1. PROPOSAL REQUIREMENTS

Proposals shall include a Transmittal Letter highlighting the proposal followed by the Proposal Forms fully completed by the Equipment Contractor. The Equipment Contractor shall address the minimum requirements as stated in this Section.

1.1. Minimum Proposal Requirements

Equipment Contractors shall briefly outline their approach to the project and detail **each of the following items within their Proposal in the order listed below:**

A. **Transmittal Letter & Proposal Forms** – Provide a Transmittal Letter that highlights the proposal, background information of the Equipment Contractor, and any exceptions taken to any of the requirements of the RFP.

B. The Proposal Forms as required by the RFP shall completed in full.

C. **List of Technical Exceptions** – Provide a complete listing of technical exceptions to the any requirements of the RFP specifically referencing the RFP section and the exception taken. The quantity and significance of exceptions taken will be considered during proposal review. Other than the exceptions taken, noted and agreed to by the City, the Equipment Contractor shall be required to fully adhere to all the Contract requirements.

D. **Technical Information** -Provide the following:

1. List each major piece of equipment the Equipment Contractor intends to provide and install on an equipment list, including the name of the manufacturer of each piece of proposed equipment, its model number, and related technical specifications including number of decks, dimensions, motor sizes, belt type, widths, and gear box types and other similar information as applicable. It is the expectation of the City that all equipment will be new; not used or refurbished.

2. Discuss Screening Technology, i.e., length, width, effective screening length, number of shafts, discs per shaft, number of decks per screen, anti-wrap design with photos, motor speeds, belt speeds, angle range, number, composition, materials of construction, expected life of discs, and anticipated time needed to replace disc (and any special considerations associated with required maintenance). Provide the projected cost per processed ton to maintain the screen and/or sorting systems as it relates to regular

preventative / predictive maintenance and overall life of the screen / sorting system.

3. Discuss automated sorting or separation technologies, i.e., optical sorters, robotics, artificial intelligence (AI) systems, drum magnets, air classifiers, eddy current separators, etc. Include full details, descriptions, dimensions, limitations, features, capacities, air requirements, power requirements and other similar information as applicable.
4. Discuss the Baler Lines (infeed conveyor and baler specifications) length, width, angle, manufacturer, material-by-material throughput, bale densities (average or range), charging hopper size, wire tier or stripper model and details, foundation requirements, motor sizes, options included / excluded, and ability to divert or bypass.
5. Provide a preliminary list of replacement / spare parts and their costs for the first year of operation.

E. Process Flow and Mass Balance Diagram - Illustrate the anticipated materials flow through the facility in the terms of a Process Flow Diagram. The flow diagram needs to illustrate the anticipated flow rates (expressed in tons per hour) for each input and output and sorting and processing step(s) in the process. Submit pertinent mass balance diagrams and calculations for the purposes of City review and consideration in the evaluation process.

F. Preliminary Design Drawings - The Equipment Contractor shall submit preliminary design drawings and supporting documentation. Drawings to be presented in both 3D and 2D format. Drawings without dimensions will not be considered acceptable and the Equipment Contractor's proposal may be rejected by the City at its sole discretion. The design should clearly illustrate:

1. The arrangement of the facility and stationary equipment and platforms in the facility.
2. Elevations of equipment.
3. Dimensions showing amount of vertical and horizontal space for maneuvering personnel or mobile equipment between the Equipment Contractor's supplied equipment, supports and walls or other obstructions to perform any operation or maintenance activity.
4. How rolling stock will move through the facility
5. Bale storage analysis for the proposed bale storage, location, and access.
6. Tipping area dimensions and storage capacity (expressed in

tons and number of days' based on throughput) based on assumed density (provided) and dimensions.

7. Pit locations and sizes
8. Layout of each platform and stairs included with the proposal
9. Electrical panel locations and power requirements at each.

G. **Equipment Description** – Describe the types of equipment the Equipment Contractor will install to meet or exceed all performance requirements listed in the Technical Specifications. Describe the attributes of the equipment and how each piece of sorting equipment will function and how the equipment types will function in relationship to each other. Discuss why the selected screens or sorting technology are proposed in each instance (i.e., positive and negative sorting of materials, anticipated percent efficiency of the sorting system, number, etc.).

H. **Project Schedule –** Provide a comprehensive project schedule specifying the total anticipated durations of equipment procurement, construction, installation, and substantial completion date and final completion date. These durations and dates shall be relative to the Notice to Proceed. Include the durations required for duration and the sequence expected to perform any and all of the expected work on-site. Identify critical path elements and contingency items as necessary.

I. **Control Panels and Power Usage Projection -** Show projected energy consumption on a kilowatt-hour basis for the Equipment Processing System based on the horsepower requirements and other supporting details for each piece of equipment. Provide the calculations. Provide location for motor control centers and associated power feed locations for all equipment. List and locate each power drop required and the electrical requirement (amps and voltage). For each control panel, identify the original manufacturer.

J. **Residue** - Discuss generation of residue, specifically residue generation locations, percent of total residue and composition. Discuss the maximum amount of residuals the system will generate by commodity. Provide a detailed description of how the system (both human, physical equipment, AI; as applicable) is designed to minimize the generation of residuals.

K. **Staffing Plan –** Provide anticipated staffing requirements and job functions for all personnel to operate, maintain and manage the

Equipment Processing System in accordance with the Technical Specifications. Include detailed calculations and all assumptions to justify the staffing plan.

L. Equipment Warranty – The entire system supplied must be unconditionally guaranteed against defective parts or components and workmanship for a period of two (2) years beginning on the date of system Acceptance. Any parts replaced under warranty shall receive an additional one (1) year warranty. Any expense from the correction of any or all defects occurring during the warranty period, including parts, labor, freight and mileage shall be borne by the Equipment Contractor. A letter of agreement regarding this guarantee from the Equipment Contractor must accompany this proposal; failure to provide such agreement will be subject to proposal rejection. Warranties of longer duration or broader scope shall be identified and will be considered in the evaluation process. Likewise, limitations and exclusions to the warranty period shall be identified and will be considered in the evaluation process.

M. Spare Parts – Provide a list of recommended spare parts however do not include the costs in the Proposal price. Following Contract award, the City and the Contractor shall confer and agree on the spare parts to be provided by the Equipment Contractor and the cost of such will be added to the Equipment Contractor's price. The Equipment Contractor must confirm that the use of non-OEM replacement and wear-parts does not void the manufacturer's warranty. The signing and approval of the Agreement will serve as a confirmation that the Equipment Contractor has received manufacturer approval or has assumed the manufacturer's warranty responsibility.

N. Training and Educational Materials – Provide a description of the hands-on training that will be provided and resource materials that will be provided at the outset of the Agreement and on-going throughout the term of the Agreement. The Equipment Contractor is encouraged to provide animation, models, flow charts, etc. that help to describe the single stream sorting process and the equipment that is operating including throughput adjustments, screen angle adjustments, maintenance points, lock- out/tag-out locations, and routine maintenance procedures.

O. Educational Tools – The Equipment Contractor, as an option, may provide description and pricing of available educational tools such as videos, displays, etc., for use by City for public education activities. This will not be an item used for the evaluation process.

P. **Documentation Submittals**- 3D files will be provided in electronic format (STEP file format) and 2D files will be in AutoCAD format fully dimensioned and labeled and fully open (e.g., not locked) for use by the City. All documentation will be available in electronic format. Confirm all source codes and details will be provided for all PLCs. If there are any limitations or restrictions to the level of detail information to be provided, these must be stipulated in detail.

1.2. Qualifications & Management Approach

The Equipment Contractor is to supply the following information with its Proposal in the form and order requested below.

A. Project staffing chart complete with areas of responsibility and relationships for key staff and resumes.

B. Identify the project team, names and information for the lead respondent, names and information of the key manufacturers, names and information of the proposed electrical subcontractor and equipment installation subcontractors selected to perform the design/installation and management for the project. Explain the roles of the team members and indicate their relevant experience in this field, including specific project examples. Include the minimum number of days each team member will be on-site.

C. Project management approach including schedule of preparation and updating, labor relations (including adherence to the prevailing wages and any applicable work rules), proposed safety plan, proposed start-up and commissioning plan, operator's training plan, collaboration approach with the City and Engineer to finalize proposal after submission and work through the required steps from submission through contract execution, collaboration approach with the project team from contract start to contract completion including with any other parties involved with the Project.

D. Identify the specific service representative companies who shall be used for service and maintenance for the various equipment components after installation and during start-up. Representative resumes indicating qualifications and location/typical response time shall be submitted. References must be provided for the service representatives. Include the minimum number of days each service representative will be on-site during start-up and commissioning. Discuss spare parts management and the process for ordering parts and resolution of warranty issues.

E. Reference projects that have been completed by the Equipment Contractor and references as required by the technical specification. Align the

information with the requirements and details so they can be confirmed during reference checks. If references are being used for the same equipment, please list each equipment item that corresponds to the references. If information is missing or incomplete, the submission will be evaluated on that basis.

1.3. Performance Guarantee

A. The Equipment Contractor shall provide City with a guarantee that the Equipment Processing System will meet or exceed all requirements in the Technical Specifications, including but not limited to the throughput requirements, system availability requirements, staffing requirements, recovery rate requirements – with associate purity rates and product quality and marketability requirements – and residue rates & composition.

1. GENERAL EQUIPMENT SPECIFICATIONS

1.1 INTENT OF CONTRACT DOCUMENTS

A. The Contract Documents include Specifications, Drawings, Equipment List and other information that are intended to be complimentary and provide for the proper and complete furnishing and execution of the Work presented herein. Reference in the Contract Documents to standard specifications, manuals or codes shall mean the latest version in effect at the time of opening of bids.

B. Equipment Contractor shall include all costs to fully execute, deliver and complete all Work associated with the Project scope and as identified by these specifications. The costs include, but are not limited to the following: materials, labor, tools, equipment, utilities, transportation, supervision, staff training, temporary construction and other items to complete the Project within the specified time. Equipment Contractor shall also include in the cost of the Project any and all costs relating to all parts of the Contract Documents.

1.2 CONTRACT DOCUMENTS

A. Equipment Contractor is responsible to check and verify figures and dimensions on the drawings, and specifications and to obtain any information needed to perform the Work. The City does not represent the accuracy of any dimensions; the Equipment Contractor shall be held solely responsible for any conflict, error or discrepancy not identified before the Work is executed, unless the Equipment Contractor could not have reasonably known about the conflict, error or discrepancy. Any errors that may be discovered by the Equipment Contractor during design and/or installation shall be immediately reported in writing to the Engineer. The Engineer, upon review of the discrepancy, shall notify the Equipment Contractor, and the City as appropriate, with appropriate corrective action. Figured dimensions shall govern over scaled dimensions, detail drawings shall govern over general drawings, larger scale details take precedence over smaller scale drawings, change order drawings govern contract drawings, and contract drawings govern over standard or shop drawings. In cases where details in two drawings conflict or where there are conflicting statements in the specifications, the more restrictive requirement shall be binding upon the Equipment Contractor.

B. The Contract Drawings shall illustrate a conceptual flow of the processing systems within the building. If the Equipment Contractor deems it necessary to vary from the Contract Drawings to accommodate the materials and equipment proposed to furnish, details of such variations and reasons therefore shall be submitted to the Engineer for approval prior to proceed with the related work. No such variations shall be made except as provided for in Sections of the General Contract Conditions relating to changes in the Work.

C. Only the original equipment manufacturers (“OEMs”) listed in the Contract

are approved by the Engineer at this time. Any other manufacturer shall be considered a "substitution" that shall require the Equipment Contractor to demonstrate that the manufacturer is "equal" by meeting all the requirements specified herein and is subject to the Engineer's approval. Whether the Equipment Contractor chooses to provide equipment from the named manufacturer or the approved alternate manufacturer, the Equipment Contractor shall be responsible at its cost for finalizing the design details to result in a fully integrated, working system delivered and acceptable to the City, and the Engineer. The Equipment Contractor shall take into account all effected changes to all other aspects to this Project at the Contractor's own cost; for example, the layout clearances, structural design and electrical design is generally based on information from the named manufacturer.

1.3 MATERIALS AND WORKMANSHIP

A. All equipment is to be adequately designed for the Work to be done and the loads to be sustained and is to be proportioned for ample stability and rigidity. Design is to provide necessary clearances for erection, repairs, operation, and adjustment. Best industry practice at the time of the Work is to be followed in all respects.

B. Design of similar units such as conveyors or platforms, for example, are to be such that they present a uniform and continuous appearance and shall be similar in operation and maintenance. Fittings and fixtures on the units are to be of the same make wherever possible. Parts are to be interchangeable wherever feasible.

C. The workmanship and materials of all items shall be of the highest industry quality and shall always be subject to the inspection at any time by the direction of the City or his designated representative. The Engineer, or designated representative, shall have authority to inspect all phases of the Equipment Contractor's Work and may reject workmanship and materials which do not conform to the Contract Documents, as interpreted by the Engineer. Upon notification by the Engineer or the City regarding unacceptable Work, all such unacceptable Work and/or material, or both, shall be removed and shall be immediately substituted with proper and acceptable workmanship or material. Materials shall not be delivered so far in advance of their proposed use that they may be subjected to potential damage.

D. As soon as possible after the Equipment Contract has been executed, but not later than the scheduled date on the project schedule prepared by the Equipment Contract and approved by the Engineer, the Equipment Contractor shall submit, to the Engineer, data relating to materials proposed to furnish for the Work. Such data are to be in sufficient detail to enable the Engineer to identify the particular product in question and to form an opinion as to its conformity to the Contract requirements.

E. All facilities and labor for the handling, installation, and inspection of all

materials shall be furnished by the Equipment Contractor. Defective materials shall immediately be removed from the site of the Work upon notice to the Equipment Contractor by either the Engineer or City.

F. In cases where materials and quality are specified, samples or specimens shall be submitted in a prompt manner so as not to cause a delay in the Equipment Contractor's own Work or in that of any other Contractor to the Engineer for approval. The Engineer shall promptly check such samples, for conformance with the design and for compliance with the information provided in the Contract Documents and approve, if acceptable. However, such inspection does not constitute inspection, nor does it relieve the Equipment Contractor or any obligations of the Contract. All Work shall be in accordance with approved submittals.

G. All Equipment and Work supplied under this Contract shall be capable of duty operation 16 hours per day, 6 days per week at the throughput capacities specified.

H. Any equipment, appurtenances, utilities and/or component malfunctions due to heat historically occurring at the Project location. is unacceptable. All equipment, materials and Work that shall be constructed, installed, designed and supplied for the ambient conditions of Phoenix, Arizona at the location within the building.

I. All conveyors, and conveyor components, that are required to be located outdoors shall be provided with covers in order to minimize, and contain, debris from blowing off the conveyor belting.

J. The City's requirements for the equipment being described below and furnished by the Contractor is that the equipment shall be designed, engineered and built to withstand the rugged environment such as found in the waste processing and recycling industry. The operating life for this equipment must comply with the following:

1. All stationary parts of the equipment except, for normal wear items shall, be designed for a minimum service life of twenty-five years (25 yrs.). All wear items shall be designed for a minimum service life of 7,000 hours. Any wear items with a service life of less than 7,000 hours must be identified in the Contractor's proposal and the guaranteed service life of those items so stated.
2. All moving parts of the equipment not in direct contact with the feedstock shall be designed and engineered to withstand a minimum ten thousand hours (10,000 hrs.) of normal service life.
3. All moving parts in direct contact with the feedstock shall be engineered and designed to withstand a minimum seven thousand hours (7,000 hrs.) of service life. Any wear items with a service life of less than 7,000 hours must be identified in the Equipment Contractor's response and the guaranteed service life of those items so stated.
4. Chutes, pans and transitions being provided by the Equipment Contractor shall be 12 gauge minimum, and any which may sustain wear

due to abrasion from materials such as glass and other abrasive materials and shall be equipped with liners that can be easily replaced.

K. All equipment supports shall meet the applicable code requirements for seismic design. Contractor shall be responsible for securing all permits including P.E. stamped drawings and calculations as necessary.

L. The Equipment Processing System shall be designed based on “zero” spillage” and with minimal fugitive dust. Use of double tail pulley seals, enclosed transfer joints, covered equipment, effective transition design is required. Adequate closure plates shall be provided on infeed, inclined and storage conveyors to prevent material from falling from the conveyors. Side skirts shall be extended full length along the conveyor frames to prevent spillage.

M. Any equipment interferences on Contract Drawings shall be resolved by the Equipment Contractor.

1.4 CERTIFICATES

All materials or equipment delivered to the site shall be accompanied by certificates, signed by an authorized officer of the manufacturing company, certifying that the materials or equipment conform to specification requirements. Such certificates shall be turned over to the Engineer on the same day of the delivery. Materials or equipment delivered to the site without such certificates shall be subject to rejection.

