Specification for Mill Turn Machine

Spec. # 01-26-3416

Manufacturing Engineering Work Group
Watervliet Arsenal
Watervliet, New York 12189
29 JAN 26

Department of the Army
TACOM

1. Scope: The dedicated function of this specification is the acquisition of a machine tool equipped as herein described. All sections are specific in their intent and are not to be misconstrued as requests for options. The machine system described by this specification shall be provided with all required equipment whether stated requirements are standard or optional with the machine tool builder/supplier. This project is classified as a “turn-key” system with the contractor being responsible for all costs and work associated with the installation unless otherwise stated. In this specification, requirements and terminology are oriented toward the purchase of a single machine tool. However, in many cases, two or more identical machine tools will be procured in accordance with this specification. In such cases, the term "the machine" means "each machine".

1.1. Abbreviated Description: The machine tool covered by this specification shall be a New CNC Milling Turning Machine, heavy duty type. Fitted with 2 spindles, slant bed with one piece base. With CNC controlled 5-axis (X, Z, Y, C, and B) Millturn, complete with 2 self-centering c-rest, coolant system, automatic chip removal system, automatic tool changer and other features and characteristics as specified herein. The slant bed shall be of heavy-duty full box construction four rail design. The preferred machine is a NT6600DCG/6000. The contract shall be for one machine with an option for a second machine.

2. Applicable Standards and Publications: All work performed and procedures followed in association with this project shall meet or exceed all applicable and current Watervliet Arsenal (WVA), Occupational Safety and Health Administration (OSHA), local, state, and federal government codes and laws relative to fire, safety, environmental, and electrical issues. These standards include, but are not limited to, ANSI, NFPA, ISO, and ASME. The quality of all work performed and material provided shall meet or exceed the most recent revision of applicable industry standards and engineering practices for this type of equipment and its intended function. In all instances material, quality, and workmanship shall meet or exceed OEM specifications.

3. General Requirements: All requirements are mandatory from the standpoint of intended function. Wherever a specific requirement would force an offeror to depart from his standard practice or configuration, the Arsenal will accept, for evaluation and approval, alternative offers for achieving the intended function. Any such alternative offers must be accompanied by sufficient technical information to allow the evaluator to reach a definite conclusion that the alternative is equal to or better than the criteria specified in this document. The equipment specified in this document shall be a standard product of the manufacturer and shall require either no design changes, or if required, minor design changes to meet the requirements of this specification. Therefore, ownership of the design shall remain with the manufacturer. Equipment incorporating new or unproven technology is subject to rejection at the discretion of the Watervliet Government Representative.

NOTE: Not all general requirements listed in section 3 shall be applicable to every machine. If a section is non-applicable, the offer is still in compliance. Please note in the attached Offeror's Statement of Compliance if a section does not apply with the offered machine.

3.1. Design and Engineering: The equipment specified in this document shall be designed and engineered in accordance with the most current version of each standard, recognized by the Association for Manufacturing Technology.

3.2. Materials and Components: Materials and components incorporated in the construction of the equipment specified herein shall be new, free from defects, and conform to the specifications and standards included within this document.

3.3. Construction: All parts of the equipment specified in this document shall be new, unused, and constructed to be capable of withstanding all forces encountered during operations within the equipment's maximum factor of safety rated capacity. The structure and assembly of the machine and its components shall be sufficiently rigid that workpiece finish and accuracy are not impaired by machine vibrations.

3.3.1. Alignment Retention: Non-integral machine components, heads and ways, which are separately assembled and whose alignments determine the squareness and parallelism of machine geometry shall utilize a positive means for retaining alignments and regaining them in the event of unintentional dislocation.

3.3.2. Slideway Design and Construction: All precision ways which guide and bear the rated design loads shall adhere to the hardness criteria shown in the examples below of acceptable way systems. Slideway systems other than the ones referred to below may be offered provided that their design is consistent with all specified performance characteristics of the machine. All slideway systems having less than a 60-degree incline to the horizontal shall be protected by way covers unless it can be substantiated that covers will interfere with machine functions. Hardness tests other than Rockwell shall be subject to approval by the Watervliet Government Representative.

A. Integral cast iron ways shall be hardened from RC 50 to RC 54 to a depth of .100 inches or more.
B. Hardened and ground steel ways for mating with Turcite, Rulon, or other such low friction forgiving materials shall be hardened within the range of RC 55 to RC 62. Actual hardness within this range shall not vary more than 5 RC points.
C. Hardened and ground steel ways for use with anti-friction roller bearings shall be to a hardness of RC 62 to RC 65 to a depth of 1/8 inch or more.

3.3.3. Replaceable Ways: If the machine being offered is portrayed as having replaceable ways, the assembly of the way bars to the machine frame shall be such that finished ground ways are fastened to a precision ground or scraped surface to permit field replacement without additional grinding.

3.3.4. Way Wipers: All way systems shall be equipped with wipers designed to prevent intrusion of foreign material. Wipers shall be adjustable to compensate for wear. Wipers shall be easily removable and replaceable.

3.3.5. Shims and Spacers: Shims that do not appear on engineering drawings shall not be incorporated in the machine. Spacers that do appear on engineering drawings are permissible.

3.3.6. Castings and Forgings: All castings and forgings shall be free of defects, scale, and mismatching. Weldments, if used, shall be braced, ribbed and gusseted to obtain strength equal to or better than the strength of castings, and shall be properly stressed relieved.

3.4. Workmanship: Workmanship throughout the construction and assembly equipment specified herein shall be free from irregularities or defects that could adversely affect performance or durability.

3.5. Maintainability: All equipment components offered that are subject to wear, distortion or failure and all parts which require periodic adjustment shall be accessible for replacement or adjustment. The contractor shall provide Instructions for the Maintenance and Adjustment of Equipment Components Instructions for the preventative maintenance and adjustment of these parts shall be clear, concise, and definitive in accordance with (IAW) Contract Data Requirements List (CDRL) A001.

3.6. Interchangeability: All parts offered that bear the same part number shall be interchangeable.

3.7. Applicable Power Source: The power source to which the machine will be connected furnishes a nominal 480 volts, 3 phase, 60 Hz AC. However, the machine shall be tolerant of line fluctuations ranging from 432 to 504 volts AC.

3.7.1. Electrical Safety Devices: The machine and its equipment shall be protected by circuit breakers which comply with National Electrical Manufacturer's Association (NEMA) standards for thermal magnetic types and shall have a minimum interrupting capacity of 25,000 Root Mean Square (RMS) symmetrical amperes for 480 volt, 3-phase system. Breaker terminals shall be UL listed as suitable for the type of conductors provided. Plug in circuit breakers or current limiting fuses are not acceptable.

3.7.2. Conversion Equipment: If DC or reduced voltage AC is required to meet any specified requirement, the necessary conversion or transformation equipment shall be provided by the contractor. All transformers must meet efficiency levels specified in CFR Title 10 Chapter II Part 431 (also known as DOE 2016 Efficiency Levels). Equipment which requires a high-quality constant power source shall have proper isolation and/or power conditioning equipment for the power service designated in this description. All electrical equipment shall have a power factor (ratio of real power to apparent power) of no less than 80%, as read at the equipment main disconnect. Equipment with a power factor of less than 80% shall be fitted with suitable power factor correction capacitance, sized based on the equipment's inductive AC load.

3.7.3. Operator Control Voltage: All electrical controls meant for use by the operator of the machine shall carry 120 volts AC maximum.

3.7.4. Utility Outlet: The machine shall be provided with a 120-volt, single phase, spec grade 20 ampere, single duty receptacle, weatherproof bi-metallic box, “in-use cover”, dual receptacle, and 3 wire utility outlet. This outlet shall be protected by a ground fault interrupter and shall be externally mounted onto the operator control panel. A noise suppression device for this circuit shall be provided.

3.7.5. Cabinet Enclosure for Electronic Equipment: All separate electrical hardware/circuitry are to be housed in a NEMA rated enclosure/cabinet. Should forced-air ventilation be necessary to maintain the interior of the enclosure at a temperature to ensure good product reliability, filtered air shall be forced into the cabinet to maintain an over pressure condition in the cabinet. Cabinet shall not inhibit operator access to the controls and/or adjustments.

3.7.6. Interconnecting Wiring: All control functions shall be pre-wired by the contractor. This includes wiring from the computer numerical control (CNC) to the interface and from the interface to the machine tool. If any disassembly of the machine tool and associated control wiring is necessary for shipment from the contractor's plant, the contractor shall rewire the system at the Arsenal unless a clearly labeled plug and socket system is employed. The Arsenal will not perform detailed control wiring. All wiring shall comply with accepted Joint Industry Code (JIC), National Machine Tool Builders Association (NMTBA), and National Fire Protection Association (NFPA) Standards.

3.8. Motors: All motors provided shall be of the type and horsepower rating to meet the specified requirements based on all applicable engineering practices and standards. All motors shall be rated for continuous duty. Motors shall not operate in an overload condition during normal operation of the equipment and shall be equipped with thermal overload protection. Motor starters and controls shall operate at 24 VDC. Motor starters shall provide drop out protection. This means that in the event of power loss, the equipment shall be re-energized only by deliberate action of the operator or maintenance personnel. Manual or mechanical motor starters are not acceptable. All motors shall be housed in enclosures of the appropriate NEMA type for class and severity of service. All AC unidirectional motor housing shall bear a directional arrow to indicate proper rotation direction when correctly wired. All AC motors rated at 25 horsepower or greater shall be equipped with a “soft start” device which provides for reduced voltage starting. All polyphase AC motors rated at 1 horsepower or greater shall be tested per IEEE Standard 112-Method B and must meet premium efficiency requirements per NEMA MG 1-2006 Table 12-12 or IE3 9IEC 60034-30:2008. All motors are to be permanently lubricated and sealed.

3.8.1. Motor I.D. Plates: Each motor shall bear an identification plate containing the identity of the manufacturer, model number, serial number, input voltage, amperage, horsepower, phase, frequency, duty cycle, and frame size or mounting identification IAW CDRL A002. No I.D. plates shall be painted.

3.9. Safety and Environmental Requirements: The contractor shall review the environmental requirements documented in Enclosure D of this document and comply as required.

3.9.1. Protection of Machine Operator: Protection of the machine operator and other personnel shall be accomplished in accordance with all pertinent Arsenal, State, Federal, and local regulations.

3.9.2. Protection of the Machine: The machine shall be designed and equipped in accordance with all applicable standards to prevent self-damage in the event of component malfunctions, power failures, expended consumables, incorrect consumables, and operator errors.

3.9.3. Noise Levels: Noise levels at a distance not exceeding one meter from the nearest point on the machine shall, under no circumstances, exceed a maximum of 85 decibels when measured by a calibrated sound level meter set for "A" weighting and slow response. Any shields, baffles, enclosures, or other devices required to bring the machine into conformance with this noise level requirement shall be provided by the contractor. Any such devices shall not interfere with the operation of the machine and shall be designed to preserve the visibility needed for safe operation and ease of maintenance.

3.9.4. Ozone Depleting Substances: Section 326 of Public Law 102-484 precludes the Department of Defense (DoD) from awarding any contract that directly or indirectly requires the use of a Class I ozone depleting substance within the Government specification or standards set forth in the contract. Enclosure B is a list of the restricted Class I CFCs and Halons. All shall be replaced by new functionally equivalent substances or systems that are approved for use by the Environmental Protection Agency (EPA) and have an "Ozone Depletion Potential" (ODP) rating of zero. Ozone Depletion Potential (ODP) is defined as the relative capacity of a substance, per unit weight, for destroying the earth's stratospheric ozone layer, in comparison with CFC 11, CFC 12 and CFC 114, each having been assigned an ODP of 1.00.

NOTE: Offerors are responsible to obtain and adhere to the most current list of prohibited substances as of the date of the submission of bids or proposals.

3.9.5. Asbestos and Mercury Free Certification: All materials utilized in the system shall be certified as asbestos and mercury free unless substitute materials do not exist. This certification shall be provided prior to machine delivery IAW CDRL A003.

3.9.6. Safety Data Sheets: The offeror shall provide Watervliet Arsenal with all safety data sheets (SDS) at the time of proposal submission IAW CDRL A004.

3.9.7. Lead Free and Chromium Free Paint Certification: All paints and primers applied to the system shall be certified as lead free and chromium free. Lead based paint is paint that contains more than six one hundredths of one percent (0.06%) lead by weight. This certification shall be provided prior to machine delivery IAW CDRL A005.

3.9.8. PCB Free Certification: To the extent that the machine is charged with lubricant or hydraulic fluids at the contractor's plant for preliminary acceptance inspection, these fluids shall not contain Polychlorinated Biphenyl’s (PCBs). The machine and its equipment shall be

certified as PCB free, and certification shall be provided prior to machine delivery IAW CDRL A006.

3.9.9. Lockout/Tagout Procedures: The manufacturer shall provide the control of hazardous energy (lockout/tagout) per OSHA 29 CFR 1910.147 IAW CDRL A007. This information shall be incorporated into the maintenance manual. Contractor shall ensure employees are trained so they know, understand, and follow the applicable provisions of the hazardous energy control procedures. The control of hazardous energy sources includes but is not limited to electrical, pneumatic, hydraulic, chemical, mechanical, UV, electromagnetic and thermal energy.

