TECHNICAL REQUIREMENTS DOCUMENT (TRD) – STATEMENT OF WORK (SOW)

U.S. Air Force (USAF)
B-52 Wheel & Brake System Improvement (WBSI) Program

3 March 2020 – Revision A

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TABLE OF CONTENTS

1.0 PURPOSE/SCOPE

1.1 Purpose

This TRD shall become the Supplier's SOW for the B-52 WBSI contract and defines contractual obligations for which the Supplier shall be responsible if awarded.

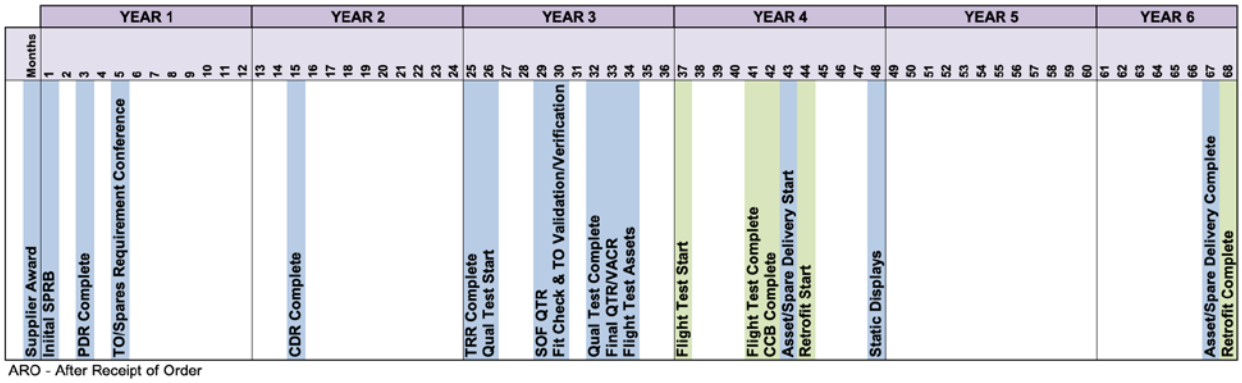
1.2 Scope

This document lists the Supplier's major program milestone schedule, hardware, data, and support requirements for the B-52 WBSI Program.

2.0 PROGRAM MANAGEMENT

2.1 Integrated Master Schedule (IMS) and Supplier Status Reports (SSRs)

The Supplier shall deliver a comprehensive IMS as an appendix to the proposal. It shall contain all critical events, milestones, completion criteria, predecessors, successors and their dependencies while providing clear evidence of the Supplier's understanding of all program objectives, major milestone, and schedule requirements. The IMS shall facilitate critical path analysis. Following award, the Supplier shall maintain and provide monthly updates/revisions to the IMS (changes clearly identified) throughout the duration of the program, including the retrofit phase. The Supplier shall not revise contractual deliverable/milestone dates without Government approval. (Reference DID DI-MGMT-81650, CDRL A001.) The following event schedule is provided to clarify the Government's required critical milestones necessary for meeting the overall program schedule.



ARO - After Receipt of Order
PDR - Preliminary Design Review
CDR - Critical Design Review
SOF - Safety of Flight
QTR - Qualification Test Report
CCB - Configuration Control Board Approval

The Supplier shall deliver a detailed SSR no more than one month After Receipt of Order (ARO) and every month thereafter throughout the duration of the program. The SSR shall summarize current activities, document progress toward upcoming milestones, provide an updated IMS, identify problems/concerns, and outline mitigations/solutions as necessary. (Reference DID DI-MGMT-80227, CDRL A017.)

2.2 Supplier Performance Review Board (SPRB) Meetings

The Supplier shall attend and facilitate SPRB meetings. The initial meeting shall serve as a Program Kick-Off meeting and shall be conducted no later than one month ARO. Subsequent meetings shall be called on an as-needed basis and hosted by the Government and shall be conducted at locations designated by the Government (which may or may not include the Supplier's facility). The Supplier shall provide agenda/data inputs to support these meetings. The meetings shall support review of the IMS and the Supplier's strategy to comply with all contractual requirements. (Reference DID DI-ADMN-81249B, CDRL A003 and DID DI-SESS-81766, CDRL A002.)

