SECTION 11 11 35
TANDEM UNDERFLOOR WHEELSET LATHE SYSTEM

PART 1 - PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT and SPECIAL TERMS AND CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Definition of Terms Used in this Specification Section:

1. Manufacturer: The firm responsible for design, manufacture, delivery, installation and commissioning of the Tandem Underfloor Wheelset Lathe System (TWTM). Referred to elsewhere in Advance Procurement Invitation for Bid (IFB) documents as the “Contractor” for contractual purposes.

2. Installer: The manufacturer and any licensed subcontractors acting under its direction and supervision.

3. Construction Contractor: The general contractor responsible for construction of the overall Frazer Maintenance Facility Expansion (also referred to herein as the Shop), having specific responsibilities related to the TWTM as detailed herein.

4. Engineer: SEPTA’s designated representative.

1.02 SECTION INCLUDES:

A. Requirements for designing, furnishing and installing a TWTM including, but not limited to, 2 lathes working in tandem, mechanic chip collection and conveying system, fume/dust collection system, controls, interlocks, spare parts and storage.

1. Unless specifically noted otherwise, references herein to “equipment” or “system” shall be understood to refer to the complete Tandem Underfloor Wheelset Lathe System as described above in 1.02A.

B. Requirements for start-up, field testing, and operation/maintenance training of SEPTA employees.

C. Requirements for the manufacturer of the TWTM System (hereinafter referred to as the “manufacturer”) to coordinate with the Construction Contractor who is responsible for construction of the facility and pit in which the TWTM System is to be installed.

D. Requirements within this specification are directed to, and the responsibility of, the manufacturer, unless specifically noted otherwise.
E. Bid Options, and Unit Pricing for storage, as indicated on the BID FORM and defined herein.

F. Division of Work:

1. The manufacturer of the TWTM System shall furnish the following materials for the Contractor to install:
   
   a. All embedments that must be cast in place for support of lathes, rail movement systems, chip conveyors, electric power & control panels, gratings, and any other elements of the equipment. Embedments shall be hot-dip galvanized.

2. The manufacturer of the TWTM System shall furnish and install:
   
   a. The Lathe shall include all required components to allow full simultaneous machining of one and two wheel sets.
   
   b. The Lathe shall machine the wheel profiles on wheel sets that are stand-alone or still in the bogies, under or removed from the rail vehicle.
   
   c. The Lathe shall include train progression control system, Mechanical Chip Collection / Removal Conveying System, Remote Controls and Interlock, and Dust and Fume Collection Systems.
   
   d. The Lathe shall include all piping, wiring, conduit and switching required to connect the equipment to the building utilities and to interconnect the various system components.
   
   e. The Lathe shall include a data acquisition and recording system for all work performed.
   
   f. The Lathe shall be provided with the capability of future interlocking systems to ensure safe operation of the system with future Overhead Catenary System (OCS) electrification.
   
   g. The Lathe shall also include all accessories, appurtenances, support structures and controls, required for complete and operational equipment installation.

3. The Construction Contractor shall be responsible for:
   
   a. Coordinating the testing and commissioning of the equipment by the manufacturer, including but not limited to making arrangements with SEPTA for employees, rail vehicles, and classroom space, based upon requests from the manufacturer. This is to ensure that testing and commissioning activities do not conflict with other facility construction activities.
   
   b. Constructing the equipment pit, installing embedded items, and providing...
all required electrical-mechanical and connectivity services in the facility per the manufacturer’s requirements, to ensure that the equipment offers an optimal performance.

c. Coordinating with the manufacturer, taking into account the dates for completion of scheduled manufacturing milestones, the delivery of the equipment in order to meet Contractor’s obligations and ensuring that the required pit, embedments and utilities are complete and ready for installation of the equipment.

4. The Construction Contractor will furnish and install (based upon the TWMT manufacturer’s approved design):

   a. Embedded shop rail up to the edge of pit, to be installed after machine rails are installed
   b. Anchor bolts for load beams
   c. Conduit with pull wires for power and control wiring (embedded conduit only)
   d. 480V electrical power to a main panel/disconnect as designated by the manufacturer on Shop Drawings.

1.03 REFERENCED SECTIONS:

   A. Section 11 00 00 Equipment General Requirements

1.04 STANDARDS AND REGULATIONS:

   A. All equipment shall be manufactured and set up in accordance with all industrial and safety standards that apply to the work.

   B. Industry Standards:

   1. AAR Association of American Railroads
   2. AFBMA Anti Friction Bearing Manufacturers Association
   3. AISC American Institute of Steel Construction
   4. ANSI American National Standards Institute, ANSI B 30.2, Safety Standard
   5. AREMA American Railway Engineering and Maintenance of Way Association
   6. ASQC American Society of Quality Control
   7. AWS American Welding Society
   8. IEEE Institute of Electrical and Electronics Engineers
   9. ISO International Standards Organization,
ISO 9001, 2008 Edition

10. NEMA National Electric Manufacturers Association

11. NFPA National Fire Protection Association, Publication No. 70 (NFPA 70)

12. NESC National Electrical Safety Code

13. UL Underwriters Laboratories, Inc.

C. Safety and Governmental Standards:

1. Occupational Safety and Health Administration (OSHA)

2. National Electrical Code (NEC)

3. Society of Automotive Engineers (SAE)

D. All applicable federal, state, and local codes and regulations

1. If there is a conflict between codes and standards, the most stringent requirements shall take precedence and the best quality materials and workmanship shall be supplied and applied.

2. Materials and equipment shall be manufactured in compliance with ISO 9001-2008 quality standards. This includes, but is not limited to, nuts, bolts, threads and heads for the same, pipes, conduits and electrical connectors.