3.10. Data Plates: All instruction, data, and identification plates and labels attached to this equipment and its controls shall be manufactured of corrosion and oil resistant metal or plastic material. All wording shall be in the English language using plain, bold face lettering. Lettering shall be permanent and have a contrasting background.

3.11. Identification Plate: A corrosion resistant metal plate shall be securely attached to the machine in a location visible to the operator's workstation. This plate shall bear, as a minimum, the information called for below, with space at the bottom of the plate for the addition of one line of information to be applied by the government IAW CDRL A008.

A. Nomenclature
B. Manufacturer's name
C. Model
D. WV# (Please contact the Watervliet Government Representative to receive this number)
E. Manufacturer's Serial Number
F. Power Input (voltage, phase, frequency, and full load amps)
G. Government Contract Number
H. Machine Weight
I. Date of Manufacture

3.12. Utility Connections: Equipment supplied to the Watervliet Arsenal shall have a single point shut off for each utility supplied to the system. This single point shut off will be referred to as the “point of first connection”. Each type of power source shall have only one point of first connection. Each point of first connection shall be clearly labeled on the system and shown in the safety Lockout/Tagout Procedures. These points of first connection shall be located on a stationary component and positioned so that they shall not create a hazard to personnel during normal operation of the system. The first connection-point shall be accessible from the shop floor without the use of ladders, steps, or stools. Access to this first connection point cannot be obstructed or hampered by operation of the system, in the event of a safety incident requiring the main power to the machine to be shut off in an emergency.

3.13. Utility Connection Labor and Requirements: Watervliet Arsenal will provide a utility connection between first point of connection for all utilities (electrical, air, water, etc.) on the equipment, and the facility. Only one “facility side” connection per utility type will be provided. All other additional or ancillary utility connections shall be provided by the contractor.

3.13.1. Electrical: The WVA power source that the specified equipment will be connected to will be a nominal 480 volts, 3 phase, 60 Hz AC voltage. However, the machine shall be able to operate normally at source voltages ranging from 432 to 504 volts AC. The WVA power source does not include sub-panels, filters, surge protection, or any peripheral equipment necessary to make the equipment functional. All electric requirements shall be routed to a single point of connection, including sub systems or 120V connections. All VFD drives shall have the appropriate harmonic filtering included, following the IEEE 519 standard.

NOTE: Contractor shall state required power/electrical requirements for offered machine. See Enclosure C – Electrical Survey and complete IAW CDRL A009.

3.13.2. Pneumatics/Air: If air is required for any machine operation or function, the machine shall be fully equipped with all required components, fully installed to the point of connection of WVA shop air. Shop air at the Arsenal is 85 psi with above normal moisture and contaminant levels. If higher or lower pressure is required at the machine or a different air flow rate is needed, the machine shall be fully equipped to modify the supply pressure and volume. The machine shall also be equipped to remove the above normal moisture and contaminant levels. Normal moisture is defined as that moisture produced when air at a relative humidity of 75% has been compressed to 85 psig. The equipment's nominal and maximum compressed air usage rates in CFM shall be provided to the Watervliet Government Representative as part of Enclosure C.

3.13.2.1. Air Booster Unit: If the equipment offered requires more than 85 psi at the volume for operation of the equipment, then an air booster unit shall be provided with the machine. If operation of the equipment requires an accumulator tank, it shall be provided with the booster.

3.13.2.2. Air Dryers/Filtration: If the offeror determines that on machine air dryers are required to maintain moisture levels, the air dryers shall have a regenerative type desiccant or refrigerated compressed air dryer capable of drying air down to 35°F pressure dew point, minimum, from air entering the equipment at 110°F. The air dryer shall supply air at the required standard cubic feet per minute (SCFM) of the equipment. The air dryer shall purge condensate automatically. In the case of a refrigerated air dryer, the refrigerant used shall not be a Class I ozone depleting substance. The air dryer shall be connected and piped to the equipment by the contractor. All air dryer designs are to be supplied by manufacturers participating in the CAGI Refrigerated Dryer Performance Verification Program and have been tested and rated in accordance with CAGI ADF 100. Power for the refrigerated air dryer unit shall be 110 Volts Alternating Current and shall be wired and powered through the machine electrical system.

NOTE: Industrial Air dryers need to be compatible with the existing Watervliet Arsenal compressed air network. Common industrial air dryers that are used at the Watervliet Arsenal include the ZEKS brand, HSE brand, and Ingersoll Rand brand D31NC models to ensure cross compatibility with existing components on the Watervliet Arsenal's compressed air system.

3.14. Lubrication: The machine shall be equipped to provide lubrication to every moving part where lubrication is essential to prevent damage. Slideways shall be lubricated by an automatically cycled distribution system such as that manufactured by Trabon or approved equivalents. Gearboxes and transmission cases shall be lubricated by the wet sump splash method. Spindle bearings shall be lubricated by recirculating pressure spray systems. Automatic lubrication systems shall be equipped to be fail safe to the maximum extent possible. All sensors and devices used to detect the presence or absence of lubrication shall be accessible for test or replacement without major disassembly. Manual lubrication methods are permissible for lubrication points not practically served by automatic systems. For non-recirculating automatic systems, such as slideway lubrication, the reservoirs shall be sized to provide lubrication reserve equivalent to 80 operating hours and shall be located at floor level. For recirculating automatic systems, cleanable or replaceable filtration devices shall be provided. Wet sump type systems shall be equipped with a means to confirm proper oil level. Sight gages shall be of the external standing tube type rather than the flush mounted porthole type. Standing tube sight gauges shall be protected against accidental breakage.

3.14.1. Lubrication Plate: A lubrication plate shall be permanently fastened to the machine and shall clearly indicate the type and viscosity of lubricant and the service interval for all automatic and manual lubrication reservoirs and fittings. The plate shall include a simple diagram which depicts the physical location of all lubrication points on the machine structure IAW CDRL A010.

3.14.2. Lubricants, Hydraulic Fluids, Oils and Coolants: Watervliet Arsenal has established a standardized list of lubricants, hydraulic fluids, oils, and coolants. The contractor shall choose the required lubricants, hydraulic fluids, oils, and coolants from Enclosure A, enclosed or where there is a designated equivalent. If a substitute is required, the contractor shall provide at the time of machine delivery, a justification which shall include the manufacturer, type, and specification number as well as the reason for the substitution. A list of all fluids required to operate the machine shall be provided to the Arsenal 30 days prior to delivery IAW CDRL A011.

3.14.3. Control of Cutting Fluids: If the machine is equipped with a coolant system, the contractor shall ensure that the machine is designed and equipped to prevent coolant from escaping the confines of the machine and leaking to the floor when producing workpieces of a size within the machine's normal working range. If the coolant reservoir is part of the foundation, the coolant shall be contained in a leak proof metallic or nonmetallic liner.

3.15. Hydraulic System: Hydraulic systems provided shall be sized and powered for the intended application and shall conform to industry standards. The system shall incorporate cleanable or replaceable filtration devices to insure fluid cleanliness. Reservoirs shall be equipped with easily visible gauges to indicate fluid level. If duty cycle of the system under maximum usage will cause the hydraulic fluid to exceed 120°F in temperature, a suitable heat exchanger shall be provided to maintain fluid temperature at or below this level. The system shall be protected against overpressure as well as under pressure. System pressure in any hydraulic device shall be as low as is practical for the intended application but shall not exceed 3000 PSI in any case. In any system which utilizes hydraulics to produce thrust or direct linear

motion, anti-surge devices or circuits shall be incorporated to insure uniformity of motion under varying loads. These devices or circuits shall be adjustable. All reservoirs shall be easily accessible for cleaning and flushing and shall be located at floor level.

3.16. Painting: All exterior machine surfaces shall be painted except where bright metal is required for machine function or to otherwise adhere to the requirements of this specification. Paint shall be chromium-free and lead-free. Quality and manner of application shall afford protection throughout the normal life of the machine. Paint shall be "semi-gloss", and selected by the Government, from a list of standard colors supplied by the offeror with their proposal IAW CDRL A012. This selection shall be made after contract award. Danger areas shall be painted red and caution areas shall be painted yellow in accordance with OSHA Standard 1910.144. Appropriate warning signs, tags or emblems shall be affixed to respective areas of the machine in accordance with OSHA Standard 1910.145.

3.17. Machine Hold Down and Leveling: The machine base shall be provided with a mounting hole quantity and location for positive hold down when operating at full rated capacity. In addition, for each hole in the machine base, the contractor shall provide a set of recommended hold down and leveling hardware. If grouting is required, it shall be provided by the contractor.

3.18. Gears: All gears used in the machine and its components shall meet or exceed the standards recommended by the American Gear Manufacturers Association for the type and severity of service required.

3.19. Handwheels: Where power feed and rapid traverse of a machine component is provided or specified, associated handwheels or cranks, shall not rotate when power feed or rapid traverse is engaged.

3.20. Technical Data: All data shall be in the English language and shall be furnished in accordance with the quantities, formats, and delivery dates below. All data shall be packaged and delivered separately from the machine itself marked to the attention of the Watervliet Government Representative. The contractor shall provide full documentation in the form of “as built” drawings and manuals. Drawings shall not be generic or sub-assembly prints. A “hardcopy” refers to a reproducible printed, paper copy. An “electronic copy” refers to a document saved on CD. All AutoCAD drawings shall be provided in AutoCAD version 2014 or later, shall be of one-to-one scale, shall be dimensioned in English units, and shall not utilize the color yellow. “On-line” technical data shall not be acceptable as the sole means of providing technical data for any of the systems provided. The Government contract number and the Watervliet WV# shall be printed in a conspicuous place on the covers of every manual, on each drawing/schematic, and on all disks/CDs provided. If applicable, it is preferred to receive a 3D file of the complete machine configuration that is compatible with current 3D parametric programs such as SolidWorks.

3.20.1. Foundation Drawings, Standard or Special: Shall be complete in all construction detail to permit pricing and construction by a general contractor and shall be furnished as soon as possible after contract award and no later than 30 days after award. All drawings shall be dimensioned in English units and text shall be in the English language. One

reproducible hardcopy and one electronic copy on CD in AutoCAD .dwg or .dxf format shall be provided. AutoCAD drawings shall not utilize the color yellow or any other colors that cannot be made readily visible when plotted out in color. When drawings are finalized, the contractor shall certify the accuracy of the drawings by providing a stamped and signed hard copy of the drawings to the Watervliet Government Representative IAW CDRL A013.

At least one drawing shall depict an over-lay top view of the machine foundation outline, machine general arrangement drawing (including all ancillary equipment) and the anchor bolt hole pattern. The foundation drawing(s) shall be provided as 100% complete and constructible. Provide all necessary information for bid and award of the foundation work by others. This information shall include, but is not limited to, complete foundation dimensions, rebar locations, rebar size, rebar pattern, concrete PSF requirements, and load bearing specs, etc. All submitted drawings and specifications shall be stamped by a registered Professional Engineer (PE) or a qualified individual (through experience or alternative applicable license). The foundation package shall be delivered as such that the project can proceed straight to the construction phase without requiring additional technical review or certification by Watervliet Arsenal employees. The Watervliet Government Representative will not give approval for foundation drawings, only confirm that a design will fit location, size, and other applicable requirements. Foundation design shall be prepared in accordance with the current edition of all applicable Codes and Regulations, including but not limited to the following:

A. UFC 1-200-01: DOD Building Code
B. UFC 3-201-01: Civil Engineering
C. UFC 3-301-01: Structural Engineering
D. ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures
E. ACI 301 Specifications for Structural Concrete
F. ACI 318 Building Code Requirements for Structural Concrete
G. ACI 351.2R Foundations for Static Equipment
H. ACI 351.3R Foundations for Dynamic Equipment
I. ASTM Cement Standards and Concrete Standards (Various)

Typical floor thickness at Watervliet is 8”-10”. A special foundation is one which exceeds thickness, load bearing capability and vibration isolation of Watervliet Arsenal's standard monolithic concrete flooring of 1,000 pounds per square foot (PSF) load rating and/or one which requires a specific thickness, uniquely shaped excavations for coolant housings, chip conveyors, electrical circuits and conductors, etc. The soil (substrate) for a foundation is assumed to be medium dense gravel or medium dense gravel/sand with a minimum bearing capacity of 4,000 PSF. Although 4,000 PSF is the assumed minimum bearing capacity, there may be variations depending on the exact location of the machine. The contractor shall contact the Watervliet Government Representative to ensure that the minimum PSF and other requirements are accurate. If the contractor states no foundation is required and does not ensure the minimum PSF in the area and the machine causes damage to floor and requires a foundation after initial installation is attempted, the contractor shall be responsible for all costs associated with floor repair, relocation of the machine, and reinstallation of the machine. Should the contractor disturb the soil below the yet to be constructed concrete foundation then the contractor shall compact the disturbed soil to achieve at least 2,000 PSF bearing capacity. See instructions in section 8.5.

