound white paper.
1. Part 1: Directory, listing names, addresses, telephone numbers and emails of City, contractor, subcontractors, and major equipment suppliers.
  2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify name, addresses, telephone numbers and emails of subcontractors and suppliers. Identify the following:

- a) Significant design criteria.
  - b) List of equipment.
  - c) Parts list for each component.
  - d) Operating instructions.
  - e) Maintenance instructions for equipment and systems.
  - f) Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
- a) Shop drawings and product data.
  - b) Air and water balance reports.
  - c) Certificates.
  - d) Photocopies or warranties and bonds, if required.
- E. Special requirements for operation and maintenance data and manuals. Adequate operation and maintenance information shall be supplied for all equipment requiring maintenance or other attention. The contractor shall provide operation and maintenance manuals for each type of equipment supplied.
1. Operation and maintenance manuals shall include the following:
    - a) All sets of manuals shall be originals. Copies will not be acceptable.
    - b) Equipment function, normal operating characteristics, and limiting conditions.
    - c) Assembly, installation, alignment, adjustment, and checking instructions.
    - d) Operation instructions for start up, routine and normal operation, regulation and control, shutdown, and emergency conditions.
    - e) Lubrication and maintenance instructions, including lubrication cross references to a minimum of three locally available suppliers.

- f) Guide to "troubleshooting".
  - g) Parts list and predicted life of parts subject to wear.
  - h) Outline, cross-section, and detailed assembly drawings; engineering data; wiring diagrams.
  - i) Test data and performance curves, where applicable.
2. The operation and maintenance manuals shall be in addition to any instructions or parts packed with or attached to the equipment when delivered, or instructions that may be required by the contractor.
  3. Manuals and other data shall be printed on heavy, first quality paper, in an 8 ½ x 11-inch size with standard 3-hole punching. Drawings and diagrams shall be reduced to 8½ x 11-inches, or 11 x 17 inches. Where reduction is not practicable, larger drawings shall be folded separately and placed in an envelope that is bound into the manuals. Each envelope shall bear suitable identification on the outside.
  4. Material shall be assembled and bound in the same order as it appears in the specifications, and each volume shall have a table of contents and suitable index tabs.
  5. All submittals shall be marked with contract identification, and inapplicable information shall be erased or deleted.
  6. Shipment of equipment will not be considered complete until required data and manuals have been received.
- F. Copies will be returned after final inspection, with City's comments. Revise content of documents as required prior to final submittal.
  - G. Submit final volumes within ten (10) days after receipt of City's comments.

#### 1.07 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts and equipment, maintenance and extra materials in quantities as noted in applicable specification sections.
- B. Deliver to project site and place in location as directed, obtain receipt prior to final payment.

#### 1.08 GUARANTEE

- A. Provide duplicate notarized copies.

- B. Execute and assemble documents and subcontractors, suppliers, and manufacturers.
- C. Provide table of contents and assemble in three D-side ring binder with durable plastic cover.
- D. Submit prior to final application for payment.

**END OF SECTION**

**SECTION 02050**  
**DEMOLITION**

**PART 1 - GENERAL**

- 1.1 The Contractor shall completely remove and properly dispose of the existing block type bearings, shafts, couplings, stuffing boxes, and other related miscellaneous items. Paddles and paddle bracing shall be disassembled and saved for re-installation.
- 1.3 The Contractor shall inspect the disassembled paddles and paddle bracing and determine if any repairs are necessary.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

3.1 PREPARATION

A. Utilities:

1. Notify CITY or appropriate utilities to turn off affected services before starting demolition or alterations.

B. Removal and Storage of Equipment for Reuse:

1. Do not remove equipment and materials without approval of CITY.
2. Properly store and maintain equipment and materials (paddles and paddle bracing) in same condition as when removed.

3.2 DEMOLITION

- A. Drawings define minimum portion of structures to be removed. Unless otherwise shown, rough cuts or breaks may be made exceeding limits of demolition shown.

- B. Remove all materials associated with existing equipment that is to be removed or relocated.

3.3 DISPOSAL

- A. Dispose of debris and other non-salvaged materials.

- B. Disposal of all waste and debris generated during the removal operations shall be conducted in accordance with the latest edition of all local, state and federal rules and regulations governing the waste product. Copies of any required certificates, forms, manifests, etc. required for proper disposal shall be submitted to the CITY in accordance with Section 01010, Submittals.