2.3 Technical Interchange Meetings (TIMs)

The Supplier shall support TIMs via teleconferencing or at locations as determined by the Government. These meetings will be conducted monthly (schedule to be determined after contract award) and chaired by the Government for the purpose of reviewing overall program and technical progress. Meeting frequency may be increased to bi-weekly as determined necessary by the Government during critical periods of the program such as qualification testing, if schedule milestones are at increased risk for delay, or if problems arise. The Supplier shall provide agenda inputs/data to support these meetings. Required actions, many of which will be the responsibility of the Supplier, will be identified and documented by the Government in meeting minutes and action lists. (Reference DID DI-ADMN-81249B, CDRL A003.)

2.4 Preliminary Design Review (PDR)

The Supplier shall host a PDR at the Supplier's facility or at a location designated by the Government. The PDR meeting shall be completed no later than 3 months (ARO). The Supplier shall deliver pre-PDR data and briefing materials no later than 15 calendar days prior to the meeting to enable Government review/preparation. The PDR shall provide the Government with an opportunity to consider design concepts/options and establish which configuration(s) should be subjected to development testing/analyses. Additionally, the PDR will enable the Supplier and the Government to coordinate on program issues and contract requirements. The Supplier shall provide agenda inputs to support a combined Government/Supplier agenda. (Reference DID DI-ADMN-81249B CDRL A003 and DID DI-SESS-81766, CDRL A006.)

2.5 Critical Design Review (CDR)

The Supplier shall host a CDR at the Supplier's facility or at a location designated by the Government. The CDR shall be completed no later than 15 months ARO. The Supplier shall deliver pre-CDR data and briefing materials no later than 15 calendar days prior to the meeting to enable Government review/preparation. The CDR shall provide the Government with an opportunity to evaluate/approve the Supplier's final design based on testing and analyses. Additionally, the CDR will enable the Supplier and the Government to coordinate on program issues and contract requirements. The Supplier shall document anticipated hardware performance and the intended method of verifying compliance for each individual technical requirement contained in the B-52 WBSI Performance Specification (PS) 201913664. The Supplier shall provide agenda inputs

to support a combined Government/Supplier agenda. (Reference DID DI-ADMN-81249B CDRL A003 and DID DI-SESS-81766, CDRL A007.)

2.6 B-52 WBSI Configuration Management

The Supplier shall deliver a Configuration Management Plan (CMP) no later than 15 calendar days prior to PDR which has been tailored to specifically address the B-52 WBSI program. The CMP shall define configuration control requirements for the entire program, including post-retrofit sustainment. The CMP shall include a specific definition and process for identification, coordination, and approval of Class I and Class II engineering change notices by the Government. Specific brake lining materials and processing requirements shall be explicitly defined. The Supplier shall provide a detailed CMP briefing at PDR. CMP format and content shall be consistent with best commercial practices. (Reference DID DI-SESS-80858C, CDRL A004.)

2.6.1 Quality Assurance

The CMP shall reference the Supplier's Quality Assurance Plan (QAP). The QAP shall demonstrate Supplier compliance with ISO 9001:2015/AS9100D standards or equivalent. Access to the Supplier's Quality Assurance System shall be available to the Contracting Officer for audits/surveys throughout the contract including all options.

2.6.2 Hardware Configuration

The new wheel and brake configurations shall comply with the requirements of PS 201913664. During the design, development, qualification, and airworthiness certification phases of the program, the Supplier shall incorporate design changes as they are identified by the Government to satisfy PS performance, reliability, and maintainability requirements. This provision includes, but is not limited to, all design changes identified during design reviews, qualification testing, fit checks, Technical Order (TO) validation/verification activities, and flight evaluation. Following airworthiness approval, the Supplier shall incorporate all design changes (as determined by the Government to satisfy PS 201913664) into all delivered production hardware and previously delivered evaluation articles such that these articles may eventually be incorporated into the Government supply system in production configuration, at no additional cost to the Government. The Government reserves the right to determine which assets are subject to this provision.

2.6.3 Incorporation of Existing Tooling, Fixtures, and Inspection Equipment

The Supplier shall leverage/utilize existing B-52 tooling, fixtures and inspection equipment to support the WBSI configurations to the greatest extent possible. If new tooling, fixtures, and/or inspection equipment is required to support field-level maintenance/repair of the new configurations, manufacturing drawings and operating instructions shall be provided. This provision includes, but is not limited to, items identified during design reviews, qualification testing, fit checks, TO validation/verification activities, and flight testing. The Supplier shall deliver a single/complete set of prototype tooling, fixtures, and inspection equipment to support TO validation/verification activities as defined in the contract no later than 26 months

ARO. (Reference DID DI-SESS-81004F, CDRL A012 and DID DI-SESS-81008F, CDRL A013.)