3.20.2. Machine and Equipment Floor Plan: Machine and equipment floor plan AutoCAD drawings shall contain information that indicates the type, magnitude, and connection points of all plant utilities required to operate the machine. The top view AutoCAD drawing shall depict the machine, foundations, feet/anchor locations, anchor requirements, grounding, all ancillary equipment, and all necessary clearance requirements for normal use and maintenance IAW CDRL A014.

3.20.3. Catalog of Standard Tooling and Accessories: Catalog shall be furnished 30 days after award of contract. For offers of foreign built machine tools (i.e., machines built outside the United States, its possessions or Canada), the catalog shall set forth U.S. domestic sources of supply IAW CDRL A015.

3.20.4. Non-Standard (Special) Tooling and Accessories: If this specification requires the development of unique tooling and accessories not generally available commercially, a set of drawings and specifications to permit manufacture of such tooling and accessories shall be furnished at the time of machine delivery IAW CDRL A016.

3.20.5. Installation Instructions and Drawings: Instructions outlining the requirements for installation of the equipment shall include a drawing containing the certified dimensioned locations of all equipment mounting/anchor holes. These documents are to be furnished 60 days prior to scheduled delivery IAW CDRL A017.

3.20.6. Lubrication Diagram and Instructions: To be delivered to the Watervliet Government Representative at time of machine delivery IAW CDRL A018.

3.20.7. Operating Instructions: These instructions shall be provided in separate manuals from other technical data provided. To be delivered upon machine delivery IAW CDRL A019.

3.20.8. Maintenance and Troubleshooting Instructions: To be supplied for all machine and control systems and shall include the machine's mechanical assembly and wiring drawings. To be delivered at time of machine delivery IAW CDRL A020.

3.20.9. Electronic and Hydraulic Schematics: To be considered acceptable, these schematics shall clearly portray all "as built" electrical and hydraulic ties to their respective main systems. To be delivered at time of machine delivery. Wiring diagrams used to do the initial power hookup shall be furnished no later than 90 days after award IAW CDRL A021.

NOTE: If, during installation and testing, the actual electrical and hydraulic systems are configured differently than depicted on the schematics, receipt of the revised "as built" schematics shall be a condition of final acceptance.

3.20.10. Repair Parts Catalog: This catalog shall encompass every replaceable part in the machine and shall include identification and original equipment manufacturer's part numbers and ordering data. Items which can normally be purchased locally may be so indicated provided they are sufficiently described. The repair parts catalog shall include illustrations which clearly

locate parts within larger subassemblies. To be delivered at time of machine delivery IAW CDRL A022.

3.20.11. Program Manuals: Where a CNC machine is specified, programming manuals shall be supplied. These manuals shall include a clear summary of the control functions implemented and usable on the system specified. To be delivered at time of machine delivery IAW CDRL A023.

3.20.12. Software Documentation: The offeror shall provide documentation of all system software and ladder logic developed to control and interface with the control/drives with the machine tool. To be delivered 30 days after delivery of the machine IAW CDRL A024. One copy of the system memory backup (S-Ram) shall be provided on a USB Type-A flash drive at startup of machine.

3.21. Training Required: The contractor shall be responsible for providing training of WVA personnel. The type and extent of training shall depend upon whether the machine specified is equipped with numerical control. All instructions and materials, oral or written, shall be in English. "On-Site" means "At Watervliet Arsenal" and "Off-Site" means "a location within the U.S. away from Watervliet Arsenal as determined and arranged for by the contractor". If specialized formal “off-site” training is available, specify on offer, availability, and price as an option. The quality of the training shall be such that at the conclusion of the specified training time, everyone within their assigned category shall be capable of repairing or operating the machine to its productive capacity. Training shall be in accordance with the applicable areas of the schedule below, and training attendance, duration and execution shall be officially documented and submitted at the time of final acceptance by the manufacturer’s trainer IAW CDRL A025. For all types of training, the associated technical data (see section 3.20) shall be on hand at the time of instruction and its use and interpretation shall be covered during the training. A minimum of **five (5)** full days training on site at WVA shall be required for the following categories.

A. Machine Operation: Four (4) persons during or after machine performance testing
B. Mechanical Maintenance: Two (2) persons during startup
C. Hydraulic Maintenance: Two (2) persons during startup (if required)
D. Electrical Maintenance: Two (2) persons during startup
E. Electronics (CNC) Maintenance: Two (2) persons during installation
F. Spindle/Axes Drives: Two (2) persons, during installation (if required)
G. Programming: Two (2) persons, during installation

3.22. Repair/Replacement Parts and Service: The offeror shall provide parts and service for the contracted equipment within 72 hours of notification of a problem. The offeror shall agree, as part of the contract, to store complete ordering data to include specifications (e.g., critical subsystem parameters and specifications), engineering drawings and other information for the contracted machine tools/parts. This data shall be stored within the U.S. or Canada and available to the Government at its request IAW CDRL A026. The contractor shall supply a list of recommended spare machine parts (e.g., belts, filters, fluids, and wear items) IAW CDRL A027. Watervliet Arsenal recognizes that it may be difficult to fulfill this requirement for major

machine components. If the requirement cannot be adhered to, the offeror shall notify the Watervliet Government Representative within two business days and shall provide a delivery schedule to be approved by the Watervliet Government Representative.

3.23. Special Tools: If any element of machine operation or maintenance requires the use of specially designed tools, these tools shall be provided with the machine and shall become the property of the Government.

3.24. Site Conditions: The machine covered by this specification shall be installed in a general machine shop space and there will be no environmental conditioning. Temperatures will range from 65°F to 95°F and relative humidity will range from 20% or less to 95%. On any given day, the temperature in the machine shop may change as much as 4°F per hour. These are the conditions under which the machine is expected to perform as specified, and the contractor shall be responsible for supplying what is required to meet the specified performance. The only permissible exception is positioning accuracy for numerically controlled machines. For this performance factor, allowances may be made for the effects of temperature fluctuation.

3.25. Heat Exchange Equipment: Heat exchange equipment shall be provided with the machine wherever it is needed to keep operating temperatures within design or specified limits. Any heat exchange equipment using water as the heat exchange medium shall be fully recirculating and shall not require the continuing input and discharge of Arsenal water supply. Wastewater systems of any type are not acceptable. Furthermore, it is the Arsenal's preference to avoid heat exchange equipment making use of the refrigeration cycle, and refrigeration systems of any kind are not acceptable unless design or specified temperature limits cannot be achieved without them. If a refrigeration system is necessary, the contractor shall ensure that it operates properly using a refrigerant having an ozone depletion potential of zero. The contractor shall be responsible for identifying and providing such a refrigerant and its safety data sheet.

3.26. Chip Removal: An automatic chip removal unit shall be provided to convey chips of any material from the machine to an external container without manual aid. The unit shall be reversible to facilitate clearing of blockages. The unit's drive mechanism shall be equipped with an external square or hexagonal extension piece to permit use of wrenches to manually free blockages which stall the drive mechanism. The unit shall operate successfully in a variety of machining environments including dry cutting, machining with cutting oils and machining with water extendable oils. Automatic means shall be provided to return cutting fluids to the machine's coolant tank which shall be separate from the unit. The chip removal unit shall be engineered for the machine so that when fully installed in accord with instructions, the following shall be true:

A. All points subject to periodic maintenance and lubrication shall be externally accessible.
B. The unit shall be capable of being disassembled and removed without disabling the machine itself.

3.27. Elapsed Time Meter: The machine shall be fitted with a meter to measure operating time of the spindle drive. The time totalizing meter shall be of the non-resetting type and shall have a range of 0 to 99,999 hours in increments of 1 hour. 1-hour being the least significant digit.

Upon reaching the maximum accumulative hours the meter readout shall automatically revert to zero and continue to totalize time. The meter shall be designed to prevent the entrance of dust and moisture and shall be mounted to withstand shock and vibration generated by the equipment. The meter shall be located as to be readily visible but not subject to abuse relative to the operating environment of the equipment. Time meters resident in the numerical control unit are unacceptable.

3.28. Enclosures: All new controller hardware shall be provided with new electrical enclosures. Enclosures located in explosive, high dust, paint, or heavy industrial manufacturing environments shall be NEMA 4X rated. All other locations shall be NEMA-12 rated. In addition, if required, given shop environmental conditions as detailed in section 3.24, new control system enclosures for electronic circuitry shall be air conditioned and air filtered to maintain constant temperature, to reduce humidity and to prevent contamination of control boards and other critical system components. Air conditioning units shall not utilize Ozone Depleting substances. New enclosures shall be painted with a color as close to the painted color of the original machine tools as possible.

3.29. Piping: All pipe work performed by the contractor shall be to the specifications below.

A. All equipment piping shall be identified per ANSI/ASME A13.1 or equivalent.
B. Brazing filler metal shall conform to AWS A5.8/A5.8M, Type BAg-5 with AWS Type 3 flux, except Type BCuP-5 or BCuP-6 may be used for brazing copper-to-copper joints.
C. Welding work for new piping systems shall be in conformance with ASME B31.9. The welding work includes brazing procedures, brazers, brazing operators, and nondestructive examination personnel, maintenance of welding records, and examination methods for welds.
D. Pipe hangers and supports shall conform to MSS SP-58, MSS SP-69, and ASME B31.1, except as specified or indicated otherwise. Piping shall be adequately supported to eliminate sag and weak points and allowance for thermal expansion must be considered on long pipe runs.
E. All piping, tubing and fittings shall be in strict accordance with manufacturer's requirements and recommendations to include industry standards and applicable codes (ANSI B16 and B31.3).
F. Process piping shall be ASTM 312, 304 stainless steel, seamless.
G. For pressure up to 150 psi, SCH 80 pipe shall be used where threaded connections are made. For pressures between 150 and 2000 psi, SCH 160 pipe shall be used where threaded connections are made.
H. Joints in piping system shall be listed as complying with ASME B31.3 to include the use of welded fittings. Gaskets and sealants shall also be listed as complying with ASME B31.3.
I. Prior to acceptance and initial operation, all piping shall be inspected, and pressure and leak tested in accordance with ASME B31, Code for Pressure Piping, and Section 705 of the IFGC.

3.30. Machine Control: If a control system is supplied with the machine, it shall be of the computer numerical control (CNC) type and the requirements specified in sections 3.30.1 through 3.30.10 shall apply. If there are additional requirements to the machine control system,

they shall be listed in section 5. A post processor program through ESPRIT must be supplied with machine. The machine environment shall be quoted **as an OPTION.**

3.30.1. Applicable Electronics Standards: The CNC system shall adhere to the current applicable revisions of the standards of the Electronics Industries Association (EIA).

3.30.2. Input/Output Requirements: The CNC shall be equipped with at least the following:

A. A visual display having sufficient resolution to provide easily readable text of at least 80-columns and 20-rows. A color display shall be provided to provide contrast between different data types. If a monochrome display is required, it shall be subject to approval by the Watervliet Government Representative and an alternate means (inverse video, for example) shall be provided.

B. An alpha-numeric keyboard for on-site program editing, operator input, MDI and other necessary communication. This keyboard shall be an open-key, tactile feedback type. The alpha characters shall be arranged in "QWERTY" format.

C. A USB Type-A flash drive and USB Type-A port on the controller shall be provided. The drive shall provide formatted data capacity of at least 8 gigabytes and shall be the means of uploading to the CNC the system executive (operating system and machine-specific data) as well as part program files.

D. The CNC offered in accordance with this specification shall have included in its design both the capability and cabinet space to permit the future installation of a remote data interface so that the control may be placed online to a remote host computer. Offerors must certify that the offered control could subsequently be equipped with any of the common interfaces covered by EIA RS-422.

3.30.3. Control/Machine Interface: It is required that the control/machine interface be of the solid-state type. Electromagnetic relays are not permissible.

3.30.4. Operator's Console: The CNC console shall house everything necessary for communicating with the control and operating the machine. This shall include at least the visual display, keyboard and USB Type-A drive specified in section 3.30.2, “A” through “C”. An emergency stop button shall also be located on the console. The console shall be machine-mounted or pendant-mounted. A floor-mounted console is unacceptable. A fixed-height machine-mounted console shall place the visual display at 66-72 inches above foot level at the operator's station. A pendant-mounted console shall be adjustable to place the visual display within this same height range.

3.30.5. User Software Interface: The control's operating system shall include a software interface providing a user-friendly environment within which operating, programming and maintenance personnel can interact with the control. "User-friendly" means that the interface shall employ on-screen menus or equivalent techniques to guide the user through the process of accessing control functions and entering or modifying data. Write access to system level data such as axis calibration tables shall be protected by user-selectable passwords.

3.30.6. <u>Control Functions and Capacities:</u> The CNC shall include at least the following functional capabilities and capacities whether standard or optional with the offeror. If there are functions listed below that clearly do not apply to this type of machine then they can be ignored. Please indicate this in your proposal.

