**Requirement Analysis**

**1. Project Overview**

* Project Name: TrafficTelligence
* Objective: To estimate and forecast traffic volume using machine learning and real-time data sources.
* Goal: Improve traffic management efficiency, reduce congestion, and support urban planning through intelligent data analysis.

**2. Stakeholders**

| **Stakeholder** | **Role** |
| --- | --- |
| Traffic Department | Uses system for real-time decision making |
| Urban Planners | Use data for long-term infrastructure planning |
| Developers | Build and maintain the ML models and systems |
| Data Scientists | Train, validate, and fine-tune ML models |
| Citizens/Drivers | Indirect beneficiaries via improved traffic systems |

**Functional Requirements**

These are the core features your system should support.

| **Requirement ID** | **Description** |
| --- | --- |
| FR-01 | Ingest real-time data from traffic sensors, GPS, and video feeds |
| FR-02 | Preprocess and clean incoming traffic data |
| FR-03 | Apply machine learning models to estimate traffic volume |
| FR-04 | Provide time-series forecasting for future traffic volume |
| FR-05 | Display analytics and visualizations on a dashboard |
| FR-06 | Allow exporting of reports for stakeholders |

**Non-Functional Requirements**

These relate to system quality.

| **Requirement ID** | **Description** |
| --- | --- |
| NFR-01 | System should update traffic estimations every minute |
| NFR-02 | Dashboard must be accessible via web and mobile devices |
| NFR-03 | High availability and fault-tolerance for data sources |
| NFR-04 | Ensure data privacy and comply with local data protection laws |
| NFR-05 | Models must be scalable to work with different cities/regions |

**User Requirements**

| **User Role** | **Feature Required** |
| --- | --- |
| Admin | Manage data sources and user roles |
| Analyst | View data reports and download analytics |
| Operator | Monitor real-time traffic conditions |
| Citizen | (Optional) View traffic predictions via a public portal/app |

**Constraints**

* Limited availability of real-time data in rural areas.
* High computational cost for real-time video processing.
* Ensuring data consistency across various data streams.

**Assumptions**

* The city infrastructure supports data collection devices.
* There’s a team available for model training and deployment
* Stakeholders have access to dashboards and reports.

**Dependencies**

* Traffic camera APIs or CCTV access.
* Open datasets or data from transport departments.
* Cloud services for data storage and model hosting.