2.6.4 Implementation/Troubleshooting Support

The Supplier shall provide technical/troubleshooting support to resolve performance or reliability issues identified by the Government during the retrofit period at no additional cost to the Government. This shall include, but is not limited to, performance/design deficiency resolution, Engineering Change Notice (ECN) processing, on-site support/assistance, and if necessary, parts rework/replacement resulting from equipment design/performance deficiencies.

3.0 SYSTEMS ENGINEERING

3.1 Performance Specification (PS)

The proposed wheel and brake system shall satisfy all requirements/criteria set forth in PS 201913664 and shall interface at the weapon system level as a form, fit, function, interface-equivalent replacement.

3.2 Qualification Test Plan (QTP)

The Supplier's qualification test program shall be structured in two phases. The first phase shall include testing that demonstrates compliance with minimum safety of flight (SOF) requirements as defined in the PS. NOTE: Completion/documentation of SOF testing will facilitate critical path flight test planning/approval activities. The second phase shall include all remaining test requirements. The Supplier shall deliver a draft QTP no later than 90 days prior to CDR which defines all formal qualification testing to be conducted by the Supplier. The QTP shall reference the TRD-SOW and PS and shall demonstrate how all performance/interface requirements will be demonstrated and when. The QTP outline/format shall mirror that of the PS and shall serve as an outline for the pending Qualification Test Report (QTR) (reference paragraph 3.10). Final QTP approval shall be granted with Test Readiness Review (TRR) approval (reference paragraph 3.3). (Reference DID DI-NDTI-80566A, CDRL A005.)

3.3 Test Readiness Review (TRR)

The Supplier shall support a TRR prior to initiating formal qualification testing. The Government shall determine the location and date of the TRR in coordination with the Supplier. The TRR shall occur approximately 30 calendar days prior to qualification test start (no later than 25 months ARO). TRR data/documentation shall be delivered for Government review/comment a minimum of 15 calendar days prior to the TRR. The Supplier shall support the TRR with the following data/documentation as a minimum (Reference DID DI-ADMN-81249B, CDRL A003 and DID DI-NDTI-80603A, CDRL A009.):

- TRR Checklist and Approval Sheet (Supplier and Government signatures)
- QTP (reflecting prior Government feedback/approval)
- Qualification Test Schedule
- Assessment of Test Facilities/Equipment/Resources and Risks

3.4 CDR Analysis Reports

The Supplier shall deliver the following reports to support CDR (reference paragraph 2.5):

- Thermal Analysis Report
- Stress Analysis Report
- Tolerance Analysis Report
- Failure Mode, Effects, and Criticality Analysis (FMECA) Report

These reports shall be delivered a minimum of 15 calendar days prior to CDR to enable Government review/preparation. Analyses and conclusions from each report shall be summarized and briefed during CDR. (Reference DID DI-NDTI-80809B, CDRL A008.)

3.5 Antiskid System Performance Evaluation Articles

The Supplier shall deliver a total of six (6) brake assemblies in accordance with the contract to serve as antiskid system performance evaluation articles. These articles will be used by the Government to perform a hardware-in-the-loop (HITL) antiskid system compliance evaluation. All assemblies shall be qualification equivalent (CDR-approved design) and shall be configurable in both a new condition (i.e. with spacers) and a fully worn condition (i.e. without spacers). These articles may be manufactured from billets and shall be delivered no later than 26 months ARO.

3.6 Pre-CDR Fit Check Support/Articles

The Supplier shall support a pre-CDR aircraft fit check by providing development-vintage test assets (one wheel and one brake). The assets will not be considered formal deliverables and will not be retained by the Government following the event. The Supplier shall be responsible for shipping the assets to and from the fit check location. The assets need not be functional, but they must simulate the anticipated design envelope and enable verification of physical/hydraulic interfaces. The pre-CDR fit check will be conducted at a date and location to be determined by the Government after contract award (no later than 14 months ARO).

3.7 Post-CDR Fit Check Support/Articles

The Supplier shall support a post-CDR aircraft fit check (and TO validation/verification per paragraph 4.5) by providing qualification-vintage test articles (two wheels and two brakes) no later than 26 months ARO. The assets will not be considered formal deliverables and will not be retained by the Government following the event. The Supplier shall be responsible for shipping the assets to and from the fit check location. The assets must be fully-functional and support completion of the following activities:

- Verification of physical/hydraulic interfaces on the axle (including brake bleeding/actuation)
- Verification of physical interfaces in the wheel well (via gear retraction/extension)
- Validation/verification of commodity/aircraft technical data (reference paragraph 4.5)

The post-CDR fit check will be conducted at a date and location to be determined by the Government after contract award (no later than 30 months ARO).