A. Two-axis linear and circular interpolation. For machines of three or more axes, the plane of interpolation shall be switchable via program code.
B. The ability to program, execute and display in both inch and metric modes. Inch/metric switching shall be possible by MDI as well as from a part program. All displayable numeric information shall reflect the selected format.
C. Selectable absolute or incremental programming.
D. Automatic maintenance of the commanded feed rate when slide velocity is a vector resulting from two or more axes of motion.
E. Full floating-point support for display and programming.
F. System resolution of 0.0001 inch (English) and 0.001 mm (metric). Visual display format and command increments shall also exhibit this resolution.
G. Dry run mode, which is the ability to execute a programmed tool path at an accelerated rate under non-cutting conditions.
H. The ability to program a dwell of adjustable duration.
I. Program and data editing at the machine. However, editing capability shall be protected by a user-selectable password.
J. Zero shift (i.e., the capability to establish a program origin point which differs from the machine's home position anywhere along each axis).
K. Provision for disabling the operator's ability to override programmed speeds at the machine.
L. Data format for positioning and contouring shall be in accordance with the most recent revision of EIA Standard RS-274.
M. A minimum of 4 GB of RAM shall be provided for the control system.

3.30.6.1. <u>CNC Features/Programming Requirements:</u>

A. Absolute/Incremental programming
B. Leading zero omission
C. Decimal point programming
D. Program resolution: 0.0001 in. Minimum
E. Single block mode
F. Program / Option stop
G. Programmed operator messages
H. Multiple G and M codes in same block
I. Optional block skip
J. Program rewind
K. Interpolation
  - **i.** Linear
  - **ii.** Circular
  - **iii.** Helical

L. Rapid traverse
M. Inch/Metric switchable conversion

N. Dry Run (with or without axes inhibited)
O. Canned cycles
P. Threading
- **i.** Constant lead and taper
- **ii.** Variable lead
- **iii.** Multiple start
- **iv.** Threads per inch

Q. FPR, FPM programming
R. Dwell
- **i.** Time based
- **ii.** Revolution based

S. Coordinate system (G52-G59)
- **i.** Machine
- **ii.** Work

T. Program edit
- **i.** Foreground
- **ii.** Background

U. Corner rounding / Chamfering
V. Direct RPM spindle speed programming
W. Mirror image programming
X. Subroutines with multiple level nesting
Y. Custom macros
Z. Stroke checks before move
AA. Stored limit checks
BB. Scaling
CC. Tool identifier
DD. Tool pocket identifier
EE. Tool offsets/Compensation
- **i.** Tool length
- **ii.** Tool radius
- **iii.** Fixture

FF. Tool life monitoring
GG. Horsepower monitoring
HH. Programmable safe zones
II. Tool Retrace and Retract
JJ. Program delete from system memory functions
- **i.** Constant surface speed
- **ii.** Presets G92, G50

KK. Program Restart
LL. Plus and Minus programming on linear and rotary axes

3.30.6.2. <u>Performance Requirements:</u>

A. Feedrates capable of:
- **i.** Rapid – .01 to 400 IPM
- **ii.** Point to point .01 to 400 IPM

iii. Contour - Minimum of current capabilities

B. Feedback resolution
- **i.** Linear axis .0001”
- **ii.** Rotary axis 0.001 deg

C. Compensation tables
- **i.** Backlash compensation (assumed one value per axis)
- **ii.** Tool length measurement/Tool setting
- **iii.** Bi-directional pitch error compensation

3.30.6.3. <u>Man-Machine Interface:</u>

A. Operator display

B. Position display
- **i.** Relative
- **ii.** Absolute
- **iii.** Machine
- **iv.** Distance to go
- **v.** Following error

C. Coordinate system display/Edit (G52-G59)
- **i.** Machine
- **ii.** Work

D. Tool offset display/Edit
- **i.** Length
- **ii.** Radius

E. Machine status display
- **i.** Feedrate
- **ii.** Feedrate override
- **iii.** Spindle RPM
- **iv.** Spindle speed override
- **v.** Real time PLC error reporting

F. Parameter display/Edit

G. Message display active M, G, S, T, D, H codes

H. Program display
- **i.** Axis positions
- **ii.** Program line number
- **iii.** Program name
- **iv.** Subroutine line number
- **v.** Subroutine name

I. Programmed spindle speed and feedrate

J. Program loading (5,120m storage minimum)

K. Program check (with or without axes inhibited)

L. Data protection

M. Clock function

N. Self diagnostic functions

O. PLC/system ladder logic software display

P. Synchronous control

Q. Spindle load meter/horsepower display
R. Program sequence number search
S. Help functions
T. Program print function through operator interface
    i. Control panel functions
U. Operating modes
    i. Manual
    ii. MDI
    iii. Auto
    iv. Edit - capability to disable feature with system level password
V. Axis select
W. Axis jog +/
    i. Continuous
    ii. Incremental
X. Feedrate override
Y. Rapid override
Z. Spindle control
    i. Clockwise
    ii. Counterclockwise
    iii. Off
    iv. Neutral
    v. Jog
    vi. Spindle orientation
    vii. Spindle positioning to 1 degree increments
AA. Spindle speed override
BB. Feedhold
CC. Cycle start
DD. Cycle stop
EE. E stop
FF. Home axes
GG. Single block
HH. Option stop
II. Tool chain +/
JJ. Tool engage/release (clamp/unclamp)
KK. Overtravel override capability
LL. Manual Pulse Generator (MPG)
MM. Lamp test push button
    i. Machine setup
NN. Number axes
OO. Maximum feedrates
PP. Servo tuning
QQ. Coordinate system definition
RR. Following error limits
SS. Axis inhibit
    i. Communications
TT. RS-232 with DB9 connection

UU. RJ45 10 Base-T Ethernet Card
VV. MT Connect Adapter

3.30.7. Diagnostics Capabilities: The CNC shall be equipped with diagnostic capabilities covering the control itself, the interface and the machine tool. As a minimum, diagnostic capability shall include the display of a message or other meaningful indicator to identify any fault which causes the machine to be inoperable. This includes electrical/electronic faults and any mechanical faults which result in operation of a safety interlock.

3.30.8. Crash Protection: The machine and control shall be equipped with means to sense and react to abnormal power draw at the spindle. Abnormal power draw shall be a variable assignable by the programmer on a tool-by-tool basis. A bi-level system employing two variables per tool is preferred, the first level being a warning threshold which shall display a warning and initiate feedhold upon completion of the current machining pass and the second level being an absolute threshold which shall initiate immediate feedhold. Even if the bi-level system is not available, a system employing at least the absolute thresholds is mandatory. Immediate crash-protection feedhold shall be disabled during threadcutting passes.

3.30.9. Temperature Control: The control shall be equipped with means to maintain electronic circuitry and devices at temperatures well within operating limits. The temperature control system shall also provide stability such that temperatures are maintained within +10°F of shop ambient temperature. Ambient temperature in the shop will range from a low of 65°F to a high of 95°F. It is preferred that temperature control be achieved without the use of refrigeration. If a refrigeration system is essential, it shall operate normally using a refrigerant having an ozone depletion potential of zero.

3.30.10. Power Supply Conditioning: The AC feed to the control's DC power supply shall incorporate transient suppression. The suppression network shall have a transient response time not greater than 6 nanoseconds and a peak ampacity of 20,000 or more.

4. Machine Installation and Startup:

4.1. Work Performed by the Arsenal:

4.1.1. Site Designation: Upon receipt of the required installation and foundation drawings (see section 3.20), Watervliet Arsenal will designate an installation site and outline a general machine location on the shop floor. The Watervliet Arsenal will not perform any floor work or other work related to the machine except for ensuring the area where the machine will be installed is cleared.

4.1.2. Utilities: Once the machine is installed, positioned and rough leveled by the contractor or their designated rigging crew, Watervliet personnel will run utilities to a single first point of connection for electrical and a single first point of connection for compressed air. Watervliet must be provided with sufficient time to accomplish these connections. Sufficient time may be up to 3 working days depending on Watervliet personnel availability. However, if the installation instructions supplied by the contractor are incomplete or insufficiently detailed,

installation work will stop and the contractor shall be required to dispatch a service engineer. Installation shall resume upon their arrival and continue under their guidance.

NOTE: If installation instructions, electrical and hydraulic schematics are not delivered at or before the times specified (see section 3.20), the Government reserves the right to forestall delivery and/or final acceptance testing of the machine by an amount of time equal to the delay in receipt of instructions, drawings, or schematics.

4.2. Work Performed by the Contractor: This project is classified as a "turn-key" system with the contractor being responsible for all costs and work associated with the installation unless otherwise stated. The Contractor shall be solely responsible for all costs associated with skidding and shipment, rigging, and installation at WVA. Contractor personnel shall adhere to the WVA requirements to wear OSHA approved non-tinted safety glasses with side shields, to wear safety shoes, and to refrain from wearing loose clothing (i.e. "hoodies") and jewelry while in the manufacturing shop areas. The contractor shall ensure they bring all equipment/material necessary for the installation of the machine. The contractor shall remove from WVA and dispose of all wastes (other than hazardous wastes) generated from uncrating, unpacking, and installing the machine at a permitted off-post disposal facility, in accordance with Enclosure D of this specification and the document "WATERVLIET ARSENAL (WVA) INFORMATION FOR CONTRACTORS" which is available on the Watervliet Arsenal website. All labor for the installation of material and equipment furnished under this Contract shall be done by experienced personnel. All workmanship shall be up to commercial standards and in compliance with the specific requirements of the Scope, Drawings and Specifications. If any of the Contractor's services do not conform to the Contract requirements, the Government may require the Contractor to perform the services again in conformity with the contract requirements at no additional cost. The Contractor shall be responsible for the professional quality, technical accuracy, and the coordination of all construction and other services furnished under this Contract. Contractor shall, without additional compensation, correct or revise any errors or deficiencies in its construction and other services.

4.2.1. Site Preparation: Once an installation site is identified by Watervliet personnel and if required, a foundation is constructed, the contractor or their designated third party shall layout the machine. Please note that much of the Watervliet Arsenal's shop floor is covered with 2.5" thick wood block. The contractor is responsible for the removal and disposal of wood block flooring and existing concrete preparation if necessary. Contractor shall also be responsible for securing wood block flooring and install any leveling pads necessary for installation. This shall include informing the Watervliet Government Representative of the number and size of metal blocks required to act as a spacer where the floor was removed to prevent the machine from sitting on the concrete below the wood block flooring. These metal blocks will be provided by the Watervliet Arsenal.

4.2.2. Site Visit: A site visit to the Watervliet Arsenal is highly encouraged after contract award. The purpose of the visit is to observe the process and how a similar machine is currently used at the Arsenal, this will enable the machine to be constructed with the process in mind. It shall also allow the contractor to see the location of the machine and determine how to rig it into place.

4.2.3. Rigging: The contractor shall arrange for rigging services to off load the machine and contractor personnel shall be on site at Watervliet when the machine arrives and is off loaded to supervise the placement of the machine on the installation site by the rigging service. Outside rigging services shall be advised that only certified grade 8 chains are permitted to be used at the Arsenal and that all rigging slings must be tagged and certified for the weights being lifted. Only propane powered forklifts are permitted, and forklifts must also be equipped with a roll cage. Operators of forklifts shall have and be able to produce valid forklift licenses IAW CDRL A028. The contractor shall ensure they bring all equipment and material necessary for the rigging of the machine. If necessary, the Watervliet Arsenal will provide the contractor with information for local rigging companies. Any crane truck or lifting equipment used for the installation works shall be inspected and certified as required by applicable regulations. Ensure full compliance with OSHA (CFR 1926) regulations as applicable as well as any other applicable regulation and Federal. If a partial road closure is required to offload and install the equipment, the contractor shall be responsible for traffic flaggers to direct traffic around the install site.

4.2.4. Installation: Once the machine is positioned and rough leveled by the contractor, the contractor, through his own service personnel, shall be fully responsible for the startup and testing of the machine, conducting any acceptance tests specified, and performing the required onsite training. The contractor shall provide competent, English speaking service personnel to install the machine, rough and finish level the machine, startup, and conduct the acceptance tests. The contractor and the service personnel shall remain until the machine activation and testing have been successfully completed. Under no circumstances shall the contractor plan on Arsenal assistance for diagnosis, troubleshooting or repair of the equipment during activation and testing. If the contractor chooses to request Arsenal assistance in lieu of providing their own resources, the request will be reviewed by the Watervliet Government Representative who shall reserve the right to impose a charge for the assistance. Approvals, even on a charge basis, shall not be taken for granted since there is no guarantee that appropriate Arsenal personnel will be readily available. In such cases, the Arsenal will not be held responsible for delays in acceptance of the equipment resulting from non-availability of Arsenal personnel or Arsenal furnished equipment. If the contractor requests Watervliet Arsenal to ship miscellaneous material via UPS, FedEx or by other similar carrier then the contractor shall provide their carrier account number for this purpose.