1.5 NAMEPLATES AND EQUIPMENT DESIGNATION

A. Each unit of equipment shall be marked with 3-inch high yellow lettering indicating the Equipment Number referenced in the Operations & Maintenance Manual, displayed on the control panel and reported in the data logging of the control system.

1.6 TESTS

A. The cost of shop and field tests of equipment, and of other tests specifically called for in the Specifications, including the cost of all fuel, lubricants, hydraulic or cooling oil, baling wire and other accessory items specified in the individual equipment specifications, shall be included in the Equipment Contractor's bid price.

B. Equipment Contractor is responsible at its cost to train the Operator’s personnel for any task involving the equipment operations and maintenance.

C. Equipment furnished and installed under this section shall be fabricated, assembled, erected, tested and placed in proper operating condition in full conformity with the drawings and specifications.

1.7 EQUIPMENT AND PERSONNEL ACCESS

A. Integrated access platforms, stairways, and hand railings and general spacing between the equipment and building walls or other Facility components, shall provide maximum connectivity to limit personnel walking on the floor, and maximize access for equipment maintenance.

B. Provide arrangement and access systems as required herein. The Equipment Contractor shall accommodate the installation of equipment, wiring, and controls in the design of platforms and access. The Equipment Contractor shall insure that adequate operational and maintenance access is provided to all equipment provided in these Contract Documents.

C. Provide platforms, stairs, ladders, handrails, etc. as required to provide convenient access to all equipment and structures that require access for normal day-to-day, weekly, monthly, and/or annual operations and maintenance. This shall also include access to the following areas:

1. Sorting Stations
2. Screens, Ballistic Separators, Magnets, Optical Sorters, ECS Units and all other equipment maintenance points

D. Arrangement of all equipment, platforms, walkways, stairs, etc. shall meet the following criteria:

1. The required Class 1, 2 or 3 accesses as specified below in this section.
2. Operation and maintenance requirements dictated by the specific equipment design, arrangement, and layout provided in these Contract Documents.
3. Design and provision of all stairways, walkways, and platforms shall be in accordance with Local, State and National Building Codes.
4. Personnel safety requirements including US, State, local, OSHA and ANSI.

E. Access requirements described herein apply to all levels (to include ground floor level).

F. Personnel Access Requirements are defined herein as follows and shall be provided by the Equipment Contractor:

1. Class 1: Regular attended areas shall have access operating platforms which shall be fully accessible by stairs. No ladder or ships ladder for access shall be permitted; unless otherwise agreed to by the Engineer.
   - **a.** Regularly manned sorting stations shall be Class 1.
   - **b.** Lubricated equipment, bearings, instruments, access doors, and equipment requiring access during operation and for normal day-to-day inspection and maintenance shall be Class 1.
   - **c.** Provide platforms at same elevation on each side of equipment with walkways connecting the two sides.

d. Platforms shall be provided to access all access hatches, access manholes and access doors.
e. Provide emergency escape caged ladders for any platforms having dead ends.
f. Provide self-closing hinged gates with latches for tops of caged ladders.
g. Platforms and main access walkways shall be not less than 3'-6" in width.
h. Stairs shall be not less than 3'-0" in width.

2. Class 2: Maintenance access areas requiring access only monthly or annually shall have access platforms of adequate size to permit two (2) people to work, 12 square foot minimum, with stair access and walkways for reaching the platforms in accordance with the following, or as otherwise agreed to by the Engineer. Where stair access is not practical, caged ladder access can be provided.

a. Maintenance access walkways shall be not less than 3'-0" in width.
b. Stairs and caged ladders shall be as specified herein.
c. Headroom shall be a minimum of 8'-0" clear. Provide adequate allowance for installation of piping, conduit and lighting fixtures.

3. Class 3: Maintenance access areas, where access is only required for painting, or replacement of components which have a service life of ten (10) years or more, shall be met by providing the Operator the ability to erect scaffolding, temporary ladders, platforms, fall protection tie-off points and safety nets to perform Work involved.

1.8 MAINTENANCE ACCESS, SPECIAL TOOLS AND ACCESSORIES

A. All equipment and motors requiring access to perform preventative maintenance and inspections must be accessible by fixed platforms provided by Equipment Contactor.

B. Equipment components over 200 lbs., without floor access and requiring mobile equipment for regular maintenance, shall be provided with monorails or jib cranes for service, disassembly and/or removal of the equipment. All monorails or job cranes shall be sized to lift the maximum load serviced by the monorail. Monorails and jib cranes shall be such as to permit equipment to be removed and lowered to grade in a single lift. Provide eyebolts or lifting lugs on equipment for use with monorails or cranes.

C. All other equipment and motors must be accessible by scissor lift or aerial lift. Areas or items requiring access by portable ladders is not acceptable. Remote grease lines and central manifolds shall be provided for equipment that is not easily accessible. The Equipment Contractor shall meet these specifications, requirements and any applicable code requirements for egress. If additional platforms and/or stairs are required, they are to the Contractor's expense.

D. The Equipment Contractor shall specify any special tools and equipment required to service all equipment and components of the Equipment Processing System. Special tools and accessories shall be furnished in a painted steel case, approved for the specific purpose and properly labeled and equipped with high-grade cylinder lock(s) and duplicate keys. These shall be provided as part of the equipment / spare parts listing for the operation and maintenance of the Facility.

E. One complete set of high-grade special tools and accessories that may be needed to adjust, operate, maintain or repair the equipment, shall be furnished by the Equipment Contractor.

F. Each tool or accessory shall be provided with a substantial nameplate, securely fastened in place, and clearly inscribed with the manufacturer's name, year of manufacture and principal rating data.

1.9 SUPERVISION-QUALIFIED WORKERS

A. The Equipment Contractor shall give the Work specific professional attention. In addition, the Equipment Contractor shall assign a full-time field superintendent to the Project, the "Superintendent". In the absence of the Equipment Contractor, the Superintendent shall receive information directly from the Engineer. The Superintendent shall have full authority from the Equipment Contractor to execute any order given by the Engineer without delay and to supply materials, equipment and labor as required in fulfillment of the Contract. The Superintendent shall be qualified, experienced and English speaking, and s/he shall attend all job meetings called by the City or the Engineer.

B. The Superintendent shall not be changed except with the consent of the Engineer unless the Superintendent proves to be unsatisfactory to the Equipment Contractor or the Engineer, each acting reasonably. The Superintendent shall represent the Equipment Contractor in their absence and all directions given verbally or otherwise, shall be as binding as if given to the Equipment Contractor. Important verbal directions shall be confirmed in writing by the Engineer to the Equipment Contractor. Other verbal directions shall be so confirmed on written request of the Equipment Contractor. The Equipment Contractor shall provide efficient and direct supervision to the Equipment Contractor's labor force using their best skill and attention and in accordance with all codes and standards. The Engineer shall not be responsible for the acts or omissions of the Superintendent or assistants.

C. The Equipment Contractor shall employ only competent and qualified workers, mechanics, or artisans for every kind of work. Whenever, in the opinion of the Engineer, any worker is unfit to perform a task, or performs work contrary to directions or conducts themselves improperly, the Equipment Contractor must remove said person immediately from the Project upon the Engineer's written request.

1. GENERAL INSTALLATION GUIDELINES

1.1 SUMMARY

A. The Equipment Contractor is to familiarize themself thoroughly with the type and nature of the equipment required in the proper execution of the Work and is to use and employ only first- class, new equipment. Sufficient equipment must be furnished and used by the Equipment Contractor to permit the completion of the Work within the time specified. The equipment used on any portion of the Work is to be such that no injury or damage to the building, adjacent equipment, or utilities will result from its use.

B. The Equipment Contractor shall furnish labor, supervision, services, tools, equipment, materials and consumable supplies required for the receiving, unloading, storage, protection, testing, startup, installation, and erection of the equipment.

C. The Equipment Contractor's regular working hours are defined as Monday through Friday from 4:00am to 5:30pm. During these regular working hours, the Equipment Contractor shall have unrestricted access to the building and site and excluding the tipping area. Working hours are subject to change at City's discretion. Requests to work at times other than standard work hours shall be submitted in writing to City and the Engineer a minimum of 72 hours before the proposed work.

D. Throughout the duration of the Project, City activities/operations on site shall include receipt and transfer of recyclable materials on the Tipping Floor (located on the east side of the building) and associated vehicle travel lanes across the site. Receipt and transfer operation hours are Monday through Friday 6:30am to 4:30pm and Saturday 6:30am to 12:00pm. For the Work, all Equipment Contractor vehicle traffic and Equipment Contractor activities must be coordinated with the City to allow City receipt and transfer operations to continue without impact.

E. For Equipment Contractor Work that may be required to occur on the Tipping Floor, the Equipment Contractor activities must be scheduled a minimum of two (2) weeks ahead of time. The City and Engineer must be advised of the intended Equipment Contractor's Work schedule and all Equipment Contractor work activities must be coordinated with the City and Engineer.

F. The Equipment Contractor shall not be responsible for building electric or heating costs during the shutdown or construction phases.

G. All equipment shall be installed, tested, and started in accordance with manufacturer's instructions and in accordance with the start-up and commissioning prepared by the Equipment Contract and submitted to the Engineer for approval. The Equipment Contractor shall also be responsible for coordinating and installation of electrical and fire protection Work.

H. The Equipment Contractor shall submit, within fifteen (15) days after Notice to Proceed, a day-by-day detailed schedule of installation Work, which states delivery requirements to support schedule for the installation Work.

The Schedule shall indicate requirements for Work by others (e.g., removal of existing equipment, building work, etc.) required to support the Equipment Contractor's schedule.

I. All Equipment Contractor vehicles, including equipment delivery vehicles and any vehicles used in the construction of the Equipment Processing System shall, at all times, be properly maintained and operated by the Equipment Contractor in accordance with the City's existing permits. These documents shall be made available for Equipment Contractor review prior to construction activities.

J. Equipment Contractor shall: Complete a risk assessment designed to ensure that reasonably foreseeable machine guarding hazards which result from the products or services provided are identified, and corresponding risks are reduced to an acceptable level (see: ANSI B11.0); and provide written instructions to the City and Engineer to identify the guards, guarding devices and controls which are to be provided and used by the Operator to reduce risks of injury.

1.2 WORK BY OTHERS

A. Work by others will include:

1. City's Contract Operations Personnel for Equipment Startup and Performance Testing per the RFP.
2. Building Work other than as specified in these specifications.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. American Gear Manufacturers Association (AGMA).
2. American Society of Mechanical Engineers (ASME).
3. National Fire Protection Association (NFPA).
4. National Electrical Code (NEC).
5. Applicable Local Building Codes.
6. International Building Code (IBC)
7. Occupational, Health and Safety Administration (OSHA).

B. The Equipment Contractor shall provide competent supervision daily throughout construction in accordance with Contract Documents.

C. Equipment shall be erected and assembled for operation per equipment manufacturer's requirements.

D. Equipment shall be assembled in accordance with the latest, commonly accepted erection, millwright shop and professional practices. All work shall be performed to the highest industry standards of quality and workmanship.

E. Except where otherwise specified, all structural and miscellaneous fabricated steel work shall conform to the Standards of the AISC.

1.4 DELIVERY, STORAGE, HANDLING, SECURITY AND CONTROL

A. Contract Documents identify the locations of building access, and equipment receiving and staging areas for the Equipment Contractor. Building Access will be through the existing overhead doors and through the existing loading docks located along the east wall. Equipment laydown areas inside the building are to be determined and approved by the City and the Engineer.

B. During all phases of construction, the Equipment Contractor shall be required to maintain the security of the building related to any openings or access to the building, except for the Tipping Floor (i.e., temporary barriers and/or security guarding must be always provided to properly secure building openings).

C. The Equipment Contractor shall, at all times, provide access to the Work to the City and Engineer and their assistants and inspectors, and to representatives of governmental agencies with jurisdictional interest.

D. The Equipment Contractor shall furnish all the necessary facilities for determining both on the Work and at the places of manufacture, that all Work to be done and all materials to be furnished under this Contract is being performed and are being made strictly in accordance with the terms of the Contract and with the Contract Drawings and specifications. The Equipment Contractor shall notify the Engineer in writing at least seven (7) days prior to the commencement of the manufacture of any materials, of the time and place where the manufacture is to take place, in order that a representative of the City may be present to inspect the manufacture, should it be so desired.

E. The Equipment Contractor shall be responsible for the receipt, unloading, inspection, damage notation, claim information, moving, uncrating for inventory, re-crating for storage, storage, and protection of materials and equipment. Also, the Equipment Contractor shall unload, store and maintain tools and spare parts furnished with the equipment in an approved manner.

F. The Equipment Contractor shall deliver equipment and materials to the site and store them in original containers suitably sheltered from the elements, but readily accessible for inspection until installed. The Equipment Contractor shall store all items that may be subject to moisture damage (such as controls and electrical equipment) in dry, heated spaces. All construction equipment and materials to be incorporated in the new Work are to be so placed as not to damage the Work and so placed that free access may be had at any time to all parts of the Work and to all utility installations in the vicinity of the Work. If insufficient area is available, the Equipment Contractor shall provide off-site areas at his own expense. Materials shall be kept neatly piled, compacted, and conveniently stored so as to not inconvenience, site vehicles, and operating personnel.

G. All vehicles, hoisting equipment, jacks, rigging, and other gear used in the delivery, unloading and handling of the equipment shall be provided by the Equipment Contractor. Care shall be taken that all equipment materials and parts are handled in accordance with the manufacturer's instructions, using

attachments or fittings where supplied for that purpose by the manufacturer, to avoid distortion or other damage to equipment items. All special rigging procedures on critical items shall be outlined and submitted to the Engineer for approval prior to handling the equipment.

H. Receiving Inspection:

1. When equipment is received, it shall be immediately inspected for damage by the Equipment Contractor. Receiving inspection shall include but are not be limited to, the following:

a. Visual inspection for damage and internal cleanliness.

b. Verify agreement with approved shop drawings including piece match marking and identification.

c. Dimensional check of equipment to discover equipment problems with respect to foundations and connections. The Equipment Contractor shall promptly report installation problems identified.

d. Check for correlation between material markings and certified test data.

e. Marking of component or material for site storage.

f. In addition to the above, all other receiving inspection requirements contained in the equipment specification shall be performed by the City.

g. Check that each equipment item has City's equipment number securely attached.

2. The City shall be notified immediately of any damage. City approval is required prior to unloading any defective equipment.

1.5 COORDINATION

A. Proper judgment must be exercised in carrying out the Work to secure the appropriate headroom and space conditions throughout, to secure neat arrangement of equipment, conduit, fixtures, etc., and to overcome local difficulties and interferences of existing conditions wherever encountered.

B. The Equipment Contractor shall verify all necessary measurements for Equipment Contractor's Work and verify dimensions of supplier, vendor and City's Drawings for consistency and coordination. The Equipment Contractor shall be responsible for the proper installation as specified and shown on the Drawings. The Equipment Contractor shall secure the approval of the City for any variations before making any changes.

2. PRODUCTS

2.1 MISCELLANEOUS MATERIALS

A. Unless otherwise indicated on the Drawings or specified, only new materials are to be incorporated into the Work. All materials furnished by the Equipment Contractor to be incorporated into the Work may be subjected to the inspection and approval of the Engineer. It is the Equipment Contractor's responsibility to meet the requirements of the Contract Documents.

B. As soon as possible after the Contract has been executed but no later than the scheduled date indicated on the City approved project schedule or thirty (30) days after the Contract has been executed, whichever comes first, the Equipment Contractor shall submit to the Engineer, data relating to materials the Contractor proposes to furnish for the Work. Such data are to be in sufficient detail to enable the Engineer to identify the specific product in question and to form an opinion as to its conformity to the Contract requirements.

C. The Equipment Contractor shall furnish all materials and/or labor required for complete erection of the equipment. The Equipment Contractor shall furnish all materials including, but not necessarily limited to, shims, wedges, packing, welding rod, and consumable gases such as carbon dioxide, oxygen, acetylene, and argon.

D. The Equipment Contractor shall provide all bolts, nuts, and gaskets required for the installation and erection of the piping and equipment, unless noted otherwise.

E. The Equipment Contractor shall provide cribbing and shoring to support the floors while moving heavy loads. The Equipment Contractor shall submit Drawings showing the method and location intended for providing temporary floor support and for the planned laydown locations during the assembly period.