3.8 Flight Test Support/Articles/Spares

The Supplier shall deliver SOF-approved configuration test articles to support flight testing of the wheel and brake equipment as defined in the table below. In addition to the flight test articles, the Supplier shall provide appropriate consumable spare parts that are unique to the new design (grease seals, wheel seals and o-rings, fasteners, bearings, etc.) to support flight test maintenance activities for tire changes. Specific contents of the spares package shall be negotiated AFTER contract award and will not include any items currently stocked and managed by the Defense Logistics Agency. In order to facilitate pricing, the Government shall specify a Not-To-Exceed (NTE) price in the contract. The Supplier shall provide technical support as requested by the Government throughout the flight test effort, including post-flight test hardware inspections/assessments. (Reference DID NDTI-80809B, CDRL A018.)

ARTICLE	QUANTITY	USE and SPECIAL CONDITIONS
BRAKE ASSEMBLY	24	Twenty-four (24) each brake assemblies shall support flight test. All of the flight test brake articles shall have two (2) center-stator thermocouples installed by the Supplier and marked with “FLT” adjacent to the Part Number (PN) prior to delivery. Eight (8) each of the instrumented heat stacks shall be machined to a 90% worn condition and thermally-conditioned by the Supplier prior to delivery.
WHEEL ASSEMBLY	24	Twenty-four (24) each wheel assemblies shall support flight test.

3.9 Vendor Airworthiness Certification Report (VACR)

No later than 33 months ARO, the suppler shall deliver a VACR that addresses all B-52 WBSI Vendor Airworthiness Certification Criteria (VACC) requirements as defined by the Government. The VACR shall be formatted in accordance with a Government template. This report shall document the Supplier’s claim that all critical performance requirements have been satisfied through testing/analysis and that the results demonstrate compliance with airworthiness requirements preparatory for aircraft flight testing. (Reference DID DI-NDTI-80809B, CDRL A016.)

3.10 Qualification Test Report (QTR)

The Supplier’s QTR shall be delivered as two different report deliverables. The initial submittal (Safety-Of-Flight QTR) shall contain only SOF data/conclusions as required by the PS and shall be delivered no later than 29 months ARO. The final QTR shall be an expansion of the SOF QTR and shall demonstrate full compliance with all test requirements as outlined in PS 201913664 and this TRD-SOW. The QTR outline/format shall mirror that of the QTP (reference paragraph 3.2). Data that supports qualification by analysis/similarity shall be included within the QTR where appropriate. A compliance matrix referencing the applicable paragraphs of the QTP, PS, and this TRD-SOW shall be included. The final QTR shall be delivered no later than 33 months ARO. (Reference DID DI-NDTI-80809B, CDRL A010)

3.11 Technical Data Package (TDP)

All drawings shall be prepared in accordance with (IAW) MIL-STD-31000. The Supplier shall PREPARE conceptual-level drawings/models for inclusion in the proposal and for review at PDR, developmental-level drawings/models for review at CDR, and production-level drawings/models for review at the conclusion of the qualification program. The Supplier shall DELIVER assembly, subassembly, and commercial-level component drawings of sufficient detail and information to permit Government cataloging and procurement (Reference DID DI-SESS-81003F, CDRL A011). As a minimum, all commercial drawings shall include envelope dimensions, weights, performance parameters, and field/depot-level inspection/processing requirements. Assembly/subassembly drawings shall identify/define each component within the assembly/subassembly.

If the Supplier separately prices the line items for Engineering Data Rights associated with the designs developed under this contract, the Supplier shall deliver assembly, subassembly, and production-level component drawings of sufficient detail and information to permit Government maintenance, modification, and engineering analysis (Reference DIDs DI-DRPR-81000A, DI-AVCS-80700A, and DI-SESS-81000F, CDRLs B001 and C001).

4.0 TECHNICAL ORDERS (TOs)

4.1 Aircraft TO Source Data

The Supplier shall deliver procedural source data (including required figures/artwork) to support revision of aircraft TOs (system volumes and job guides). The Supplier shall submit draft source data deliverables prior to submitting final deliverables so that the Government can verify acceptability of data format/content and to facilitate formal validation/verification of the final products. Final (USAF-approved) aircraft TO source data shall be delivered no later than 42 months ARO. (Reference TM-86-01Q, CDRL A014.)