NOTE: Under normal circumstances the contractor will be allowed to work as long as is desired during normal workdays. Contractor work outside Watervliet's normal workdays cannot be guaranteed. Watervliet is on a condensed work schedule. Normal work hours/days for this schedule are four 9-hour workdays (Friday off) one week and four 9-hour days, one 8-hour day (Friday) the following week. Contractor work on the Friday off and weekends cannot be guaranteed. Contractor's classified as foreign nationals may further restrict work hours and days available.

4.3. Project Safety: Throughout the duration of the project, all contractors must maintain a safe working environment for both the contractors and WVA personnel. This shall include, but not limited to, sections 4.3.1 and 4.3.2.

4.3.1. Safety Fencing: If applicable, the contractor shall provide temporary safety fencing around the work area within five (5) business days of work beginning at the Arsenal. The contractor shall maintain the safety fencing for the duration of the contract work and remove the safety fencing within five (5) business days of Government acceptance of the completed work. The type of safety fencing used (barrier, mesh and pole, etc.) shall be subject to approval by the Watervliet Government Representative. Signage shall be posted notifying all personnel that no foot traffic is allowed.

4.3.2. Safety Systems: Protect the integrity of all installed safety systems or personnel safety devices. Obtain prior approval from the Watervliet Government Representative if entrance into systems serving safety devices is required. If it is temporarily necessary to remove or disable personnel safety devices to accomplish Contract requirements, provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and obtain approval from the Watervliet Government Representative.

4.4. Denial of Entry: The equipment purchased in this specification shall be installed on a secure military base. As such, all visitors to the base shall be subject to denial of entry. This applies to riggers, technicians, trainers, company employees, and anyone else who would need to come on site. If this person is not a citizen of the United States of America (foreign national), they will be denied access without obtaining prior approval. If a foreign national must be sent to work on this equipment, a request shall be made to the Watervliet Government Representative at least 30 days in advance.

4.5. Cleaning and Housekeeping: The site of installation shall be return to its original state, to the best of the contractor's ability. This shall include removal of trash, debris, boxes, crates, and other unneeded items. If applicable, the area around the machine shall be swept and oil cleaned from the floor. The interior of the machine shall be cleaned of all shipping materials, including cosmoline.

5. Machine Specific Requirements:

5.1. Machine Tool Description: The machine tool covered by this specification shall be a New CNC Milling Turning Machine, heavy duty type. Fitted with 2 spindles (left and right), slant bed with one piece base. With CNC controlled 5-axis (X, Z, Y, C, and B) Millturn, complete with 2 self-centering c-rests, coolant system, automatic chip removal system, automatic tool changer and other features and characteristics as specified herein. The slant bed shall be of heavy duty full box construction four rail design. The preferred machine is an NT6600DCG/6000 with Fanuc F31iB5 and CELOS or equal. The contract shall be for one machine with an option for a second machine.

5.1.1. Machining Capabilities: The machine shall be able to cut at the minimum:

A. TURNING – O.D. cutting, I.D. drilling/tapping, I.D. cutting, I.D. threading.
B. MILLING – O.D. milling, O.D. hole machining, ball end milling, angular machining (deburr)
C. Profiling/contouring/hobbing/workpiece cut-off/face cutting.

D. Ability to finish all machining process in a single machine setup.

5.2. <u>Required Characteristics:</u> Watervliet requires the machine to be able to accommodate our minimum workpiece characteristics:

A. Max Length Workpiece: 18 ft
B. Max Workpiece OD: 12 inches
C. Max Workpiece Weight: 10,000 lbs.

5.2.1. <u>Performance Characteristics:</u>

5.2.1.1. <u>Capacities:</u>

A. Max. swing of workpiece: ≥42.1 inches
B. Swing over cross slide: ≥42.1 inches
C. Max distance Between Centers Standard: ≥256.2 inches
D. Max. turning diameter: ≥42.1 inches
E. Max. turning length: ≥239.2 inches

5.2.1.2. <u>Travel:</u>

A. X-axis (linear): 40.9 inches
B. Y-axis (linear): 26 inches
C. Z-axis (linear turn-mill spindle): 242.1 inches
D. B-axis (rotational): +/- 120 degrees
E. ZA, ZB, ZC-axis: 191.7 inches

5.2.1.3. <u>Through Spindle (Left Main Spindle):</u>

A. Max. spindle speed (left spindle): 1,000 rpm
B. Number of spindle speed ranges: 2
C. Type of spindle nose: JIS A_1- 20
D. Through spindle hole diameter: 10.8 inches
E. Min. spindle indexing increment: 0.0001°
F. Spindle bearing inner diameter: 14.2 inches
G. Low speed spindle torque (30 min/cont) (ft·lbf): 5,003.6/4,111.2
H. High speed spindle torque (30 min/cont) (ft·lbf): 2,224.5/1,830.0

5.2.1.4. <u>Through Spindle (Right Spindle):</u>

I. Max. spindle speed (left spindle): 1,000 rpm
J. Number of spindle speed ranges: 2
K. Type of spindle nose: JIS A_1- 20
L. Through spindle hole diameter: 10.8 inches
M. Min. spindle indexing increment: 0.0001°
N. Spindle bearing inner diameter: 14.2 inches

O. Low speed spindle torque (30 min/cont) (ft·lbf): 5,003.6/4,111.2
P. High speed spindle torque (30 min/cont) (ft·lbf): 2,224.5/1,830.0

5.2.1.5. Mill-Turn Spindle:

A. Number of tool stations: 1
B. B axis indexing time (s): 0.55/90°
C. Min. B axis indexing increment: 0.0001°
D. Max. Turn mill Spindle speed min: 8,000rpm
E. Taper hole of rotary Turn mill Spindle: HSK-A100
F. Tool storage capacity: 100
G. Max. tool diameter (With adjacent tools): 4.7 inches
H. Max. tool diameter (Without adjacent tools): 9.8 inches
I. Max. tool length: 23.6 inches
J. Max. tool weight: 66 lbs
K. Spindle torque: 222.7/129.1/108.4 ft-lbf

5.2.1.6. Tailstock: Not applicable.

5.2.1.7. Rapid Traverse Feedrates:

A. X-axis (Turn mill spindle): 131.2 fpm
B. Y-axis (Turn mill spindle): 98.4 fpm
C. Z-axis (Turn mill spindle): 105 fpm
D. ZA, ZB, ZC-axis (steady rest): 26.2 fpm
E. B axis min: 80 rpm
F. C axis min: 70 rpm

5.2.2. Machine Alignments:

A. Straightness of Z axis (Z-Y plane)- Full Travel: ≤ 0.0004"
B. Straightness of Y axis (Y-X & Z-Y planes): ≤ 0.0004"/20"
C. Straightness of X axis (Z-X & Y-X planes): ≤ 0.0004"/20"
D. Angle deviation of Z axis (Y-X & Z-X planes): ≤ 0.0006"/40"
E. Squareness of Z-axis to X-axis movement: ≤ 0.0006"/20"
F. Squareness of X-axis to Y-axis movement: ≤ 0.0006"/20"
G. Squareness of Y-axis to X-axis movement: ≤ 0.0006"/20"
H. Perpendicularity between Z & Y axis movement: ≤ 0.0006/20"
I. Perp. between spindle centerline and Z & Y axis in the - Z-X / Y-X planes: ≤ 0.0005"/12"
J. Runout of Spindle @ Taper: ≤ 0.0002" TIR
K. Parallelism Z & Y axis movement to table top: ≤ 0.0006"/20"
L. Parallelism of B axis swivel to Y-X plane: ≤ 0.002"
M. Parallelism between pallet edge locator & Z-axis: ≤ 0.004"/10"

5.2.3. Bi-Directional Positioning Accuracy (ISO 230-2):

A. Linear axes (X, Y, Z, X^T, Z^T): ≤ +/- 0.00016" (4.1 µm)
B. B Rotary axis: ≤ +/- 1.8 arc-sec (0.0005°)
C. C Rotary axis: ≤ +/- 3.0 arc-sec (0.00083°)

5.2.4. Positioning Repeatability (ISO 230-2):

A. Linear axes (X, Y, Z, X^T, Z^T): ≤ +/- 0.00006" (1.5 µm)
B. B Rotary axis: ≤ +/- 1.0 arc-sec (0.00028°)
C. C Rotary axis: ≤ +/- 1.5 arc-sec (0.0004°)

5.2.5. Measuring Resolution:

A. Linear axes (X, Y, Z, X^T, Z^T): ≤ +/- 0.00005" (1.3 µm)
B. B Rotary axis: ≤ +/- 0.05 arc-sec (0.00014°)
C. C Rotary axis: ≤ +/- 0.05 arc-sec (0.00014°)

5.2.6. Workpiece Performance Characteristics:

A. Surface Flatness: ≤ 0.0004"/12"
B. Parallelism (of 2 machined opposing surfaces): ≤ 0.0005"/12"
C. Squareness (of machined surfaces): ≤ 0.0005"/12" (each direction)
D. Surface Finish: ≤ 64 Ra
E. Accuracy of size bored hole diameter: ≤ Nominal + 0.0005" (diameter)
F. Roundness of bored hole diameter: ≤ 0.0003" TIR
G. Relative accuracy of location of bored holes, center to center: ≤ 0.0005"/12" of separation
H. Accuracy of depth of machined features: ≤ 0.0005"/12"
I. Accuracy of width of machined features: ≤ 0.0005"/12"
J. Accuracy of height of machined features: ≤ 0.0005"/12"
K. Accuracy of milled/contoured angles (during linear interpolation): ≤ +/- 30 seconds
L. Accuracy of contoured radii: ≤ 0.001"/12" of radius
M. Drilling capacity: ≥ 1" diameter (without pilot hole)
N. Tapping capacity: ≥ 1" diameter (coarse thread)

5.3. Required Features, Options and/or Accessories: The machine shall be fully designed, configured, and installed with the following features, options, and accessories in addition to the base machine design:

5.3.1. Through Spindle Coolant/High Pressure Coolant System: This feature shall provide at least 1,000 psi @ 1.5 gpm flow rate to effectively eliminate chips at tooling tip, cool the machine point, and lengthen overall tooling life. An appropriate through spindle coolant filtration system shall also be provided. System shall include a super high pressure coolant system. An air blow system for the tool tip and chucks shall be included.

5.3.2. Cooling System: The coolant system shall have an interface for mounting with predefined 8 steps of pressure selected by M code. The system shall include a flow and float switch to detect low coolant flow and trigger and alarm. The system shall include a coolant

chiller to cool the coolant. The system shall also include a magnetic type coolant gun attached to the front of the machine. The coolant system shall include an oil skimmer to maintain coolant quality.

5.3.3. Mist Collection Unit. The machine shall be provide with a mist collection unit for the work area. This unit shall be powered through the machine electronics.

5.3.4. External Belt Type Chip Conveyor: If a chip conveyor is required herein, an automatic, belt type reversible chip removal unit shall be provided, by the contractor, capable of conveying various types of ferrous and nonferrous chips from the entire work area of the machine to a suitable container outside of the machine without manual aid. The chip conveyor system shall have an operation panel. An inspection window shall be included to allow the rotating part of the chip conveyor to be visually checked.

5.3.5. Part Probe: The machine shall be provided with an automatic contacting part probe capable of part measurement. The Renishaw model RMP600 (or equivalent) part probe, associated transmitter / receiver, and software/macros shall be included to exchange to/from the tool magazine and the spindles via the tool changer arm and be capable of locating and measuring parts surfaces, edges, and diameters. The part probe shall be interfaced with the CNC unit and update control unit registers automatically.

5.3.6. Tool Probe: The machine shall be provided with an automatic, non-contact, laser tool probe that can measure tool lengths/diameters of a tool held in the any spindle. The Renishaw model TS27R tool probe (or equivalent) shall automatically detect broken tools, interrupt operation and display an error message on the CNC unit. The tool probe shall be interfaced with the CNC unit, update control unit registers automatically, and be mounted so as not to compromise the working envelope of the machining center. Probe use training shall be included as part of the machine package.

5.3.7. Probing System: The machine shall integrate the latest in Renishaw's probing hardware and software including all for: 1) part/component set-up and inspection (RMP600 probe desired), 2) tool setting, and, 3) broken tool detection (TRS2). The system shall include full-closed loop control for the X-Axis, Y-Axis, and Z-Axis, and an automatic in-machine tool presetter AND in machine workpiece measuring system such as Inspection Plus for Turn mill (Renishaw).

5.3.8. Pull Studs: The machine shall be provided with pull studs for through-spindle coolant, tooling holders. This means one (1) for each socket in the tool changer or 100.

5.3.9. Tool Holders/Magazine: The machine shall include a complete set of varied sized tool holders. A set is defined as one tool holder for each available tool position in the tool magazine. Therefore if the equipment has 100 positions in the tool magazine, 100 standard tool holders shall be provided with the system. Indicate types and sizes to be provided. All necessary adaptors included. The maximum tool length will be 600mm/23.6 inches.

5.3.10. Direct Scale Feedback: Magnetic type absolute positioning scales for the X and Y axes, and electromagnetic induction type for the Z-axis.