1.05 QUALITY CONTROL AND QUALIFICATIONS:

A. The provisions of specification section 11 00 00 apply.

B. The information contained in this Specification and on the Contract Drawings is based upon a typical installation. It is provided to describe the basic scope and requirements of the TWMM System and as a design guide for the completion of the work. This specification may not provide all of the details associated with the specific model of the selected manufacturer. The TWMM System manufacturer shall provide SEPTA with information and details associated with the specific TWMM System to be provided. This detail and information includes, but is not limited to:

1. All of the components required for the proper operation of the TWMM System.

2. The manufacturer’s installation requirements needed for the design of all supporting infrastructure such as concrete foundations, structural steel supports, electrical service and grounding, other utility connections, safety guarding, and any temporary or permanent fixtures of the facility necessary to allow installation, operation and maintenance to take place.
3. Inserts and anchoring device requirements that must be set in concrete or built into the construction by the Construction Contractor for the installation of the TWTM System.

C. Design and manufacture the system for a minimum 30-year life span given that scheduled maintenance will be performed in accordance with the manufacturer’s instructions.

D. Employ a quality assurance program that meets the requirements of ANSI and that satisfies all safety-related quality assurance requirements imposed by applicable government regulatory agencies.

E. Assembled components purchased by the manufacturer for this Contract, such as motors, pumps, and electrical devices, shall be the standard products of qualified manufacturers.
   1. A “qualified manufacturer” is defined as a firm having a minimum of 5 years documented experience in the manufacture of the component.
   2. All similar items shall be the products of a single manufacturer.

F. The TWTM manufacturer shall coordinate the following with the Contractor:
   1. The design of systems, sub-systems and components with the building structure and in matters of building and life/safety.
   2. The equipment to be located within the spaces allocated for such equipment and verify that all dimensions and utility services are adequate for the equipment.
   3. The design of inserts and anchoring devices, which must be set in concrete or built into the construction for installation of the system.

G. Qualifications of TWTM manufacturer:
   1. The TWTM manufacturer shall be a reputable manufacturing firm, regularly engaged in the design and manufacture of the type of industrial equipment specified herein.
   2. The TWTM manufacturer shall operate an installation and repair department, and shall maintain an adequate supply of spare parts.
   3. The TWTM manufacturer shall be able to demonstrate at least five years' experience designing, manufacturing, installing, and providing product support for specialized equipment of this type.
   4. The TWTM manufacturer shall be responsible for providing equipment of high quality and workmanship, which will perform specified functions reliably and safely, and shall permit required maintenance procedures with minimum interference of service or degradation of reliability.
   5. Shop drawings and design calculations that pertain to the structural design of the equipment required by this Section shall be sealed by the TWTM manufacturer's Professional Engineer licensed to practice in the Commonwealth of Pennsylvania.
H. TWTM Manufacturer’s Field Representative:

1. The TWTM manufacturer's field service representative shall be on site, for a minimum of two days, to supervise/approve of the locations of embedded items listed in paragraph 1.01.C.1 including all embedments, pipes and conduits related to the drop table, prior to placing in concrete.

2. The TWTM manufacturer's field service representative shall supervise the installation of the equipment, conduct acceptance testing, and train SEPTA personnel in the proper operation and maintenance of the equipment.

3. The TWTM manufacturer's field service representative shall be a qualified supervisor currently employed by the TWTM manufacturer, having a minimum of 5 years documented training and experience in the installation of the equipment being furnished; and who shall work with the Contractor and shall be present at the Site for all of the installation work of the equipment being furnished. The manufacturer shall submit the qualified supervisor’s resume for review and approval a minimum 90 days prior to the shipment of the equipment.

I. Qualifications of Installer:

1. Installation of the TWTM System is part of the scope of work for the TWTM manufacturer. The manufacturer may elect to do all of the installation work with his own employees, or may elect to hire one or more qualified subcontractors to perform the work under direct on-site supervision of the manufacturer.

2. Firm(s) performing actual installation of the TWTM System, as distinct from supervision, shall have a minimum five years' documented experience in performing similar types of heavy equipment installation, and possess current state contractor's license(s) and general liability insurance as required by the Commonwealth of Pennsylvania and as set forth in Section B, “SPECIAL TERMS AND CONDITIONS.”

3. The TWTM manufacturer (and his subcontractor(s), if any) shall employ an adequate number of specialists who are skilled workmen and who are thoroughly trained and experienced in the methods and requirements necessary for the proper execution of the work under this Section.

4. The TWTM manufacturer shall provide a qualified Supervisor who is a factory-trained employee with documented experience in equipment installation and testing, and who shall be present at the job site for 100% of the equipment installation, start-up and testing.

J. Welding: Refer to specification 11 00 00.

K. Pre-Installation Conference: SEPTA, the Contractor and the TWTM manufacturer shall meet at least one week in advance of the scheduled date for start of the installation of the equipment, and after submittals have been approved. The requirements for the equipment installation and conditions which could possibly interfere with successful performance of the work will be reviewed at this time. All individuals concerned with the equipment installation, or required to coordinate with it or to protect it thereafter, are required to attend the conference.
1.06 SUBMITTALS:

A. Submittals shall be provided in accordance with Section 11 00 00, Equipment General Requirements, as supplemented and/or modified by this section.

B. Incomplete, partial or “piecemeal” submittals will be returned without review. Submit packages in accordance with the Sequence of Approval in Section 11 00 00.

C. For each package, include an electronic copy (Adobe Acrobat PDF) on CD-ROM or flash drive. Scanned items shall be legible at normal (100%) display. Color originals shall be scanned in color.

D. Submit product data for all non-consumable purchased components, including:
   1. Catalog cuts, pamphlets, brochures, color samples, and descriptive literature.
   2. Equipment specifications.
   3. Performance and test data.
   5. Components not falling under this requirement are shop-fabricated items and/or items having a list unit price less than $1000.00.
   6. Specific items included in this work shall be indicated on the manufacturer's product data sheets. Excluded items may be crossed out if this configuration is more logical.
   7. The Contractor shall include product data addressing the following items along with all other requested product data:
      a. Hydraulic power unit, including performance curves that indicate rate of delivery.
      b. Programmable Logic Controller (PLC) (if utilized)
      c. Operator interface
      d. All motors
      e. Electrical starters, breakers, and panels
      f. Transducers, limit switches and sensors

E. Detailed information on locations where fabrication and/or assembly operations for the equipment to be furnished as part of this Contract are to take place.