4.2 Commodity TO Source Data

The Supplier shall develop and deliver a single commodity TO for the wheel assembly and a single commodity TO for the brake assembly, both of which contain applicable intermediate-level maintenance information, depot-level overhaul information, and an illustrated parts breakdown (IPB) (two commodity volumes total). The commodity volumes shall provide details/instructions that are comparable to existing Government wheel and brake TOs. Additionally, the TOs shall include the tool, fixture, and inspection equipment drawing information with full manufacturing detail to support back shop wheel and brake repair. The Supplier shall submit, as a minimum, the following iterations to ensure the documents are compatible with format requirements of the Government’s Automated Technical Order System (ATOS) and to ensure that final content has been fully reviewed/approved. The Government may determine that additional submittals are required based upon Supplier performance. Final (USAF-approved) commodity TO source data shall be delivered no later than 42 months ARO. (Reference TM-86-01Q, CDRL A014.)

TO Iteration	Purpose	Minimum Submittal Requirements
SAMPLE	To determine format is compatible and acceptable with ATOS and to review proposed content	Sample from the wheel or brake volume containing sufficient data to enable an ATOS compatibility assessment
DRAFT	To conduct table-top review for initial red line changes	Complete draft wheel and brake volumes that are ATOS-compatible (two (2) volumes total)
FINAL DRAFT	To support TO val/ver and final red line changes	Updated draft versions with all requested changes incorporated (two (2) volumes total)
FINAL	To support flight testing	Final versions (two (2) volumes total)
FINAL (Post Flight Test)	To incorporate any changes identified during flight testing	Updated final versions (as required) (two (2) volumes total)

The commodity TO data shall include, as a minimum, the repairs and instructions listed below in paragraphs 4.2.1 and 4.2.2.

4.2.1 Repair - Wheel Assembly

Depot repairs for the wheel assembly shall include, but are not limited to, the areas identified in the following list:

Repair – Wheel Assembly	
Bearing bore sleeve repairs (0.060 per radius minimum)	Drive key bar attachment repair (0.060 per radius minimum)
Structural interface repairs (0.050 material removal minimum)	Wheel retention interface repair (0.050 per radius minimum)
Environmental sealing surface repairs (0.050 material removal minimum)	100% shot peening overhaul procedure
Inflation/over-inflation valve boss repair (oversized, 0.050 per radius minimum)	Oversize insert repair (0.050 per radius minimum)
Wheel seal glands (reworked/oversized)	Heat damage conductivity and hardness criteria
Bearing grease seal glands (oversized, 0.050 per radius minimum)	Damage/removal limits for all structural components (nonfunctional surface blend allowances [0.100 minimum] to be presented/approved during CDR)
Re-plating procedures for all plated components (cadmium-free)	Fuse plug hole repair (oversized, 0.050 per radius minimum) or oversized seal option

Note: Minimum/maximum material conditions and allowable damage limits shall be clearly defined by appropriate figures.

4.2.2 Repair - Brake Assembly

Depot repairs for the brake assembly shall include, but are not limited to the areas identified in the following list:

Repair – Brake Assembly	
Torque tube inspection criteria	Re-plating requirements for all plated components (cadmium-free)
Brake piston housing conductivity and hardness limits	Re-stack procedure for heat stack (including all replacement hardware)
Brake heat stack component and backing plate flattening procedure (if applicable)	Environmental sealing surface repair (adjuster assembly glands and bleeder bosses)
Brake piston housing repair limits	

Note: Minimum/maximum material conditions and allowable damage limits shall be clearly defined by appropriate figures.

4.3 TO Formatting

TO data (commodity and aircraft) shall be consistent with the style, format, and content of current TOs and comply with Government requirements. (Reference TM-86-01Q, CDRL A014.)

