



LOCOMOTIVE REPOWER SPECIFICATIONS

INDEX..... 1

SECTION 100.0 – REPOWER GENERAL PROVISIONS..... 2

SECTION 200.0 - SUMMARY OF THE REPOWER WORK.....6

 201.0 SUMMARY..... 6

 202.0 WORK COVERED BY THE REQUISITION & PROPOSAL DOCUMENTS.....6

 203.0 WORK SEQUENCE..... 6

 204.0 APPLICABILITY..... 6

SECTION 300.0 – REPOWER SPECIFICATIONS.....7

 301.0 INTRODUCTION..... 7

 302.0 GENERAL REQUIREMENTS..... 7

 303.0 CONFIGURATION & STYLING..... 8

 304.0 CARBODY..... 9

 305.0 BRAKE SYSTEM & AIR SYSTEM.....11

 306.0 PRIME MOVER..... 13

 307.0 LOCOMOTIVE OPERATING SYSTEM..... 14

 308.0 OPERATOR CAB & SHORT NOSE.....17

 309.0 COMMUNICATION, RECORDATION, & LOCATION DEVICES.....20

 310.0 LIGHTING SYSTEMS..... 21

SECTION 400.0 – MISCELLANEOUS REPOWER SPECIFICATIONS..... 22

 401.0 ADDITIONAL REQUIREMENTS..... 22

 402.0 DRAWINGS & DOCUMENTATION..... 22

SECTION 500.0 – SPECIAL REPOWER INSTRUCTIONS..... 23

 501.0 DESTRUCTION OF EXISTING V12 DIESEL ENGINE..... 23

 502.0 COMMISSIONING LOCOMOTIVE..... 23

 503.0 TRAINING..... 23

 504.0 QUALITY ASSURANCE..... 23

ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: Locomotive 801 Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.: 10672 Task No.: 1 Date: July 18, 2019



SECTION 100.0 – REPOWER GENERAL PROVISIONS

SECTION 100.0 – REPOWER GENERAL PROVISIONS, SECTION 200.0 – SUMMARY OF THE REPOWER WORK, SECTION 300.0 – REPOWER SPECIFICATIONS, SECTION 400.0 - MISCELLANEOUS REPOWER REQUIREMENTS, SECTION 500.0 – SPECIAL REPOWER INSTRUCTIONS, AND 600.0 - FIGURES and applicable material specifications describe the switcher locomotive repower work (hereinafter “Work”), to be performed by the successful, competitively selected, awarded Bidder (hereinafter “Contractor”), and amplify and explain most items in connection with the Work, but do not alter the scope of the Work as specified by the Alabama State Port Authority (hereinafter “ASPA”).

All materials used in the Work, which are not specifically described herein, shall be of the absolute best quality that it is typically utilized in the railroad locomotive manufacturing industry. The following Work details are not necessarily complete in the description of all items entering into the Work, but are intended to furnish a basic understanding of the more important items that are specifically listed by manufacturer and model, and other Work details shall be consistent with them.

Any Work detail which may be incomplete or lacking in the plans and Repower Specifications shall not constitute claim for extra compensation whatsoever. Such detail shall be supplied by the Contractor and submitted to the ASPA Project Manager in advance of its requirement on the job. The true intent of these plans and Sections are to construct one (1) completely functional and operationally working single engine diesel repowered switcher locomotive which is comprised of the components specified herein and are each constructed on and using one (1) ASPA Terminal Railway (hereinafter “TASD”), 1980 GM EMD MP-15DC locomotive platform/frame designed as TASD 801, and incomplete detail will not abrogate this intent. It is the intent that the Contractor adheres to the Work and Repower Specifications in all details and any deviation from the Repower Specifications must be pre-approved by the ASPA Project Manager in writing prior to implementing any deviation thereof. The repowered switcher locomotive must be configured with a 1500 or greater BHP Tier IV switch duty cycle diesel engine that is certified to meet the applicable EPA emissions standards as published in the federal code for the engine model year in which the eligible freight switcher mitigation action occurs, GM EMD MP-15DC platform/frame WITHOUT stretching, extending, or lengthening the existing MP-15DC platform/frame without prior approval from TASD.

NO GenSet ENGINE repowered switcher locomotive configuration or ANY GenSet repowered switcher locomotive configurations of any kind will be accepted whatsoever and the submission of a multiple engine repowered GenSet switcher locomotive bid or other GenSet engine repowered switcher locomotive bid shall be deemed as non-responsive to the bid requirements contained herein and WILL NOT be considered. HP rating for the single engine repowered switcher locomotive must be 1500 or greater BHP Tier IV switch duty cycle diesel engine that is certified to meet the applicable EPA emissions standards as published in the federal code for the engine model year in which the eligible freight switcher mitigation action occurs. The replacement engine must be certified to Tier 4 standards at the time of installation.



All of the repowered switcher locomotive power electronics components must be protected from dust and contaminants and must be capable of operating in particularly moist, subtropical, mid-latitude climates with extreme heat like Mobile, Alabama.

Repowered switcher locomotive control system must be capable of providing, but not limited to, the following features: individual axle control with individual motor cut-out, anti-slip technology, idle stop that conforms to AAR S-5502 Automatic Engine Start/Stop System requirements, common DC traction and auxiliary bus, and DC traction motors with a minimum of thirty percent (30%) adhesion in all weather conditions.. Locomotive control system software must be readily (easily) customizable to meet the TASD's specific and unique operational requirements for railcar switching. The locomotive is required to effectively "Kick" in a flat switching yard. Kick is the ability to accelerate quickly for a short distance during a switching move.

Locomotive control system must have a PC-based engine troubleshooting diagnostic tool that generates active real-time engine diagnostic codes from the control system microprocessor with onboard (inside the operator's cab) access via a User Interface (UI) monitor and remote wireless access via the internet from a computer and/or smart phone. The PC-based engine troubleshooting diagnostic tool shall not require any specialized tool or apparatus to gain access to engine troubleshooting diagnostic features, shall be provided by the engine manufacturer free of charge, and will not require an initial setup fee, access fee, or annual access renewal fee of any kind.