F. Submit Shop Drawings showing the following:
   1. Layout drawings showing equipment layout, elevations, conduit runs, utility layout and hook-ups, clearances, and all required dimensions.
   2. Foundation drawings identifying the equipment footprint; required pit dimensions and details including dimensions, depth, utility locations, and drain locations; base plate dimensions including length, width, and depth; floor loading; vibration isolation pads; anchor bolt details, including locations, quantity, size, type, and
embedment; and elevations. In addition to embedded items, items that require coring and grouting/cementing of pit shall also be identified, dimensionally located, detailed and coordinated with equipment requirements.

3. Data for structural loads into pit/foundation.

4. Design calculations for foundation and pit requirements, including loads imposed on the foundation under maximum conditions and rolling (impact) loads across the pit floor.

5. Fabrication/Assembly drawings, including bill of materials and material specifications.

6. Detail drawings of assemblies and components, other than assembly drawings.

7. Operation drawings showing the fixtures, and adapters used for the operation of the service top, auxiliary (single wheelset) service top, bascule top, motor support dolly and locking bars.

8. Operation narrative describing truck and wheelset placement operations including description of tooling, fixtures, and adapters to be used. Operation narrative shall include description of any safety interlocks.


10. Electrical control diagram/schematic.

11. Electrical wiring diagrams. Show all requirements for embedded conduit.

12. Hydraulic system schematic diagram.

G. Submit equipment installation instructions including:

1. Manufacturer’s recommended installation instructions;

2. Manufacturer’s installation drawings;

3. Installation schedule;

4. Installation instructions shall include a detailed explanation of the equipment installation process, and a listing of embedments and fasteners, including torque requirements, accessories, or other items necessary for a complete installation;

5. Installation schedule shall clearly describe installation steps that will be performed by the Contractor, and installation steps that will be performed by the manufacturer/Installer along with estimated time durations for these steps.

H. Submit Material Safety Data Sheets (MSDS), or 16-section Safety Data Sheets if available in this new format, of all chemical materials, substances and compounds that will be used on this Contract. This includes but is not necessarily limited to the following:

1. All cements, caulks, sealants and paint products used in the installation

2. Any recommended lubricant, oil, hydraulic fluid, or chemical products to be used in the operation and/or maintenance of the equipment, including product trade name, chemical composition, and physical properties.
I. Start-up and Acceptance Testing Plan, procedures, and typical schedule.
   1. Identify all rail vehicles and other items needed for start-up and testing.
   2. Provide timely notification to Contractor to arrange for rail vehicles and other items.
   3. Rail vehicles, wheelsets and assembled trucks required for testing, will be furnished by SEPTA, as arranged and coordinated by the Construction Contractor.

J. Training Program:
   1. Training shall be provided in accordance with Section 11 00 00, Equipment General Requirements.

K. Spare Parts List
   1. Spare parts list shall be provided in accordance with Section 11 00 00, Equipment General Requirements, as modified herein.
   2. Provide spare parts considered normal for routine maintenance of the equipment for one year, in accordance with the lists in paragraph 2.15G in this Section. Include pricing for SEPTA to purchase these parts within 2 years of completion of the project.
   3. Provide a recommendation for spare parts inventory, beyond that listed in 1.05K.2 above, considered critical and for which extended acquisition time would create excessive downtime. Include part description, part number, quantity for review by SEPTA. Include pricing for SEPTA to purchase these parts within 2 years of completion of the project.

L. Special Tools
   1. Submit a list all tools, fixtures, shims, adapters, and other specialty accessories required for proper operation of the TWTM System.
   2. Provide two complete sets of tools to SEPTA, delivered directly to the Owner’s designated representative (not via Contractor). Obtain receipt for delivery.
   3. Provide two industrial-grade metal toolboxes for storage of these items.

M. Operation and Maintenance (O&M) Manuals:
   1. O&M Manuals shall be provided in accordance with Section 11 00 00, Equipment General Requirements.

1.07 VEHICLES AND DIMENSIONS:

A. Verify the dimensions and vehicle/truck/wheel characteristics of SEPTA’s fleet of locomotives and coaches to ensure proper operations of the equipment and avoid clearance conflicts. The SEPTA revenue vehicle fleet to be serviced at the Frazer Maintenance Facility will consist of the following:
   1. Locomotives:
a. 7 AEM-7 Electrics
b. 1 ALP-44 Electrics
c. 13 ACS-64 Electrics

2. Coaches:
   a. 10 JWC3 Cab Car
   b. 45 JWC3 Coaches
c. 36 Multi-Level Coaches
d. EMU SilverLiner IV
e. EMU Silverliner V

B. The manufacturer shall be responsible for coordination and proper relation of all work to the equipment installation and to the work of all trades for the installation of the equipment in the pit.

C. The manufacturer shall verify all dimensions of the site that relate to fabrication and delivery of the TWTM System and notify the Engineer of any discrepancy before fabrication and delivery of the equipment to the site.

D. Surfaces to receive metal fabrications shall be sound, square and true. Such surfaces shall be examined prior to the installation of the fabrications and all defects that might impair the operability or shorten the life of any of the parts of the item shall be brought to the attention of the Engineer in writing, and will be corrected by the Contractor.

1.08 DELIVERY, STORAGE AND HANDLING:

A. Equipment and components shall be suitably crated to prevent damage in transit or during handling. Upon delivery, items shall be carefully stored or staged as required by SEPTA in a manner to avoid misalignment or distortion, and shall be adequately protected against damage by weather, vandalism, or other cause.

1. Manufacturer shall be responsible for safe storage/staging of the equipment during installation.

2. Damage to equipment caused by negligence of Construction Contractor’s forces will be compensated by Construction Contractor.

B. Special precautions shall be taken to prevent damage to electrical components such as motors, controls and conductors.

C. The TWTM manufacturer shall store the equipment at his facility until such time that it is required for installation in the pit in the newly constructed building.

1. Coordinate with Construction Contractor regarding schedule for delivery and installation.

2. Construction Contractor will be responsible for off-site storage charges that result from a postponement of delivery due to Construction Contractor delays.
D. All materials shall be delivered to the site with their original manufacturer’s markings and identification intact. SEPTA and the Engineer reserve the right to reject materials that are damaged, improperly identified or not in conformance with reviewed shop drawings and catalog cuts.