F. The Equipment Contractor shall not use the City's equipment or any other party's equipment or tools.

2.2 ASBESTOS CONTAINING MATERIAL AND HAZARDOUS MATERIAL

A. The Equipment Contractor shall not supply, provide or bring onto the construction site any asbestos containing material (ACM) or hazardous material (either in kind, as a component of equipment to be used or furnished under the Contract, or as a component of another material to be used or furnished under the Contract) without the expressed and provided advance written consent of the City. The term, "hazardous material" shall have the meaning ascribed in Federal Standard No. 313B in effect on the date of the Contract.

B. The Equipment Contractor shall submit to the City (with a copy to the Engineer) a Safety Data Sheet (Department of Labor Form OSHA-20) together with a complete written description of the intended usage for any such material for which the City's consent is required, at least thirty (30) days before the delivery of such material.

C. Such consent shall not be given if materials or equipment not containing asbestos or hazardous material are available, and the Equipment Contractor shall not be entitled to any adjustment in time or compensation for providing non-asbestos-containing and non-hazardous materials.

3. EXECUTION

3.1 INSTALLATION

A. The Equipment Contractor shall have on hand sufficient and proper tools and machinery of ample capacity to facilitate the Work and to handle all emergency

situations that may normally be encountered in work of the type specified herein.

B. Equipment shall be erected in a professional and competent manner on the foundations at the locations and elevations shown on the plans unless directed otherwise by the Engineer during installation. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

C. The Equipment Contractor is responsible for insuring that all materials and equipment furnished fit the spaces provided. Equipment Contractor is to make all necessary field measurements and is to order only those materials and equipment which can be accommodated in the spaces provided. Where materials or equipment which occupy more or less space than is shown on the Drawing or is available, and which require different arrangements from those shown on the Drawings, or which require any modifications of the structures or other equipment or connections, the Equipment Contractor is to install the equipment so as to operate properly and in agreement with the intended design and is to provide all labor, materials and equipment necessitated by such rearrangements or modifications at the Equipment Contractor's own expense. This is a performance design and the Equipment Contractor is responsible for any modifications to comply with the intent of the Contract Documents.

D. The Equipment Contractor shall furnish all oils and greases not supplied by the manufacturer for the lubrication of the equipment prior to initial operation.

E. The Equipment Contractor shall insure that all grease fittings on each piece of equipment furnished under the Contract are standardized so that only "Zerk" type of fitting is utilized. Equipment Contractor to provide centralized manifolds with tubing so all grease fittings are accessible by maintenance technicians from floor level or a platform without the need to use ladders or lifts.

F. For the purpose of avoiding conflicts with other trades and adjoining work, where more than one article, device, product, material, fixture, form or type of construction is referred to by proprietary name, manufacturer, make or catalog number, the FIRST NAMED has generally been used as the basis of conceptual drawing.

G. Mechanical equipment and accessory equipment shall be set and located in accordance with Drawings and data, which have been approved by the City. Work shall be performed by mechanics and craftsmen skilled in their various trades under the direction of experienced and competent supervisors of the Equipment Contractor. Changes or adjustments, which are found necessary during the installation, shall be subject to the approval of the City or Engineer. Upon the Equipment Contractor's requests, the City shall promptly provide the recommendations from the equipment manufacturers as to installation procedures, sequence of installation, and tolerances allowed in installation. The Equipment Contractor, however, has full responsibilities for the Work and such recommendations are provided for guidance and reference only.

H. Equipment shall be carefully handled utilizing gear, lifting lugs, and other devices supplied by the equipment manufacturer for this purpose. The Equipment

Contractor shall follow the recommendations of the manufacturer relating to handling installation, cleaning, and preparation for initial operation.

I. Upon completion of all installation, the Equipment Contractor shall furnish to the City, for the permanent records of the City, a record of all clearance measurements and settings on mechanical equipment.

J. The Equipment Contractor shall test and place in successful operation all equipment installed by the Equipment Contractor. All defects in the erection or in the equipment itself shall be corrected by the Equipment Contractor to the satisfaction of the City. Rotating equipment shall be checked for proper direction of rotation, shaft alignment, and balance. Equipment subject to pressures shall be carefully examined for leakage.

K. Electric motors shall be set in position, properly aligned, and secured in place. The electrical connections shall be completed, and the motors bumped electrically for correct rotation prior to the shaft couplings being connected.

L. Setting and Grouting:

1. Skilled mechanics equipped with precision tools shall align all equipment or machines to the requirements of the manufacturer's installation instructions using the reference prints and the limits imposed for "square", "level", "plumb," "angular alignment," and "lineal alignment." All preliminary and final alignments shall be witnessed and approved by the City.

2. Machines and equipment shall be aligned and leveled using wedges, blocks, shims, or leveling bolts. The Equipment Contractor shall furnish and install all shims which may be required in addition to those furnished by material or equipment manufacturers. Shim stock material shall be furnished as follows: Shims for concrete foundations shall be random size carbon steel plate, washers and/or bars. Shims shall be located adjacent to anchor bolts and at sufficient intermediate points to assure complete alignment and support of equipment.

3. Structural steel foundations shall be cleaned and deburred at punched holes, sheared edges, and irregularities to provide smooth and level bearing surfaces. Friction reducing bearing plates provided by the equipment manufacturer shall be installed per equipment and plate manufacturer's recommendations.

4. Machines and equipment that required shimming shall be grouted securely to the bases and foundations with non-shrink grout by the Equipment Contractor unless otherwise noted.

5. Before initial operation, all equipment shall be thoroughly cleaned, all shipping blocks and restraints removed and all moving or rotating parts checked for clearances and freedom from foreign matter. Lubricants of suitable quality and grade shall be furnished by the Equipment Contractor.

3.2 CUTTING AND PATCHING

A. The Equipment Contractor shall perform all necessary cutting and patching of the Work that may be required to properly receive the Work of the various trades or

as may be required by the Contract Drawings and Specifications to complete the structures. The Equipment Contractor is to restore all such cut or patched Work to a condition which receives the approval of the Engineer. Cutting of structures that may endanger the Work, adjacent property, workers or the public is not to be performed.

3.3 TOUCH UP PAINTING

A. Equipment Contractor is required to touch up paint all equipment.

B. Equipment and other materials as specified shall be furnished with a factory applied paint finish as defined in the equipment specifications. Field touch up shall repair paint damaged in transit, unloading, handling, erection, field welding, field modifications, etc.

C. Touch up paint color shall closely match the color of the equipment being painted.

D. Prior to touch up, damaged area shall be sanded so that all edges are smooth and feathered.

E. Compatible rust preventative primer shall be applied prior to application of finish coat.

F. Paint can be applied by brush to areas smaller than 3” x 3”. All larger areas must be painted by spray application.

G. Touch up painted areas that do not closely match adjacent areas must be repainted to eliminate any visible color mismatch to factory applied finish.

3.4 WELDING

A. The Equipment Contractor shall be responsible for all welding performed by personnel employed or contracted by the Equipment Contractor. The Equipment Contractor shall furnish the welders, welding and related equipment and welding rods.

B. Prior to any welding operations, the Equipment Contractor shall submit to the Engineer and City for approval all welding procedures. These procedures shall be updated and reapproved as required. Approval of procedures does not relieve the Equipment Contractor of any responsibility under this Contract.

C. Qualification of welders and welding procedures shall be in accordance with applicable Federal, State, local and professional society rules, regulations and codes, and in accordance with the Engineer’s recommendations.

D. The Equipment Contractor shall maintain a record of the procedures used and of the welders employed on the Work. These records shall be up-to-date and available to the Engineer and City at the construction site.

E. Arc strikes on plant equipment or material metal surfaces are expressly

forbidden. Arc strikes shall be removed by mechanical grinding, emery cloth, metal file, or methods approved by the Engineer. The removal of arc strikes shall not affect the operation of integrity of the equipment or material. The Equipment Contractor shall be responsible for damage or replacement caused by arc strikes or arc strike removal.

F. All grounding shall be performed by the Equipment Contractor in a manner that will insure no damage to any equipment, and electrical, electric or computer systems.

3.5 FIELD QUALITY CONTROL

A. The Equipment Contractor shall furnish all labor, equipment and materials required to perform any testing necessary to demonstrate proper installation and operation of the equipment to the satisfaction of the Engineer and original equipment manufacturer. City shall be notified prior to all tests. These tests shall include, but not be limited to, the following:

1. Running tests for all rotating equipment.
2. Equipment having moving parts shall be tested for freedom of movement and for function.
3. Weight and movement tests for all lifting devices installed by the City.
4. Correct alignment of all equipment, motors, and couplings.
5. Hydrostatic testing, proof, leak and/or tightness tests.

B. The Equipment Contractor shall be responsible for the repair of defects found with the Equipment Contractor's Work during these tests and shall provide quick, prompt response labor during all phases of the testing. The Equipment Contractor shall promptly remedy all defects of Work furnished by the Equipment Contractor.

3.6 SERVICE OF MANUFACTURER'S REPRESENTATIVES

A. The Equipment Contractor is to provide the services of a skilled and experienced representative of each manufacturer supplying equipment under this Contract, for such periods as, are satisfactory to the City, are essential for the proper and satisfactory installation and testing of the equipment, and training of the City's Contract Operator's personnel in its use. In certain instances, particular specification sections may indicate the minimum number of visits and/or hours required to comply with the intent of the specifications regarding services of manufacturer's representatives.

3.7 MATERIALS AND EQUIPMENT SUIT DESIGN

A. The Equipment Contractor is to be responsible for insuring that all materials and equipment furnished fit the spaces provided in the construction. Equipment Contractor is to make all necessary field measurements and is to order only those materials and equipment which can be accommodated in the spaces provided.

B. Where materials or equipment which occupy more or less space than is shown on the Drawing or is available, and which require different arrangements from those shown on the Drawings, or which require any modifications of the structures or other equipment or connections, the Equipment Contractor is to install the equipment so

as to operate properly and in agreement with the intended design and is to provide all labor, materials and equipment necessitated by such rearrangements or modifications at his own expense. This is a performance design and the Equipment Contractor is responsible for any modifications to comply with the intent of the Contract Documents.

C. It is also the responsibility of the Equipment Contractor requesting the use of equivalent or substitutions material and equipment other than that specified for the basic layout to verify that it meets all indicated space requirements.

3.8 GENERAL MECHANICAL DESIGN

A. All equipment is to be adequately designed for the work to be done and the loads to be sustained and is to be proportioned for ample stability and rigidity. Design is to be neat and is to provide necessary clearances for erection, repairs and adjustment. Best modern practice is to be followed in all respects.

B. Design of similar units is to be such that they present a uniform appearance and be similar in operation. Fittings and fixtures on the units are to be of the same make wherever possible. Parts are to be interchangeable wherever feasible.

3.9 CLEANING

A. The highest degree of cleanliness practically achievable shall be maintained throughout this Project, keeping in mind that the materials and equipment are to be handled, opened, examined, assembled, heated, and welded under Project construction conditions. Foreign matter, construction debris, welding rods and other consumables, miscellaneous hardware and excess materials whose presence might lead to operational difficulties or material failure shall be removed. The Equipment Contractor shall maintain the required final cleanliness in all systems to the full satisfaction of the City.

B. Work areas shall be maintained clean during the construction period during which each piece of equipment and material shall be suitably protected and kept reasonably clean. Final cleaning shall be made at the time of final visual inspection of the completed systems.

C. Equipment and materials coming from storage areas shall be moved to the place of erection with their protective coverings, plugs, or bags intact.

D. During the field assembly, foreign matter shall be removed from equipment as Work progresses. Protective covers shall be placed and maintained over equipment connections to prevent the introduction of foreign matter until erection procedures and fit-up require their removal.

1. GENERAL DESIGN AND CONSTRUCTION REQUIREMENTS

A. The Equipment Contractor shall design, manufacture, fabricate, shop test, ship, install, performance test, train, commission and demonstrate a highly efficient, cost effective Equipment Processing System in full compliance and adherence to the Contract Documents, all applicable codes and standards and good engineering practices and standards applied in the recycling industry.

B. The Equipment Contractor shall provide the complete design and installation for all aspects of the Equipment Processing System including, but not limited to, process structural, mechanical, electrical, control elements, and the installation of all components required to complete and operate the Equipment Processing System, including meeting the Performance Requirements and Criteria set forth in these Contract Documents.

C. The Equipment Contractor shall produce an effective and efficient design layout and configuration of their equipment.

D. The Equipment Contractor shall provide project leadership with integral responsibility for the successful completion of the Project and to provide effective coordination of equipment layout, design, and installation which shall meet the following criteria:

1. The Equipment Processing System shall be designed and constructed in accordance with all Federal, State, OSHA, ANSI and Local building, safety, electrical and fire codes, as well as all current MRF industry standards, including but not limited to those listed in the Contract Documents.
2. Produce system flow schematics and drawings (in both AutoCAD and PDF formats) that meet system requirements outlined in the Contract Documents. Meet with the City and its Representatives to review and receive comment upon the proposed design. If requested by the City, incorporate changes into the design.
3. Engineer, design, specify, detail and document all process, structural, metal fabrications, electrical, mechanical, and control systems comprising a complete and functional Equipment Processing System.
4. Equipment specifications shall be presented for steel gauge, welds, surface preparation, and painting. Whether parts are bolted or welded shall be noted.
5. Furnish and install all guards and safety items in accordance with the safety standards required by Federal, State, OSHA, ANSI and Local code or inspectors. Equipment Contractor shall provide emergency stops, lockout / tagout locations, and guarding for all equipment where required.
6. Furnish and install all equipment support structures and operator / maintenance access stairs, platforms, and ladders. Include all handrails, railings, kick plates, floor plates and gratings as required.
7. Furnish and wire all electrical equipment including motors, electrical drives, all equipment and component control devices, compressed air, power panels, control panels and operator interface panels in accordance with all Contract Documents.

8. Minimize the energy usage of the Equipment Processing System to the greatest extent reasonable by providing high efficiency components including but not limited to high efficiency motors, lighting, variable frequency drives, and HVAC equipment.
9. Utilize high quality materials and workmanship to ensure that all components of the Equipment Processing system meet or exceed the minimum required service life, as identified in the Contract Documents.
10. Effectively and efficiently coordinate the delivery and installation schedule with the City and other Contractors to allow for efficient Equipment Processing System construction, equipment installation, startup and commissioning while minimizing impacts to ongoing operations and other building work that will be in progress during these project phases. Work By Others is identified in the RFP.
11. Observe, coordinate, and monitor all traffic flow restrictions, staging areas, building access and other information as indicted in the RFP.

E. The Equipment Contractor shall provide:

1. General size, layout, heights, and structural loading of all equipment and for all support structures and operator/maintenance access stairs, platforms, and ladders.
2. Support points and preliminary floor and foundation loads.
3. Preliminary locations and sizes of required utilities, i.e., water, electricity, sanitary, stormwater, gas, etc.
4. Denote if building cranes will be required.
5. Hazardous waste requirements.
6. Dust collection requirements.
7. Compressed air requirements.
8. Denote temperature control range.
9. Detailed equipment list to include electrical requirements.
10. Identify the footprint and clearance heights under all conveyor and platforms to accommodate design of the fire suppression system in under equipment areas.
11. Identify sorting personnel locations.
12. Identify high dust generating areas.
13. Illustrate safe walking access, platform interconnection, and rolling equipment circulation and considerations when developing the proposed equipment layout.
14. Identify locations of new pits as necessary.
15. Identify Wi-Fi and network requirements, including fiber optics.

F. The Equipment Contractor shall have verifiable experience in the form of successful previous projects of similar scopes. Reference projects must consist of work of the same trade of which the Contractor is to perform for this Project.

G. The Equipment Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract

Documents. The Equipment Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction.

H. At all times during the Work, the Equipment Contractor shall assign a competent resident superintendent who shall not be replaced without prior written notice to the City and Engineer except under extraordinary circumstances.

I. In performing all work required for the fabrication and installation of the Equipment Processing System, the Equipment Contractor shall follow industry best-practices and trade-specific professional codes to ensure that the Equipment Processing System adheres to the Contract Documents and remains safe and reliable throughout its life.

J. Unless otherwise specified in the Contract Documents, the Equipment Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the construction, installation, performance, testing, startup, and completion of the Work.

K. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of the City. If required by the Engineer, the Equipment Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind and quality of materials and equipment.

L. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

1.2 GENERAL CONSTRUCTION REQUIREMENTS

A. The Equipment Contractor shall be responsible for designing, furnishing, and installing all structural items and hardware that are required to install and operate the Equipment Processing System per the Contract Documents and any applicable Federal, State and Local codes. This includes but is not limited to:

1. Structural steel for elevated platforms
2. Structural steel support structures for equipment
3. Steel bins and bunkers

B. Any and all components that are to be located on the exterior of the building, or otherwise exposed directly or indirectly to rain, or other moisture on a temporary or continuous basis shall be designed, fabricated and installed in manner to resist corrosion and function as-designed for the entirety of the anticipated lifespan of the particular equipment or component. This may be accomplished by the addition of corrosion protection devices or coatings.