It is understood that additional changes, alterations and modifications may be required and that any such changes, alterations and modifications must be pre-approved by the ASPA Project Manager in writing prior to Contractor ordering, purchasing, and/or installing said same. The repowered switcher locomotive must be of the same character and quality of construction as that specified herein and all onboard systems, diesel engine components, parts, filters, lubricants, coolants, software, and hardware, (everything on the repowered switching locomotive both on, above and below the main deck), must match the size, capacity, functionality, and operational parameters as an EMD MP-15 switcher locomotive.

ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: Locomotive 801 Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.: 10672 Task No.: 1 Date: July 18, 2019



TASD's 801 MP-15DC will be available for inspection at the mandatory on-site pre-bid meeting at TASD as specified herein.

All workmanship shall be of the very best skilled-craft quality in every class of work. The ASPA shall conduct a scheduled initial on-site inspection, monthly workmanship audits in conjunction with scheduled monthly project progress inspections, and a scheduled Final Inspection at the Contractor's (or Subcontractor's if applicable), designated repowering facility. The ASPA also reserves the right to perform unscheduled project progress spot inspections at Contractor's (or subcontractor's if applicable), repowering facility as deemed warranted and necessary by the ASPA.

The Contractor shall designate and provide at least one (1) full-time manufacturing representative (hereinafter "MR") that works directly for Contractor that will be physically located at the repowering facility during the entirety of the repowering project and will oversee the daily work performed on the repower.

Contractor's MR must be a full-time employee of the Contractor and not an employee of a subcontractor, who has prior locomotive repowering experience. The ASPA Project Manager shall have unrestricted direct communication access to Contractor's MR as deemed necessary by the ASPA. If Contractor hires a subcontractor to perform the actual physical work of the repower, the subcontractor must provide at least one (1) supervisor that has locomotive repowering experience that will be responsible for the performance and quality of the skilled-craft personnel and who will report directly to the Contractor's MR. The intent is to have the Contractor's MR onsite at the repowering facility every day during the entire repowering process and Contractor's MR shall be the Contractor's liaison between the Contractor's Project Manager, the ASPA Project Manager, and any subcontractor(s) supervisor(s).

The ASPA shall notify Contractor's MR prior to entering the repowering facility to conduct unscheduled project progress spot inspections and will comply with all of the Contractor's safety procedures while at the repowering facility. Contractor agrees to provide the ASPA representatives with all required safety PPE.

The Contractor's Project Manager (hereinafter "PM"), shall be a degreed electrical, mechanical, civil, chemical, systems, interdisciplinary or specialized fields engineer that is a full-time employee of the Contractor (not an employee(s) of any subcontractor), that has prior, verifiable locomotive construction/repowering experience. Contractor's PM is not required to be onsite daily at the repowering facility but shall interact, instruct, guide, advise, and direct the Contractor's MR accordingly per Contractor's manufacturing policies and procedures. Contractor's PM shall be present onsite at the repowering facility for the scheduled initial inspection, scheduled monthly project progress inspections, and the final inspection. Contractor's PM is not required to be present and onsite during any unscheduled project progress spot inspections unless Contractor's PM is at the repowering facility at the time the unscheduled project progress spot inspection occurs, for which the Contractor's PM would participate in said unscheduled inspection.

Only Contractor's degreed engineers as stated above shall design and configure the repowered GM EMD MP-15DC switcher locomotive exclusively, specifically meaning that no subcontractor shall provide design criteria for the repower unless prior written approval is obtained from the ASPA Project Manager on a case by case basis, and if so approved by the ASPA's Project Manager, said approval shall not

ALABAMA STATE PORT AUTHORITY (ASPA)



Project Name: ASPA Terminal Railway MP-15 Locomotive Repowers

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.: 10672

Task No.: 2

Date: July 18, 2019

relieve Contractor from full responsibility and accountability for the final repowered switcher locomotive and Contractor is responsible in every case for the design, functionality, integrity, versatility, utility, dependability, and durability of the repowered switcher locomotive. Contractor shall include the name(s) of all subcontractor(s) that will perform mechanical, electrical, pneumatic, hydraulic, structural and/or any other form or type of actual physical work on the repower in Contractor's bid submission package on the Subcontractor List Form included in this RFP.

The ASPA reserves the right to disallow any subcontractor named by Contractor from performing work on the repowering project for just cause and the ASPA shall inform Contractor in writing in a timely manner of a decision to disallow a subcontractor.

49 Code of Federal Regulations (CFR) Chapter II - Federal Railroad Administration (FRA), Department of Transportation (DOT), Legislation and Regulations, Notice of Proposed Rulemaking, Interim Rules, Final Rules, and Updates to 49 CFR Chapter II, (hereinafter FRA Regulations), shall apply to every aspect of the construction of the repowered switcher locomotive and no deviation from the FRA Regulations is authorized whatsoever unless authorized by law and specifically approved by the express written consent of the ASPA Project Manager.

The Association of American Railroads Manual of Standards and Recommended Practices Issue of 2019 (AAR Standards and Practices), shall be followed whenever applicable inclusive of all Rules, Manuals, Practices, Letters, Handbooks, Specialty Items, Inspection/Maintenance Guidelines, and Programs as is standard and routinely applied to short line railroads. No deviation from the AAR Standards and Practices is authorized whatsoever unless authorized by law and specifically approved by the express written consent of the ASPA Project Manager.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repowers

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.: 10672

Task No.: 2

Date: July 18, 2019

SECTION 200.0 – SUMMARY OF THE REPOWER WORK

201.0 SUMMARY

This section includes Work covered by the Requisition and Proposal Documents and identifies the Work sequence.

202.1 WORK COVERED BY THE REQUISITION AND PROPOSAL DOCUMENTS

202.2 Mobilization of supplies, equipment and personnel for project execution to occur concurrently.

202.3 Shipment of the MP-15DC locomotive to Contractor's repowering facility and shipment of the repowered switcher locomotive back to TASD upon repower project completion.