3.4 SALVAGE

- A. Equipment and materials, within the limits of demolition, unless otherwise specified, shall become the property of CONTRACTOR.

**END OF SECTION**

**SECTION 03300****CONCRETE WORK**

This section includes specifications for furnishing all labor and material to modify concrete pedestal supports as shown on the contract drawings and detailed in the specifications. Included are the following topics:

**PART 1 GENERAL****1.01 SUBMITTALS**

- A. Submit shop drawings of reinforcing steel modifications in accordance with Section 01010 Summary of Work, PART 2.
- B. Initial submittal of reinforcement modification shop drawings shall be complete. No partial submittals will be accepted.
- C. Indicate reinforcement sizes, spacing, locations and quantities of reinforcing steel, bending and cutting schedules, splicing, supporting and spacing devices.
- D. Reinforcement placement shop drawings for foundations shall conform to ACI SP-66, providing full elevations.
- E. Submit proposed mix design of each class of concrete to the City.

**1.02 QUALITY ASSURANCE**

- A. Perform work in accordance with ACI 301, 305 and 306.
- B. Conform to requirements of local, State and Federal rules and regulations applicable to work and project location.

**1.03 ENVIRONMENTAL REQUIREMENTS**

- A. Concrete shall not be placed on frozen sub-grade or one that contains frozen materials. Forms and reinforcement shall have ice and snow completely removed before placing concrete. The removal of frozen materials shall be done by applying heat. The spreading of salts or chemicals on forms is not permitted. The method of heating materials shall be approved by the City.
- B. Arrangements for covering, insulating or housing newly placed concrete shall be made, in advance of placement, to maintain adequate protection in all parts of the concrete. Methods of protection and curing shall be such as to prevent evaporations of moisture from the surface of concrete for period of not less than five (5) days. Means of protection and curing shall be approved by the City.

## PART 2 PRODUCTS

### 2.01 FORM MATERIALS

- A. Plywood Forms: Douglas Fir or Spruce species: sound, undamaged sheets with clean true edges, exterior glue, facing material to provide finish specified.
- B. Lumber: Douglas Fir or Spruce species; construction grade or better; with grade stamp clearly visible.
- C. Preformed Steel Wall Forms: Minimum 16 gage thick, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and surface appearance.
- D. Form Ties for Exposed Surfaces: Plastic cone snap ties with 1 inch outside diameter by 1 inch (nominal) long cones, with no metal within one (1) inch of concrete face after removal; manufactured by Dayton Superior, Richmond Screw Anchor Co., or an approved equal.
- E. Form Ties for Hidden Surfaces: Metal spreader type, removable to a depth of 1 inch from concrete face; manufactured by Dayton Superior, Richmond Screw Anchor Co., or an approved equal.

### 2.02 REINFORCING STEEL

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade billet steel deformed bars; uncoated finish.

### 2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150, Portland, grey color.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Potable and clean.

### 2.04 CHEMICAL ADMIXTURES

- A. Admixtures are to be approved in writing by the City prior to use.
- B. Chemical admixtures shall be in accordance with ASTM C494.
- C. Admixtures are to be used in accordance with manufacturer's recommendations.
- D. Chemical admixtures containing chlorides, sulfides or nitrides are not permitted.
- E. Admixtures permitted shall be supplied by a single manufacturer.

### 2.05 CURING MATERIALS

- A. Water: Potable and clean.

- B. Membrane Curing Compound: ASTM C309; Type II white pigmented as manufactured by W.R. Meadows, "WP40"; Dayton Superior, "J10"; Symons, "Resi-Chem, MI48" or approved equal.

## 2.06 CONCRETE MIX

- A. Concrete mix shall comply with Section 902.7 "Ready-Mixed Concrete" of the City of Milwaukee Street Construction Specifications.
- B. Schedule of Mixes: Class C, maximum aggregates size 3/4 inch, slump 3 inches, minimum cement 6 sacks/cu. yd., minimum compressive strength 4000 psi/28 days.

## PART 3 EXECUTION

### 3.01 FORMWORK ERECTION

- A. Concrete Forms: Forms shall be designed to produce concrete having the shape, lines, and dimensions shown on the plans. Forms shall be constructed and maintained in proper position and accurate alignment.

Concrete with formed surfaces which will be exposed to view when construction is completed shall be placed against plywood forms or forms that are lined with plywood or fiberboard. Plywood or lined forms will not be required for surfaces which are buried or not ordinarily exposed to view. Other types of forms, such as unlined wooden forms or steel forms, which have been approved by the City, may be used for surfaces that are not restricted to plywood or lined forms, and may be used as backing for form linings.