C. The Equipment Contractor shall seal all openings in the exterior wall of the building between the edge of the opening and the surface of the equipment for all equipment, pipes, conduit or other equipment related item penetrating the building's existing exterior wall. All seals shall be designed, fabricated and installed in a manner that will remain weatherproof, vector and vermin proof, for a minimum period of five years from Acceptance.

D. All electric components and equipment shall be designed, specified and installed in compliance with NFPA 70 and any other applicable code or best-practice.

E. The Equipment Contractor shall provide for all connections of the Equipment Processing Facility to all existing on-site utilities that are required for the Equipment Processing System to function per the Contract Documents. This includes coordinating with the City, the Engineer and the Building Contractor to ensure that items provided by the Building Contractor, including power drops to equipment panels, HVAC equipment for sort rooms, and piping for sump pumps are properly located and sized.

F. The Equipment Contractor shall verify the location, elevations, size and present usage of existing utilities lines and shall notify the Engineers of any discrepancy with the contract drawings before proceeding with the work.

G. The Equipment Contractor shall be responsible for designing, furnishing, fabricating, assembling, and installing all safety items that are required to install and operate the Equipment Processing System per the Contract Documents and all applicable codes. The Equipment Processing system provided by the Equipment Contractor shall satisfy all Federal, State, and local safety requirements. Specific items to be delivered by the Equipment Contractor include:

1. Guard rails around platforms, stairs, ladders, sort stations, exposed pits.
2. E-Stops on all conveyors accessible by personnel, and/or anywhere else required.
3. A penetrating firestopping system that is designed, fabricated and installed to resist the spread of fire, passage of smoke and other gases, and maintain the original fire-resistance rating of the construction penetrated.
4. An emergency lighting system including emergency flood lights and exit signs on all egress doors.

1.3 MATERIALS

A. METALS:

1. Structural steel is to conform to "Specifications for Structural Steel" Designation ASTM A992, except for tube sections which are to conform to "Specifications for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes" ASTM A500, Grade B, with 46,000 psi yield strength. Where stock a material is approved for use, it is to conform to the requirements set forth in Section 5(a) for the "Code of Standard Practice

for Steel Buildings and Bridges" of the American Institute of Steel Construction.

B. WELDING

1. Welding, if used, is to be equivalent in strength to a bolted connection and is to be done in accordance with the current American Welding Society Specifications.
2. Filler metal for Arc-welding electrodes is to conform to "Specifications for Iron and Steel Arc Welding Electrodes" of the American Welding Society.
3. Upon request, submit written welding procedures for each type of welded joint used per Appendix E of the AWS Structural Welding Code.
4. Where welding is specified or detailed on the Drawings, it shall be done in strict accordance with the "Structural Welding Code" AWS D1-1, for procedures, appearance and quality of welds, and for the methods used in correcting welding work.
5. Welding electrodes shall be E70XX and the electrodes and fluxes shall conform to "Specification for Mild Steel Covered Arc-Welded Electrodes", ASW A5.1.
6. All welding shall be done by qualified welders with current AWS welding certificates. When required by the Engineer, copies of these certificates shall be presented.
7. The Engineer may require that certifications be provided stating that all welded work meets the requirements as specified herein. These certificates are to be presented to the City through the City's representatives. Such certifications are to include individual qualified welder's certificates.

C. CONNECTIONS

1. All connections for steel framing shall conform to the AISC Manual of Steel Construction, Thirteenth Edition, and shall be capable of supporting one-half the total uniform load capacity shown in the table of uniform load constants; for the given beam, span and grade of steel specified; unless a larger reaction is shown on the Drawings. Where, due to framing, a special connection must be used, it shall be capable of supporting the loading given above. All connections shall be friction-type connections.
2. A minimum of four bolts is required at each connection
3. In general, shop fabricated connections may be welded or high strength bolted. Bolted connections using clips shall be done at the shop. Fastenings specifically shown on the Drawings are to be used.
4. Field connections are to be high strength bolted unless welding is indicated.
5. Holes for the attachment of work by other trades are to be provided as required. Holes are to be punched or drilled; burning will not be permitted.

D. Master Control Centers (MCC)

1. The MCC must conform to Underwriters Laboratory (UL) 845, current revision, CSA, EEMAC, NEMA ICS-2, the latest version of the National Electrical Code, and the Canadian Electrical Code. All MCC's must be manufactured in an ISO 9001 certified facility.
2. Provisions shall be provided for locking all disconnects in the *off* position with up to three (3) padlocks.

3. Motor control centers shall not be located in hazardous locations. The area chosen shall be well ventilated and totally free from humidity, dust and dirt. The temperature of the area shall be no less than 0° C (32° F) and no greater than 40° C (104° F). Protection must be provided to prevent moisture entering the enclosure.
4. All MCC's shall undergo thorough quality inspections before shipment, including physical inspections and electrical tests.

E. ELECTRICAL CONNECTIONS

1. Tighten electrical connectors and terminals according to manufacturer's published torque- tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
2. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
3. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.

1.4 FIELD QUALITY CONTROL

A. Testing and Inspecting: A qualified independent testing and inspecting agency shall be hired by and paid by the Equipment Contractor to perform field tests and special inspections and prepare test reports.

B. After installing electrical systems and before electrical circuitry has been energized, Equipment Contractor shall test electrical components including but not limited to service entrance/feeder conductors, and the grounding system for compliance with requirements. Equipment Contractor shall perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification and certify compliance with test parameters.

C. Equipment Contractor shall perform testing, adjusting and balancing procedures (TAB) on each HVAC system according to the procedures contained in AABC's "National Standards for Total System Balance" or ASHRAE 111 or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section. Following the TAB, Contractor shall prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced system.

1. EQUIPMENT BASIC REQUIREMENTS GENERAL

Requirements of this Specification Section apply to all Equipment.

1.1 QUALITY ASSURANCE

A. Referenced Standards:

1. American Bearing Manufacturers Association (ABMA).

2. American Gear Manufacturers Association (AGMA).

3. ASTM International (ASTM):

a. E1934, Standard Guide for Examining Electrical and Mechanical Equipment with Infrared Thermography.

b. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

4. Hydraulic Institute (HI):

a. 9.6.4, Centrifugal and Vertical Pumps for Vibration Measurements and Allowable Valves.

5. International Electrotechnical Commission (IEC).

6. Institute of Electrical and Electronics Engineers, Inc. (IEEE).

7. International Organization for Standardization (ISO):

a. 1940, Mechanical Vibration - Balance Quality Requirements for Rotors in a Constant (Rigid) State - Part 1: Specification and Verification of Balance Tolerances.

8. National Electrical Manufacturers Association (NEMA):

a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

b. ICS 6, Enclosures for Industrial Control and System.

c. MG 1, Motors and Generators.

9. International Electrical Testing Association (NETA):

a. ATS, Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems.

10. National Fire Protection Association (NFPA):

a. 70, National Electrical Code (NEC):

1) Article 430, Motors, Motor Circuits, and Controllers.

11. National Institute for Certification in Engineering Technologies (NICET).

12. National Institute of Standards and Technology (NIST).

13. Occupational Safety and Health Administration (OSHA):

a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.

14. Underwriters Laboratories, Inc. (UL).

a. 508, Standard for Safety Industrial Control Equipment.

b. 508A, Standard for Safety Industrial Control Panels.

15. Vibration Institute.

16. American National Standards Institute (ANSI)

B. Any Equipment malfunction due to freezing or high temperatures experienced in Phoenix, Arizona is unacceptable. All processing Equipment that shall be installed shall be designed and supplied for the ambient conditions of Phoenix AZ. Such Equipment shall be able to cold start following a 48-hour period of inactivity.

C. Electrical Equipment and Connections Testing Program:

1. Testing firm:

a. An independent firm performing, as the sole or principal part of its business for a minimum of ten (10) years, the inspection, testing, calibration, and adjusting of systems.
b. Must have an established monitoring and testing Equipment calibration program with accuracy traceable in an unbroken chain, according to NIST.

2. Field personnel:
a. Minimum of one (1) year field experience covering all phases of electrical Equipment inspection, testing, and calibration.
b. Relay test technician having previous experience with testing and calibration of relays of the same manufacturer and type used on project and proficient in setting and testing the types of protection elements used.
c. Supervisor certified by NETA or NICET.

3. Analysis personnel:
a. Minimum three (3) years combined field testing and data analysis experience.
b. Supervisor certified by NETA or NICET.

D. Miscellaneous:
1. A single manufacturer of a "product" to be selected and utilized uniformly throughout Project even though:
a. More than one (1) manufacturer is listed for a given "product" in Specifications.
b. No manufacturer is listed.
2. Equipment, electrical assemblies, related electrical wiring, instrumentation, controls, and system components shall fully comply with specific NEC requirements related to area classification and to NEMA 250 and NEMA ICS 6 designations shown on Electrical Power Drawings and defined in Division 26.

1.2 DEFINITIONS

A. Product: Manufactured materials and Equipment.

B. Equipment:
1. One (1) or more assemblies capable of performing a complete function.
2. Mechanical, electrical, instrumentation or other devices requiring an electrical, pneumatic, electronic or hydraulic connection.
3. Not limited to items specifically referenced in "Equipment" articles within individual Specifications.

C. Installer or Applicator:
1. Installer or applicator is the person installing or applying the product in the field at the Project site.
2. Installer and applicator are synonymous.

1.3 SUBMITTALS

A. Shop Drawings:
1. General for all Equipment:
a. See other Contract requirements for the mechanics and administration of the submittal process.

b. Data sheets that include manufacturer's name and complete product model number.
  1) Clearly identify all optional accessories that are included.
c. Acknowledgement that products submitted comply with the requirements of the standards referenced.
d. Manufacturer's delivery, storage, handling, and installation instructions.
e. Equipment identification utilizing numbering system and name utilized in Drawings.
f. Equipment installation details:
  1) Location of anchorage.
  2) Type, size, and materials of construction of anchorage.
  3) Anchorage setting templates.
  4) Manufacturer's installation instructions.
g. Equipment area classification rating.
h. Shipping and operating weight.
i. Equipment physical characteristics:
  1) Dimensions (both horizontal and vertical).
  2) Materials of construction and construction details.
j. Equipment factory primer and paint data.
k. Manufacturer's recommended spare parts list.
l. Equipment lining and coatings.
m. Equipment utility requirements include air, natural gas, electricity, and water.
n. Ladders and platforms provided with Equipment:
  1) Certification that all components comply fully with OSHA requirements.
  2) Full details of construction/fabrication.
  3) Scaled plan and sections showing relationship to Equipment.

2. Mechanical and process Equipment:
a. Operating characteristics:
  1) Technical information including applicable performance curves showing specified Equipment capacity, rangeability, and efficiencies.
  2) Brake horsepower requirements.
  3) Copies of Equipment data plates.
b. Piping and duct connection size, type and location.
c. Equipment bearing life certification.
d. Equipment foundation data:
  1) Equipment center of gravity.
  2) Criteria for designing vibration, special or unbalanced forces resulting from Equipment operation.

3. Electric motor:
a. Motor manufacturer and model number.
b. Complete motor nameplate data.
c. Weight.
d. NEMA design type.
e. Enclosure type.
f. Frame size.
g. Winding insulation class and temperature rise.
h. Starts per hour.
i. Performance data:

1) Guaranteed minimum efficiencies at 100 percent, 75 percent, and 50 percent of full load
2) Guaranteed minimum power factor at 100 percent, 75 percent, and 50 percent of full load.
3) Locked rotor and full load current at rated terminal voltage and minimum permissible or specified terminal voltage.
4) Starting, full load, and breakdown torque at rated terminal voltage and minimum permissible or specified terminal voltage.

j. Bearing data and lubrication system.
k. Thermal protection system including recommended alarm and trip settings for winding and bearing RTD's.
l. Fabrication and/or layout drawings:
1) Dimensioned outlined drawing.
2) Connection diagrams including accessories (strip heaters, thermal protection, etc.).
m. Certifications:
1) When utilized with a reduced voltage starter, certify that motor and driven Equipment are compatible.
2) When utilized with a variable frequency controller, certify motor is inverter duty and the controller and motor are compatible.
a) Include minimum speed at which the motor may be operated for the driven machinery.
n. Electrical gear:
1) Unless specified in a narrow-scope Specification Section, provide the following:
a) Equipment ratings: Voltage, continuous current, kVa, watts, short circuit with stand, etc., as applicable.
2) Control panels:
a) Panel construction.
b) Point-to-point ladder diagrams.
c) Scaled panel face and subpanel layout.
d) Technical product data on panel components.
e) Panel and subpanel dimensions and weights.
f) Panel access openings.
g) Nameplate schedule.
h) Panel anchorage.

4. Systems schematics and data:
a. Provide system schematics where required in system specifications.
1) Acknowledge all system components being supplied as part of the system.
2) Utilize Equipment, instrument and valving tag numbers defined in the Contract Documents for all components.
3) Provide technical data for each system component showing compliance with the Contract Document requirements.
4) For piping components, identify all utility connections, vents and drains which will be included as part of the system.

5. Qualifications for:
a. Vibration testing firm and personnel.
b. Infrared thermography testing firm and personnel.
c. Electrical Equipment and connections testing firm and personnel.

6. Testing plans, in accordance with PART 3- EXECUTION of this Specification Section:
   a. Vibration testing.
   b. Thermography testing.
   c. Electrical Equipment and connection testing.

B. Operation and Maintenance Manuals:
   1. See Contract Documents:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

C. Miscellaneous Submittals:
   1. Sample form letter for Equipment field certification.
   2. Certification that Equipment has been installed properly, has been initially started up, has been calibrated and/or adjusted as required, and is ready for operation.
   3. Certification for major Equipment supports that Equipment foundation design loads shown on the Drawings or specified have been compared to actual loads exhibited by Equipment provided for this Project and that said design loadings are equal to or greater than the loads produced by the Equipment provided.
   4. Notification, at least one (1) week in advance, that motor testing will be conducted at factory.
   5. Certification from Equipment manufacturer that all manufacturer-supplied control panels that interface in any way with other controls or panels have been submitted to and coordinated with the supplier/installer of those interfacing systems.
   6. Motor test reports.
   7. Certification prior to Project closeout that electrical panel drawings for manufacturer supplied control panels truly represent panel wiring including any field-made modifications.
   8. Provide three (3) bound final written reports and (3) electronic copies documenting and testing for specified Equipment.
      a. Include the acceptance criteria of all Equipment tested.
      b. Provide individual tabbed sections for information associated with each piece of tested Equipment.
   9. Preliminary field quality control testing format to be used as a basis for final field quality control reporting.
   10. Testing and monitoring reports in accordance with PART 3- EXECUTION of this Specification Section.
   11. Certification that driven equipment and VFD are compatible.

D. Manufacturers of processing machinery and Equipment shall:
   1. Complete a risk assessment designed to ensure that reasonably foreseeable machine guarding hazards which result from the products or services that they provide are identified, and corresponding risks are reduced to an acceptable level (see ANSI B11.0);
   2. Provide instructions to the employer to identify the guards, guarding devices and controls which are to be provided and used to reduce risks of injury.

2. PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Motors:

a. Baldor.
b. General Electric.
c. Marathon Electric.
d. Reliance Electric.
e. Siemens.
f. Teco-Westinghouse.
g. U.S. Motors.
h. WEG.
i. SEW Eurodrive
j. Nord Gear

2.2 MANUFACTURED UNITS

A. General:

1. Furnished Equipment manufacturer's field quality control services and testing as specified in the individual Equipment Specification Sections.
2. Execute pre-demonstration requirements in accordance with Specification Section 01350.
3. Perform and report on all tests required by the Equipment manufacturer's Operation and Maintenance Manual.
4. Provide testing of electrical Equipment and connections in accordance with Division 26.
5. Equip testing and analysis personnel with all appropriate project related reference material required to perform tests, analyze results, and provide documentation including, but not limited to:
a. Contract Drawings and Specifications.
b. Related construction change documentation.
c. Approved Shop Drawings.
d. Approved Operation and Maintenance Manuals.
e. Other pertinent information as required.

B. Equipment Monitoring and Testing Plans:

1. Approved in accordance with Shop Drawing submittal schedule.
2. Included as a minimum:
a. Qualifications of firm, field personnel, and analysis personnel doing the Work.
b. List and description of testing and analysis Equipment to be utilized.
c. List of all Equipment to be testing, including:
1) Name and tag numbers identified in the Contract Documents.
2) Manufacturer's serial numbers.
3) Other pertinent manufacturer identification,

C. Instruments Used in Equipment and Connections Quality Control Testing:

1. Minimum calibration frequency:
a. Field analog instruments: Not more than 6 months.
b. Field digital instruments: Not more than 12 months.
c. Laboratory instruments: Not more than 12 months.
d. If instrument manufacturer's calibration requirements are more

stringent, those requirements shall govern.