5.3.11. Chucks: The machine shall be provided with two 4-jaw independent chucks that can accommodate an OD of 12 inches minimum for the left and right spindle. There shall be two 3-jaw hydraulic chucks provided **AS AN OPTION.** The chucks shall come with the following features if applicable to the type (independent vs hydraulic):

A. Chuck Foot Switch (Double Pedal) for Left and Right Spindle
B. Chuck Cylinder Stroke Check (Linear Position Monitoring) for Left and Right Spindle
C. Chuck Inching Function for Left and Right Spindle

5.3.12. Steady Rest: The machine shall be provided with two removal and manual steady rests to prevent vibration and deflection of the workpieces. The steady rests shall be of the "revolving rest" type.

5.3.13. Windows: The machine shall come with six (6) rotating clear view windows attached to the machine to allow a clear view of the machining area and shall automatically remove coolant that adheres to the inner side of the window utilizing a pneumatic system.

5.3.14. Remote Operator's Pendant: A remote hand operator's pendant shall be provided. The remote operator's pendant shall be setup with the following minimum functions.

A. Inch/Metric Incremental Jog
B. Feed Override
C. Spindle CW/CCW/Neutral
D. Axis select
E. Axis +/- Jog
F. Spindle Start/Stop
G. Cycle Start
H. Feed Hold
I. Machine Stop
J. Master Stop
K. Remote On/Off
L. Position Display

5.3.15. Other Machine Features: The machine shall come with the following machine features:

A. 4-color signal lamp mounted to top of machine
B. 3-layer signal lamp mounted to top of operation panel
C. Automatic door
D. Safety fence interface (if applicable)
E. Multi Dry Filter
F. Air Dryer
G. 8 External M Codes

H. Manual Pulse Generator
I. Electrical Cabinet Chiller
J. In-Machine Step (to prevent operator from falling into the chip disposal outlet)
K. Internal Hard Wired Camera System (To monitor machine operation)

5.3.16. Other Control Features: The machine shall come with the following control features:

A. 5-Axis Machining Function Package
B. 1 GM Memory Card
C. AI Contour Control II
D. Nano Smoothing
E. Workpiece Position Error Compensation
F. Diameter and Radius Dynamic Switching Function
G. Tilter Working Plane Command
H. Synchronous Tapping (Turning Spindle)
I. 8 MB Part Program Storage Length
J. Playback
K. External High-Speed Skip
L. Circular Threading
M. Variable Lead Threading
N. Variable Speed Thread Cutting and Recutting
O. Manual Handle Interruption
P. Program Restart
Q. Tool Retract and Recover
R. Turn-Mill Spindle Axis Direction Handle Feed
S. Left Spindle Hobbing Function
T. 48 Additional Set of Workpiece Coordinate Systems
U. 8 Optional Block Skip Functions
V. Tool Management System
W. SMARTkey
X. X-Axis Direction JIS/ISO Standard
Y. JB Interlock

5.3.17. Technology Cycle Features: Not applicable.

5.4. Tooling: The following requested tooling or tooling certificates shall be provided **AS AN OPTION.** The vendor shall provide a standard 100-piece tooling package or a tooling certificate and work with the Watervliet Arsenal Government Representative to finalize the list. If no tooling is purchased with the equipment, tooling for the preliminary and final runoff shall be provided by the vendor as needed to satisfy the requirements of section 6.

6. Requirements for Demonstration of Conformance:

6.1. Certification, Drawing and Test Required: The contractor shall demonstrate the machine's conformance to all requirements elsewhere specified in sections 3, 4, and 5 of this

specification. The contractor shall also, as a minimum, provide the following certification and perform the following specific tests:

6.1.1. Certification of Completeness: The contractor shall provide written certification that the machine is complete, including all specified systems, accessories, markings, safety devices, geometric and accuracy requirements. The certifications shall be provided to the Watervliet Government Representative 14 days prior to the scheduled preliminary testing.

6.1.2. Test of Conformance to Specified Characteristics: The machine shall be dry cycled at least 30 minutes, during which time the machine shall be tested for conformance to specified performance characteristics, including but not limited to, feeds, speeds and manual as well as automatic cycling.

6.1.3. Test of Conformance to Specified Alignments and Accuracies: The machine shall be tested for conformance to the alignments and accuracies listed below. The contractor shall supply all materials and labor needed to demonstrate conformance. 3 (three) Bi-directional laser tests shall be in accordance with ISO 230-2. A certified factory inspection report shall be provided to the Arsenal 14 days prior to the scheduled preliminary testing. As part of the final acceptance testing the contractor shall, on all applicable axes, perform laser positioning and repeatability testing and develop and enter into the control optimal bi-directional axes compensation values. Also, the contractor shall provide the laser equipment and labor for this testing for preliminary and final acceptance testing. For future reference a hardcopy and electronic copy of the final compensation values/tables for each axis shall be provided as part of the final technical documentation provided with the machine.

6.1.3.1. Machine Reassembly Testing: Once the machine is reassembled (if disassembly is necessary to ship it to WVA) and installed at WVA, the contractor shall perform final acceptance testing on site at WVA and, on all applicable axes, perform laser positioning and repeatability testing, and develop and enter into the control optimal bi-directional axes compensation values. The contractor shall also provide the laser equipment and labor for this final acceptance testing. The contractor shall deliver a final acceptance testing report containing the final compensation values/tables required to obtain conformance to the specified alignments and accuracies.

6.1.4. Test of Conformance to Specified Horsepower Characteristics: At the discretion of the Watervliet Government Representative, the machine may be tested for power and rigidity. The vendor shall provide a proposed test part of their choosing for this test. The test shall pull full load spindle horsepower for at least three minutes. The work piece finish and machine rigidity will be evaluated.

6.1.5. Test of Conformance to Specified Performance on Workpiece: The machine shall be tested for the performance characteristics specified in sections 6.1.2 through 6.1.8 by successfully completing the following performance and accuracy tests without interruption due to machine or control malfunction. A preliminary dry cycling period not in excess of sixty minutes may precede the testing. In a sequence to be selected by the contractor, the following functions shall be demonstrated as described in sections 6.1.7 through 6.1.8.

6.1.6. Test Workpieces: For both the preliminary and final acceptance test, the contractor shall provide a 4340-steel test part that is comparable to our M20 cannon and approved by WVA. The workpiece shall include a "workpiece drawing" that indicates the dimensions and planned cuts to be performed IAW CDRL A029 WVA may elect to provide additional test pieces for final acceptance.

6.1.7. Pre-Acceptance System Test: A demonstration of all machine functions while performing test cuts on contractor provided workpiece in accordance with section 6.1.6. The contractor shall design these tests to fully demonstrate the capabilities (milling, drilling, turning) of the machine and be approved by WVA. Results shall be documented in a detailed test report. The contractor shall also perform a standard test, such as a "circle diamond square" test or equivalent.

6.1.8. Final System Test: A demonstration of all machine functions while performing test cuts on contractor provided workpiece in accordance with section 6.1.6. The same test cuts will be done for this test as the preliminary in section 6.1.7. In addition, WVA may elect to perform test operations utilizing WVA provided test assets.

6.2. Provision of Materials/Equipment for Preliminary/Final Acceptance Testing:

6.2.1. Workpieces: Workpieces for the preliminary test will be provided by the contractor. Workpieces for the final acceptance test will be provided by WVA.

6.2.2. Tooling: All tools (perishable, non-perishable, & special) required to perform the tests specified in section 6 shall be furnished by the contractor and shall become the property of the Arsenal. There shall also be a standard tooling package included with the following but not limited to: mill chucks, collets, toolholders etc. A full list shall be provided for approval by WVA.

6.2.3. Hydraulic Fluids and Lubricants: All fluids and lubricants necessary to perform all required tests shall be furnished by the contractor during preliminary acceptance testing and final acceptance testing. A list of acceptable fluids and lubricants is located in Enclosure A. If the equipment needs to use a fluid or lubricant not listed in Enclosure A, a justification shall be provided.

6.2.4. Testing and Measuring Equipment: All testing and measuring equipment, including fixtures, required to perform all required tests and measurements shall be furnished by the contractor and shall be calibrated to standards traceable to the National Institute of Standards and Technology (NIST).

NOTE: So that both preliminary and final inspections of the machine can be conducted, the Government will only provide the contractor with gun tubes. Any other supplies, materials, measuring equipment or other equipment required for machine acceptance shall be provided by the contractor.

7. Quality Assurance Provisions:

7.1. Responsibility for Inspection: The contractor shall be responsible for performing all certifications and tests required in section 6 and shall provide materials, supplies and equipment specified.

7.2. Preliminary Acceptance Inspection: Preliminary acceptance inspection shall occur at the contractor's facility prior to machine shipment to WVA and shall consist of the certifications and tests specified in section 6. Once the certification of completeness is provided (see section 6.1.1), the contractor shall provide no less than 14 calendar days' notice to the Watervliet Government Representative that the machine is ready for the preliminary acceptance inspection, along with the results of any tests performed before preliminary acceptance IAW CDRL A030. The Watervliet Government Representative will schedule a factory acceptance and the contractor shall await the arrival of the Arsenal representatives before starting the official preliminary acceptance.

7.3. Arsenal Participation in Preliminary and Final Acceptance Inspection:

7.3.1. Examination for Completeness: The contractor shall furnish the Watervliet Government Representative with a manufacturer's certification of completeness that certifies all required systems, subsystems and components are complete and in operational condition (see section 6.1.1). The Government will reserve the right to examine the machine to ascertain the presence of all specified features, equipment, markings, and safety devices.

7.3.2. Examination of Performance Characteristics: During the test of conformance to specified performance characteristics, the Watervliet Government Representative will observe the machine and its equipment for proper operation.

7.3.3. Examination of Power and Rigidity: During the test of conformance to specified power and rigidity (see section 6) the Watervliet Government Representative will observe the machine for rigidity of construction and achievement of full power for the specified time and reserve the right to examine the workpiece after the test.

7.3.4. Examination of Alignments and Accuracies: During the test of conformance to specified alignments and accuracies the Watervliet Government Representative will observe the performance of the test and reserve the right to review the results obtained.

7.3.5. Examination of Performance Testing: During the test of conformance to specified performance on workpieces, the Watervliet Government Representative will observe the operation of the machine and its equipment and reserve the right to inspect the workpiece for conformance to drawing requirements after completion of the test.

7.3.6. Supplementary Tests and Examinations: The Watervliet Government Representative reserves the right to ask for demonstration of any specified features or machine characteristics not demonstrated during the tests conducted in accordance with section 6.

7.4. Re-Inspection Provisions: If, during preliminary acceptance inspection, deficiencies are discovered which cannot be satisfactorily corrected during this visit, preliminary acceptance will be withheld, and the contractor shall take corrective actions to correct the deficiencies.

NOTE: It is still the responsibility of the offeror to correct any deficiencies that may not have been noted or over looked at the Preliminary Acceptance Inspection.

7.5. Post Preliminary Inspection Procedures: The Watervliet Government Representative will not grant authority to ship the machine following factory acceptance inspections, even in cases where there have been no apparent instances of non-conformance. Authority to ship will be granted only by the Watervliet Government Representative. In cases where it is determined that the machine and its equipment conform to specification, the Watervliet Government Representative, will grant shipping authority within (10) working days of completion of the Preliminary Acceptance Inspection. In cases where deficiencies requiring correction are discovered, the Watervliet Government Representative will furnish a formal listing of required corrective actions within 15 working days of completion of the preliminary acceptance inspection. Also, in such cases, the provisions of section 7.4 shall apply.

7.6. Final Acceptance Inspection: Final inspection and acceptance of the machine shall occur after installation at the Arsenal. At this time the machine shall again be subjected to, and required to pass, the test procedures specified in section 6.

7.7. Warranty: Upon final acceptance of the machine a Standard Commercial Warranty shall commence. **A 5-year PPP warranty with crash protection shall be quoted AS AN OPTION.** This Standard Commercial Warranty shall include, at a minimum, parts and labor for the duration of the warranty at no cost to the Government. The warranty period shall commence from the date of notification by the Watervliet Government Representative of the final acceptance of the machine. Final acceptance is defined as the act of an authorized representative of the Government (the Watervliet Government Representative in this case), by which the Government assumes ownership of existing supplies/equipment and/or approves specific services rendered, as partial or complete performance of the contract (i.e., testing, training, and delivery of all required technical documentation and ancillary equipment and supplies/parts included in the original contract) IAW CDRL A031.

7.8. Preservation and Packaging: The contractor shall utilize standard commercial methods of preservation and packaging appropriate for machine tools and acceptable to commercial carriers. As a minimum, all areas susceptible to damage from exposure to the elements shall be preserved and packed to prevent damage. The machine and equipment shall be blocked, braced and skidded to prevent damage during transport and to facilitate handling, loading and unloading. The contractor shall be responsible for ensuring that the machine and equipment are delivered to Watervliet Arsenal in operational condition and shall retain this responsibility until the machine and equipment are off loaded at Watervliet Arsenal and installed. All components of the machine shall be delivered in the same time frame. No individual components of the machine shall be shipped to the Watervliet Arsenal without either authority to ship from the Watervliet Contracting Officer following preliminary acceptance (see section 7.5), or approval from the Watervliet Government Representative and the Watervliet Contracting Officer. Shipments to the

Watervliet Arsenal sent without permission will be returned to sender at cost to the contractor. To request approval for advanced shipment, provide the following information to the Watervliet Contracting Officer and Watervliet Government Representative – length, width, height, weight, stackable, and contents.