1.09 WARRANTY:

A. Warranty: All equipment shall be warranted in accordance with Section B SPECIAL TERMS AND CONDITIONS and the following provisions:

1. Warranty period: two years from the date of final acceptance.

2. The manufacturer warrants that the work performed, and all materials and equipment furnished hereunder by the manufacturer or his subcontractors or suppliers will be free from defects in design, material, workmanship and operation for the warranty period.

3. "Defects" are hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finished, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected, and unsatisfactory conditions.

4. The TWTM manufacturer shall remedy any such defect at his own expense.

5. Work that has been abused or neglected by SEPTA is excluded from this warranty.

6. Furnish written warranties required by the respective sections of the Specifications for time stipulated therein. These warranties shall be in writing, on manufacturer’s or supplier’s letterhead, and fully-executed copies shall be included in the O&M manual(s).

7. Major equipment components, specifically those manufactured by other than the primary equipment supplier, shall be covered by their own respective warranties, which shall not be less than the supplier’s standard warranty. These warranties shall also be included in the O&M manual(s).

8. Nothing in these requirements, conditions or specifications including SEPTA’s right to a complete inspection shall constitute a disclaimer to or limit, negate, exclude or modify in any way any warranty created hereunder.

1.10 DELIVERABLES:

A. Installed TWMT System and all accessories

B. Shop drawings of equipment pit, within 45 calendar days of receipt of order

C. Embedments, for installation by Contractor. Deliver embedments within 60 days following approval of pit foundation shop drawings.

D. Operation & Maintenance and Parts Manuals

E. Training Program
F. Certificates of completion following training

G. Spare Parts Lists

H. Special Tools: Two sets of special tools and instruments, if any, required for maintenance or adjustment, packed in two appropriate steel tool boxes. Furnish these tools at least 21 days prior to commencement of the training program.

I. Matching touch-up paint for each color used to permit retouching, prior to issuance of Substantial Completion Certificate.

1.11 EQUIPMENT IDENTIFICATION

A. Provide a corrosion-resistant identification plate clearly marked and stamped with the manufacturer’s name and address, model number, serial number, date of manufacture, and all pertinent utility and operating data (or ratings), and permanently attach it at a prominent location on the equipment.

PART 2 – PRODUCTS

2.01 GENERAL REQUIREMENTS:

A. Manufacturer:

1. The Tandem Underfloor Wheelset Lathe System (TWTM) shall be model number U2000-400-D as manufactured by the following, or approved equal:

   a. Niles-Simmons-Hegenscheidt Group
      1700 North Broadway
      Albany, NY 12204
      Tel. No. (518) 462-5431
      www.smitgroup.com

B. The machine shall include all required components to allow full simultaneous machining on one and two wheel sets. The lathe shall machine the wheel profiles and the mounted brake disc surfaces on wheelsets that are standalone or still in the trucks, under or removed from the rail vehicle.

C. Equipment shall operate at supplied 480V / 3 phase / 60 hertz power.

D. The TWTM System, including but not limited to chip collection system, dust/fume collection system shall be installed as shown on the Contract Drawings.

2.02 DESIGN REQUIREMENTS:

A. The machine shall consist of a frame mounted in the foundation by four leveling devices (fixators). These fixators shall be used for the alignment of the machine. The frame shall carry the crossbeam of the machine with two attached tool blocks and the roller carriers.
and the rail system. The electrical cabinet and the hydraulic unit shall also be attached to the base frame.

B. The equipment shall be comprised of:

1. Two side weldments
2. Four leveling devices and anchor bolts and accessories
3. Gauge-dependent crossbeam
4. Two crossbeams shall serve as a machine bed of the tool blocks.
5. Two set of friction roller drives shall support and rotate the wheelsets.
6. Two sets of axial guide rollers shall be designed to guide the wheels at the inner surface.
7. Two sets outer axle box centering units shall be adjustable in height, for radial centering of wheelsets equipped with outer bearings.
8. Two sets inner axle box centering units for radial centering of wheelsets equipped with inner bearings.
9. Two sets tailstock centering units adjustable in height that can be manually swiveled from the parallel to the rail track position into 90 degrees to the rail track position. Tailstock centering units are able to clamp the wheel via live centers.
10. Two sets CNC turning tool blocks carrying out various wheelset machining tasks of the machine.
11. Two set-off standard turning tools for profile machining.
12. Four wear and diameter measuring devices intended to determine the position of the wheel set on the machine as well as the diameter, back-to-back dimension and the wear condition of the wheelset to be machined.
13. One complete rails system to be used for positioning and to support a vehicle (train) over the latter.
14. Two sets of machine enclosures (Covers, safety equipment) for optimum protection of the operator.
15. Anti-Slip Control System shall be designed to monitor wheel slippage between driver rollers and wheel set.
16. Data storage on flash drive shall be designed to allow transferring vehicle/wheelset data as well as measuring and machining data to a USB port jump drive.
17. A data acquisition and recording system for all work performed. This system shall ensure that the wheelset data is transferred to maintenance data records in the format required by the system.
a. Master Machine Control Panel (MMCP):

1.) The MMCP enclosure shall house motor starters, disconnect switches, the control circuit transformer, fuse blocks, contact blocks, and interlocks necessary for the proper function and operation of the wheel truing machine equipment. Each motor shall be protected by its own circuit breaker and each magnetic motor must have overload ground fault protection in all three phases. The MMCP shall be supplied power from a single 480 Volt, 3 phase, 60 hertz source and shall provide for circuit protection from that point.

2.) Control voltage shall be 120 V, 60 Hz or 24VDC obtained from control transformer(s) furnished within the MMCP. No controls accessible to the operator shall have wiring exceeding 120V to the ground.

3.) Machine drive shall be by motors of sufficient capacity, provided with infinitely variable speed control. Variable speed controllers shall be mounted in the MMCP.

b. CNC Controller:

1.) Machine operations shall be based on the CNC operations and be integrated with the Programmable Logic Control (PLC) functions. The CNC operation shall be centralized CNC operation, incorporating a screen display on which operations and sequence of operation inclusive of help screens and operating prompts shall be displayed.