Lumber used in forms for unexposed surfaces shall be straight, dressed to uniform width and thickness, and free from loose knots, offsets, warping, buckling, dents, holes, other surface irregularities, sags, and other defects.

- B. Design: Forms shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied in such a manner that they will maintain the desired position, shape, and alignment during and after placing concrete herein. Walers, studs, internal ties, and other form supports shall be of sufficient size and number and shall be so located and spaced that proper working stresses therein are not exceeded.
- C. Form Ties: Form ties shall be of the removable end, permanently embedded body type and shall have sufficient strength, stiffness, and rigidity to support and maintain the form in proper position and alignment without the use of auxiliary spreaders. Cones shall be provided on the outer ends of each tie, and the permanently embedded portions shall be at least one inch back from adjacent outer concrete faces. Permanently embedded portions of form ties which are not provided with threaded ends shall be of a design and construction such that the removable ends are broken off by twisting only and are removed without damage to the concrete or concrete surface. All form ties shall be approved by the City. All form tie holes in concrete exposed to view shall be patched

before providing rubbed finish surface.

### 3.02 REINFORCEMENT

- A. The fabrication of all reinforcing steel shall conform to the "Manual of Standard Practice for Detailing Reinforced Concrete Structures", ACI 315.
- B. A detail plan and corresponding bill of material showing all bedding details, placement diagrams, and accessories shall be submitted to and shall receive the final approval of the City before steel is placed.
- C. At time of placement, all reinforcing bars shall be free of mortar, mud, oil, or other non-metallic coatings that adversely affect the bond with concrete.
- D. Furnish and install all metal spacers, chairs, ties, and other devices necessary for properly placing, spacing, supporting, and fastening reinforcement in place.
- E. Provide spacers with tie wire at proper intervals to hold slab bars in position and to raise them to provide the clearances required. Provide chairs for all bars at such intervals so as to prevent bar sagging between chairs. Tie bars to chairs. All reinforcing shall be supported on bolsters or chairs and carrying bars, not by bricks or other unapproved materials.
- F. Position reinforcement to a plus or minus 1/4 inch and, unless otherwise specified or shown, secure against displacement by tying in place with 16 gauge soft annealed wire or suitable clips at a spacing adequate to prevent movement by the worker's movement or by the concrete pour.

### 3.03 PLACING CONCRETE

- A. Notify the field engineer a minimum of 24 hours prior to placing concrete. Failure to notify may result in rejection of concrete placed without observation.
- B. Except as modified herein, the placing of all concrete shall conform to the requirements of Chapter IV of ACI 304 Recommended Practices of Measuring, Mixing, and Placing of Concrete.
- C. No concrete shall be placed until foundation forms, reinforcing steel, anchors, inserts and all other work required to be built into concrete have been inspected and approved by the City. All water shall be removed from all excavations prior to placing concrete.
- D. All footings and slabs are to be placed on compacted crushed stone subgrade. The subgrade shall be wetted slightly prior to pouring concrete. If earth indicates tendency to cave, securely brace the side wall to prevent earth from falling into concrete when pouring footings.

- E. After completion of mixing, concrete must be handled rapidly from place of mixing to place of final deposit, and under no circumstances shall concrete be used that has partly set. Every precaution shall be taken to prevent separation or loss of ingredients while transporting concrete.
- F. Concrete interfacing with forms shall be well spaded and mortar flushed to surface to forms. Concrete shall be worked around reinforcement and into corners of forms by continuous puddling with proper implements.
- G. Vibration with "Spud" type internal vibrator with flexible shaft shall be used where possible to consolidate entire mass of concrete as it is being placed.
- H. All surfaces to be exposed in the completed project shall be finished smooth and uniform. The holes left after removal of form ties shall be carefully filled. If, in spite of properly pouring concrete, a honey comb should develop, it shall be repaired in an approved manner.

#### 3.04 FORM REMOVAL AND CURING

- A. Forms may be removed after concrete has developed sufficient strength to safely sustain its own weight and any superimposed loads, but no sooner than 24 hours.
- B. Immediately after finishing operations are completed, just after the concrete has attained its initial set or upon removal of forms, all exposed concrete shall be coated with a curing compound. Applications shall be at a rate and quality sufficient to obtain the necessary water retention and to form a continuous, coherent, water impermeable film. The rate of application shall not be less than that recommended by the manufacturer of the compound.
- C. The new poured concrete shall be protected against any appreciable loads other than workmen, hand tools, etc., for a period not less than seven (7) days, or as long as determined by the City.

