Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	15 Feb 2026
Team ID	LTVIP2026TMIDS43270
Project Name	Visualization Tool for Electric Vehicle Charge and Range Analysis with Tableau
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Interactive EV KPI Dashboard	Displays key metrics such as Average Battery Charge (%), Average Driving Range (km), Energy Consumption (kWh), Charging Duration, and Efficiency Rate with filters for vehicle ID, region, and time period.
FR-2	Charge & Range Trend Analysis	Visualizes trends of battery charge vs driving range over time using line charts and area graphs; supports daily, weekly, and monthly views.
FR-3	Environmental Impact Analysis	Shows correlation between temperature, terrain, driving speed, and EV range using scatter plots and comparison charts.
FR-4	Charging Station Utilization Insights	Displays charging station usage patterns, peak hours, average charging time, and demand trends using bar charts and heatmaps.
FR-5	Geo-Map Representation	Provides interactive map visualization of EV performance and charging infrastructure across regions/cities.
FR-6	Battery Performance & Degradation Monitoring	Tracks long-term battery health, efficiency decline, and range variation trends through historical analysis charts.
FR-7	Cost & Energy Consumption Analysis	Visualizes charging cost trends, energy usage comparison per vehicle, and operational cost summaries.
FR-8	Story-Based Dashboard Navigation	Provides a sequential story view explaining EV performance insights, charging behavior patterns, and optimization recommendations with narrative captions.

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

NFR No.	Non-Functional Requirement	Description
NFR-1	Performance	Dashboard must load within 3–5 seconds even when applying filters (vehicle, region, date range).
NFR-2	Scalability	System should support additional EVs, new charging stations, and extended historical data without performance degradation.
NFR-3	Responsiveness	Dashboard layout must be suitable for laptops, large screens, and projectors during stakeholder presentations.
NFR-4	Accessibility	Interface should be intuitive, simple, and usable by non-technical stakeholders such as fleet managers and executives.
NFR-5	Usability	Use a clean, professional theme with readable fonts, clear legends, and consistent color coding for battery, range, and energy metrics.
NFR-6	Data Accuracy	All KPIs (Average Range, Efficiency, Energy Consumption) must be validated against raw EV datasets before publishing.
NFR-7	Security	Access to dashboard data must be restricted to authorized users when deployed on Tableau Server or cloud platform.
NFR-8	Reliability	Dashboard should handle missing or incomplete charging data without system crashes or incorrect calculations.