NOTE: If any special lifting devices are required by the contractor to facilitate handling, such devices shall be shipped with the machine.

8. Instructions to Offerors: The purpose of these instructions is to provide prospective contractors with additional guidance relative to the structure of their technical proposals.

8.1. Contents of Proposals: All proposals must as a minimum include:

A. A complete statement of compliance (section 8.2)
B. Prior customer list (section 8.4)
C. Foundation information (section 8.5) – only if a foundation is required
D. SDS sheets (section 3.9.6)
E. Electrical survey (Enclosure C)
F. Machine layout drawing (section 3.20.2)
G. Completed control spreadsheet (section 3.30) – only if CNC controls are required

NOTE: Failure of any proposal to meet the above minimum requirements may render that proposal technically unacceptable. In addition, brochures, illustrations, narratives, drawings and sketches pertinent to the equipment being offered are permissible and are encouraged. Offerors are cautioned, however, to screen such materials carefully before submission to ensure that they will not introduce any of the deficiencies described in the request for technical proposals. Generalized information not pertinent to the equipment being offered is not encouraged and will not be evaluated.

8.2. Offeror's Statement of Compliance: Enclosed with the specification is a prepared form entitled "Offeror's Statement of Compliance". The left-hand margin of this form lists, in order, the number of all the sections in the specification containing requirements which must be addressed by offerors. To the immediate right of each section number are two blocks headed "comply" and "non-comply". The entry of "x" or a check mark is required in one of these two blocks for each numbered section of the form. However, offerors are advised that the checking of the "non-comply" blocks for any section will result in non-acceptance of the offer unless explanation is provided and deemed acceptable by the Arsenal. For this reason, space is also provided on the form for offerors to explain any entry of "non-comply". This explanation should point out the degree of, and reason for, non-compliance, and it should explain what is being offered as an equal or better alternative to the specified requirements. Furthermore, checking of “comply” without providing the pertinent supporting information or detail as to how compliance will be achieved is not acceptable. Proposals will be classified as unresponsive and unacceptable when submitted with only the “comply” checked and no explanation provided as to how compliance will be achieved. A thorough explanation of how compliance will be achieved is required. Space provided for comply/non-comply explanations on the form is limited. If additional space is required, a separate sheet may be used to continue the explanation. If such a

continuation sheet is used, it should refer to the section number being explained. Offerors are further advised that although specified requirements are mandatory, they normally stem from performance needs at the Arsenal. Thus, when an offeror must take exception to a specified requirement, they are well advised to provide as much information as possible about what they are offering so that the Arsenal can judge the impact, if any, upon the equipment's performance, as well as the builder's adherence to proper design practices. On the lower right-hand corner of each page of the form is a signature block. Each page of the form should be signed by the offeror or his/her authorized representative.

8.3. Required Supplementary Information: Also enclosed with this specification may be a form entitled "Supplementary Information Questionnaire". Its purpose is to obtain specific information about the offered equipment in areas where the specification is permissive of "ranges" of acceptability. For example, section 3.3.2 of the specification permits various types of slideway systems. The questionnaire is intended to supplement the offeror's statement of compliance by obtaining specific information about the type of slideway system being offered. The information asked for in this questionnaire is needed of the offerors, and proposals received without the completed questionnaire will be considered unacceptable. Due to the limited space available on the questionnaire itself, offerors are invited and encouraged to answer the questions on separate sheets, using the questionnaire as a reference.

8.4. Prior Customer List: While the Arsenal is committed to the procurement of the most up to date technology, it is our established policy not to finance R&D efforts when an established state of the art technology already exists which will satisfy the requirements of the specification. Consequently, and unless the specified equipment is classified as special, offerors are required to submit a list of prior customers to whom they have furnished equipment essentially identical to that being offered in accordance with the specification. This list will include company names, addresses, and the names of points of contact, and will be used by the Arsenal to complete its evaluation in three areas:

A. It will serve as evidence that new R&D will not be required, and the item to be furnished is proven equipment.
B. It will provide the opportunity for the Arsenal to contact (and possibly visit) the prior customers to confirm that the equipment is, in fact, essentially identical to that being offered and has been successful.
C. It will provide the opportunity for the Arsenal to contact the prior customers for confirmation that the offeror's repair parts and service organization will satisfy the requirements of section 3.22 of the specification.

8.5. Special Foundations: Due to the periodic need for machine tools to be relocated because of changing production requirements, it is the Arsenal's preference to avoid special foundations. The footnote to section 3.20.1 of this specification defines the essential properties of the machine shop floors at the Arsenal. It also defines special foundation as any foundation which requires alteration to that floor. That includes not only the installation of deeper concrete footings, and/or isolation pads, but also any excavations within the floor to house chip conveyors, coolant sumps, wire ways, and other items. Consequently, offerors are to provide

with their proposals a narrative addressing the foundation requirements for the machine tool being offered. This narrative must address at minimum the following questions:

A. Will the offered machine tool require a special foundation?
B. If so, why is the foundation required? The response to this question should make clear whether the foundation is required for vibration isolation, retention of leveling and alignment, installation of ancillary equipment or a combination of these.
C. If a foundation is required for vibration isolation or for retention of leveling and alignment, what will be the probable impact upon machine tool performance and longevity if the Arsenal chooses not to provide the foundation?

Enclosure A - Acceptable Lubricants, Hydraulic Fluids, Oils, and Coolants

Type	Manufacturer
Coolant, Water Soluble Oil	Van Straten #826-C
Coolant, Water Soluble, "No Dye" Concentrate Must Be Clear	Qualichem
Cutting Fluid Sulfur and Chlorine Additive 285°F min. Flash Point. 18-22 Centistokes at 100°F Viscosity (Gun Drilling)	MIL-C-46149 Grade 4 *
Cutting Fluid Sulfur and Chlorine Additive 30°F Pour Point, 285°F min. Flash Point 40-44 Centistokes at 100°F Viscosity (Honing)	MIL-C-46149 Grade 5 *
Cutting Fluid Sulfurized Fatty And Mineral Oils. Federal Test Method Std. No. 791	WVTPD 1051 *
Cutting Oil Sulfurized Fatty Mineral	VV-C-850 Type II Grade D
Cutting Oil, Non-Staining, Mineral Oil Base 400°F Flash Point	Mobilmet Omicron
Cutting Oil (Broach Oil)	Product Sol # 336
Cutting Oil (Rifler)	Fuchs Ecocut 336 X
Cutting Oil (Guided Bore)	Benz Patraulic 32
Cutting Oil (Guided Bore)	Monroe Cut NC DP-1 EXP
Grease (Medium Grade)	Almaplex 1275
Grease, Automotive and Artillery	MIL-G-10924-C *
Grease	MOLYKOTE BR-2 PLUS
Hydraulic Fluid, Petroleum Base	MIL-H46001-D *
Lubricant Center Saver	Cimcool
Lubricating Oil, General Purpose, Corrosion & Salt Spray Resistant 39.8-55 Centistokes at 130°F	MIL-L-3150 *
Lubricating Oil, Light Spindle, Velocite #10 (Sunvis #911)	MIL-L-46014 *
Oil, Hydraulic, Light	Socony Mobil DTE-24
Oil, Gear	Mobil #636
Oil, Hydraulic	DTE #26
Oil, Magnetic Particle Insp.	DD-F-87935 (NORPAR 13)
Oil, Hydro Treated Paraffinic Mineral Oil	Pillsbury Circlene FG #21
Oil, Reciprocating	Taco 10/40
Oil, Fatty (Lard Oil)	MIL-F-46148 *
Additive Oil, Extreme Pressure	Lubrizol #5345

* Approved industry/commercial equivalents will be acceptable substitutes

Enclosure B - Class I Ozone Depleting Substances

- CFC 11: Trichlorofluoromethane (CFCL3)
- CFC 12: Dichlorodifluoromethane (CF2CL2)
- CFC 13: Chlorotrifluoromethane (CF3CL)
- CFC 111: Pentachlorofluoroethane (C2FCL5)
- CFC 112: Tetrachlorodifluoroethane (C2F2CL4)
- CFC 113: Trichlorotrifluoroethane (C2F3CL3)
- CFC 114: Dichlorotetrafluoroethane (C2F4CL2)
- CC 115: Monochloropentafluoroethane (C2F3CL)
- CFC 211: Heptachlorofluoropropane (C3FCL7)
- CFC 212: Hexachlorodifluoropropane (C3F2CL6)
- CFC 213: Pentachlorotrifluoropropane (C3F3CL5)
- CFC 214: Tetrachlorotetrafluoropropane (C3F4CL4)
- CFC 215: Trichloropentafluoropropane (C3F5CL3)
- CFC 216: Dichlorohexafluoropropane (C3F6CL2)
- CFC 217: Monochloroheptafluoropropane (C3F7CL)
- Halon 1011: Bromochloromethane (CH2BRCL)
- Halon 1202: Dibromodifluoromethane (CBR2F2)
- Halon 1211: Bromochlorodifluoromethane (CF2CLBR)
- Halon 1301: Bromotrifluoromethane (CF3BR)
- Halon 2402: Dibromotetrafluoroethane (C2F4BR2)
- Carbon Tetrachloride: Tetrachloromethane (CCL4)
- Menthyl Chloroform: 1,1,1-Trichloroethane (C2H3CL3)

Enclosure C - Electrical Survey

The Watervliet Arsenal requests that all offerors provide the following machine information along with their proposal (please complete as much as possible):

1. Full Load Amps (FLA) @ 480 VAC
2. Start-up (surge) current
3. Average Power requirement (75%)
4. Standby power load at idle (if applicable)
5. Power Factor Information (efficiency)
6. Wiring schematics
7. Size and number of the largest motor(s)
8. Number of motors
9. Type of motor
    a. Synchronous
    b. Induction
10. Nominal and maximum compressed air usage rates (CFM)
11. Equipment Manufacturer contact information:
    a. Point of contact for equipment electrical power requirements
        i. Telephone Number
        ii. Email address
12. Sub-Components Manufacturer Recommendations for Installation
    a. Electrical Manual
    b. Manufacture's Point of contact
        i. Telephone Number
        ii. Email address

Enclosure D - Environmental Protections Requirements

1. Compliance with Environmental Laws and Regulations: Contractor shall comply with all applicable federal, state, and local environmental laws, statutes, regulations, executive orders, permits, Army regulations (with supplements), as well as Major Subordinate Command (MSC) and installation regulation, policy, Host Tenant Agreement, Interagency Service Support Agreement, or Status-of-Forces Agreement. Contractor shall immediately report any conflicts between applicable federal, state, local environmental laws, statutes, executive orders, and provisions of Army Regulation 200-1, and any specifications within this contract to the Watervliet Government Representative.

2. Compliance with Green Procurement Requirements: Contractor shall follow Federal EPA Comprehensive Procurement guidelines (www.epa.gov/cpg) and Army Contracting Command Quick Guide (https://acc.aep.army.mil/accapps/ACCMAP/Documents/Quick-Guide-for-Sustainable-Procurement.docx) for acquisition of building materials and products and select materials that have a long life cycle; the least toxic materials; recyclable materials; materials that are resource-efficient; materials with the maximum recycled content; materials harvested on a sustained yield basis; and products causing the least pollution during their manufacture, use, and reuse.

3. Compliance with License and Certification Requirements: Contractor shall obtain all license and certification required by Federal, State, and Local environmental laws and regulations necessary to adhere to the specifications of this contract. The Contractor shall submit all plans, notifications, reports, submittal documents, and fees required by Federal, State, and Local environmental laws and regulations to the appropriate Federal, State, and Local authority and/or agency as necessary to adhere to the specification of this contract. All required licenses and certifications required by Federal, State, and Local environmental laws and/or regulations shall be considered a contract deliverable IAW CDRL A032.

4. Notification of Federal and State Regulators: Contractor shall immediately notify the Designated Government Representative (DGR) and COR of the arrival on site of any Federal, State, and/or DoD environmental regulator or enforcement agent and/or the receipt of any correspondence from a Federal or State environmental agency.

5. Inspections of Work Sites: Contractor shall submit to potential Federal, State, Army and installation work site environmental regulatory inspections and/or investigations into noncompliance, and fully cooperate with such inspections/investigations by providing the appropriate records and documentation. Environmental regulatory agencies are authorized by law to inspect any work site for environmental compliance with regulatory requirements. If an inspection is conducted, it will not stop or disrupt ongoing contract activities. The inspection will only require the work site environmental officer, or supervisor/manager to answer questions and/or escort the inspector to specific work site areas with the potential to affect environmental quality.

6. Reporting Noncompliance: Contractor shall immediately report any nonconformance and/or noncompliance with applicable Federal, State or Local environmental laws, Army and installation environmental regulations or policies to the COR and DGR.