#### 3.05 CONCRETE TESTS

Concrete cylinders (if requested by the City) will be taken for test purposes during the progress of the concrete work. The test cylinders will be taken by the City job inspector from the concrete being poured and the contractor shall cooperate in securing the samples. The contractor shall provide safe storage for the cylinders pending their removal to the testing laboratory. Samples of concrete shall be obtained in accordance with Section 902.5.1 of MSCS and shall be transported to a place on the site where tests can be made and cylinders stored without being disturbed the first 24 hours.

Slump tests shall be made at the option of the City following the procedure in MSCS. Slump tests shall always be made of concrete from any batch from which strength tests are made. Concrete slump shall not exceed 3 inches.

Contractor shall be responsible for the delivery of all test samples to a City approved testing laboratory. Costs of all tests required shall be borne by the contractor.

A strength test for any class of concrete shall consist of one (1) set of four 6" x 12" standard concrete cylinders. Two cylinders shall be tested at 7 day age and two cylinders shall be tested at 28 day age.

The compressive strength level of the concrete at 28 day age will be considered satisfactory if the averages of all sets of three (3) consecutive strength test results equal or exceed the required design strength ( $f_c$ ) and no individual strength test falls below the required  $f_c$  by more than 500 psi. A record will be made of the delivery ticket number for the concrete and the exact location in the work at which each load represented by a strength test by the City.

If individual tests of laboratory-cured specimens produce strengths more than 500 psi below the required minimum compressive strength ( $f_c$ ), tests on drilled cores from the area may be required. Tests shall conform to ASTM C42. Cores will be tested dry if concrete will be dry during use. Cores will be tested in a saturated surface dry condition if the concrete will be wet during use. Three (3) cores will be taken for each case of a cylinder test more than 500 psi below  $f_c$ . Strength cores will be considered adequate if the average compressive strength is greater than 85% of  $f_c$  and no individual test is less than 75% of  $f_c$ . Should any core fall below 75% of  $f_c$ , the concrete is considered unsatisfactory and shall be removed and replaced with satisfactory concrete and all costs shall be borne by the contractor.

**END OF SECTION**

**SECTION 03600****GROUT****PART 1 - GENERAL****1.01 SCOPE**

- A. This section covers procurement and installation of grout. Unless otherwise specified, only non-shrink non-metallic grout shall be furnished.

**1.02 SUBMITTALS**

- A. All submittals of drawings and data shall be in accordance with the requirements of Section 01010 and this section.
- B. A letter of certification indicating the types of grout to be supplied and the intended use of each type shall be submitted.

**1.03 DELIVERY, STORAGE AND HANDLING**

- A. Materials shall be handled, transported, and delivered in a manner which will prevent damage of any kind. Materials shall be protected from moisture.

**PART 2 - PRODUCTS****2.01 NON-SHRINK NON-METALLIC GROUT**

- A. Non-shrink, non-metallic grout shall be furnished factory premixed so that only water is added at the jobsite.
- B. Non-shrink, non-metallic grout shall be in accordance with ASTM C1107.

**2.02 WATER**

- A. Water shall be clean and free from deleterious substances.

**PART 3 - EXECUTION****3.01 PREPARATION**

- A. The concrete foundation to receive non-shrink grout shall be saturated with water for at least twelve (12) hours preceding grouting unless additional time is required by the grout manufacturer.

**3.02 INSTALLATION**

- A. Mixing
  - 1. Grout shall be mixed in a mechanical mixer. No more water shall be used than is necessary to produce a flowable grout.

**B. Placement**

1. Unless otherwise specified or indicated on the drawings, grout under bearing sub-baseplates shall be 1-1/2 inches [38 mm] thick. Grout shall be placed in strict accordance with the directions of the manufacturer so that all spaces and cavities below the baseplates are completely filled without voids. Forms shall be provided where structural components of baseplates will not confine the grout.

**C. Edge Finishing**

1. In all locations where the edge of the grout will be exposed to view, the grout shall be finished smooth after it has reached its initial set. Except where shown to be finished on a slope, the edges of grout shall be cut off flush at the baseplate.

**D. Curing**

1. Non-shrink grout shall be protected against rapid loss of moisture by covering with wet cloths or polyethylene sheets. After edge finishing is completed, the grout shall be wet cured for at least three (3) days and then an acceptable membrane curing compound shall be applied.