Examples of correctly-formatted commodity TOs (combined intermediate, depot, and IPB content) are as follows:

Commodity TO Examples	
TO 4W1-8-3	TECHNICAL MANUAL INTERMEDIATE/DEPOT MAINTENANCE INSTRUCTIONS WITH ILLUSTRATED PARTS BREAKDOWN **WHEEL ASSEMBLY, MLG** PART NO. 90008597
TO 4B1-2-1343	TECHNICAL MANUAL INTERMEDIATE/DEPOT MAINTENANCE INSTRUCTIONS WITH ILLUSTRATED PARTS BREAKDOWN **BRAKE ASSEMBLY, MLG** PART NO. 90008596-1

4.4 TO Requirement Conferences (TORCs)

The Supplier shall support TORCs prior to and during development of all TO deliverables as deemed necessary by the Government. The purpose of TORCs shall be to establish expectations prior to commencing activities, review preliminary/interim submittals, ensure that changes/revisions have been incorporated as requested by the Government, and approve final submittals. TORCs shall be held at sites to be selected by the Government and will be documented by the Government with minutes and action items. The Supplier shall provide agenda inputs to support these conferences at least 30 days in advance and provide responses to all action items as assigned. The initial TORC shall be conducted no later than 5 months ARO (and may be held in conjunction with PDR). (Reference DID DI-ADMN-81249B, CDRL A003)

4.5 TO Validation/Verification

The Supplier shall support coordination/completion of formal TO validation/verification activities with the Government for all TO data (field level and depot level) prior to

submittal of final TO deliverables. TO validation/verification shall be accomplished at sites to be selected by the Government and completed no later than 30 months ARO. The Supplier shall support all required visits with latest configuration wheel and brake assemblies (reference paragraph 3.7) and all proposed prototype tooling, fixtures, and configuration-unique hardware required for validation/verification of the TO deliverables (including shipping to and from Government-defined destinations). Government-requested revisions shall be promptly incorporated and submitted to the Government within 30 calendar days.

5.0 LOGISTICS

5.1 Spare Parts Packages

The Supplier shall deliver consumable spare parts packages in accordance with the quantities identified in the contract. Packages shall include parts required to support base level operations and maintenance of the new wheel and brake assembly system on 25 aircraft for an initial two (2) year use period. Specific contents of the consumables package shall be negotiated AFTER contract award and will not include any items currently stocked and managed by the Defense Logistics Agency. In order to facilitate pricing, the Government shall specify a Not-To-Exceed (NTE) price in the contract. Delivery containers shall be marked with a “B-52 WBSI PROGRAM” identification and include points of contact as defined by the Government prior to shipment.

5.3 Spares Requirement Conferences (SRCs)

The Supplier shall support SRCs prior to and during development of all logistics deliverables as deemed necessary by the Government. The purpose of SRCs shall be to consider/identify future spares requirements and to develop a preliminary long-term procurement schedule. SRCs shall be held at sites to be selected by the Government and will be documented by the Government with minutes and action items. The Supplier shall provide agenda/data inputs to support these conferences and provide responses to all action items as assigned. The initial SRC shall be conducted no later than 5 months ARO (and may be held in conjunction with PDR). The final SRC shall be conducted no later than 2 months after the Critical Design Review (and may be held in conjunction with CDR). (Reference DID-DI-ADMN-81249B, CDRL A003)

5.4 Logistics Management Information (LMI)

The Supplier shall provide LMI data to support cataloging, development of usage projections, and preparation for long-term sustainment of the new configurations. Format, content, and schedule for submitting LMI data shall be determined by the Government at the initial SRC. Final LMI data shall be delivered no later than 36 months ARO. (Reference DID DI-ADMN-81249B, CDRL A003 and DID DI-ALSS-81529, CDRL A015.)

5.5 Initial Investment Spare Parts

The Supplier shall deliver initial investment pipeline spare parts in support of the B-52 WBSI program as defined in the table below. Component types and quantities are listed

as subcontract line items to the Initial Investment Spare Parts line item. The Supplier shall price these components within their proposal. Final specific components and component part numbers will be determined after CDR based on the Government approved design.

INVESTMENT SPARES	
ASSEMBLY	**QUANTITY**
Wheel	50
Brake	25
Piston Adjuster	100
Piston Housing	20
Heat Stack	20
Torque Tube	20

5.6 Wheel and Brake Assembly Static Displays

The Supplier shall deliver two (2) free-standing wheel and brake assembly static displays to be used for personnel training. Each assembly shall be provided with cutaway areas, including the brake piston housing and adjuster assembly, to expose the internal features of the hardware. All surfaces (forged, machined, and sectioned) shall be smoothed/rounded and painted per drawing requirements with a “like-new” appearance, except that the sectioned surfaces shall be highlighted with red paint. Each wheel/brake assembly shall be mounted on a rolling frame/cart that can be readily/safely transported and that allows relative motion between the wheel and brake.