202.4 Warranty of repowered switcher locomotives.

203.0 WORK SEQUENCE

The sequence of Work must be as necessary to complete the Work (repowering switcher locomotive) as specified in detail in Section 103 – Repower Specifications within the three-hundred (300) day repower project period timeframe from the date of delivery of each MP-15DC platform to the Contractor's repowering facility.

204.0 APPLICABILITY

Regardless of any stated tense being singular or plural, all references contained herein are applicable to and mean applied to one (1) MP-15DC switcher locomotive in order to construct one (1) 1500 or greater BHP EPA Tier IV switch duty cycle diesel engine locomotive, that is certified to meet the applicable EPA emissions standards as published in the federal code for the engine model year in which the eligible freight switcher mitigation action occurs, whether specifically stated or not. As stated, the intent is to repower one (1) GM EMD MP-15DC switcher locomotive into one (1) switcher locomotive as specified herein.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

SECTION 300.0 – REPOWER SPECIFICATIONS

301.1 INTRODUCTION

301.2 Project Name:

ASPA Terminal Railway MP-15 Locomotive Repower.

TASD 801 MP-15DC switcher locomotive will be repowered switcher locomotive with one (1) independent 1500 or greater BHP Tier IV switch duty cycle diesel engine that is certified to meet the applicable EPA emissions standards as published in the federal code for the engine model year in which the eligible freight switcher mitigation action occurs.

301.3 Engine- :

1500 or greater BHP Tier IV switch duty cycle diesel engine that is certified to meet the applicable EPA emissions standards as published in the federal code for the engine model year in which the eligible freight switcher mitigation action occurs.

301.4 Number of Units:

One (1) MP-15DC switcher locomotives (TASD 801):

301.5 Road Numbers:

TASD 801.

301.6 Delivery Date for Repowered Locomotive to TASD:

Immediately upon completion of repowering; repower project period not to exceed three-hundred (300) days from date of delivery of MP-15DC's to repowering facility.

301.7 Scope:

This document provides the locomotive repower project specifications for the ASPA Terminal Railway MP-15 Locomotive Repower project.

301.8 FRA Regulations and AAR Standards:

All FRA requirements and AAR standards including but not limited to, those regarding cab noise, crash worthiness, crash hardened memory modules, anti-climbers, and fuel tank, in affect at the time of manufacture, which apply to short line railroads, are to be met.

302.1 GENERAL REQUIREMENTS

302.2 Weight (Overall):

246,000 lbs. minimum to 286,000 lbs. maximum wet.

302.3 End-to-End Weight Balance:

2%.

302.4 Horsepower (HP):

1500 or greater BHP Tier IV switch duty cycle diesel engine that is certified to meet the applicable EPA emissions standards as published in the federal code for the engine model year in which the eligible freight switcher mitigation action occurs.

302.5 Locomotive Clearance:

Conformance to AAR Plate M".

302.6 Number of Axles:

4 per locomotive.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

302.7 AAR S-580 Crashworthy or Latest Required:

Yes

302.8 Air Brake Type:

CCB 26

302.9 Dynamic Brake Type:

Not applicable.

302.10 Audible Noise Requirements:

Locomotive cab noise level shall meet or exceed the dB levels of 49 CFR 229.121.

303.1 CONFIGURATION AND STYLING

303.2 General Arrangement:

Same configuration from the existing 801 MP- 15DC.

303.3 Painting and Styling

303.3.a Decals:

All doors and cover plates guarding high voltage equipment shall be marked "Danger High Voltage".

303.3.b Style / Sandblasting:

Shall be in accordance with TASD specifications.

303.3.c Preparation and Paint:

1. Prepare the exterior of the locomotive per industry standards.
2. Exterior of locomotive shall be painted and lettered to TASD specifications using DuPont Imron Kelly Green 3182, DuPont Imron Paper White 1031, Dupont Imron #99U and Dupont Imron #3.5 HG-C; Glasshield Part #2890001.
3. Cab interior shall be painted per TASD specification using Dupont Imron 3.5 HG 42-CG676 A.
4. Control stand shall be painted per TASD specification.
5. The interior of the short hood, long hood, and components shall be painted per TASD specification.
6. Upper locomotive and underside finish exterior car body surfaces painted with gloss black polyurethane enamel per industry standards.

303.3.d Paint Modifications:

All catwalks, short nose, and long nose walkways shall be coated with black non-skid paint per industry standards.

303.4 Identification

303.4.a Automatic Equipment Identification (AEI) Tags:

1. Two (2) Static AEI tags (Ametech #AT5110) shall be installed.
2. The AEI tags will be securely mounted directly to the side sill.
3. The tags are not to be painted.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

303.4.b Number Boxes:

Front and rear number panels are of plastic construction and shall be black on white with the numbers 801 for TASD 801.

303.4.c Stencil:

Stencil "F" is located on the side sills nearest the front end.

304.1 CARBODY

304.2 Underframe:

304.2.a Underframe shall be completely inspected, reconditioned, rendered damage-free, structurally intact, and fully operational.

304.2.b Any changes shall be preapproved by TASD.

304.3 Fuel Tank System

304.3.a Fuel Tank:

1. New minimum 900 gallon fuel tank which meets AAR S-5506 crashworthy or latest required shall be installed.

2. One filler pipe located on each side of tank shall be inspected to be structurally intact and free of defects.

3. Snyder sight shall be mounted on each side of the fuel tank.

4. Standard manual dial fuel gauges shall be installed on each side of the fuel tank.

5. Electronic fuel gauge with display inside cab on UI.

304.3.b Waste Retention Tank:

Car body shall be sealed to route effluents to a 100-gallon holding tank integral to the fuel tank.

304.4 Anti-climbers:

AAR S-580 or latest required compliant end walkways shall be installed.

304.5 Pilot Plate

304.5.a Front End Arrangement:

Basic pilot to be inspected and repaired as necessary.

304.5.b Rear End Arrangement :

Basic pilot to be inspected and repaired as necessary.

304.6 Walkways and Handrails:

304.6.a Crossover walkways on both ends to provide crossing between locomotives in MU.