**END OF SECTION**

**SECTION 05500**

**STAINLESS STEEL SHAFTS**

**PART 1 - GENERAL**

**1.1 INSTALLATION CONDITIONS**

- A. Allowable roof slab loading on coagulation/mixing basins shall not exceed 50 psf. The methods by which the Contractor removes the old flocculator equipment and brings in the new equipment shall be submitted to the CITY for approval.
- B. Planking of the entire traveled area over the basins shall be required unless a small four-wheel drive vehicle and/or a four-wheel trailer are used to transport materials. All damage to lawn areas shall be repaired to the satisfaction of the Commissioner.
- C. Disturbed areas over the basins shall be restored to pre-existing condition. Re-seed after the winter season, as necessary.

**1.2 DESIGN CRITERIA**

- A. The existing flocculator components are based upon the following criteria (Coagulation Basin #4):

- 1) Inside Mixing Basin Dimensions
  - Parallel to paddle shaft and transverse to basin flow ..... 92'-0"
  - Perpendicular to paddle shaft and in direction of basin flow 99'-0"
  - Water depth – Normal side wall ..... 15'-9-1/2"
  - Total depth to top of buried cover slab ..... 18'-0"
- 2) Maximum basin flow ..... 30 MGD
- 3) Design temperature ..... 4° C
- 4) Velocity Gradient (Rows 1, 2 & 3, at maximum speed)... 34 fps/ft
- 5) Velocity Gradient (Rows 4 & 5, at maximum speed)..... 12 to 14 fps/ft
- 6) Rotation ..... CW & CCW
- 7) Outside diameter of paddle assemblies..... 15'-6"
- 8) Number of paddle rows ..... 5
- 9) Number of paddle assemblies (each row)..... 5
- 10) Number of submerged shaft bearings (each row) ..... 6
- 11) Number of compression couplings (each row) ..... 5
- 12) Number of non-submerged shaft bearings (each row)..... 1
- 13) Bearing spacing – Maximum (each row)..... 20'-4"
- 14) Paddle shaft:
  - Maximum total angular deflection ..... 5 degrees
  - Maximum combined unit stress ..... 7500 psi

Maximum vertical deflection between bearings ..... 1/600 of span

- B. It is the intent to re-use all existing paddle components. If any components are damaged, they shall be replaced with similar materials. All steel structural members, bracing bars, and other steel devices shall be hot dip galvanized after fabrication and drilling. The weight of zinc coating shall not be less than 2 oz./sq ft as determined from the average of two or more specimens. A 2 oz./sq ft zinc coating is approximately equivalent to 3.5 mils. Any galvanized steel material with a coating thickness less than 3.0 mils will be rejected. All paddle wheel bolting materials shall be 18-8, Type 304 stainless steel. All bolts shall be provided with double nuts to provide a permanently rigid assembly.

## **PART 2 – PRODUCTS**

### 2.1 SHAFTS

- A. The shafting system for each mechanism shall be sized within stress limitations at full operating load and within deflection limitations under dry load. The maximum shear stress shall not exceed 6,000 psi at any point in the shaft. The maximum shear shall be determined by combining the bending and torsional stresses under full operating load through Mohr's circle stress convention. The maximum vertical deflection of the shafting system shall not exceed 0.033"/ft of shaft between support reactions under dry load.
- B. **All shafting shall be 4-7/16", solid type 304 stainless steel, straight and true.**
- C. 304 stainless steel, split, compression fittings shall be provided for connecting all sections of continuous solid shafting. One coupling shall also be provided on the inside of stuffing boxes for each shaft as shown on the plans.
- D. Coupling halves on solid shaft sections shall have a neck at least 6" long and shall be accurately machine fitted and securely keyed to the shaft. Coupling flanges shall be turned and faced square with the shaft. Each flange coupling shall be bolted together with 304 stainless steel machine bolts, washers, and nuts of ample number, size, and designed for the service intended and secured with suitable lock nuts.
- E. Fabricated 304 stainless steel hubs shall be provided for mounting paddle arms at locations shown on the plans. Hubs shall be firmly keyed to the shaft with keys of adequate size to transmit the maximum torque.
- F. Each entire shafting assembly shall be machined, faced, and matched that it will be straight and in true rotational balance throughout its entire length when assembled in the field on properly aligned bearings and bearing supports.

