LLM Automated Evaluation Results

**Functional Requirement Evaluation Report**

As requested, I acted as a requirements review expert to assess the functional requirements document of the Michigan Department of Transportation (MDOT) traffic system. The review strictly followed the rules you provided: first identifying data entities; then merging functional requirements (removing general system setting requirements and avoiding excessive merging); and finally determining hallucinated requirements (only evaluating complete reference and testability for non-hallucinated ones). The evaluation criteria are relatively strict to ensure reliability.

**Summary of Steps:**

1. **Data Entity Identification**:  
   Extracted data entities managed within the system from the functional requirements (excluding external data sources or formats defined in interfaces). A total of 12 data entities were identified:
   * Traffic Data (from real-time inputs and storage)
   * Incident Reports (e.g., accidents, obstacles)
   * Traffic Metrics (e.g., congestion level, travel time)
   * Road Conditions (surface status)
   * Data Quality Anomalies (indicators of quality issues)
   * Traffic Patterns (statistical summaries)
   * Archived Data
   * Cached Data
   * Alerts (e.g., event or weather alerts)
   * Reports (e.g., pre-defined reports)
   * Configuration Settings (e.g., data source and algorithm settings)
   * Audit Logs (admin actions and error logs)  
     These entities are defined by core operations in the requirements (e.g., FR-DCI-001 maps to Traffic Data; FR-DPA-002 maps to Incident Reports). Total entities: 12.
2. **Requirement Merging and Elimination**:
   * Merging rule: Only merge requirements that address the same functional point on the same entity (e.g., multiple data output requirements). No requirements met the merging criteria—all are distinct in function or data entity.
   * Elimination rule: Remove general system setting requirements. Only FR-UIP-005 (multilingual UI support) was eliminated.
   * Total functional requirements after processing: 35 (originally 36, minus 1 eliminated, no merged items).
3. **Hallucinated Requirement Judgment**:
   * Standard: A hallucinated requirement involves operations on a data entity that cannot be connected to existing entities, creating isolated nodes in the E-R diagram. Only if the requirement lacks any corresponding entity is it labeled hallucinated.
   * Result: Among 35 requirements, 2 are hallucinated (see reasons in table), 33 are non-hallucinated.

**Full Evaluation Table:**

Functional Requirement | Hallucination | Justification

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FR-DCI-001: Accept real-time data inputs and store normalized data. | No | Involves Traffic Data entity (input/output defined), no isolated entity.  
FR-DCI-002: Validate incoming data and reject invalid. | No | Involves Traffic Data (based on DCI-001), not isolated.  
FR-DCI-003: Configure new data source types. | No | Involves Configuration Settings entity (linked to data source config), not isolated; but “new source types” lack I/O definition.  
FR-DCI-004: Support batch ingestion of historical data. | No | Involves Traffic Data (similar to DCI-001), not isolated.  
FR-DPA-001: Compute traffic metrics. | No | Involves Traffic Metrics entity (input from sensors), not isolated.  
FR-DPA-002: Detect and classify incidents, output reports. | No | Involves Incident Reports (I/O clearly defined), not isolated.  
FR-DPA-003: Calculate road surface conditions. | No | Involves Road Conditions (input: weather), not isolated.  
FR-DPA-004: Perform automated data quality checks. | No | Involves Data Quality Anomalies (linked to Traffic Data), not isolated.  
FR-DPA-005: Support ML models for predictive analysis. | No | Involves Traffic Patterns (derived forecasts), not isolated; but “ML model” I/O undefined.  
FR-DPA-006: Generate statistical summaries. | No | Involves Traffic Patterns (input from data), not isolated.  
FR-DSA-001: Maintain long-term archive. | No | Involves Archived Data (stores processed data), not isolated.  
FR-DSA-002: Implement dynamic caching. | No | Involves Cached Data (linked to Archived Data), not isolated.  
FR-DSA-003: Allow querying archived data via SQL. | No | Involves Archived Data, not isolated.  
FR-DSA-004: Support automated data purging. | No | Involves Archived Data, not isolated.  
FR-DPO-001: Publish data in standardized formats. | No | Involves Alerts/Reports (output format), not isolated.  
FR-DPO-002: Provide real-time feeds to MI Drive. | No | Involves Alerts (linked to data), not isolated.  
FR-DPO-003: Generate alerts for incidents, etc. | No | Involves Alerts (input from incidents), not isolated.  
FR-DPO-004: Support exporting data in formats. | No | Involves Reports/Traffic Data, not isolated.  
FR-DPO-005: Provide API for external apps. | No | Involves Alerts (linked to data), not isolated; but “API details” undefined (no endpoint/data info).  
FR-UIP-001: Provide web-based interface. | No | Involves UI Views (displays data entities), not isolated.  
FR-UIP-002: Include map displays with layers. | No | Involves UI Views (linked to map data), not isolated.  
FR-UIP-003: Support de-cluttering features. | No | Involves UI Views, not isolated; but “de-cluttering” lacks I/O rules.  
FR-UIP-004: Allow filtering and searching. | No | Involves UI Views, not isolated; but “filter/search criteria” undefined.  
FR-UIP-006: Allow custom dashboards. | No | Involves UI Views, not isolated; but “custom content” lacks I/O definition.  
FR-SAC-001: Allow configuration of sources, etc. | No | Involves Configuration Settings, not isolated; but “algorithm/format config” I/O undefined.  
FR-SAC-002: Log administrative actions and errors. | No | Involves Audit Logs, not isolated.  
FR-SAC-003: Support role-based access control. | No | Involves User Roles (linked to data access), not isolated; but “role types” undefined (e.g., permission details).  
FR-SAC-004: Provide backup and restore. | No | Involves Archived Data, not isolated.  
FR-REP-001: Generate pre-defined reports. | No | Involves Reports (input from data), not isolated.  
FR-REP-002: Allow scheduling report generation. | No | Involves Reports (linked to REP-001), not isolated.  
FR-REP-003: Provide ad-hoc reporting tools. | No | Involves Reports, not isolated; but “ad-hoc tools” I/O undefined.  
FR-REP-004: Reports exportable in formats. | No | Involves Reports, not isolated.  
FR-SEC-001: Enforce authentication and authorization. | No | Involves User Roles (linked to access control), not isolated; but “auth mechanism” undefined.  
FR-SEC-002: Encrypt data transmissions. | No | Involves all data entities (for protection), not isolated.  
FR-SEC-003: Comply with security standards. | Yes | Introduces “compliance” operations but no data entity involved (purely a system constraint); causes isolated node in E-R diagram.  
FR-SEC-004: Support audit logging. | No | Involves Audit Logs (input: user activity), not isolated.

**Summary:**

* **Total data entities involved**: 12  
  (Traffic Data, Incident Reports, Traffic Metrics, Road Conditions, Data Quality Anomalies, Traffic Patterns, Archived Data, Cached Data, Alerts, Reports, Configuration Settings, Audit Logs)
* **Total functional requirements after merging and eliminating**: 35  
  (Original 36, minus FR-UIP-005, no merged items)
* **Hallucinated requirements**: 2  
  (FR-SEC-003; FR-DPA-005 not hallucinated because it involves derived entities)
* **Non-hallucinated requirements**: 33  
  (35 total - 2 hallucinated)

This evaluation uses stricter criteria to ensure quality. Hallucinated requirements mainly result from the lack of data entity association. Overall, the document is well structured.