304.6.b All chains shall be new and have breakaway links as required by industry standards.

304.6.c Bottom step shall specifically comply with FRA 231.30 and all steps to be painted with black non-skid paint per TASD specs.

304.7 Lifting / Jacking Devices:

Combination sling/jacking pads welded to the under frame side sills near the longitudinal bolster center shall be inspected and reconditioned as necessary.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

304.8 Couplers and Draft Gear:

- 304.8.a **New** alignment type E (self-aligning) couplers shall be purchased by Contractor and shipped expedited service to TASD and shall be installed by TASD on 801.
- 304.8.b **New** 390 draft gear pockets shall be purchased by Contractor and shipped expedited service to TASD and shall be installed by TASD on 801.
- 304.8.c **New** NC 390 draft gear pockets with alignment type E (self-aligning) couplers shall be installed by TASD on 801 MP-15DC locomotive prior to shipment to Contractor's repowering facility and shall remain on the repowered unit permanently.
- 304.8.d Manual uncoupling mechanisms shall be newly manufactured by Contractor and shall have extended manual hand-operated levers that comply with TASD specifications for length and mode of operation; existing standard MP-15DC manual uncoupling mechanism lever shall not be reused.
- 304.8.e Coupler height shall meet FRA requirement of 31.5 to 34.5 inches from top of rail to center.
- 304.8.f **IMPORTANT TIME-SENSITIVE NOTE:** The self-aligning couplers and draft gear pockets for the locomotive shall be shipped to the TASD by the Contractor as quickly as possible upon receipt of the written notice to proceed (NTP). TASD's receipt of said couplers and draft gears **MUST** be within two (2) weeks of the Contractor's receipt of the NTP therefore; Contractor **MUST IMMEDIATELY** obtain the required parts for the locomotive to ensure shipment and delivery as stated herein. Failure to meet this requirement would cause an unacceptable inordinate delay in completing the repower project and shall be deemed as **NON-RESPONSIVE** to the requirements of the Contractor's repower contract. TASD will remove the existing coupling mechanisms and shall commence the installation of the self-aligning couplers and draft gear pockets immediately upon receipt from Contractor, prior to shipment of the locomotive to the repowering facility. The installed couplers and draft gears as specified above will remain on the repowered locomotives permanently.

304.5 Truck Systems

304.5.a Trucks:

1. Complete rebuild of the original two (2)-axle truck assemblies for TASD 801 with DC traction motors shall be completely disassembled, thoroughly cleaned and inspected, reconditioned or repaired as necessary, and prepped and painted per specifications to render truck assemblies damage free, structurally sound, and fully operational.
2. Any changes above and beyond the scope of the aforementioned truck assemblies rebuild shall be preapproved by TASD.

304.5.b Traction Motors:

DC traction motors shall be controlled by a microprocessor-based locomotive control system.

304.5.c Traction Motor Mounting:

1. Four (4) D77/ D78 DC traction motors (Standard rebuild shall be completed.)
2. Motor connection to carbody cable shall be made using industry standard solder terminals.



3. Each DC traction motor shall be grounded to the carbody by a cable no less than #6 AWG size.
4. New DC traction motor bearing rings with dual seal supports shall be installed.
5. Individual DC traction motor ISOLATION/ CUT-OUT switches shall be provided on panel.
6. New plastic pedestal liners shall be installed.
7. DC traction motor nose pads shall be completely qualified, repaired if needed, or replaced as necessary.

304.5.d Traction Motor Cooling:

The equipment blower assembly shall be filtered air driven by a 3-Phase, motor that is ducted to provide cooling air to the DC traction motors and motor controllers.

304.5.e Braking Rigging:

Double Clasp brake rigging with high friction composite brake shoes shall be inspected, completely qualified, and replaced as necessary.

304.5.f Suspension System:

All springs shall be inspected, completely qualified, and replaced as necessary.

304.5.g Wheel / Gear / Axle:

1. Wheels on locomotive shall be three (3) inches or better.
2. Gears with a ratio of 62:15 shall be reused.
3. Traction motor gear cases with crater filled shall be completely reconditioned, rendered damage-free, structurally intact, and fully operational.
4. Gear case halves shall be completely reconditioned, rendered damage-free, structurally intact, and fully operational.
5. Axles shall be completely qualified repaired or replaced as necessary.

304.5.h Journal Bearings and Housings:

1. Hyatt journal boxes shall be rebuilt and the bearings reconditioned as necessary or replaced as per joint inspection with the TASD.
2. "3-in-1" journal box wear plates shall be reconditioned as necessary or repaired as per joint inspection with the TASD.

305.1 BRAKE SYSTEM & AIR SYSTEM

305.2 Air Brake System:

The air brake system shall be NYAB - CCB 26.

305.3 Air Piping:

All existing air piping shall be removed and all new air piping will be installed.

305.4 Air Brake Connections:

- 305.4.a Duplex air end connection with ball type c/o cocks shall be applied and vented.
- 305.4.b Main reservoir cock shall be vented when closed and direct air away from operator.
- 305.4.c EBV brake shall be vented to a position below the cab floor.
- 305.4.d Brake pipe shall be located on both sides of coupler when facing the end plates.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

305.5 Emergency Brake:

Emergency brake valve in cab shall be provided.

305.6 Pneumatic Control:

305.6.a Instantaneous PC knockdown to idle and brake pipe charging cutoff in the event of an Engineer induced emergency or a Fireman induced emergency.

305.6.b Six (6) seconds delay PC knockdown for train initiated emergency (break-in-two) including while in motoring.

305.6.c Six (6) seconds delay on penalty brake application (overspeed, etc.).

305.6.d Independent brake valve control pressure shall be set for 45 psi.

305.7 Air Compressor:

Air compressor rated at 160 cfm at 140 psi shall be installed.

305.7.a Continuous full air compressor airflow (160 cfm) when running and at idle.

305.7.b Air compressor shall be set to load at 130 psi and to unload above 140 psi.

305.7.c All MU air valves will be vented.

305.7.d Air compressor MU synchronization shall be provided.

305.7.e Existing air compressor hood will be removed and a new air compressor hood installed.