2.) The operator shall be required to confirm the wheel set data obtained by the measuring system and provide an affirmative command for the next menu instruction.

3.) The CNC screen shall display images relating to operator communications of pre-measuring, determination of depth of cut(s), machining proposal, operational data, final wheel set parameters, post measuring, auxiliary system(s) operations, end of cutting cycle, general wheel set data, and other images determined to be necessary for proper automatic machine operation.

4.) Data input by operator shall be checked for validity. Error input or input outside established and acceptable limits shall be rejected requiring new input via system entry.

5.) Image display shall also state selected flange correction value, flange thickness, wheel diameter (left/right), flange back to back dimension and other features relating to the operation.

6.) The CNC controls shall communicate with the machine Programmable Logic Controller to provide diagnostic data of machine fault condition(s) leading to trouble identification.

7.) Post measuring of finished wheel sets shall be recorded and printable at the machine operator’s location.

8.) Wheel tread profile(s) shall be permanently stored in the programmable memory. Loss of memory is to be protected during power failure.

c. PLC Controller:
1.) The Programmable Logic Controller (PLC) shall control the machine functions and operations.

2.) The PLC functions shall be connected to the CNC control operations and provide an optimum degree of automation and operator guidance. Operator guidance features shall be included for profile selection, sequence of machining steps, permissible limit values and fault indication.

3.) The PLC control shall also give the proper commands for all auxiliary systems such as chip conveyors, sliding rail assembly and approach indicators (both sides of machine).

4.) The PLC shall control the sequence of operation for lifting and initial positioning of wheels sets inclusive of supporting functions for hydraulic and electrical operations.

d. Provide a Data Acquisition System (DAS) to record and store operator identification and vehicle, truck and wheel set identification. The system shall include computer, user-friendly software, storage media, internal modem, wireless network connection, laser printer and a work kiosk suitable to the shop environment. Display and print out shall include, but is not limited to:

   1.) Operator name
   2.) Vehicle number
   3.) Truck serial number
   4.) Truck position on vehicle
   5.) Axle identifier
   6.) Date and time of start and completion of truing
   7.) Back to back wheel dimensions
   8.) Initial diameter
   9.) Final diameter
  10.) Finished wheel set data specified in accuracy requirements.

18. One chip disposal system designed to continuously guide the flow of chips.

   a. Long continuous chips or turnings shall be directed into an auger or shredder and reduced to a small size. The auger or shredder shall be located directly under the wheel truing machine; and shall discharge into the chip collection system described below.

   b. Chip collection shall be accomplished by means of an enclosed conveyor system which empties into a metal, self-dumping hopper. One metal, self-dumping hopper container shall be furnished under this contract. The location of the discharge end of the conveyor and the hopper are subject to the approval of the Engineer. Discharge end of the conveyor shall be stowable when not in use to maximize clearance adjacent to the conveyor.

   c. Conveyor length shall be based on chip removal from under the machine to a container location near the shop door. Exact location to be determined at the time of shop drawing submittal.
d. Electrically interlock the auger and conveyor system to automatically start and stop with the machine operation. In addition, provide a manual on/off control. The conveyor shall be void of chips prior to automated shut down.

e. Chip Crusher Features:
   1.) A box type crusher casing of heavy welded steel plate.
   2.) Once complete crushing mechanism with exchangeable cutting knives made from high grade special steel, ground on both faces for optimum operations.
   3.) One chip funnel made from sheet metal, adjusted to the chip clearances of the machine.
   4.) One complete crusher drive with gear and drive motor.

f. Hinged Belt Conveyor Features
   1.) Welded steel square tube structure, mounting flanges and adjustable supporting feet and supports below discharge end.
   2.) Roller mounted hinged belt with smooth plates and carriers.
   3.) Complete drive including three-phase motor, electrical controls equipment, integrated in the control cabinet system of the machine.
   4.) Joint hinged belt running on rollers.
   5.) Complete drive with three-phase motor, electrical control system equipment, integrated in the electrical control of the machine.
   6.) Provide layout of conveyor as shown on contract drawings.

19. Provide a 3 cubic yard capacity self dumping hopper container with the following characteristics:
   a. Hopper shall be model 4T-3/16-810 as manufactured by Roura Material Handling Inc., Clinton, MI 48035 Tel. #800-968-9070 or approved equal.
   b. 8000 lb capacity, 7 gauge steel
   c. Standard forklift entry base
   d. Angle reinforced top
   e. Body chained to base
   f. Pierced and extruded trunnion track
20. Manufacturer shall provide a grounding design to protect the equipment and operating personnel. Contractor will provide installation labor and materials for the grounding system. Equipment grounding, structural steel grounding, and rail grounding in the pit area shall be accomplished by individually connecting each item with properly sized copper conductor and a common ground bus bar in the pit area. A similar but separate grounding system shall be provided for the control circuits. Contractor will provide embedded ground rods if needed.

21. Wiring at the machine and control cabinets shall comply with NFPA 70 and Publication 79; except as clarified below:
   a. Control panels shall be NEMA 12 enclosure.
   b. Minimum size shall be AWG No.12 for power circuits and AWG NO.14 for control circuits. Wire shall be copper. Terminations shall be approved lugs in terminal blocks with numbered terminals and color coded wires with wire markers.
   c. Wires in each of the control panels shall be color coded must be marked in the wiring diagram.
   d. Wiring shall run from the control panels and terminate at junction boxes mounted on the machine. Wiring to fixed objects shall be run in conduit. Wiring to movable objects shall be made with flat cable festoon, or armored cable track.