### 2.2 STUFFING BOXES

- A. A shaft seal shall be provided for each shaft extending through a basin wall. Each seal shall consist of a fabricated, type 304, stainless steel stuffing box with grease lubrication fitting, bronze grease ring, flushing connection, and non-asbestos acrylic fiber, graphite coated, and impregnated with lubricant, packing rings. Pressure shall be maintained on the packing rings with a two piece, type 304 stainless steel gland follower and take-up stubs mounted in the stuffing box.

### 2.3 NON-SUBMERGED BEARINGS

- A. Non-submerged shaft bearings shall be split cast iron pillow block bearings with lube fittings and bronze bushings. Each shaft row shall have one bearing installed in the drive pit, attached to the outside of the basin wall using a mounting bracket.

## **PART 3 - EXECUTION**

### 3.1 INSTALLATION

- A. The Contractor shall be responsible for shaft alignment accuracy to within 0.0025"/ft of shaft between bearings in any direction.
- B. Each paddle shaft shall be furnished with an approved lifting hook or other type-lifting device at or near each end. All shafting shall be furnished in sections of such length and weight that they can be conveniently handled and installed through existing openings in the basin roof slabs, as shown on the plans.
- C. All shafting in power transmission equipment, and through stuffing boxes and paddle shaft bearings, shall be lathe turned, ground and polished to a tolerance of -0.0005 to -0.0040 inches. No shims/sleeves will be allowed in coupling installation. Thermal welding to straighten out of tolerance shafts will not be permitted.

**END OF SECTION**

## SECTION 15545

### FLOCCULATOR BEARINGS

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. This section specifies the replacement of all submerged bearings, seals and lubrication for the existing flocculator equipment in Coagulation Basin #4.
- B. The existing flocculator system consists of 5 paddle rows with shaft diameters of 4-7/16". Each paddle row has five paddle sections and six submerged shaft bearings.

#### PART 2 – PRODUCTS

##### 2.1 BEARINGS

Bearings shall be fabricated from solid Ultra High Molecular Weight Polyethylene (UHMWPE), virgin natural material, conforming to ASTM D-4020 (latest revision) and be FDA compliant. Bearings shall be split pillow block type, designed for water lubrication. Bearings shall be provided with grease fitting and grease groove to provide for rust prevention. The two segments of the pillow block bearings shall be held together using nuts and bolts to allow for maintenance and future replacement of the bearing without removal of the shaft. The bearing shall conform to the following physical properties:

A.	Specific Gravity	0.0336 lb/in <sup>3</sup>
B.	Hardness, Shore D	66
C.	Tensile Strength, Ultimate	5,800 psi
D.	Elongation at Break	300 %
E.	Tensile Modulus	100,000 psi
F.	Flexural Modulus	110,000 psi
G.	Flexural Yield Strength	3,500 psi
H.	Compressive Strength	3,000 psi
I.	Compressive Modulus	80,000 psi
J.	Shear Strength	4,800 psi
K.	Coefficient of Friction	0.12
L.	Melting Point	275° F

M. Maximum Service Temperature, Air 180° F

2.1.2 Acceptable Products:

1. TIVAR® 1000 UHMWPE
2. Approved Equal

2.1.3 Quantity and sizes as follows:

**Six (6) 4-7/16" bore diameter submerged bearings per paddle row.**

**NOTE: There are five paddle rows in Coagulation Basin #4.**

2.2 LUBRICATION

1. Each top section of the bearing shall be drilled and tapped to accommodate a "ZERK" type grease fitting with a ¼" diameter NPT base. The drilled hole shall extend completely through the top half of the bearing to facilitate future greasing.
2. Prior to final assembly of the bearing halves, bearings shall be packed with "**ALITHICON 452000-FM Food Machinery Bearing Lubricant**", a white food grade, water resistant grease, manufactured by Alithicon Lubricants Company.

All bearings shall be cleaned and free of preservatives and contaminants. As the component parts of the bearing are assembled around the shaft, they should be hand coated with grease. The bearing should never be assembled dry and the lubricant injected after the unit is mounted.

**PART 3 - EXECUTION**

3.1 INSTALLATION

1. Furnish services of an approved Erection Technician during all alignment work and major erection work.
2. The Contractor shall be responsible for bearing alignment accuracy to within 1/16" between bearings in the vertical and horizontal direction. Each bearing shall also be aligned to within 1/64" end to end and shall be leveled both parallel and perpendicular to the centerline of the shaft in the horizontal plane. The equipment Manufacturer's service manual shall provide procedures for installing and aligning bearings.

**END OF SECTION**