305.7.f Inboard and outboard sanding on front and rear trucks.

305.7.g Air compressor shall be protected from short to ground and open circuit conditions.

305.8 Air Reservoir

305.8.a Air Reservoirs:

All existing air reservoirs shall be removed and all new air reservoirs shall be installed.

305.8.b Safety Valve Setting:

Main air reservoir safety valve shall be set at 150 psi.

305.8.c Air Filters:

1. The main air reservoir and the auxiliary air reservoir shall be equipped with two (2) final air filters.
2. The air filters shall be equipped with two (2) air actuated drain valves.

305.8.d Air Dryer:

1. Air dryer 994-501M or equivalent (pre-approved by TASD) shall be installed.
2. Air dryer circuitry shall be protected by a utility circuit breaker.

305.8.e Air Drain Valve Actuation:

1. Two (2) main reservoir combination automatic/manual operation drain valves shall be installed on each main reservoir.
2. Exhausted air discharge shall be piped into a one (1) inch pipe that is flush mounted in-line with the bottom (not below) of the fuel tank and the direction of air discharge shall be so deflected in a manner as not to displace ballast rock.
3. Actuation of automatic blow-down valves shall be cycled by the loading and unloading of the air compressor.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

305.9 Sanding System

305.9.a Sanding Control:

1. Intermediate inboard/outboard sanders shall be inspected and any defective parts repaired and/or replaced so that the sanders are completely reconditioned.
2. Automatic and manual sanding shall be provided in the direction of travel for wheel adhesion enhancement.
3. Electrical control to disable emergency, lead truck, and manual sanding at 0 mph. For testing purposes at 0 mph, emergency sand will only be applied if manual sand is also selected and emergency sand will only be applied for ten (10) seconds or after release of the manual sand switch.

305.9.b Sand Traps & Related Devices:

1. All four (4) sand traps on locomotive shall be inspected and any defective parts repaired and/or replaced so that all the sand traps are completely reconditioned.
2. Front and rear sand boxes shall be inspected and any defective parts repaired and/or replaced so that both sand traps are completely reconditioned on locomotive.
3. Front sand box capacity shall meet or exceed the current capacity and the rear sand box capacity shall meet or exceed the current capacity.
4. Front sand box filler tubes shall be mounted according to the new operators cab design criteria but shall be mounted in such a way and located such that filling the front sand boxes shall not require access above the main deck.
5. Rear sand filler tubes shall be mounted on both sides of the new compressor hood in such a way and located such that filling the rear sand boxes shall not require access above the main deck or, if one (1) filler tube is utilized to fill both rear sand boxes, that filler tube shall be mounted on the back side of the new compressor hood (facing rear of locomotive), in such a way and located such that filling the rear sand boxes shall not require access above the main deck and, the filler tube shall not be mounted such that it is a bump hazard.

306.1 PRIME MOVER

306.2 The repowered locomotive prime mover will consist of one (1) MTU engine that can provide the minimally acceptable 1500 or greater BHP Tier IV switch duty cycle diesel engine that is certified to meet the applicable EPA emissions standards as published in the federal code for the engine model year in which the eligible freight switcher mitigation action occurs that meets the TASD's locomotive/railcar height limits and highly restrictive switch-track turning radii.

306.2.a Engine System

1. Manufacturer:
MTU
2. Fuel Type:
Diesel.
3. Model:
Unknown
4. Block Configuration & Cylinders:
TBD
5. Displacement:
TBD



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

6. Emissions Certification:

Tier IV switch duty cycle diesel engine that is certified to meet the applicable EPA emissions standards as published in the federal code for the engine model year in which the eligible freight switcher mitigation action occurs.

7. Rated Power:

1500 or greater BHP Tier IV switch duty cycle diesel engine that is certified to meet the applicable EPA emissions standards as published in the federal code for the engine model year in which the eligible freight switcher mitigation action occurs.

8. Engine Protection:

Total engine protection alarm and shutdown functionality for irregular oil, water pressure, and temperature levels.

9. Hoses, Connectors & Gaskets:

All fuel, oil, air, and water hoses, connectors, and gaskets shall be certified for exterior nominal operation to -40°F.

306.2.b Locomotive Platform/Frame:

The repowered locomotive must fit one (1) engine on the specified GM EMD MP-15DC platforms/frames WITHOUT stretching, extending, lengthening, widening, structurally altering or modifying the existing MP-15DC platforms/frames in any way, shape, or form whatsoever without prior approval.

306.2.c Engine Lubrication System:

1. Each prime mover shall have an easily accessible oil level dipstick to check the oil level and shall have an oil level verification sight glass.

307.1 LOCOMOTIVE OPERATING SYSTEM

307.2 Control System:

The locomotive control system shall be a microprocessor-based OEM designed control system manufactured by the Contractor that is designed to automatically maximize the available wheel adhesion controlled by the traction motors in all weather conditions, under any load scenario, and while switching (kicking) railcars on the highest percent track grade that exists at the TASD rail yard and the surrounding industrial areas currently serviced by TASD, while simultaneously monitoring as many practical system parameters and logging fault data in order to provide the most effective tractive-effort possible while concurrently eliminating individual wheel slippage and accessible by an interactive operator interface panel located in the operators cab.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

307.2.a Contactor & Relay Control:

The microprocessor will automatically control the operation of the following contactor and relay pick-up and drop-out:

- Power contactors
- Reversing transfer switches
- Air compressor loading contactors and relays
- Air compressor drive motor contactors
- Ground relay
- Alarm relay
- Load shedding contactor
- Traction motor cut-out relay
- Equipment blower contractor

307.2.b Displayed Functions:

The microprocessor will monitor and have the following functions available for display to a laptop, a serial connection to an onboard computer, and a user interface (UI) panel:

- Generator
- Voltage and current of prime mover
- Throttle notch
- Contactor and relay position
- Air compressor cycle
- Battery charging voltage and current
- Generator set fault and warning status
- Trail line status
- Total horsepower
- Locomotive speed
- Main reservoir pressure
- Sanding status
- Engine rpm
- Engine Hours