22. Dimensions and Capacities
   a. The machine shall be capable of machining wheels; under the following range of conditions.
   b. Vehicle specific:
      1.) Maximum Vehicle Length: 85’-0”
      2.) Maximum Vehicle weight: 220,000#
      3.) Minimum Wheel center to Wheel center: 8’-6”
      4.) Maximum Wheel center to Wheel center: 51’-0
      5.) Maximum Wheel Diameter: 4’-5”
      6.) Minimum Wheel Diameter: 2’-8”
      7.) Track gauge: 4’-8 ½”.
   c. Tread hardness, when new, may range from <INSERT>. Tread hardness of wheels in service may exhibit harder characteristics, especially in areas of skid flats.
   d.) Finished wheel set accuracy: The manufacturer shall guarantee the following accuracies of machined wheel sets:
      1.) Diameter parity of wheels on same axle not to exceed <INSERT> and not to exceed <INSERT> between axles on a single bogie.
      2.) Concentricity (axial and radial run-out each wheel with journal surface for reference) <INSERT>
3.) Tread surface finish-based on finish cut under ideal conditions not to exceed <INSERT>.

2.03 STRUCTURAL REQUIREMENTS:

A. Verify dimensions prior to fabrication and construction.

B. Provide ASTM A36 or ASTM A572 Grade 50, tube steel to ASTM A500 Grade B, and pipe steel to the provisions of ASTM A501.

C. High Strength Bolts: ASTM A325.

D. Anchor Bolts: ASTM A 36 steel with heavy hexagonal nuts and standard washers.

E. Welding Requirements: American Welding Society Structural Welding Code AWS D1.1 and welding electrodes shall be E70XX classification of AWS A5.1.

F. Surfaces to receive metal fabrications shall be sound, square and true, free from dirt, oil, grease, objectionable coatings, loose detached, or unsound fragments and all other foreign material.

G. Drilled in Anchors: HILTI, or approved equal, Stainless Steel Model HAS Rods with Model HVU Adhesive System, placed in accordance with manufacturer’s recommendations.

H. Grout: Epoxy grout for areas subject to vibration or impact loading.

2.04 ELECTRICAL REQUIREMENTS:

A. Provide totally enclosed, fan cooled, 60-minute, 55 degrees Celsius rise drive motors with motor-mounted disc brakes, air and hydraulically activated.

B. Provide motor controls with across-the-line, reversing, and magnetic 3-pole starters with circuit breakers and motor overload and under voltage protection. Include in the motor circuits current limit relays and timers to sense an overload condition and automatically shut down the system should excessive loads occur.

C. Design the system to operate from 480-volt, three-phase, 60-hertz current. Power shall be supplied from the main electrical panel for the wheel lathe. Provide all power and control conduit and wiring between the wheel lathe and car progression system. Provide a transformer to reduce the potential in the control circuits, including the push buttons and limit switches, to 120 volts.

D. Provide Shunter or Train Progression System Interlocks with TWTM. Provide control circuits to accept interlocks from the TWTM system to prevent operation of the shunter or progression system when the WTWM is energized. Coordinate the interlock requirements and locations with the selected WTWM manufacturer and the Engineer.

E. Main Control Panel: The main control station is located adjacent to the wheel lathe. It contains 2 controls for operating the rail movers. A 2-position maintained selector switch shall be provided. An ‘Emergency Button’ shall be provided.
F. Auxiliary Panels: Provide one (1) auxiliary panel adjacent to the individual rail movers, as shown on the contract drawings.

G. System Activation Warning System: A horn and lights along the wheel truing track will operate whenever the system is energized.

H. Emergency Stop: Design car progression emergency stop system to stop both car pullers whenever any "Emergency Stop" button is depressed.

I. Equipment shall be totally wired by the manufacturer starting at the power supply point and including a main disconnect switch.

J. Equipment grounding shall be accomplished by means of a separate grounding conductor in each conduit, sized according to Code. The grounding conductor shall have green insulation.

K. Provide conduit where required:
   1. Minimum exposed conduit size: ¾ inch
   2. Minimum embedded conduit size: 1 inch

L. Supply service will be 480 V, 3 phase, 60 Hz.

M. Motors and drives shall be checked carefully for correct rotation and alignment before placing equipment into operation.

2.05 SAFETY INTERLOCKS
A. The Wheel Truing machine shall have the capability for future interlock systems that will ensure safe operation of the wheel truing systems.
B. Provide an interlock to prevent energizing the shunter or train progression system until the machine is in the shut-down mode, and sliding rails are closed, permitting movement of a vehicle over the machine.
C. Provide emergency stops as designed by the manufacturer. Whenever an emergency stop is activated PLC shall display a visual notice of which stop is active and audio alarms shall sound.

2.06 DUST/FUME COLLECTION SYSTEM
A. A dust collection unit shall be provided for each machine truing area and will be designed in accordance with NFPA 90A.
B. The unit shall of sufficient size to draw a vacuum through the piping system to the truing area to remove air borne particles generated by wheel truing.
C. Flexible hoses shall be provided as required.
D. Collected materials will be deposited in canister for disposal.
E. Replaceable filter media shall be provided and easily replaced.
F. The dust and fume extraction system shall be placed within the pit and can be operated automatic and manual mode. The suction pipes shall be positioned close to the working area of the tooling. Provide suction diversion valve to accommodate vacuum hose connection when lathe is not in use.

2.07 TRAIN PROGRESSION CONTROL PANEL AND INDICATION
A. The machine shall have space and power for a lathe side controller for any of the rail vehicle mover(s) servicing for Wheel Shop for use by the lathe operator.

2.08 GASKETS AND FASTENERS:
A. Furnish all bolts, studs, nuts, and other fasteners for make-up of all connections to equipment and replace any of these items damaged in storage, shipment or moving. Bolts shall comply with applicable SAE requirements including manufacturer’s identification and certification of testing.
B. All torque fasteners shall be torque-marked.

2.09 HOLES, OPENINGS AND INSERTS:
A. The Contractor will provide holes and openings in floors, walls, ceilings, and roofs.
B. The Contractor will use dustless methods, grout holes in concrete pit walls, and floor after installation of equipment, and will leave them in a completely neat and sealed condition.
C. The Contractor will install concrete inserts.

2.10 NOISE AND VIBRATION ISOLATION:
A. The noise level shall not exceed 80 dBA at the operator’s main console location when the TWTM System is in operation.
2.11 PAINTING:

A. Shop prime and finish coat the equipment, with the exception of wearing surfaces and non-ferrous material; and touch-up in field after installation in accordance with the manufacturer’s painting recommendation and OSHA requirements.