7. Verification of National Environmental Policy Act Documents: Contractor shall obtain from the COR or DGR, a copy of AMC's National Environmental Policy Act Policy and 32 CFR 651 which addresses actions to be taken by contractor. These documents include but is not limited to the analysis-associated decision document of an Environmental Impact Statement and Record of Decision; Environmental Assessment and Finding of No Significant Impact or Notice to Proceed; or Record of Environmental Consideration on the proposed contract actions prior to commencement of such actions.

8. Conformance with Environmental Management System: Contractor shall take the necessary actions to identify, monitor, and control those contract operations and activities that pose risk of contamination, or can negatively impact the natural and/or human environment.

9. Assignment of Environmental Compliance Designee (ECD): Contractor shall appoint an ECD for all contract work periods exceeding 180 consecutive days. Contractor shall appoint a primary and alternate ECD for each production, shop or work area that uses and/or stores hazardous materials and/or generates hazardous wastes. Contractor ECDs shall monitor implementation of all environmental regulatory requirements, report all environmental noncompliance to the work site supervisor, correct all environmental noncompliance, and verify implementation of directed actions to correct identified environmental noncompliance. Contractor shall have at least one ECD on duty at all times at each shop or work area. Contractor shall require all personnel designated as ECDs to complete the initial ECD training through the installation or Major Subordinate Command (MSC) environmental compliance point of contact within 15 days of the start of contract performance. Contractor personnel appointed as ECDs may perform other duties provided they do not prevent the performance of ECD duties. Contractors may request a waiver of this requirement through the COR and DGR, if using and/or storing very small quantities of hazardous materials.

10. Competency Training for Contractor Personnel: Contractor shall not allow personnel to perform any activities and/or tasks on AMC installations without proper and adequate qualifications or job competency training. In the event of any identified noncompliance, the Contractor shall, if requested, provide proof of contract personnel training or qualification (individual name, training/qualification type, training/qualification certificate, and date of training/qualification) to perform those contract activities associated with the identified noncompliance.

11. Generation of Solid Waste: Contractor shall remove from the installation and dispose of all solid waste generated, which cannot be recycled to an approved and permitted off-post disposal facility. Additional requirements include, but are not limited to, the following:

A. Contractor shall make every effort to divert construction, demolition debris, and all other solid waste to comply with the Army Integrated Solid Waste Management Policy.

B. The Contractor shall establish a program to promote cost-effective waste reduction in all operations and facilities covered by the contract. This includes collection, separation, and processing products or other materials recovered from solid waste streams for use in the form of raw materials.

C. The Contractor shall make maximum effort to reduce and prevent waste.

12. Segregation of Hazardous Waste:

A. All hazardous waste generated on this contract must be segregated and kept physically separate from any other waste items and materials. All wastes must be properly containerized and labeled. Waste containers are to be supplied by the Contractor and must be designed for the waste type being disposed of according to all Federal, State and Local laws. In the event the waste classification is unknown prior to containerization, the container must be marked "under analysis, treat as hazardous waste". All waste must be properly sampled and characterized at the Contractors expense, with copies of all analytical results submitted to the Environmental Department within 24 hours of receipt IAW CDRL A033. Any waste characterized as Hazardous Waste must be properly labeled and will stored at the WVA RCRA Storage Area.

B. All waste items must be so marked, that they are readily identified to this contract throughout the process. In addition, the contractor must ensure that there is a clear audit trail for all items until final treatment/disposal is accomplished.

C. The Contractor is responsible for proper disposal of all excess samples, they shall be added to the corresponding waste container.

12.1. Treatment of Hazardous Waste on Government Facility:

A. Treatment of hazardous waste (including solidification) on Government facilities is not permitted. Treatment is defined as any process which meets the definition of treatment as set forth in applicable local, state, and Federal (including 40 CFR 260.10) laws and regulations.

B. The contractor shall not drain and/or flush PCB items at Government installations. Draining will be allowed only to prevent leaking and to meet DOT regulations.

C. Treatment, disposal, or release of gas (other than inert) to the atmosphere on Government premises is not permitted by this contract. The contractor may perform gas extraction for other than inert gas cylinders at the pickup location using self-contained apparatus. This apparatus shall emit no gas into the atmosphere and purge the entire cylinder contents into a closed receiver for transport to a recycling or disposal site.

12.2. Waste Disposal Requirements and Documentation:

A. The Contractor is responsible for the proper disposal of any Hazardous Waste generated during the project, in accordance with all applicable Federal, State, and Army regulations. Disposal shall only be through licensed/permitted Treatment Storage and Disposal Facilities (TSDF), utilizing properly permitted waste transporters. Waste profiles will be provided to the WVA Environmental Office for review prior to the removal of any waste. All Hazardous Waste Manifests MUST be signed only by a representative of the WVA Environmental Office IAW CDRL A034. The Contractor may NOT sign hazardous waste manifests on

behalf of the Generator. Non-RCRA regulated (Non-Hazardous) waste will be properly disposed of by the Contractor, at the Contractor's expense. The contractor shall, without additional expense to the Government, be responsible for paying all fees, preparing or obtaining any necessary licenses, permits, notifications, waste profiles, or reports, which result from a contractor's transportation, recycling, or disposal decision of such wastes.

B. The Contractor shall pay all fees, surcharges, fines, or civil penalties resulting from errant or illegal waste profiling, packaging, labeling, documentation, transport, or disposal of any waste from the project. The Contractor shall contact the Environmental Department immediately upon learning of any of the above.

C. All references to manifests in this provision relate to the "appropriate shipping paper" as required. The Contractor shall obtain and prepare all manifests, required for acceptance of waste into a Qualified Facility, and any other shipping documents. The contractor shall provide the COR with a copy of the completed form(s), for review by the appropriate Government official at least five (5) business days prior to removal IAW CDRL A035. Prior to removal from the site, completed copies of all manifests shall be furnished to the Environmental Office. Disposal receipts, weight slips and/or recycling receipts shall be submitted to the Environmental Office within 24 hours of receipt by Contractor. Each manifest, as well as all other documentation required herein, shall be clearly and distinctly marked with the generator and the contract and task order number, as applicable. Emergency response information and twenty-four-hour emergency phone numbers shall be listed on the manifest as well. If blocks are not provided, this information shall be placed in the upper, right-hand corner of each document.

D. The contractor shall notify the Environmental Department at least **five (5) business days** BEFORE attempting analysis or pickups of any waste for disposal.

E. The Government reserves the right to take appropriate action, such as the pursuit of monetary consideration and/or annotation of negative past performance if the contractor fails to meet the above applicable notification of waste removal from the pick-up location.

F. Contractor may not ship waste outside of the United States to circumvent Environmental Protection Agency (EPA) land disposal restrictions.

13. <u>Use of Hazardous Materials:</u> Contractor shall assign all hazardous materials management responsibilities to the appointed ECD. Contractor shall contact the DGR or COR to obtain technical assistance from Environmental Office for assisting the ECD with achieving and maintaining compliance with hazardous material storage, issue, use, and disposal requirements. Contractor shall submit to the COR and/or DGR a hazardous material inventory. The hazardous material inventory will be submitted 30 days prior to commencement of work for contracts that exceed 180 consecutive days IAW CDRL A036. The inventory list will contain the hazardous material type and maximum quantities of materials anticipated to be stored on-site. The hazardous material shall be properly identified and include any applicable identification number, such as National Stock Number or Special Item Number. The Contractor shall maintain copies of Safety Data Sheets for all hazardous materials used and stored on-site during performance of the contract. Contractor shall not supply or deliver any hazardous materials or chemicals to an installation that are listed on EPA toxic chemical list without prior written approval from DGR and/or COR.

14. <u>Prevention of Storm Water Pollution:</u> The Contractor shall perform, track, participate, implement, and comply with storm water pollution prevention minimum control measures, protocols, and best management practices (BMP) and ensure that water quality standards are not violated in accordance with all regulations and policies as applicable to the Pollutant Discharge Elimination System general permit requirements. Applicable permits include, but are not limited to, "The Multi-Sector General Permit for Storm Water Discharges Associated with Industrial Activities (MSGP)". All Construction Activity Storm Water permits minimum control measures include, but not limited to:

A. Public Education and Outreach on Storm Water Impacts
B. Public Involvement and Participation
C. Illicit Discharge Detection and Elimination
D. Construction Site Storm Water Run-off Control
E. Post Construction Storm Water Management in New Development and Redevelopment
F. Pollution Prevention/Good Housekeeping for Municipal Operations Contractors will comply with the MSGP permit when the activity is identified as a permitted industrial activity. BMPs include, but are not limited to:
G. Practicing spill prevention and good housekeeping.
H. Installing and managing erosion and sediment control.
I. Contractors will obtain permit coverage for construction activities disturbing over one acre of land (total acreage is cumulative across all portions of the project). BMPs include, but are not limited to:
J. Preparing and implementing a site-specific Storm Water Pollution Prevention Plan (SWPPP) as outlined in the permit and prior to any soil disturbance.
K. Installing and managing erosion and sediment control.
L. Make available, upon request, permit associated documentation.
M. Practicing spill prevention and good housekeeping.
N. Schedule inspections and provide corrective actions for noted deficiencies.

15. <u>Storm Water Management Low Impact Design/Development (LID):</u> The Contractor shall perform, track, participate, implement, and comply with Section 438 of the Energy Independence and Security Act; Executive Order 13514; and the DOA memorandum (2010) for full implementation of low impact design/development (LID) techniques to restore predevelopment hydrology to the maximum extent technically feasible for both new and renovation construction projects regardless of size. In support of LID, Contractors will adhere to installation landscape codes and the guidance found in the Installation Design Guide concerning Low Impact Design/Development for storm water management. The following LID practices include, but are not limited to:

A. Restoring predevelopment hydrology to the maximum extent technically feasible
B. Promoting natural removal of pollutants such as nutrients, oil and grease, and sediments from storm water
C. Managing rainfall at the point where it falls
D. Meeting the requirements of the MS4 permit
E. Important Note: Utilization of permanent retention/detention ponds is prohibited without authorization from the Installation Planning Division.

16. Use of Pesticides: N/A

17. Protection of Work Site Resources: Contractor shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any work, the Contractor shall identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and landforms. The Contractor shall provide effective protection for land and vegetative resources at all times. Prior to site clearing and grubbing, the Contractor shall coordinate harvesting of saleable timber with the DGR and/or COR. Contractor shall notify the DGR and/or COR if any trees are required to be disposed or removed. The Contractor is not authorized to remove or dispose of any tree greater than 6 inches in diameter unless permission has been granted in writing by the DGR or COR.

18. Prevention of Spills: Contractor shall adopt the installation's Spill Prevention Control and Countermeasures Plan (SPCC) if transporting, processing, storing, or in any way managing hazardous waste, hazardous material, petroleum-oils-lubricants, or other restricted items. In case of a spill, the person in control of the spill site or their designated representative shall take appropriate action to protect workers and bystanders; contain the spill (if it can be done safely); secure the spill site; restrict ignition sources; and immediately contact the installation Fire and Emergency Services (Fire Department).

19. Protection of Sensitive Areas: Contractor shall comply with all installation designated sensitive and/or off-limit area restrictions. Sensitive areas are generally demarked indicating what activities (e.g., driving, digging, foot traffic) are prohibited. The Contractor shall also adhere to the following installation sensitive areas requirements:

19.1. Cultural Resources Sites: Do not excavate, remove, damage, or otherwise deface any archeological resource located on public lands.

20. Corrective Action for Noncompliance: Contractor shall when given a verbal and/or written notice of environmental noncompliance or nonconformance by the COR, take immediate corrective action. Failure or refusal to comply promptly may be grounds for the Watervliet Government Representative to invoke the appropriate contractual remedies. This may cause all or part of the work to be stopped immediately until satisfactory corrective action has been taken.

21. Noise: Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted without written permission from the Watervliet Government Representative, and then only during the designated times. Pile-driving operations shall be coordinated through the DGR and COR.

22. Mercury: Mercury is prohibited, unless specified otherwise, except for mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices such as mercury vapor lamps, fluorescent lamps, and mercury switches, in rubbish containers is prohibited. Remove without breaking, pack to prevent breakage, and transport out of the activity in an

unbroken condition for disposal as directed. Immediately report to the DGR and COR instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the Watervliet Government Representative. Cleanup of a mercury spill shall not be recycled and shall be managed as a hazardous waste for disposal.

23. Universal Waste / e-Waste Management: Universal waste and e-wastes including but not limited to some mercury containing building products such florescent lamps, mercury vapor lamps, high pressure sodium lamps, CRTs, batteries, aerosol paint containers, electrical equipment containing PCBs, and consumed electronic devices, shall be managed in accordance with applicable environmental law and installation instructions.

24. Pollution Prevention / Hazardous Waste Minimization: Minimize the use of hazardous materials and the generation of hazardous waste. Consult with the Environmental Office for suggestions and to obtain a copy of the installation's pollution prevention/hazardous waste minimization plan for supporting waste minimization goals.