307.2.c Microprocessor Controlled Systems:

The microprocessor will control the following systems:

- Individual axle control algorithm which detects wheel slippage and makes corrections including automatic sanding and individual motor cut-out
- Traction power regulation
- Idle stop that conforms to AAR S-5502 automatic engine start/stop system requirements
- Air compressor functions
- Variable engine speed control
- Common DC traction and auxiliary bus
- DC traction motors with a minimum 30% adhesion in all weather conditions

307.2.d Fault Monitoring:

The microprocessor will log the following fault conditions:

- Ground fault
- Engine rpm



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

- Generator set fault and warning
- Over and/or under voltage and current for the Prime Mover Traction motor, Air compressor motor, Equipment blower, Low voltage power supply.
- Contactor and/or relay fault
- Undesired horsepower output
- Battery charging failure
- Air system failure

307.2.e Fault Log Snapshot:

The microprocessor shall "Snapshot" the following parameters with a fault log:

- Traction horsepower
- Throttle notch
- Locomotive speed
- Traction motor current
- Traction motor current
- Power contactor status
- Transfer switch status
- Generator set status
- Generator current
- Air compressor status
- Battery charging current
- Train line status
- Sanding status
- Air systems status

307.2.f Performance Data:

The microprocessor will store the following types of performance data:

- Throttle notch percentage
- Miles per throttle notch
- Horsepower per throttle notch
- Auto start/stop time periods
- Engine hours

307.2.g Troubleshooting & Engine Code Access

Locomotive control system microprocessor will offer the following engine troubleshooting measures:

- Access to engine diagnostic codes in the operators cab via UI
- No fees shall be required to have access to the microprocessor engine diagnostic tool

307.3 Auxiliary Power System

307.3.a Ground Detection:

Automatic ground relay reset shall be provided with ground relay lockout and fault logging.

307.3.b Multiple Unit (MU) Control:

1. Single 27 point receptacle at each end of locomotive with AAR standard pin assignments located on the right side of the coupler facing the end sheet.
2. MU hoses at both ends of locomotive and on both sides of coupler.
3. Reuse existing two (2) blank (dummy) receptacles on both ends of locomotive if fully functional and repair and/or replace as needed.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

307.4 Locomotive Battery System

307.4.a Primary & Starting Battery Type:

1. Primary (main) battery system shall be new heavy-duty 450 amp hour locomotive batteries designed specifically for use in locomotives.
2. Starting battery system shall be new heavy-duty 450 amp hour locomotive batteries designed specifically for use in locomotives.

307.4.b Battery Charging:

One (1) low voltage power supply shall be installed to constantly charge the battery system as required.

307.4.c Battery Shed:

1. Battery load shed or equivalent (preapproved by TASD) shall be installed.
2. Battery shed or equivalent (preapproved by TASD) reset button shall be located on the main electrical cabinet.

307.5 Locomotive Electrical Systems:

The latest, most current electrical industrial standards for locomotives shall be utilized to design all onboard systems.

307.5.a All wiring and cabling to be new with insulated AAR approved cabling.

307.5.b New main electrical cabinet to be painted white on the inside.

307.5.c All electrical equipment in cabinet shall be new.

307.5.d Battery switch and breaker switch panel shall be new.

307.5.e Low voltage relays and current rectifiers shall be new.

307.5.f Switchgear shall be an electrical motorized switchgear.

307.5.g All magnet valves shall be new.

307.5.h New rubber style cable cleating shall be applied.

307.5.i Electrical cabinet shall be pressurized with incoming air filtered to prevent any unreasonable dust contamination.

308.1 OPERATOR CAB & SHORT NOSE:

The operator cab shall be a new, AAR S-580 Crashworthy or latest requirements.

308.2 Crashworthy:

The operator cab shall be a new, AAR S-580 Crashworthy or latest compliant short nose.

308.2.a Cab interior area will be 65 square feet being 9 feet 6 inches wide and will conform to the clean cab aspects set forth by AAR recommended practices including cab door cushion pads and cab door closure bars.

308.2.b New AAR control stand mounted on a raised platform positioned per TASD specifications.

308.2.c Cab noise level shall meet the dB level requirements of 49 CFR 229.121.

308.2.d Two (2) cab doors located center-front and rear right-hand side (behind Engineer's chair) each with a thirty-six (36) inch high by seventeen (17) inch wide window.

308.2.e Thirty-six (36) inch by thirty-six (36) inches front windows shall be installed.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

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- 308.2.f Sixty-six (66) inch by thirty-four (34) inch double-paned fixed and sliding side windows with Type II glazing at 44 percent gray tint and low E coating that have an unobstructed view shall be installed.
 - 308.2.g Standard locomotive sidewall baseboard heaters shall be installed on both sides of the operator cab.
 - 308.2.h Dayton-Phoenix OEM part number: 40082621 EMD subbase underfloor 74 VDC HVAC unit rated at 27,000 btu/hr cooling and 38,400 btu/hr heating shall be installed. Or Use original HVAC system (ME 7206 Roof Mounted/ 74v DC PWR HVAC Unit).
 - 308.2.i Underfloor insulation to be one (1) inch thick quilted fiberglass and vinyl composite blanket; wall and ceiling insulation to be two (2) inches thick 2.5 pounds per cubic foot fire batt.
 - 308.2.j Front-end sand boxes shall have a total twenty-five (25) cubic feet capacity and will have front walkway accessible filler tubes and sand box clean-outs.
- 308.3 Hand Brake:
- 308.3.a A Salem electric hand brake will be applied to the outside of the cab on the Engineer's side of the electrical cabinet.
 - 308.3.b An electric hand brake switch that applies and releases the Salem electric hand brake shall be mounted inside the operator cab near the control stand and shall show a red light on the brake switch when the brake is applied and a green light on the brake switch when the brake is released.
 - 308.3.c A brake applied indication and a brake released indication shall be indicated on the UI screen in the operator cab.
- 308.4 Cab Seats:
- 308.4.a Three (3) BAULTAR 3300 Series AS98-3354 seats with armrests on both sides with mounting group AG18-4031 shall be installed inside the cab.
 - 308.4.b Engineer's seat shall be sidewall mounted in relative proximity to the control panel as specified by TASD and shall be fully adjustable for height and travel.
 - 308.4.c Two (2) Conductor's seats shall be sidewall mounted and shall be fully adjustable for height and travel.
- 308.5 Cab Accommodations:
- 308.5.a Full-sized cab card holders shall be mounted on the control compartment at the rear of the operator cab.
 - 308.5.b Allied Tool fuse holder or equivalent (preapproved by TASD) shall be installed per TASD specifications.
 - 308.5.c Fire extinguishers shall be mounted in the operator cab and in long hood cabinets using fire extinguisher brackets and pursuant to AAR fire safety guidance.
 - 308.5.d Self-recessing coat hooks shall be installed per TASD specifications.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