B. Surface Finish: All surfaces shall be primed, and then painted with a two-part epoxy or polyurethane paint in accordance with the paint manufacturer’s instructions.

C. Equipment shall be given one shop prime coat of approved rust-inhibitive paint containing at least 50 percent rust-inhibitive pigments and manufacturer’s standard finish coat system. Submit paint color charts and samples which shall indicate brand and type of paint for both the prime coat and finish coat systems. All selections must be approved by the Engineer.

D. Field painting equipment, including touch-up painting, if any, is included under this Section. Normally, equipment shall be factory-finished as previously specified. Where factory finishes are provided on equipment and no additional field painting is specified, all marred or damaged surfaces shall be touched up or refinished so as to leave a smooth, uniform finish at the time of Final Acceptance. Touch-ups shall be of the same and type of paint as the original.

E. Surfaces shall be free of rust, scale, dirt, and oil before painting. Matching touch-up paint shall be provided in the amount of one quart of each color used to permit retouching. The touch-up paint shall be provided prior to Substantial Completion.

F. Field painting equipment including touch-up painting, if any, is included and the equipment shall be factory-finished.

G. Where factory finishes are provided on equipment and no additional field painting is specified, all marred or damaged surfaces shall be touched up or refinished to leave a smooth, uniform finish at the time of final inspection.

2.12 LABELING

A. Securely attach to each major item of equipment showing manufacturer’s name, serial and model numbers, electrical characteristics, and capacity.

B. All equipment, control panels and ancillary devices shall be clearly and distinctly identified by signage to indicate its intended use and purpose for all related operator and maintenance functions. All wording and symbols shall be in English; all dimensions shall be in metric and English.

C. All control, warning and instructional information shall be engraved on stainless steel metal and be riveted or screwed into conspicuous places, unless otherwise approved by the Project Manager.
D. All characters’ colors shall be in contrast with the background color. All colors shall be resistant to fading from all sources including, but not be limited to, sunlight, dirt, extreme temperatures, age, ozone, oil and common cleansers.

2.13 SPECIAL TOOLS
A. The equipment shall be designed by the manufacturer to minimize the need of special tools for operation and maintenance. Furnish required special tools with the machine or equipment. Special tools are defined as tools not normally available through commercial tool suppliers.

2.14 MAINTAINABILITY
A. Design the wheel lathe and chip collection system, dust/fume collection system, and car progression system, associated equipment, and appurtenances requiring periodic maintenance, to allow accessibility for service, adjustment, repair, or replacement with use of common tools associated with the equipment or the specified special tools.

2.15 WARNING DEVICES
A. Provide and install two (2) visual amber colored warning lights. The location shall be coordinated with Engineer.
B. Provide and install two (2) alarm bells. Coordinate location with Engineer.

2.16 BID OPTIONS:
A. Extended Warranty and Service Agreement: The manufacturer shall offer extended maintenance agreements on a bi-annual basis for a minimum of six years, to commence at the end of the 2-year Warranty period. Include guaranteed annual pricing on Bid Form. Pricing includes repair parts.

PART 3 - EXECUTION

3.01 PREPARATION:
A. The manufacturer shall:
1. Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease scaling or laitance, projections and other foreign matter detrimental to performance. Obtain manufacturer’s approval of substrate in writing; submit copy to Engineer.

2. Remove debris from underfloor wheel lathe and all equipment specified herein, blow substrate surfaces clean using oil-free compressed air.

3. Prohibit traffic on prepared areas until Work of this Section completed.

4. Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

5. Use the services of a qualified Manufacturer’s Representative to verify that all pit and foundation work relating to the equipment installation is correct and notify the Engineer.

6. Include field measurements, protection of track work and related electrical and compressed air service connection points, surface preparation and approval by the Manufacturer’s Representative.

3.02 FABRICATION:

A. Fabrication shall be in accordance with all specifications and approved shop drawings.

B. Fabricate equipment from newly manufactured materials, products, and components. The manufacturer shall not utilize used, refurbished, or remanufactured materials, products, or components. Surfaces shall not be warped (unless by design) and free of dents and distortions.

C. Pre-assemble units to greatest extent feasible for shipping. Grind exposed welds flush. Remove all sharp edges.

D. Field check for clearances and interferences before fabrication and relocate material and equipment furnished as required to eliminate interferences.

3.03 PRE-SHIPMENT INSPECTION AND TESTING:

A. Pre-shipment inspection and operational testing shall be performed at the manufacturer’s factory to determine conformance with the requirements in the equipment specification.

1. The manufacturer shall make the equipment ready for a comprehensive pre-shipment inspection and witnessing of operational testing by SEPTA.

2. The equipment shall be laid-out in its final configuration to allow for all performance and functionality to be observed before shipment.

3. The pre-shipment inspection shall also allow for confirmation of compliance with all documentation submitted to SEPTA.
B. Prepare and submit for SEPTA’s approval a schedule and comprehensive procedure for functional testing and inspection. The submittal shall be submitted for review and approved not less than 4 weeks prior to the start of the pre-shipment inspection and testing and shall include step by step procedures, pass/fail criteria, all referenced documentation, and any other information necessary to perform one successful demonstration of the equipment’s operation and performance. At a minimum the pre-shipment inspection and testing shall demonstrate:

1. Equipment performs the work for which it is intended
2. Ability of the control logic to protect the mechanical and electrical equipment from common operator and other types of errors and problems.
3. All safety features
4. Basic functions of the equipment

C. The manufacturer shall bear all expenses of all tests, including the furnishing of all necessary instruments, lubricants, hydraulic fluids, supplies, data recorders, and operating personnel.

D. Any issues or discrepancies identified during the pre-shipment inspection and testing shall be documented in a written report, prepared by the manufacturer, detailing the issues or discrepancies identified and the manufacturer’s proposed corrective actions. This report shall be submitted to SEPTA within two weeks after the completion of the pre-shipment inspection and testing and the manufacturer must obtain approval from SEPTA before corrective actions may be implemented. All issues or discrepancies identified shall be resolved before the equipment is shipped.