2. Carry current calibration status and labels on all testing instruments.
3. See individual testing programs for additional instrumentation compliance requirements.

D. Electrical Equipment and Connections Testing Program:

1. Perform testing on Division 26 Equipment and connections in accordance with Division 26 requirements.
2. Testing of motors:
   a. After installation and prior to energizing the motor, perform inspections and tests per NETA ATS 7.15 for all motors 25 HP or above.
   b. Bump motor to check for correct rotation.
3. Repair or replace Equipment shown to be out of range of the acceptable tolerance until the Equipment meets or exceeds acceptability standards.

E. Other Testing:

1. Perform tests and inspections not specifically listed but required to assure Equipment is safe to energize and operate.
2. Sub base that supports the Equipment base and that is made in the form of a cast iron or steel structure that has supporting beams, legs, and cross members that are cast, welded, or bolted shall be tested for a natural frequency of vibration after Equipment is mounted.
   a. The ratio of the natural frequency of the structure to the frequency of the disturbing force shall not be between 0.5 and 1.5.

F. Electric Motors:

1. Where used in conjunction with adjustable speed AC or DC drives, provide motors that are fully compatible with the speed controllers.
2. Design for frequent starting duty equivalent to duty service required by driven Equipment.
3. Design for full voltage starting.
4. Design bearing life based upon actual operating load conditions imposed by driven Equipment.
5. Size for altitude of Project.
6. Furnish with stainless steel nameplates which include all data required by NEC Article 430.
7. Use of manufacturer's standard motor will be permitted on integrally constructed motor driven Equipment specified by model number in which a redesign of the complete unit would be required in order to provide a motor with features specified.
8. AC electric motors less than 1/3 HP:
   a. Single phase, 60 Hz, designed for the supply voltage shown on the Drawings.
   b. Permanently lubricated sealed bearings conforming to ABMA standards.
   c. Built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element with stainless steel enclosure.
9. AC electric motors 1/3 to 1 HP:
   a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
   b. Permanently lubricated sealed bearings conforming to ABMA standards.
      1) For single phase motors, provide built-in manual reset thermal

protector or integrally mounted manual motor starter with thermal overload element.

10. AC electric motors 1-1/2 to 10 HP:
- **a.** Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
- **b.** Permanently lubricated sealed bearings conforming to ABMA standards.
- **c.** For vertical motors provide 15-year, average-life thrust bearings conforming to ABMA standards.

MOTOR LOCATION	MOTOR ENCLOSURE / WINDING INSULATION
Unclassified Indoor Areas	TEFC, Standard Insulation
Wet indoor Areas	TEFC, Standard Insulation
Wet outdoor Areas	TEFC Encapsulated Windings

NOTE: Provide TENV motors in the smaller horsepower ratings where TEFC is not available.

11. Provide oversize conduit box complete with clamp type grounding terminals inside the conduit box.

G. Submersible Motors: Refer to individual narrow-scope Specification Sections for submersible motor requirements.

H. V-Belt Drive:
1. Provide each V-belt drive with sliding base or other suitable tension adjustment.
2. Provide V-belt drives with a service factor of at least 1.6 at maximum speed.
3. Provide static proof belts.

2.3 COMPONENTS

A. Gear Drives and Drive Components:
1. Size drive Equipment capable of supporting full load including losses in speed reducers and power transmission.
2. Provide nominal input horsepower rating of each gear or speed reducer at least equal to nameplate horsepower of drive motor.
3. Design drive units for 24 HR continuous service, constructed so oil leakage around shafts is precluded.
4. Utilize gears, gear lubrication systems, gear drives, speed reducers, speed increasers and flexible couplings meeting applicable standards of AGMA.
5. Gear reducers:
   - **a.** Provide gear reducer totally enclosed and oil lubricated.
   - **b.** Utilize antifriction bearings throughout.
   - **c.** Provide worm gear reducers having a service factor of at least 1.20.
   - **d.** Furnish other helical, spiral bevel, and combination bevel-helical gear reducers with a service factor of at least 1.50.

2.4 ACCESSORIES

A. Guards:
- **1.** Moving components of machinery which contain a pinch point, rotating parts, point of operation hazard, ingoing nip points or create other potential safety hazards such as ejecting materials from the point of operation shall be enclosed, guarded, or both, except as provided for in specific standards for the individual Equipment type.
- **2.** All guards shall be appropriate for the hazards involved, secured in place, constructed of substantial material and have surfaces free of hazardous projections.
- **3.** Guards and guarding devices (e.g., interlocks) shall be designed, constructed, installed, and maintained so as to prevent the operator from having any part of his/her body in the danger zone during the operating cycle.
- **4.** Hazards created by point of operation, ingoing nip points, rotating parts, fan blades, belts, pulleys, gears, chains and other moving parts shall be guarded to a height of no less than 7 feet (2.1 meters) above the floor or working level.
- **5.** Provide each piece of Equipment having exposed moving parts with full length, easily removable guards, meeting OSHA requirements.
- **6.** Interior applications:
  - **a.** Construct from expanded galvanized steel rolled to conform to shaft or coupling surface.
  - **b.** Utilize non-flattened type 16 GA galvanized steel with nominal 1/2 IN spacing.
  - **c.** Connect to Equipment frame with hot-dip galvanized bolts and wing nuts.
- **7.** Exterior applications:
  - **a.** Construct from 16 GA stainless steel or aluminum.
  - **b.** Construct to preclude entrance of rain, snow, or moisture.
  - **c.** Roll to conform to shaft or coupling surface.
  - **d.** Connect to Equipment frame with stainless steel bolts and wing nuts.

B. Anchorage:
- **1.** Cast-in-place anchorage:
  - **a.** Provide ASTM F593, Type 316 stainless steel anchorage for all Equipment.
  - **b.** Configuration and number of anchor bolts shall be per manufacturer's recommendations.
  - **c.** Provide two (2) nuts for each bolt.
- **2.** Drilled anchorage:
  - **a.** Adhesive anchors per Specification Section 01300.
  - **b.** Epoxy grout per Specification Section 01300.
  - **c.** Threaded rods same as cast-in-place.

C. Data Plate:
- **1.** Attach a stainless-steel data plate to each piece of rotary or reciprocating Equipment.
- **2.** Permanently stamp information on data plate including manufacturer's name, Equipment operating parameters, serial number and speed.

D. Lifting Eye Bolts or Lugs:
- **1.** Provide on all Equipment 50 LBS or greater.
- **2.** Provide on other Equipment or products as specified in the narrow-scope Specification Sections.

2.5 FABRICATION

A. Design, fabricate, and assemble Equipment in accordance with modern engineering and shop practices.

B. Manufacture individual parts to standard sizes and gages so that repair parts, furnished at any time, can be installed in field.

C. Furnish like parts of duplicate units to be interchangeable.

D. Ensure that Equipment has not been in service at any time prior to delivery, except as required by tests.

E. Furnish Equipment which requires periodic internal inspection or adjustment with access panels which will not require disassembly of guards, dismantling of piping or Equipment or similar major efforts.

1. Quick opening but sound, securable access ports or windows shall be provided for inspection of chains, belts, or similar items.

F. Provide common, lipped base plate mounting for Equipment and Equipment motor where said mounting is a manufacturer's standard option.

1. Provide drain connection for 3/4 IN PVC tubing.

G. Machine the mounting feet of rotating Equipment.

H. Fabricate Equipment which will be subject to Corrosive Environment in such a way as to avoid back-to-back placement of surfaces that cannot be properly prepared and painted.

1. When such back-to-back fabrication cannot be avoided, provide continuous welds to seal such surfaces from contact with corrosive environment.
2. Where continuous welds are not practical, after painting seal the back-to-back surfaces from the environment in accordance with Contract Documents

I. Critical Speed:

1. All rotating parts accurately machined and in as near perfect rotational balance as practicable.
2. Excessive vibration is sufficient cause for Equipment rejection.
3. Ratio of all rotative speeds to critical speed of a unit or components: Greater than 1.2.

I. Control Panels Engineered and Provided with the Equipment by the Manufacturer:

1. Manufacturer’s standard design for components and control logic unless specific requirements are specified in the specific Equipment Specification Section.
2. NEMA or IEC rated components are acceptable, whichever is used in the manufacturer’s standard engineered design, unless specific requirements are required in the specific Equipment Specification Section.
3. Affix entire assembly with a UL 508A label "Listed Enclosed Industrial Control Panel" prior to delivery.
   a. Control panels without an affixed UL 508A label shall be rejected.

2.6 SHOP OR FACTORY PAINT FINISHES

A. Electrical Equipment:

1. Provide factory-applied paint coating system(s) for all electrical Equipment components in accordance with Contract Documents.
   a. Field painted Equipment: Refer to Contract Documents for factory applied primer/field paint compatibility requirements.

B. Field paint other Equipment in accordance with Contract Documents.
   1. Refer to Contract Documents for factory applied primer/field paint compatibility requirements.

2.7 SOURCE QUALITY CONTROL

A. Motor Tests:
B. Test motors in accordance with NEMA and IEEE standards.
C. Provide routine test for all motors.
D. The City reserves the right to select and have tested, either routine or complete, any motor included in the project.
   1. The City will pay all costs, including shipping and handling, for all motors successfully passing the tests.
   2. The Contractor shall pay all costs, including shipping and handling, for all motors failing the tests.
   3. If two (2) successive motors of the same manufacturer fail testing, the City has the right to reject all motors from that manufacturer.

3. EXECUTION

3.1 INSTALLATION

A. Install Equipment as shown on Drawings and in accordance with manufacturer's directions.

B. Utilize templates for anchorage placement for slab-mounted Equipment.

C. For Equipment having drainage requirements such as seal water, provide 3/4 IN PVC or clear plastic tubing from Equipment base to nearest floor or Equipment drain.
   1. Route clear of major traffic areas and as approved by Engineer.

D. DO NOT construct foundations until major Equipment supports are approved.

E. Extend all non-accessible grease fittings using stainless steel tubing to a location which allows easy access of fittings from closest operating floor level.

F. Equipment Base:
   1. Construct level in both directions.
   2. Take particular care at anchor bolt locations so these areas are flat and level.

G. Couplings:
   1. Align in the annular and parallel positions.
      a. For Equipment rotating at 1200 rpm or less, align both annular and parallel within 0.001 IN tolerance for couplings 4 IN size and smaller.
         1) Couplings larger than 4 IN size: Increase tolerance 0.0005 IN per inches of coupling diameter, i.e., allow 6 IN coupling 0.002 IN tolerance, and allow a 10 IN coupling 0.004 IN tolerance.
      b. For Equipment rotating at speeds greater than 1200 rpm allow both

annular and parallel positions within a tolerance rate of 0.00025 IN per inch coupling diameter.

2. If Equipment is delivered as a mounted unit from factory, verify factory alignment on site after installation and realigned if necessary.
3. Check surfaces for runout before attempting to trim or align units.

H. Grouting:

1. After machine base has been shimmed, leveled onto Equipment base, couplings aligned and mounting bolts tightened to correct torque value, place a dam or formwork around base to contain grouting between Equipment base and Equipment support pad.
   a. Extend dam or formwork to cover leveling shims and blocks.
   b. Do not use nuts below the machine base to level the unit.
2. Saturate top of roughened concrete subbase with water before grouting.
   a. Add grout until entire space under machine base is filled to the top of the base underside.
   b. Puddle grout by working a stiff wire through the grout and vent holes to work grout in place and release any entrained air in the grout or base cavity.
3. When the grout has sufficiently hardened, remove dam or formwork and finish the exposed grout surface to fine, smooth surface.
   a. Cover exposed grout surfaces with wet burlap and keep covering sufficiently wet to prevent too rapid evaporation of water from the grout.
   b. When the grout has fully hardened (after a minimum of seven (7) days) tighten all anchor bolts to engage Equipment base to grout, shims, and Equipment support pad.
   c. Recheck driver-driven unit for proper alignment.

3.2 INSTALLATION CHECKS

A. For all Equipment specifically required in detailed specifications, secure services of experienced, competent, and authorized representative(s) of Equipment manufacturer to visit site of work and inspect, check, adjust and approve Equipment installation.

1. In each case, representative(s) shall be present during placement and start-up of Equipment and as often as necessary to resolve any operational issues which may arise.

B. Secure from Equipment manufacturer's representative(s) a written report certifying that Equipment:

1. Has been properly installed and lubricated.
2. Is in accurate alignment.
3. Is free from any undue stress imposed by connecting piping or anchor bolts.
4. Has been operated under full load conditions and that it operated satisfactorily.
   a. Secure and deliver a field written report to City immediately prior to leaving jobsite.

C. No separate payment shall be made for installation checks.

1. All or any time expended during installation check does not qualify as Operation and Maintenance training or instruction time when specified.

3.3 IDENTIFICATION OF EQUIPMENT AND HAZARD WARNING SIGNS

Identify Equipment and install hazard warning signs.

3.4 FIELD PAINTING AND PROTECTIVE COATINGS

For required field painting and protective coatings, comply with Contract Documents.

3.5 WIRING CONNECTIONS AND TERMINATION

A. Clean wires before installing lugs and connectors.

B. Coat connection with oxidation eliminating compound for aluminum wire.

C. Terminate motor circuit conductors with copper lugs bolted to motor leads.

D. Tape stripped ends of conductors and associated connectors with electrical tape.

1. Wrapping thickness shall be 150 percent of the conductor insulation thickness.

E. Connections to carry full ampacity of conductors without temperature rise.

F. Terminate spare conductors with electrical tape.

3.6 FIELD QUALITY CONTROL

A. Furnish Equipment manufacturer services as specified in the individual Equipment Specifications.

B. Inspect wire and connections for physical damage and proper connection.

C. Bump motor to check for correct rotation:

1. Ensure motor has been lubricated.
2. Check prior to connection to driven Equipment.

1. EQUIPMENT STARTUP, TESTING AND TRAINING

1.1 PRETEST RESPONSIBILITIES

A. Prior to commencing functional and performance testing of the Equipment Processing System provided by the Equipment Contractor as described under this Section, the Equipment Contractor shall have first satisfied the following minimum requirements:

1. Completed the installation of all equipment, materials, systems and accessories, including all electrical wiring and controls for the Equipment Processing System included under this Contract.

2. Prepared, submitted and received the City's approval of Equipment Contractor's proposed test protocols and procedures. City's approval must be received by the Equipment Contractor not less than sixty (60) days prior to the Equipment Contractor's notifying City of request to initiate testing.

3. Prepared, submitted and received City's approval of the Equipment Contractor's Operation & Maintenance (O&M) Manual. City's approval must be received not less than sixty (60) days prior to the Equipment Contractor's notifying City of request to initiate testing.

4. Notified the City and the Engineer thirty (30) days in advance of each required test which the Equipment Contractor proposes to initiate and undertake.

1.2 OBJECTIVES

A. The objectives of testing the Equipment Processing System furnished and installed under this Contract are:

1. To demonstrate that the equipment has been installed properly, operates consistent with the manufacturer's requirements and the Contract Documents, and functionally interrelates with the other equipment installed under these Contract Documents.

2. To introduce, familiarize and train the Operator's personnel in the proper operation and maintenance of the installed equipment.

3. To demonstrate that the Equipment System can receive and feed, as well as selectively distribute, separate, and recover material in accordance with the Contract Documents resulting in marketable commodities.

4. The Equipment Processing System shall meet or exceed the Minimum Performance Requirements as specified in these Contract Documents.

1.3 RESPONSIBILITIES

A. Equipment Contractor Responsibilities: The Equipment Contractor shall be responsible for the following:

1. Provide all labor, supervision, equipment and materials to satisfy the requirements, fulfill the objectives and meet all Contract Document responsibilities to successfully complete the Testing described herein.

2. Equipment Contractor to provide additional supervision during the startup, testing and training phase of the Project.

3. Demonstrate to the full satisfaction of the Engineer and the City that all installed Equipment Processing System is in compliance with the Contract Documents. This includes:

   a. Minimum Performance Requirements
   b. Materials of Construction
   c. Drives
   d. Speeds
   e. Lubrication
   f. Electrical Controls, Interlocks and Instrumentation
   g. Hoppers, Skirts, Spill Plates and Discharge Chutes contain material and residue flows without spillage.

4. Demonstrate the satisfactory installation and performance of all electrical, instrumentation and controls installed under this Contract.