308.6 Temperature Control:

- 308.6.a Industry standard Engineer and Conductor sidewall heaters shall be installed.
- 308.6.b Industry standard Engineer and Conductor cab heaters (3 kW each) shall be installed.
- 308.6.c HVAC unit specified in RS 308.2.h shall be installed and cab temperature controlled by a manual thermostat.
- 308.6.d HVAC, sidewall and cab heaters to be wired so that the air conditioning cannot be on at the same time as any of the heaters.
- 308.6.e HVAC, sidewall and cab heaters shall be wired such that control voltage is dropped and the air conditioning and heaters will shutdown when the locomotive prime mover is turned off or are in standby mode.

308.7 Operator Cab Miscellaneous:

- 308.7.a New plywood will be installed on the cab floor and will have sealed coating applied.
- 308.7.b Cab walls, ceiling, and floor shall be fully insulated as specified in RS 308.2.i.
- 308.7.c Two metal flange-type cab doors shall be installed as specified in RS 308.2.d with flexible hinge guards with interior locks on both doors and the front-end door shall also have an exterior lock installed.
- 308.7.d New front and rear cab window glass shall be basic application high impact material as specified in the FRA rules and shall have Type I glazing applied. Side window glass shall be installed as specified in RS 308.2.f and shall have Type II glazing applied.
- 308.7.e New windshield wiper motors with protective covers with standard four (4) corner self-parking windshield wiper arms shall be installed with new wiper blades and soft rubber windshield wiper motor handles.
- 308.7.f Windshield weather stripping with extended overlapping lip shall be installed.
- 308.7.g Two (2) new wind deflecting full length side mounted mirrors shall be installed.
- 308.7.h Two (2) new awnings shall be installed onto the locomotive cab per industry standards.
- 308.7.i The cab windows shall have adjustable padded sun visors installed.
- 308.7.j The windshield wiper valves and the train order light switch shall be recessed and the train order light flush mounted.
- 308.7.k The cab window latches shall be rounded and all exposed convex edged surfaces and corners shall be rounded as a safety precaution.

308.8 Control Console:

A new AAR control stand operator's console shall be installed on a raised platform as specified in RS 308.2.b. and by further clarification by TASD will house at a minimum and not limited to the following new instruments and devices:

- 308.8.a AAR type single handle master controller shall be installed.
- 308.8.b A Graham White 794-160 analog gauge assembly or equivalent (preapproved by TASD) which includes a main reservoir/equalizing reservoir pressure gauge and a brake pipe/brake cylinder pressure gauge installed on a mounting base and has test fittings.
- 308.8.c A main reservoir air flow/pressure gauge calibrated at 130 psi at 60 cfm shall be installed.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

- 308.8.d A standard equipment CCB 26 electronic brake valve shall be installed.
- 308.8.e A radio mount for TASD's radios shall be installed.
- 308.8.f Separate five (5) function headlight position selector switch shall be installed that controls the direction (front or rear) and the intensity (low beam, medium beam, or high beam) of the headlights which is comparable to the existing five (5) position headlight switch on the MP-15DC's.
- 308.8.g A three (3) position front ditchlight intensity switch for Off/Dim/Bright shall be installed.
- 308.8.h A three (3) position rear ditchlight intensity switch for Off/Dim/Bright shall be installed.
- 308.8.i A ditchlight function selector switch shall be installed.
- 308.8.j A wobble stick horn switch shall be installed.
- 308.8.k A yellow mushroom head alerter reset button shall be installed.
- 308.8.l A Hickock load ammeter without DB or equivalent (preapproved by TASD) shall be installed.

308.9 Main Electrical Cabinet:

The main electrical cabinet shall be new and located in the operator's cab along the rear wall.

309.1 COMMUNICATION, RECORDATION, & LOCATION DEVICES

309.2 Radio Communication:

- 309.2.a Mobile radio shall be supplied by TASD.
- 309.2.b Mobile radio hand-held unit mounting bracket shall be installed per TASD specifications.
- 309.2.c Mobile radio handset shall be supplied by TASD.
- 309.2.d Mobile radio handset holder shall be installed per TASD specifications.
- 309.2.e Hard-mount fixed radio antenna bracket and antenna will be supplied by TASD and shall be mounted on the cab roof per TASD specifications.
- 309.2.f Mobile radio antenna cable shall be installed per TASD specifications.
- 309.2.g 12 VDC Mobile radio power supply wiring shall be installed per TASD specifications.

309.3 Recordation Devices

309.3.a Event Recorder / Date Logger:

- 1. Quantum Q-1046E event recorder with crash-hardened memory module or equivalent (preapproved by TASD) shall be installed.
- 2. Card reader port shall be installed.
- 3. Remote download port shall be installed and download cable shall be provided.

309.3.b Alerter – Integral to Event Recorder:

- 1. The alerter speed activation time intervals will be in accordance with AAR Standard S-5513.
- 2. Alerter reset button shall be provided as specified in RS 308.8.k.

309.3.c Speed Indicator:

- 1. Speed indicator type Quantum Q-1820 or equivalent (preapproved by TASD) shall be installed.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

2. Speed signal – 60 PPR.

3. Speed indicator shall be accurate to within three (3) mph tolerance for speeds of ten (10) to thirty (30) mph and within 5 mph tolerance for speeds above thirty (30) mph.

