**Engineering Design Maturity**

**Level 1: Requirements Analysis**

- Requirements Decomposition completed
- Functional Baseline completed
- Derived Requirement development completed
- Interface identification completed
- Quality plan completed

**Level 2: Preliminary Design Analysis**

- Allocated Baseline completed
- Component Analysis / Selection completed
- CAD Drawings completed
- Weight / Cost BOM completed
- Interface Designs completed
- Right Hand Operation Design completed
- Design For Manufacturability study completed
- Special Characteristics plan and list completed

**Level 3: Subsystem Integration, Testing, and Analysis**

- Subsystem Integration, Testing, and Analysis completed on the following subsystems:
    - Hull / Structure / Frame
    - Suspension
    - Braking
    - B-Kit Protection
    - Power Generation and Distribution
    - Engine / Transmission / Transfer Case
    - Electronics Architecture / Software
- Requirements Compliance Matrix completed
- Supplier quality assurance plan completed
- Manufacturing plan completed
- Failure Analysis completed

**Level 4: Detailed Design Analysis**

- Subsystem Designs updated
- CAD Drawings updated
- Weight / Cost BOM updated
- Interface Designs updated
- Joint summary completed

**Level 5: System Integration, Testing and Analysis**

- System Demonstrator fabricated
- System Testing completed (to current requirements)
    - Automotive Performance Testing
    - C4I Performance Testing
    - RAM Testing over JLTV OMS/MP

- Requirements Compliance Matrix updated
- Failure Analysis completed
- Supplier quality assurance plan updated
- Special Characteristics plan and list updated

**Level 6: Post-Testing Detailed Design Analysis**

- Design updated based
- CAD Drawings updated
- Weight / Cost BOM updated
- Interface Designs updated
- Requirements Compliance updated
- Supplier quality assurance plan Updated
- Manufacturing plan Updated
- Quality plan updated
- Joint summary updated

**System Reliability & Maintainability (R&M) Maturity**

**Level 1: Requirements Analysis**

- R&M Case Report completed. The R&M case report summarizes the contractor's framework for continually improving the contractor's R&M process to ensure that the reliability and maintainability requirements specified in the JLTV purchase description (Attachment 1) are achieved.
- Reliability (Mean Miles between Hardwar Mission Failure) and Maintainability (Maintenance Ratio, Mean Time to repair, Max-Time to Repair) Allocations completed down to the Line Replaceable Unit (LRU) level.

**Level 2: Preliminary Design Analysis**

- Design Failure Mode Effects and Analysis (DFMEA) completed in accordance with the JLTV FDSC and OMS/MP for the following sub-systems.
    - Hull / Structure / Frame
    - Suspension
    - Braking
    - B-Kit Protection
    - Power Generation and Distribution
    - Engine / Transmission / Transfer Case
    - Electronics Architecture / Software
    - Steering
- Fault Tree Analysis (FTA) completed in accordance with the JLTV FDSC and OMS/MP for all Mission Essential Functions (MEFs).
- Critical Items List (CIL) has been developed. CIL includes items whose failure would result in a hardware mission failure or Category III or higher Hazard Severity Rating as defined in MIL-STD-882D.
- Reliability (Mean Miles between Hardwar Mission Failure) and Maintainability (Maintenance Ratio, Mean Time to repair, Max-Time to Repair)Predictions are updated with complete Level 2 preliminary design analysis at the LRU level.
    - Predictions have been adjusted using the JLTV FDSC and OMS/MP.
    - R&M predictions include failure rates for each LRU, failure rates are individually identified as estimated (E), calculated (C), or measured (M).
    - Predictions have been rolled up to the system level.
- Reliability Growth Plan and Reliability Growth Curves are IAW AMSAA Projection Maturity Model (PM2) and are updated with complete Level 2 preliminary design analysis.

**Level 3: Modeling & Simulation (M&S), Analysis, and Sub-System testing**

- M&S, Analysis, and Sub-system level testing has been completed IAW the JLTV OMS/MP, utilizing JLTV provided course inputs on the following sub-systems:
- M&S, Analysis, and Sub-System testing includes, but is not limited to:
    - Physics of failure (PoF)
    - Finite Element Analysis (FEA)
    - Dynamic/static modeling

  - Environmental stress screening (ESS)
  - Highly Accelerated Life Testing (HALT)
  - Dyno testing
- Sub-system integration analysis completed on Sub-Systems IAW the JLTV OMS/MP, utilizing JLTV provided course inputs on the following sub-system:
- Digital Mock-up Assembly (DMA) has been completed to demonstrate design for maintainability and demonstrate maintainability predictions for the following sub-systems:
  - Hull / Structure / Frame
  - Suspension
  - Braking
  - B-Kit Protection
  - Power Generation and Distribution
  - Engine / Transmission / Transfer Case
  - Electronics Architecture / Software
  - Steering

**Level 4: Detailed Design Analysis**

- DFMEAs and FTAs have been updated with complete Level 3 M&S, Analysis, and Sub-system testing results.
- Failure Reporting and Corrective Action System (FRACAS) have been updated with complete Level 3 M&S, Analysis, and Sub-system testing results.
  - Failure modes have been identified
  - Root Cause has been determined
  - Corrective Action has been determined and implemented that reduces failure rate
  - Process has been modified or implemented to reduce the failure rate
  - Corrective action has been validated through analysis or test.
- R&M predictions at the LRU level have been updated with complete level 4 detailed design analysis.
  - Reliability and maintainability improvements have been identified at the sub-system level.
  - R&M prediction have been adjusted using the JLTV FDSC and OMS/MP.
  - Predictions have been rolled up to the system level.
- Reliability Growth Plan and Reliability Growth Curves are IAW AMSAA Projection Maturity Model (PM2) and are updated with complete 4 detailed design analysis.

**Level 5: System Level Testing**

- System has undergone at least 10,000 miles of R&M/durability testing IAW the JLTV OMS/MP.
  - Vendor has provided detailed test plan (DTP).
  - DTP identifies test location, date, mission profile (RMS values, wave number spectrum values), and test miles.

**Level 6: Post Testing Detailed Design Analysis**

- Failure Reporting and Corrective Action System (FRACAS) have been updated with complete Level 5 system level testing results.

    - Failure modes have been identified
    - Root Cause has been determined
    - Corrective Action has been determined and implemented that reduces failure rate
    - Process has been modified or implemented to reduce the failure rate
    - Corrective action has been validated through analysis or test.
- System level R&M predictions have been updated with complete Level 5 system level test results.
- Reliability Growth Plan and Reliability Growth Curves are IAW AMSAA Projection Maturity Model (PM2) and are updated with completed Level 5 system level test results.