5. Train the designated management, operations and maintenance personnel of the City's Operator in the proper operation and maintenance of the Equipment Processing System.

6. Review and compare the Equipment Contractor's preliminary approved O&M Manual with actual conditions experienced during Testing. To the extent that revisions are found to be necessary, the Equipment Contractor shall be responsible for making such changes to the O&M Manual to reflect such actual conditions and resubmitting the O&M Manual to the City.

7. Develop and submit to the Engineer for approval all startup and training schedules, Test protocols, Test schedules and Test material requirements for performance of all startup, training and Testing requirements as discussed in this Specification Section.

8. The Equipment Contractor shall provide the services of skilled and experienced representatives of each manufacturer supplying equipment under this Contract for such periods, as satisfactory to the City, are essential for the proper and satisfactory installation and testing of the equipment, and training of the City's personnel in its use. In certain instances, particular specification sections may indicate the minimum number of visits and/or hours required to comply with the intent of the specifications regarding services of manufacturer's representatives.

B. City's Responsibilities:

Under this Section, the City shall be responsible for the following:

1. Provide the required / desired feedstock to the Facility in accordance with the Equipment Contractor's written notifications to the City.

2. Provide designated management personnel with whom the Equipment Contractor can coordinate Testing Programs.

3. Provide sufficient operating personnel as required to meet Equipment Contractor's

Testing Schedule, including material sorters capable of meeting generally accepted good industry standard pick rates.

4. Provide for the removal of recovered / marketable materials and residue.

5. Provide electricity, light and heat during hours of Testing.

1.4 EQUIPMENT START-UP TEST (NO-LOAD TEST)

A. With the Engineer's approval and as soon as is possible and feasible after permanent installation, all conveyors and equipment, individually and as a group, shall be powered on and operated under the full range of operating conditions in the unloaded mode, unless otherwise specified. Safety, interlocks, instrumentation, and control switches shall be proven at this time. The Equipment Contractor shall furnish electrical connections and controls, lubricants and other materials, instruments, and all labor needed for the initial start-up testing program. The Equipment Contractor shall submit a protocol for approval with inspection data sheets for each piece of equipment.

B. For all processing equipment including conveyors, screens, optical sorters, robotics, magnets, blowers, eddy current separators, crushers, trommels, balers, compactors and control panels the Equipment Contractor shall include and provide as part of the Contract Price, the services of the manufacturer's factory representative (non-technical sales representatives unqualified or unfamiliar with the intricate design and operation of the equipment item are unacceptable to the City) of the equipment being tested who shall be present during this initial test.

C. All processing equipment shall be operated as a process, not individually, for not less than eight (8) hours, and under such variable operating conditions as required by the manufacturer's representative for the manufacturer to warrant in writing to the Equipment Contractor and the City that his equipment is properly installed, performs as required under the conditions specified in these Contact Documents and is free from defects such as overheating, overloading and undue vibration.

D. The manufacturer's representative or the Equipment Contractor shall determine motor power draw while operating under the above conditions. The Equipment Contractor, at his expense, shall make all necessary changes, adjustments and replacement as required in order to obtain the required manufacturer written warranty as specified in the contract.

E. The successful operation of an equipment item during this test phase shall not constitute Final Acceptance of the equipment item by the City. Until the equipment has performed satisfactorily during the Equipment Performance Test described below in Section 1.6, Final Acceptance by the City shall not be considered.

1.5 EQUIPMENT SHAKEDOWN TEST (LOAD TEST)

Prior to the Equipment Performance Test, the Equipment Shakedown Test shall be performed as described herein. The Equipment Processing System installation work shall be complete, equipment shakedown shall be complete and the system shall be tested for a minimum of 13 run hours (over two (2), 6.5 run hours shifts per day) at a minimum of 75 percent of the guaranteed minimum throughput capacity to demonstrate performance efficiencies of individual components for the Equipment Shakedown Test. Equipment

throughput capacity for the purpose of this test shall be defined as 22.5 TPH for the (75% of 30 TPH).

A. The Equipment Contractor's personnel shall begin the Shakedown Test under loaded conditions upon written certification that the Equipment Start-up Test has been completed and as a trial run before the Equipment Performance Test. The Equipment Contractor shall include in the Contract Price the costs of the Equipment Shakedown Test and City's personnel training.

B. To prove the performance of each piece of equipment, the City shall provide feedstock in quantities requested by the Equipment Contractor.

C. Equipment to be tested shall be activated from the Control Panel, or at each equipment location and adjusted to accept feed material consistent with the capacity requirements of this Specification section.

D. During the Equipment Shakedown Test, the City shall supply sufficient manpower, mobile equipment and storage containers required to move and remove materials. All processed materials shall become the property of the City. Likewise, all residue material resulting from the process shall be disposed of by the City.

E. During the Equipment Shakedown Test, the Equipment Contractor shall train and instruct key personnel provided and identified by the City in equipment operation, performance and maintenance.

F. In addition to and separate from the City's Operator supplied staffing as stated under this Subsection, the Equipment Contractor shall also furnish a team of personnel consisting of their own personnel and factory representatives of the individual equipment items to operate and regulate the equipment. The Equipment Contractor's Team shall include servicemen, instructors, mechanics and electricians to maintain all equipment supplied and installed under this Contract during the Equipment Shakedown Test. The Equipment Contractor shall also furnish lubricants and all other materials, equipment and field instruments necessary for the shakedown of the equipment and accessories furnished installed under this Contract.

G. In case of failure of equipment to perform due to any cause whatsoever, all defective parts shall be replaced or corrected by the Equipment Contractor at his expense.

H. Equipment shall be considered meeting performance requirements when it successfully demonstrates the ability to process material as required by the Contract Documents when fed specified material at or above specified capacity.

I. The successful completion of the Equipment Shakedown Test for each piece of equipment and the overall Equipment Processing System shall constitute Substantial Completion.

J. The successful Equipment Shakedown Test for each piece of equipment and the overall Equipment Processing System shall not constitute Acceptance of the Project. After the Equipment Processing System has performed satisfactorily during the Equipment Performance Test as determined by the Engineer and City, Final Acceptance shall then be considered.

K. All warranties on the Equipment Processing System shall not start until the date of Final Acceptance. All repairs, modifications and replacements prior to Final Acceptance shall be considered punch list items required to be completed prior to Final Acceptance and/or Final Completion, as applicable.

1.6 EQUIPMENT PERFORMANCE TEST

A. After the Equipment Shakedown Test is successfully completed, and on a mutually agreeable date that the equipment and the process system is properly working to the satisfaction of the Engineer, the Equipment Contractor shall perform an Equipment Performance Test. This Test shall be supervised by the Equipment Contractor and witnessed by the Engineer. The City shall provide material delivery, material removal, and the necessary Plant management, operating and maintenance personnel based upon the Equipment Contractor's submitted Test Protocol and Test Schedule.

B. The purpose of the Equipment Performance Test is to demonstrate, under actual Project capacity throughput conditions, the compliance of all equipment and accessories under this Contract with the requirements of the Contract Documents. The Equipment Contractor shall include in the Contract Price the costs of performing the Equipment Performance Test.

C. Unless otherwise directed by the City, the Test shall consist of operating the equipment at not less than the minimum throughput capacity of the Equipment Processing System and the approximate material composition of the feedstock. Feedstock shall be provided by the City to the Equipment Contractor in the proportions received by the City as part of normal operations. The amount of materials to be processed shall be as normally received by the City or the City's supplier of materials.

D. The Equipment Performance Test shall be conducted over a five (5) Test Day period of one (1) 7.5 run hours shift per Test Day duration in order to demonstrate compliance with the all the following Minimum Performance Requirements concurrently:

1. Throughput Test: The purpose of the Throughput Test is to demonstrate that the Equipment Processing System is capable of processing Residential Fiber and Commingled Containers at the Minimum Average Throughput Test Requirement during the Equipment Performance Test:

- The Equipment Processing System shall receive and process a total of 1,125 tons of single stream material (aka feedstock material) over a period of five (5) days; 7.5 run hours per day (a total of 37.5 run hours over five (5) Test Days) resulting in meeting the Minimum Average Throughput Requirement of 30 TPH.

2. System Availability Test: The purpose of the System Availability Test is to demonstrate the Equipment Processing System availability. During the Equipment Performance Test, performance criteria for system availability shall be a minimum of 95% up-time or system availability. Excusable down-time will not be considered as down-time when calculating system availability. Excusable down-time includes scenarios where the Equipment Processing System is not operating due to human intervention (such as an E-Stop being applied) or a power outage, or due to other causes that are out of the control of the Equipment Contractor. The Engineer will

have full discretion in identifying excusable downtime. If there is excusable downtime and if over the 5-day period either the tons processed or the processing time or the average TPH does not conform, a sixth (6th) day is permitted and the Test time will be extended to compensate for the equivalent excusable down-time.

3. Recovery Rate / Residue Test: The purpose of the Recovery Rate / Residue Test is to demonstrate that the Equipment Processing System is capable of recovering each material product type at the Minimum Recovery Rate. During the Equipment Performance Test, the Equipment Processing System shall recover a minimum of 95% and 98% (as applicable) by weight of each recovered material product type listed in these Contract Documents.

4. Product Quality and Marketability Test: The purpose of the Product Quality and Marketability Test is to demonstrate that the Equipment Processing System is capable of meeting the market specifications for Recovered Materials processed throughout the Equipment Performance Test. If produced by the Equipment Processing System, materials shall be produced during the Test in "marketable form" in conformance with the quality requirements as outlined in the most recent (as of date the Contract for the Equipment Processing System) Institute of Scrap Recycling Industries (ISRI) Guidelines as follows below. Material will be deemed "Marketable" and compliant with these specifications based on acceptance letters from each of the respective end markets after their receipt and inspection at their facility or by a mill buyer providing an acceptance letter following their inspection of Test bales awaiting shipment at the Facility.

Recycle Commodities	
Material Group	**Material Grade**
Fiber	1. SRPN – Special news mix or #56 grade 2. OCC – Old Corrugated Cardboard
Metals	3. UBC – Used Beverage Containers 4. Aluminum 5. Ferrous Metals – Steel Cans 6. Scrap Metal
Plastics	7. PET – Polyethylene Terephthalate 8. HDPE – Natural 9. HDPE – Color 10. PP – Polypropylene 11. Mixed Rigid Plastics (#1-7) 12. TBD – Spare Bunker
Glass	13. GLASS- 3 mix

E. During the Equipment Performance Test, the City's Operator's maintenance personnel shall maintain all equipment and systems under the instruction of the Equipment Contractor-furnished manufacturer's factory representative.

F. The City's Operator shall supply mobile equipment and storage containers required to move and remove materials. All processed materials shall be the property of the City and may be disposed of as the City sees fit. Likewise, all residue material resulting from the

process shall be disposed of by the City.

G. In case of equipment failure from any cause whatsoever, all defective parts shall be immediately replaced or corrected by the Equipment Contractor at its expense. The Equipment Performance Test shall then be restarted and continued.

H. In case the Equipment Processing does not achieve the Minimum Performance, Guarantees or does not meet the Contract requirements, the Equipment Contractor is fully responsible for promptly correcting the problems at the Equipment Contractor's cost and to repeat the entire 5-day Equipment Performance Test. The Equipment Contractor shall modify, replace and correct his work promptly. The corrective plan shall be prepared by the Equipment Contractor and submitted to the Engineer for review. If the Engineer determines the corrective plan to be inadequate and not in conformance with the Contract Documents, the Equipment Contractor shall resubmit a new plan.

I. During performance of the Equipment Performance Test, the City shall provide the following:

1. Operator's personnel
2. Electric power
3. Light and heat
4. Scale weights
5. Mobile equipment (forklifts, loaders, etc.).
6. Delivery and removal of Test Materials, Recovered Materials and Residue.

J. During performance of the Equipment Performance Test, including any failed or repeated test due to Equipment Contractor fault, the Equipment Contractor shall include the following:

1. Equipment Contractor's personnel
2. Manufacturer's representatives
3. Lubricants
4. Miscellaneous materials and instrumentation costs associated with the Equipment Performance Test.

K. Upon successful completion of the Equipment Performance Test and demonstrating to the Engineer's satisfaction that the Equipment Contractor's Work was performed in accordance with these Contract Documents, the Equipment Contractor shall inspect and restore, as required, the equipment to first-class operating condition as determined by the Engineer.

L. Upon completion of the Equipment Performance Test, the Equipment Contractor shall develop an in-depth Test Report of all Test activities. The Equipment Contractor shall notify the City in writing, that the Equipment Processing System has passed the Test and is in a condition to be transferred to the City. Upon receipt of such notification, the City shall request from the Engineer a recommendation to accept the Project.

M. Within fourteen (14) days of the completion of the Equipment Performance Test, the Equipment Contractor shall furnish the City/Engineer with five (5) printed copies of the Test Report and one (1) electronic copy. The Test Report shall present the results of the Test and shall certify that the Minimum Performance Requirements have been met. The Report shall include:

1. Executive Summary which certifies that Testing was conducted in accordance with the Test Protocol and presents a summary of the results of the Equipment Performance Test;
2. Certification of the Equipment Performance Test results, including a determination to the extent to which the Facility complies with the applicable Minimum Performance Requirements;
3. Test results presented in an organized manner utilizing data tables and spreadsheets, as applicable;
4. Description of the Test conducted;
5. Listing of daily staff utilized;
6. All Test Data sheets completed;
7. All inbound scale tickets and reports;
8. All data measured and recorded during the Equipment Performance Test Period which shall include Test date, quantities of Test Materials received and processed, process time periods, Residue quantities measurements, material quality results, Unacceptable Materials received, Recovered Products processed (Note: to be provided as an Addendum to the Test Report).
9. Detailed description of all Report attachments and appendices, as applicable;
10. All calculations used in determining Test Results;
11. All data reasonably requested by the City and Engineer to be included in the Test Report.

1.7 FINAL ACCEPTANCE

A. Final Acceptance of the Equipment Processing System by the City shall occur upon Successful Completion of all testing requirements and any other requirements for Substantial Completion. This includes the Equipment Startup Test, Equipment Shakedown Test, and Equipment Performance Test.

1.8 TRAINING

A. See individual equipment specification sections.

B. The Equipment Contractor shall design and execute an operator-training program of two week's duration. The program shall consist of both classroom and hands-on training, covering all aspects of operating and maintaining the individual process equipment items and the system as a whole. The training program shall be conducted in conjunction with the System Start-Up (No-Load) Testing and System Shakedown Test (Load Test). All training must be completed prior to commencement of the Equipment Performance Test.

C. The training program shall be conducted by individuals certified by the equipment manufacturers to be qualified instructors.

D. The Equipment Contractor shall submit for approval the training program syllabus thirty (30) days prior to the commencement of training.

E. The facility Operation & Maintenance Manuals shall be used for the training program.

F. Training shall be provided to all facility administration, maintenance personnel, supervisory personnel, and other facility operations personnel.

G. Training shall include facility safety training, including proper procedures for personnel protection, including lock-out, tag-out procedures.

H. Conduct all personnel training after completion of Equipment Start-up for the equipment

for which training is being conducted.

I. Personnel training on individual equipment or systems will not be considered completed unless:

1. All pre-training deliverables are received and approved before commencement of training on the individual equipment or system.
2. No system malfunctions occur during training.
3. All provisions of field and classroom training specifications are met.
4. Training not in compliance with the above will be performed again in its entirety by the manufacturer at no additional cost to City.

J. Field and classroom training requirements:

1. Hold classroom training on-site.
2. Notify each manufacturer specified for on-site training that the City reserves the right to video record any or all training sessions. Organize each training session in a format compatible with video recording.
3. Training instructor: Factory trained and familiar with giving both classroom and "hands- on" instructions.
4. Training instructors: Be at classes on time. Session beginning and ending times to be coordinated with the City and indicated on the master schedule. Normal time lengths for class periods can vary, but brief rest breaks should be scheduled and taken.
5. Organize training sessions into maintenance verses operation topics and identify on schedule.
6. Plan for minimum class attendance of five (5) people at each session and provide sufficient classroom materials, samples, and handouts for those in attendance.
7. Instructors to have a typed agenda and well-prepared instructional material. The use of visual aids, e.g., films, pictures, and slides are recommended for use during the classroom training programs. Deliver agendas to the Engineer a minimum of seven (7) days prior to the classroom training. Provide equipment required for presentation of films, slides, and other visual aids.
8. In the on-site training sessions, cover the information required in the Operation and Maintenance manuals submitted according to the Contract Documents and the following areas as applicable:
    - **a.** Operation of equipment.
    - **b.** Lubrication of equipment.
    - **c.** Maintenance and repair of equipment.
    - **d.** Troubleshooting of equipment.
    - **e.** Preventive maintenance procedures.
    - **f.** Adjustments to equipment.
    - **g.** Inventory of spare parts.
    - **h.** Optimizing equipment performance.
    - **i.** Capabilities.
    - **j.** Operational safety.
    - **k.** Emergency situation response.
    - **l.** Takedown procedures (disassembly and assembly).
9. Maintain a log of classroom training provided including: Instructors, topics, dates, time, and attendance.

