Requirement Analysis Document

# TrafficTelligence – Advanced Traffic Volume Estimation Using Machine Learning

## 1. Introduction

TrafficTelligence is a machine learning-based system designed to estimate and predict traffic volume using historical traffic data. This document outlines the functional and non-functional requirements for developing the system.

## 2. Purpose

The purpose of this document is to define the system requirements to ensure all stakeholders have a clear understanding of the project’s scope, functionality, and constraints.

## 3. Functional Requirements

* - System should allow data upload or access via API
* - Preprocess raw traffic data including handling missing values and feature extraction
* - Perform Exploratory Data Analysis (EDA) for better understanding of patterns
* - Train multiple regression models on historical data
* - Predict traffic volume based on user input (e.g., hour, weather)
* - Display results visually and numerically in the web application
* - Export prediction results as reports (optional)

## 4. Non-Functional Requirements

* - The system should respond to predictions within 1 second
* - Ensure the model achieves at least 70% R² Score
* - The system should be user-friendly and work across different devices
* - The web interface should be lightweight and responsive
* - Ensure security of uploaded data (if deployment includes user input)

## 5. System Requirements

* - Python 3.x
* - Libraries: pandas, numpy, scikit-learn, matplotlib, seaborn, Streamlit
* - Internet connection for dataset and external library access
* - Jupyter Notebook or Google Colab for model development
* - Streamlit or Flask for web deployment

## 6. Assumptions and Constraints

* - The dataset used is clean and reliable (e.g., Metro Interstate Traffic Volume)
* - Model accuracy depends on the quality and quantity of historical data
* - Real-time data integration is not part of the initial scope
* - The solution is targeted for educational or prototype purposes

## 7. Stakeholders

* - Project Developers
* - End Users (Traffic Analysts, City Planners)
* - Mentors/Academic Evaluators