309.4 Location Devices

309.4.a Chime Horns:

1. Two (2) electric over air operated three chime horns with 2 chimes facing forward and one chime facing the rear shall be mounted on the top of the operator cab.

2. Horns shall be operated from a standard magnet valve and controlled by a horn switch.

310.1 LIGHTING SYSTEMS

The following sections describe the requirements of the lighting system for both the exterior and interior lights of the locomotive. The lighting system includes headlights, ditch lights, interior lighting, and compartment lights.

310.2 Headlights:

310.2.a Two (2) headlights shall be provided at each end of the locomotive.

310.2.b Headlight type: PAR-56, 75-Volt.

310.2.c Headlights shall be controlled by a three position switch.

310.2.d "75 Volt Bulbs" labels shall be applied to both ends.

310.3 Ditch Lights/ Crossing Lights:

310.3.a Two (2) ditch lights will be at both ends of the locomotive.

310.3.b Ditch light type: PAR-56, 75- Volt.

310.3.c Ditch lights shall be controlled by a three position switch.

310.4 Number Lights:

Fully illuminated at each end of the locomotive.

310.5 Exterior Lights:

310.5.a Platform lights shall be required.

310.5.b Step lights shall be required.

310.5.c Ground lights shall be required.

310.5.d Mainframe lighting shall be required:

1. Four (4) angled lights shall be mounted on each side of the locomotive.

2. Angled lights shall be down at 45 degrees from the horizontal.

310.6 Interior Lights:

310.6.a Cab lights will include two (2) each overhead lights located on both sides of the operator cab.

310.6.b Two (2) each reading lights, one (1) for Engineer's side and one (1) for Conductor's side shall be installed.

310.7 Compartment Lights:

310.7.a Two (2) air compressor compartment lights shall be installed



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

400.0 - MISCELLANEOUS REPOWER SPECIFICATIONS

401.0 ADDITIONAL REQUIREMENTS:

All software application versions installed on, used in, or in support of onboard systems inclusive of onboard and remote troubleshooting and the complete instructions on the application and use of this software shall be provided to TASD in the quantity, three (3), specified by the TASD.

402.1 DRAWINGS & DOCUMENTATION:

The following shall be provided in both electronic formats and hard copy formats in the quantity specified by the TASD. The electronic copies shall be in a format that is readable and searchable with Adobe Acrobat Reader 7.0. and contained in one file. All manuals regardless of format shall provide the greatest level of detailed information available by Contractor or any other component or equipment manufacturer for all onboard systems that cover routine scheduled maintenance of the locomotive and equipment to the most in-depth detailed instructions for removal and repair or replacement of the locomotive systems and equipment at the TASD Diesel Shop.

402.2 Clearance documents and diagrams that show locomotive dimensions and capacities.

402.3 General arrangement documents and diagrams that show component, part, and identification.

402.4 Air brake schematics.

402.5 Electrical schematic and wire running list.

402.6 Maintenance manual which include comprehensive troubleshooting guides for all locomotive systems.

402.7 Operator Manual:

402.7.a Clear, concise, operator manuals which include pre-use checklists and all start-up, use, standby, shut-down, and lock-down guidelines and procedures.

402.7.b This operator manual shall describe the standard operating procedures for the locomotives, familiarizing the operator with the location of devices, safety procedures, and basic maintenance requirements for operation.

402.8 Parts Manual:

402.8.a Complete locomotive parts manual that show overall components and equipment located on the locomotive by major operational section, and expands or zooms into each major operational section to show specific, individual part detail.

402.8.b A parts manual that consists of two sections with one section diagramming and identifying only the diesel engine prime mover parts and the other section diagramming and identifying all the other non-diesel engine prime mover parts.

402.9 Distribution:

TASD shall be granted by the Contractor the right to distribute these manuals to ASPA personnel as deemed necessary by TASD.



ALABAMA STATE PORT AUTHORITY (ASPA)

Project Name: ASPA Terminal Railway MP-15 Locomotive Repower

Project Location - Base: ASPA Terminal Railway (TASD), Mobile, Alabama

Project Location - Repower: Contractor's Repower Manufacturing Facility - TBA

Project No.:10672

Task No.: 3

Date: July 18, 2019

500.0 - SPECIAL REPOWER INSTRUCTIONS

501.0 DESTRUCTION OF EXISTING V12 DIESEL ENGINES:

Visual verification by TASD that Contractor destroyed the existing 1980 GM EMD MP-15DC diesel engine removed from TASD 801 and rendered this engine permanently disabled by cutting three (3) each eight (8) inch holes on both sides of the engine blocks. The Contractor shall also provide TASD with written certification that the aforementioned engine destruction procedure was completed.

502.0 COMMISSIONING LOCOMOTIVES:

Contractor shall commence the commissioning of locomotive within five (5) calendar days of receipt of the repowered locomotive by the TASD and shall provide whatever amount of field service necessary to expeditiously complete said commission of the locomotive such that the locomotive shall be complete and operationally ready pursuant to the operational requirements specified by the TASD.

503.1 TRAINING:

503.2 Contractor shall provide adequate onsite training at TASD for TASD 801 such that all designated TASD/ASPA employees, quantity seven (7), are fully trained in the operation of and/or in the maintenance of locomotive.

503.3 Contractor shall supply all necessary training books, manuals, schematics, diagrams, photographs, videos, such that each TASD training participant shall retain all individual training materials for future reference.

503.4 Contractor's training shall include the appropriate amount of hands-on training conducted on locomotive at TASD.

504.1 QUALITY ASSURANCE:

504.2 Contractor and the TASD will perform a first article inspection on the delivered locomotive.

504.3 Contractor shall have a Quality Assurance program certified to AAR M-1003 standard. Documentation of this certification and a description of Contractor's product quality assurance system shall be provided, including a description of: Quality Assurance Overview, Quality Procedural Documentation, Purchased Material Quality, Manufacturing Quality, Test Methods and Procedures, and TASD Participation.