1. JOB CONDITIONS

1.1 WORK INCLUDED

A. The Equipment Contractor shall review the Contract Documents to determine the extent of the Work. The Equipment Contractor is specifically alerted to this section concerning inspection of the existing field conditions. The Equipment Contractor is encouraged to visit and inspect the Project prior to preparing its Proposal in order to clearly familiarize themselves with all field conditions, the intent of the layout, and the extent of all Work.

B. Any Work that is to be performed that will likely disrupt or interrupt day-to-day operation of the tipping area shall be scheduled on weekends, subject to change at City's or the Engineer's discretion.

C. Before proceeding with any Work, the Equipment Contractor shall confirm methods of construction, obtain field measurements, and verify all dimensions on the Drawings as required.

D. Failure of the Equipment Contractor to familiarize themselves with all drawings relating to the Work and conditions existing at the site of construction will not relieve the Equipment Contractor of its obligation to furnish all materials, labor and overtime necessary to carry out the provisions of the Contract Documents and to complete the contemplated Work for the consideration set forth in its proposal.

E. The Equipment Contractor is cautioned that existing utilities are to be kept in operation during the period of the Contract.

F. The Equipment Contractor is alerted to the fact that the City and Engineer assume no responsibility for actual conditions of the areas affected by Work indicated or called for by the Contract Documents.

1.2 CONSTRUCTION SEQUENCE

A. The Equipment Contractor shall undertake Work under this Contract only in accordance with the following sequence of construction activities. This sequence may be modified from time to time by the Engineer and City, but the Equipment Contractor shall not depart from the sequence indicated below without prior written permission from the Engineer or City to do so. Construction sequence follows below:

1. Shop Drawing and other Drawing and Information Submittal by Equipment Contractor
2. Shop Drawing and other Drawing and Information Review and Approval by Engineer
3. Equipment Procurement
4. Mobilization
5. Construction
    - a. Delivery and inspection of all new processing equipment
    - b. Installation of new processing equipment
    - c. Connections to existing and new electrical and control systems
    - d. Restoration and clean-up
    - e. Testing of process system to ensure performance

6. Demobilization

1.3 CONSTRUCTION ACCESS

A. The Equipment Contractor is made aware that the recommended access for the Project is through the existing overhead doors. All equipment and building features that are removed or damaged during the sequence of construction must be replaced and restored, unless directed by the City or Engineer.

1.4 ASBESTOS CONTAINING MATERIAL AND HAZARDOUS MATERIAL

A. The Equipment Contractor shall not supply, provide or bring onto the construction site any asbestos containing material (ACM) or hazardous material (either in kind, as a component of equipment to be used or furnished under the Contract, or as a component of another material to be used or furnished under the Contract) without the express advance, written consent of the City. The term, "hazardous material" shall have the meaning ascribed in Federal Standard No. 313B in effect on the date of the Contract.

B. The Equipment Contractor shall submit to the City (with a copy to the Engineer) a Material Safety Data Sheet (Department of Labor Form OSHA-20) together with a complete written description of the intended usage for any such material for which the City's consent is required, at least thirty (30) days before the delivery of such material.

C. Such consent shall not be given if materials or equipment not containing asbestos or hazardous material are available, and the Equipment Contractor shall not be entitled to any adjustment in time or compensation for providing non-asbestos-containing and non-hazardous materials.

1. PROGRESS SCHEDULES

A. Equipment Contractor shall submit, within fifteen (15) days after Notice To Proceed, a day- by-day detailed schedule of installation work, which states delivery requirements to support schedule for the installation work. The Schedule shall indicate requirements for work by others (e.g., removal of existing equipment, building work, etc.) required to support the Equipment Contractor's schedule and critical path.

B. If, in the opinion of the Engineer, the Equipment Contractor falls behind the progress schedule, the Equipment Contractor shall take such steps as may be necessary to improve the progress, and the Engineer may require the Equipment Contractor to increase the number of shifts and/or overtime operations, days of work, and/or the amount of construction plant, and to submit for approval such supplementary schedule or schedules in chart form as may be deemed necessary to demonstrate the manner in which the agreed rate of progress will be regained, all without additional cost to the City.

C. Failure of the Equipment Contractor to comply with the requirements of the Engineer under this provision shall be grounds for determination by the Engineer that the Equipment Contractor is not executing the Work with such diligence as will ensure completion within the time specified. Upon such determination, the Engineer may terminate the Equipment Contractor's right to proceed with the Work, or any separable part thereof, in accordance with the delays-damage clause of the Contract.

1. PROJECT MEETINGS AND REPORTS

1.1 SUMMARY

This section includes the following administrative and procedural requirements:

A. Project Meetings:
- **1.** Pre-construction conference
- **2.** Progress meetings

B. Schedules and Reports:
- **1.** Coordination of submittals
- **2.** Construction progress schedules
- **3.** Weekly progress reports
- **4.** Special reports

1.2 PROJECT MEETINGS

A. Pre-construction conference

1. The Engineer will administer a meeting prior to the start of construction, to review items stated in the following agenda and to establish a working understanding between the Parties as to their relationships during conduct of the Work.

2. Pre-construction conference shall be attended by:

- **a)** Equipment Contractor and key staff
- **b)** Representatives of principal Subcontractors and Suppliers as necessary
- **c)** Engineer and Resident Project Representative
- **d)** City representative(s)
- **e)** Other affected Parties determined by the City

3. Suggested pre-construction agenda:

- **a)** Designation of responsible personnel
- **b)** Projected construction schedules
- **c)** Critical Work sequencing
- **d)** Project coordination
- **e)** Procedures and processing of:
  - **(1)** Field decisions
  - **(2)** Substitutions
  - **(3)** Submittals
  - **(4)** Change Orders
  - **(5)** Application for payment
- **f)** Procedures for testing
- **g)** Procedures for maintaining record documents.
- **h)** Use of premises:
  - **(1)** Office, work and storage areas
  - **(2)** City requirements
- **i)** Construction facilities, controls, and construction aids
- **j)** Temporary utilities

k) Safety and first aid
l) Security
m) Requirements of any permits
n) Work by others

4. Location of meeting: City's main conference room.

B. Progress meetings

1. The Engineer will administer a weekly meeting and at other times requested by the Engineer. Equipment Contractor, Engineer and all Subcontractors active on the site shall be represented at each meeting. Equipment Contractor may request attendance by representatives of his Suppliers and other Subcontractors, or other entities concerned with current program or involve with planning, coordination or performance of future activities. All participants in the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work. Weekly meetings shall be videoconference (preferred) or teleconference capable for any personnel not located in Phoenix, AZ.

2. Equipment Contractor and each Subcontractor shall be prepared to discuss the current construction progress report, any anticipated future changes to the schedule, and advise if their current progress or future anticipated schedules are compatible with the Work.

3. If one Subcontractor is delaying another, Equipment Contractor shall direct such changes as are necessary for those involved to mutually agree on schedule changes in the best interest of construction progress.

4. The following is the suggested progress meeting agenda. This agenda may be modified upon agreement by the City, Engineer or Equipment Contractor:

a) Review of construction progress since previous meeting
b) Field observations, interface requirements, conflicts
c) Problems which impede progress per construction schedule
d) Off-site fabrication
e) Delivery schedules
f) Submittal schedules and status
g) Site utilization
h) Temporary facilities and services
i) Hours of Work
j) Hazards and risks
k) Quality and Work standards
l) Change Orders
m) Documentation of information for payment request
n) Corrective measures and procedures to regain projected schedule if necessary
o) Revisions to construction schedule
p) Progress and schedule during succeeding week
q) Review proposed changes for:
(1) Effect on construction schedule and on completion date

(2) Effect on other contracts issued by the City related to this Project

r) Housekeeping

s) Other business

C. Location of weekly progress meetings: To be agreed upon by all parties.

1. Reporting: after each meeting, minutes of the meeting will be prepared and distributed by the Engineer as required to each party present and other interested parties.

1.3 SCHEDULES AND REPORTS

A. Preliminary Schedules:

1. Within fifteen (15) days after the Notice to Proceed, the Equipment Contractor shall submit to the Engineer for review and acceptance:

a) A preliminary progress schedule in accordance with Contract documents and Specifications.

b) A preliminary schedule of values for partial pay purposes in accordance with Contract documents and Specifications.

c) A preliminary schedule of submittals as stated in Contract documents and Specifications.

d) Certifications of insurance or copies of policies if not previously submitted.

2. Engineer will review and comment on the schedules, and upon agreement with Equipment Contractor concerning any necessary revisions, the schedules will be accepted.

3. If required by the City or Engineer, provide copies of any purchase order placed by Equipment Contractor or Subcontractors.

B. Weekly Progress Reports:

1. Submit a report on actual construction progress on a weekly basis or as directed by the Engineer, to be used during the weekly progress meetings. More frequent reports may be required should the Work fall behind the accepted schedule.

2. Weekly progress reports may consist of a marked-up copy of prints made from the accepted construction progress schedule and a narrative which shall include but not be limited to the following:

a) A description of the work accomplished in the previous week. Work reported complete but not readily apparent to the Engineer must be substantiated with supporting data.

b) A description of current and anticipated delaying factors, if any

c) Impact of possible delaying factors, and

d) A description of the anticipated work to be accomplished in the next two weeks.

C. Special Reports:

1. When an event of an unusual and significant nature occurs at the site, Equipment

Contractor shall prepare and submit a special report. List the chain of events, persons participating, response by Equipment Contractor's personnel, an evaluation of the results or effects, and similar pertinent information. Equipment Contractor shall advise Engineer in advance when such events are known or predictable.

2. Monthly Progress Schedule report and narratives shall be per the Contract Documents

1. QUALITY CONTROL

1.1. SUMMARY

A. This section includes administrative and procedural requirements for quality control services.

B. Quality control services include inspections, tests, and related actions, including reports performed by Equipment Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Engineer.

C. Inspection and testing services are required to verify compliance with requirements specified or as indicated. These services do not relieve Equipment Contractor of their responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1) Specific quality control requirements for individual construction activities are specified in the sections that specify those activities. Requirements in those sections may also cover production of standard products.

2) Specified inspections, tests, and related actions do not limit the Equipment Contractor's quality control procedures that facilitate compliance with Contract Document requirements.

3) Requirements for the Equipment Contractor to provide quality control services required by the Engineer, the City, or authorities having jurisdiction are not limited by provisions of this section.

E. Specification Attachment referred as Submittals" specifies requirements for development of a schedule of required tests and inspections that are critical elements and obligations of the Equipment Contractor's Quality Control requirements of this Contract.

1.2. RESPONSIBILITIES

A. Equipment Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Equipment Contractor shall provide inspections, tests, and other quality control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction. Costs for these services are included in the Contract price.

1) Where individual Sections specifically indicate that certain inspections, tests, and other quality control services are the Equipment Contractor's responsibility, the Equipment Contractor shall employ and pay a qualified independent

testing agency to perform quality control services. Costs for these services are included in the contract price.

2) Where individual sections specifically indicate that certain inspections, tests, and other quality control services are the City's responsibility, the City will engage the services of a qualified independent testing agency to perform those services.

3) Where the City has engaged a testing agency for testing and inspecting part of the Work, and the Equipment Contractor is also required to engage an entity for the same or related element, the Equipment Contractor shall not employ the entity engaged by the City unless agreed to in writing by the City.

B. Retesting: The Equipment Contractor is responsible for retesting where results of inspections, tests, or other quality control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Equipment Contractor's responsibility.

1. The cost of retesting construction, revised or replaced by the Equipment Contractor, is the Equipment Contractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements.

C. Associated Services: Equipment Contractor shall cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:

1. Provide access to the Work.
2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
4. Provide facilities for storage and curing of test samples.
5. Deliver samples to testing laboratories.
6. Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
7. Provide security and protection of samples and test equipment at the Project site.

D. Duties of the Testing Agency: The independent agency engaged by the City to perform inspections, sampling, and testing of materials and construction specified in individual sections shall cooperate with the Engineer and the Equipment Contractor in performance of the

agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the Engineer and the Equipment Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the contract documents or approve or accept any portion of the Work.

3. The agency shall not perform any duties of the Equipment Contractor.

E. Coordination: Coordinate the sequence of activities to accommodate the required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Equipment Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

2. QUALITY ASSURANCE

A. Qualifications for Service Agencies: The Equipment Contractor and City will Engage inspection and testing service agencies, including independent testing laboratories, that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.

B. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

3. REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes.

B. Protect construction exposed by or for quality control service activities and protect repaired construction.

C. Repair and protection is the Equipment Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

1. SUBMITTALS

1.1 SUMMARY

A. Section Includes: General requirements for preparation and submission of the following submittals required for the completion of the Work of the Contract along with re-submittals and updates as required.

1. Technical Submittals:

- **a.** Schedule of Technical Submittals
- **b.** Schedule for submitting Requests for Information (RFI)
- **c.** Shop Drawings
- **d.** Samples
- **e.** Product and Performance Data
- **f.** Manufacturer's Instructions
- **g.** Certificates of Compliance

2. General Submittals:

- **a.** Schedule of General Submittals
- **b.** Project Construction Schedule
- **c.** Monthly Progress Reports
- **d.** Safety Program

3. Submittals Not Requiring Approval:

- **a.** Weekly Status Report
- **b.** Weekly Person-hour Reports/Employee Roster
- **c.** Monthly Schedule Updates
- **d.** Safety Program

B. All submittals shall be in English.

C. The Equipment Contractor shall submit all submittals to the Engineer electronically as well as in hard copy format, however subject to the Engineer's approval, certain agreed upon submittals can be submitted electronically with acceptable transmittal letter.

D. Technical and General Submittals shall be numerically serialized by type, Technical Submittal with a "T" prefix (T-1, T-2, T-3, etc.) and General Submittals with a "G" prefix (G-1, G-2, G-3, etc.).

E. The Equipment Contractor shall submit the number of copies of each submittal that the Equipment Contractor requires to be returned, plus four (4) copies that will be retained by the Engineer.

F. The Engineer will clearly label the submittals as follows and return to the Equipment Contractor:

1. Approved
2. Approved as Noted

3. Revise and Resubmit

4. Rejected

5. Information Only

G. When submittals are returned marked with either "Revise and Resubmit" or "Rejected", the Equipment Contractor shall make such revisions and corrections as required and resubmit the submittal with the same submittal number followed by R-1 (Revision One). Example: T-5 - R-1 within 5 days unless additional time is requested by the Equipment Contractor with justification and agreed to by the Engineer, not unreasonably withheld.

1.2 RELATED SECTIONS

A. Refer to all other Technical Specification Sections in these Contract Documents.

1.3 TECHNICAL SUBMITTALS

A. Schedule of Technical Submittals:

1. The Equipment Contractor shall prepare and submit within fifteen (15) days of the Notice To Proceed a Technical Submittals Schedule listing all technical submittals required by the Contract Documents.

2. The Technical Submittals Schedule shall separate submittals by major specification section. This Schedule shall include submittal delivery dates, required return dates, material delivery dates, and other pertinent data required to ensure that the Equipment Contractor meets the Project Schedule.

3. This Schedule shall be updated monthly to reflect progress and any additions or deletions to the submittal schedule. Copies of the updated schedule shall be furnished to the City/Engineer during the first week of each calendar month.

B. Technical Data Sheets

1. Equipment Contractor shall submit all equipment technical information indicated on Technical Data Sheets provided by the Engineer to reflect full compliance with the Contract.

2. Any item found not to be in conformance with the Contract Documents may be rejected at the sole discretion of the Engineer and the Equipment Contractor shall be directed to comply with the Contract Documents.

3. The Engineer reserves the right to request supplemental information (i.e., calculations) to support the information provided. Form must be filled out completely (either handwritten or typed) after Award of Contract.

C. Shop Drawings:

1. Equipment Supplier Shop Drawings (or Detailed/Assembly Drawings) shall include all individual equipment drawings, equipment arrangement drawings, installation drawings, wiring drawings, schematic drawings of electrical wiring details, and assembly and maintenance drawings require for:
- **a.** The necessary engineering to coordinate and install Equipment Contractor's furnished equipment.
- **b.** The installation and termination of interconnecting wiring and field wiring
- **c.** The operation and maintenance of all Equipment process equipment.