E. Upon acceptance of the factory test by SEPTA, the manufacturer shall then submit a site installation acceptance testing program at least 30 calendar days prior to the test, allowing SEPTA to witness the test, demonstrating how the equipment complies with all specified requirements. Provide material and manpower required for the program. SEPTA will provide rail vehicles and components.

F. After successful completion of in-plant testing SEPTA may elect to order spare parts. Upon receipt of any order for parts, the manufacturer shall furnish five copies of the approved spare parts lists as adjuncts of the Operations and Maintenance manuals within 30 days.

3.04 DELIVERY, STORAGE AND HANDLING:

A. Coordinate with the Construction Contractor for the delivery, storage on Site, and handling.

B. The manufacturer shall be responsible for storing the equipment at his facility or at a Bonded Warehouse until such time that it is required for installation within the newly constructed building.

1. Provide a weekly storage rate as indicated on the Bid Form.
2. Coordinate with Construction Contractor regarding schedule for delivery and installation.

3. Construction Contractor shall be responsible for off-site storage charges that result from a postponement of delivery due to Construction Contractor delays.

C. Special precautions shall be taken to prevent damage to electrical components such as motors, controls and conductors.

D. All materials shall be delivered to the Site with their original manufacturer’s markings and identification intact. SEPTA will reject all materials that are damaged, improperly identified or not in compliance with reviewed shop drawings and catalog cuts.

E. Equipment items/components that are furnished for installation by the Construction Contractor shall be provided when needed on site so that they may be installed within the building’s infrastructure. The TWTM manufacturer shall provide the Construction Contractor with instructions for the proper storage and handling of the items/components, and obtain a signature on the Bill of Lading from the Construction Contractor’s Representative acknowledging receipt of the items/components.

1. Delivery of equipment items/components furnished for installation by the Contractor shall be coordinated with the Construction Contractor to ensure that items/components are delivered when they are needed by the Construction Contractor and will not cause delays.

2. All major components shall be delivered fully match marked.

3.05 INSTALLATION:
A. Erect TWTM system including all appurtenances in accordance with approved shop drawings and manufacturer’s instructions. Manufacturer’s Representative shall supervise the installation of the TWTM and appurtenances. These same requirements apply to the rail progression system.

B. Install supports and hangers required for the proper installation of equipment.

C. Install electric wiring and controls complete to deliver a properly operable and maintainable wheel truing system and rail progression system.

D. Make final connections to building utility services provided as work of other Sections.

E. Lubricate equipment as required by the manufacturer, using recommended lubricants.

F. After erection, clean field bolts, nuts and adjacent areas and finish with the same system as the shop finish.
G. Retouch surfaces where the shop finishes are damaged, using the same materials and dry film thickness as the original shop finish.

H. Prior to installation of TWTM system, inspect the pit for proper installation of anchor bolts and conduits as indicated on the approved Drawings.

I. Fit equipment and appurtenances to the space provided and make readily serviceable. The Construction Contractor and manufacturer shall coordinate work with other trades.

J. Furnish and install additional supports and hangers as may be required for the proper installation of the equipment.

K. The TWTM and all appurtenances shall be installed by the manufacturer or his authorized agent in accordance with the Drawings and approved manufacturer's instructions.

L. Make power connections to the main electrical panel, power and control connections in the pit, control connections to the Master Control Console and at each of the receptacles, and connections to the limit switches in the pit.

3.06 SETTING AND ALIGNING EQUIPMENT:

A. Equipment shall be set and aligned in accordance with manufacturer's recommendations, by the manufacturer's Drawings and applicable standards of trade practice.

B. Equipment shall be set true and level. The manufacturer shall demonstrate adequate leveling of installed equipment.

C. Retighten bolted connections after installation.

3.07 CLEANING:

A. Clean fabricated assemblies and equipment items thoroughly before and after operating and testing.

B. Touch-up damage to painted finishes.

C. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.

D. Clean area around equipment installation and remove packing or installation debris from job site.

3.08 EQUIPMENT FINAL ACCEPTANCE TEST
A. Perform all testing of the equipment and system as required to verify proper installation and operation of all systems and components. Include the following test:

1. Electrical test:
   
a. Electrical continuity of all circuits.
   
b. Power voltage and ampere readings during operating tests, using recording instruments.
   
c. Short circuit and ground.
   
d. Test Interlock Systems to demonstrate that the rail progression system is not operable when the underfloor wheel lathe is in operation. Demonstrate this interlock using all car progression system controls.

B. Equipment final acceptance test plan shall identify operational performance testing, functional performance testing, and integrated system testing to be performed. Testing shall include the following:

1. Operate wheel truing equipment through four complete cycles of operation. Two cycles shall demonstrate proper truing of two (2) wheels on a single axle. Two cycles shall demonstrate proper simultaneous truing of two axles (and four wheels) on a single truck. Each cycle shall confirm that the machine is meeting the machining tolerances and other requirements specified herein. Confirm that all equipment operates as specified.

2. Operate car progression system through four complete cycles of operation. Demonstrate the ability to pull cars in both direction and accurately position each wheelset on the center of the truing machine. Confirm that equipment operates as specified.

3. Check and adjust horizontal and vertical alignments of wheel truing and rail progression equipment. Check and adjust limit switches, controls, and equipment.

4. Demonstrate proper operation of diagnostic interface with the factory via modem provided with the equipment.

3.09 FOLLOW-ON INSPECTION AND TESTING:

A. Provide two complete follow-on inspections of the equipment:

1. First inspection shall be performed by the manufacturer and witnessed by SEPTA six months after the date of Final Acceptance of the TWTM System. At this time a re-alignment and/or adjustment of all critical equipment elements shall be made at the manufacturer’s expense. All machine functions shall be tested for proper operation. Provide a written report to SEPTA of all findings, maintenance and operating recommendations and any items in need of repair or modification.
2. At 12 months after Final Acceptance of the TWTM System, all machine functions shall be tested by the manufacturer for proper operation. Provide a written report to SEPTA of all findings. Maintenance and operating recommendations and any items in need of repair or modification shall be made by the manufacturer.

B. A 24-month follow-on inspection and test shall be made by an authorized manufacturer's factory service technician, with assistance from SEPTA.

END OF SECTION
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