2. Required shop drawings shall include, but not be limited to the following:
- **a.** Equipment arrangement drawings (plan and elevations)
- **b.** Equipment outline drawings for each piece of equipment
- **c.** Electrical and control drawings providing the following information:
  - **i.** Equipment motor data sheets
  - **ii.** Arrangement of all motors and electrical loads requiring power
  - **iii.** Control panel and junction box locations
  - **iv.** Control panel layouts, complete schematic and wiring diagrams
  - **v.** Identification of all field wiring termination points and interfaces to other equipment and systems with function, terminal board and terminal identification
  - **vi.** Identification of all external power supply requirements including voltage, phase, continuous and peak current.
- **d.** Structural drawings, including but not limited to the following:
  - **i.** Foundation loading diagrams
  - **ii.** Foundation base plate and anchor bolt drawings
  - **iii.** Arrangement of support steel, platforms and stairs

3. Shop drawings shall establish the actual detail of all manufactured or fabricated items, indicate proper relation of adjoining work and incorporate minor changes of design or construction to suit actual conditions. Shop drawings shall be drawn to scale and shall be completely dimensioned.

4. Sheet sizes of shop drawings shall be 8 1/2 inches x 11 inches, 11 inches x 17 inches, 22 inches x 34 inches, or 24 inches x 36 inches. Electronic versions of drawings for submittal is acceptable.

5. A clear space of 3 inches by 3 inches shall be provided on each drawing for the Engineer's review stamp and comments.

6. After the Engineer has completed the review of shop drawings, the Engineer will return copies to the Equipment Contractor indicating the approval status.

7. The Engineer will review and generally return shop drawings within ten (10) days of receipt.

D. Samples:

1. The Equipment Contractor shall submit samples, such as paint colors, to the Engineer at least ten (10) days before purchasing, fabricating, applying, or installing such materials and finishes, unless otherwise stated. The Engineer will review the samples for visual aspects such as kind, color, pattern, and

texture, all will approve or ask for re-submittal of samples generally within ten (10) days of the Equipment Contractor's submittal. Approvals of samples will be given by the Engineer in writing.

E. Product and Performance Data:

1. Each copy shall be marked to identify applicable products, models, options, performance, and other data; manufacturers' standard data shall be supplemented to provide information unique to the Work.

2. The Equipment Contractor shall submit the number of copies, which the Equipment Contractor requires to be returned, plus four (4) copies which will be retained by the Engineer.

F. Manufacturer's Instructions:

1. As stated throughout the Contract Documents, the Equipment Contractor shall submit manufacturer's printed instructions for delivery, storage, shelf life, assembly, installation, operations, maintenance, adjusting, and finishing.

G. Certificates of Compliance:

1. The Equipment Contractor shall submit certificates of compliance for certain materials and products in lieu of the specified sampling and testing procedures as specified in each Specification section. Submit certificates required for demonstrating proof of compliance of materials with specification requirements in duplicate with each lot of materials delivered to the Work. The lot so certified shall be clearly identified by the certificate. Certificates shall be signed by an authorized representative of the producer or manufacturer and shall state that the material complies in all respects with the requirements of the Contract Documents. In the case of multiple shipments, each shipment shall be accompanied by a certificate of compliance.

2. The certificate of compliance shall be accompanied by a certified copy of test results or shall state that such test results are on file with the producer or manufacturer and shall be furnished to the Engineer on request. The certificate shall give the information specified for samples in Paragraph C above, the name and address of the organization performing the tests, the date of the tests, and the quantity of material shipped.

3. Materials used based on a certificate of compliance may be sampled and tested at any time. The fact that material is used on the basis of a certificate of compliance shall not relieve the Equipment Contractor of responsibility for incorporating material in the Work that conforms to the requirements of the contract and any such material not conforming to such requirements will be subject to rejection, whether in place or not.

4. The Engineer reserves the right to refuse to permit the use of certain materials based on a certificate of compliance.

1.4 GENERAL SUBMITTALS

A. Schedule of General Submittals: The Equipment Contractor shall prepare and submit a Schedule of General Submittals listing all General Submittals required by this Section.

B. Schedules and Reports: The Equipment Contractor shall prepare and submit Schedules and Reports in accordance with the requirements of this Section.

C. The schedules and reports shall describe the Equipment Contractor's Work plan in sufficient detail as delineated below to provide:

1. Assurance to the Engineer that the finished Work complies accurately with the contract Documents,

2. A basis for determining the progress of the Work, and

3. A basis for the City's internal planning activities.

D. Within ten (10) calendar days after Notice to Proceed, the Equipment Contractor shall provide the Engineer with initial copies of the General Submittals specified in this Section.

E. The schedules shall be in a reproducible form, prepared to the same scale or may be combined as approved by the Engineer.

F. Unless otherwise specified, the schedules shall be presented in graphic format and shall be updated for each construction meeting at least monthly and transmitted to the Engineer.

G. The Equipment Contractor shall obtain approval of the various schedules specified in this Section before submitting the first application for payment. Schedule revisions also require Engineer approval.

H. Project Construction Schedule:

1. Scheduling: A preliminary issue of the Project Construction Schedule shall be prepared by the Equipment Contractor within fifteen (15) days after receipt of Notice to Proceed for Engineer's review and comment. The Equipment Contractor shall submit the Project Construction Schedule for formal approval within five (5) days after receipt comments from the Engineer.

2. Format: The Project Construction Schedule shall consist of the following items, each compatible with the other and developed from the same basis:

Schedule: Bar Chart or Critical Path Method (CPM).
Critical Milestone Dates as listed below.

a. Start/complete mobilization
b. Start/complete Electrical Work
c. Start/complete Commingled Container Processing Equipment installation
d. Start/Complete Residential Fiber Processing Equipment installation
e. Start/complete Mechanical / HVAC Work
f. Start/complete Fire Protection Work

g. Start/complete Plumbing Work
h. Start/complete general construction/carpentry Work
i. Start/complete final inspection
j. Start/complete demobilization

3. Revised schedule, if required, will be given a new revision number and submitted to the Engineer for approval.

4. Weekly construction schedule updates will be submitted by the Equipment Contractor, showing the work progress based on the baseline schedule submitted and approved by the Engineer.

a. Modifications: Changes shall be made and submitted with each Schedule Revision and/or each executed Contract Proceed change in accordance with the requirements of the Contract Documents.

I. Monthly Progress Reports:

1. The Equipment Contractor shall submit a Monthly Progress Report, listing all construction activities and their schedule completion dates. Activities shall show the percent of completion and the days required for completion and shall include milestone events that occurred during the month.

2. A Monthly Progress Report format shall be furnished by the Equipment Contractor for approval by the Engineer at the pre-construction conference.

3. Three (3) copies of each Monthly Progress Report shall be forwarded to the Engineer no later than the fifth (5^{th}) working day after the last working day the Report is based on.

4. Other Requirements: Requests for progress payments shall be accompanied by the latest pertinent report.

J. Safety Program:

1. The Equipment Contractor for presentation and discussion at the pre-construction meeting shall prepare a preliminary Safety Program. The Equipment Contractor's Safety Monitor shall be named and be present at the pre-construction meeting. Although the Safety Program will not be formally approved, the City will review and comment of its adequacy.

1.5 SUBMITTALS NOT REQUIRING APPROVAL

A. The Equipment Contractor shall furnish the following submittals for information only. These submittals will not be approved and returned to the Equipment Contractor

1. Weekly Status Reports: The Equipment Contractor shall submit a Weekly Status Report to the Engineer by Friday at 12:00pm. The report shall be on a form satisfactory to the Engineer and shall include items such as a Summary of Work completed and a two-week Look Ahead Bar Chart.

2. Monthly Schedule Updates: The Equipment Contractor shall submit an

updated schedule, with the Critical Milestones clearly identified, by the first of each month. The status of the schedule shall indicate percent complete by activity and remaining duration of in-progress activities.

1. MAINTENANCE OF RECORD DOCUMENTS

A. Maintain at the job site one (1) printed full-size copy of the most current up-to-date following Project Documents for record purposes:

1. Construction Drawings
2. Technical Specifications
3. Change Orders
4. Engineer's Field Orders
5. Reviewed Shop Drawings
6. Clarifications or Explanatory Drawings and Specifications
7. Inspection Reports

B. Store documents used for record purposes in the field office or other approved location, apart from documents used for construction.

C. File documents in accordance with the Contract Documents.

D. Maintain documents in clean, dry, legible condition.

E. Do not use record documents for construction purposes.

F. Always make documents available for inspection by the City, the Engineer or its authorized representatives.

2. RECORD DRAWINGS

A. Project Drawings:

1. Equipment Contractor shall maintain "As-Built" or record drawings of all Work and subcontracts, continuously as the job progresses. A separate set of prints, for this purpose only, shall be kept at the job site at all times. All deviations from the drawings, exact locations of permanent property markers or monuments, all utilities and services, mechanical and electrical lines, details, and other Work shall be finally incorporated on this reproducible set.
2. During construction, actual locations to scale shall be identified on the Record Drawings for all runs of mechanical and electrical work, including all site utilities and services, installed underground, in walls, or otherwise concealed. Deviations from the Construction Drawings shall be shown in detail. All main runs, whether piping, conduit, ductwork, or drain lines shall be located, in addition, by dimension and elevation.
3. No work shall be permanently concealed until the required information has been recorded.
4. Where the Engineer's Drawings are not of sufficient size, scale, or detail, Equipment Contractor shall furnish his own drawings for incorporation of details and dimensions.
5. Progress payments may be withheld if Equipment Contractor does not mark-up record drawings on a daily basis.
6. The final record set of Record Drawings, including As-Built Drawings shall be signed and dated by the Equipment Contractor, and shall be delivered to the Engineer, prior to the City's Acceptance of the Project.

B. Shop Drawings / Detailed Assembly Drawings:

1. One (1) complete set of reviewed shop drawings/detailed assembly drawings, including manufacturer's printed catalog cuts and data, shall be collected and maintained for record purposes.
2. Shop drawings shall be filed and maintained separate from Project drawings. Shop drawings shall be filed in letter size file folders to the greatest extent

possible and shall be indexed in accordance with the Specification-Division Format.

3. Shop drawings shall be delivered in new paperboard boxes manufactured specifically for the storage of file folders. Boxes shall have covers and cutout handles and shall be accurately identified as to the contents.

3. RECORD SPECIFICATIONS

A. Project Specifications:

1. The specifications book for record purposes shall be filed in a large-ring, 3-ring binder or binders with labels on the spine and cover.
2. Information, changes, and notes shall be recorded in the specifications in blank areas, such as page margins or the backs of opposite pages, or on separate sheets inserted in the binder. All such information, changes, and notes be recorded with red pen or red typewriter ribbon.
3. In each section, in an appropriate location, record the manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

B. Change Orders and Field Orders:

1. All Change Orders and Engineer's Field Orders shall be incorporated into the front of the specifications book in reverse chronological order. Use appropriate page dividers to identify addenda and change orders and to separate addenda from the specifications.
2. In addition, the changes to the specifications effected by Change Order or Field Order shall be annotated on the affected page or pages of the specifications, or adjacent thereto.

4. SUBMISSION OF DOCUMENTS

A. At completion of the Project, and before submitting an invoice for final payment, deliver record documents to the Engineer.

B. For Project Record Drawings, including As-Built Drawings, the Equipment Contractor shall submit one (1) electronic copy in AutoCAD 2021 format, one (1) electronic copy in PDF format and one (1) electronic copy for 3D drawings in STEP format also in a 3D Viewer format. The electronic copies shall be submitted on three (3) USB stick drives. The Equipment Contractor shall submit the same documents in a printed a format for five (5) blueline or blackline prints full-size and five (5) 11 x 17 prints.

C. Record documents shall be delivered neatly and efficiently packaged.

D. Submission of record documents shall be accompanied with a transmittal letter, in triplicate, containing the following information:

1. Date of submission.
2. Project title and number.
3. Equipment Contractor's name and address.
4. Title and number of each record document. (Shop drawings may be grouped in basic categories or divisions of work.)
5. Certification that each document as submitted is complete and accurate.
6. Signature of Equipment Contractor or his authorized representatives.

1. OPERATIONAL AND MAINTENANCE DATA

1.1 REQUIREMENTS INCLUDED

A. Format and content of manuals.

B. Instruction of City's personnel.

C. Schedule of submittals.

1.2 RELATED REQUIREMENTS

A. Submittals: Submittals procedures. Shop drawings, product data and samples.

B. Contract Closeout: Project closeout procedures.

C. Project Record Documents.

D. Individual Specifications Sections: Specific requirements for operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.4 OPERATION AND MAINTENANCE MANUAL

A. The Equipment Contractor shall furnish the services of qualified manufacturer's representatives to instruct designated employees of the City's Operator in the operation and maintenance of all equipment. The Equipment Contractor shall furnish and deliver to the City for approval six (6) complete sets in printed copy and electronic format of Operation and Maintenance Manuals and include instructions, bulletins, diagrams and other data and information required for proper operation and maintenance of the equipment, including ordering of spare parts.

B. The operation and maintenance manuals shall include, but not be limited to, the following topics:

1. Step-by-step operating instructions for preparation for starting, operating, and shutdown of each piece of equipment, system, and subsystem (as appropriate).
2. Assembly and erection drawings of the equipment reflecting each part.
3. As-installed control diagrams, including color coded wiring diagrams for all electrical motor controller connections and interlock connections with other mechanical equipment.
4. Installation instructions.
5. Dimensional drawing of the installation.
6. Performance data including all settings for all processing equipment,

conveyor speeds and proximity switch delay settings.

7. Baling sequence for the commodities, tier and strapper settings for each commodity with consideration to avoid material cross-contamination, to minimize the number of times the wire tying or strapping spacing and/or number of wires need to change and to minimize the risk of fires in the baling chamber from spreading.
8. Recommended lubricants.
9. Complete parts list with prices and name of local suppliers.
10. Maintenance instructions including lubrication schedule.
11. Manufacturer's Recommended Spare Parts List.
12. As-Built Drawings of all new and modified equipment, systems and building work associated with the Project.

C. The Equipment Contractor shall submit to the Engineer for review and comment, two (2) complete copies of the Operation and Maintenance Manual for each piece of equipment, within a period of thirty (30) calendar days after the date of approved shop drawings. The Engineer shall review and return one (1) copy of the proposed Manual with comments. The Equipment Contractor shall incorporate the comments into the final Operation and Maintenance Manual. The Equipment Contractor shall submit two (2) copies of the final Operation and Maintenance Manual to the Engineer for review. Upon the Engineer's approval, the Equipment Contractor shall deliver to the Engineer six (6) additional copies of the complete Operations and Maintenance Manual. The final Operations and Maintenance Manual shall include all equipment and systems and shall be submitted prior to Substantial Completion and Testing.

D. In addition to the requirements listed, the Operation and Maintenance Manual shall include the following format:

1. Neatly typewritten index near the front of the manual, giving immediate information as to the location within the manual of all emergency data regarding the installation, operation and maintenance.
2. Use heavy-duty plastic or vinyl covered 3-ring binders.
3. Front cover and spine of each manual shall clearly identify the City and the Project address.

1.5 FORMAT

A. Prepare data in the form of an instructional manual.

B. The printed copies of the Operation and Maintenance Manuals are to be organized into one or more completely indexed volumes bound into heavy duty, three ring binders (maximum size 3"). Page size should be 8.5" x 11" where possible with punched vinyl pockets as necessary to accommodate over-size sheets.

C. The electronic copies of the Operation and Maintenance Manuals are to be exact facsimiles of the printed copies and shall be fully indexed, printable

and searchable.

D. For mechanical systems, include binder space, tab, and index designation for temperature controls, test and balance report, and sheet metal drawings.

E. Each binder is to be identified on the front and spine with the Project name, volume number, and the title "OPERATION AND MAINTENANCE MANUAL".

F. Arrange content by systems, under section numbers and sequence of Table of Contents of this Project Manual.

G. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

H. Text: Manufacturer's printed data on 20-pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.6 CONTENTS, EACH VOLUME

A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer and Equipment Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

E. Type Text: As required to supplement product data. Provide logical sequence of instructions for each procedure.

1.7 MANUAL FOR MATERIALS AND FINISHES

A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations.

B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional Requirements: As specified in individual product specification Sections.

E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.8 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

B. Panelboard Circuit Directories: Provide electrical service characteristics, controls and communications.

C. Include as-installed color-coded wiring diagrams.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide as-installed control diagrams by controls manufacturer for each control panel.

1.9 INSTRUCTION OF PERSONNEL OF THE CITY'S OPERATOR

A. Before final inspection, instruct City's Operator's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times in accordance with the Contract

requirements.

B. For equipment requiring seasonal operation, perform instructions for other seasons within six (6) months.

C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.