# Functional Requirement

Requirement ID Statement  
FR-1-001 The system shall provide real-time alerts to the user when a disruption occurs on their planned route.  
FR-1-002 The system shall include the reason for the disruption and an estimated duration in each real-time alert.  
FR-2-001 Upon detecting a disruption, the system shall immediately recalculate the optimal route.  
FR-2-002 The system shall update the route in real-time and notify the user of the change.  
FR-3-001 The system shall suggest alternative routes that are context-aware, considering the user's current location and time sensitivity.  
FR-3-002 The system shall prioritize alternative routes based on real-time conditions and user preferences.  
FR-4-001 For each suggested alternative route, the system shall provide a clear explanation of trade-offs, including time required, number of transfers, and walking distance.  
FR-5-001 The system shall integrate with local transit data sources to include replacement services (e.g., buses for downed train lines).  
FR-5-002 The system shall ensure real-time and automated integration with local transit data sources, maintaining up-to-date route information.  
FR-6-001 The system shall display crowd level indicators for public transport options during peak hours.  
FR-7-001 The system shall provide walking directions based on landmarks to help users navigate unfamiliar areas during detours.  
FR-7-002 The system shall present walking directions with visual support to enhance clarity.  
FR-8-001 The system shall allow users to rate and review alternative routes, particularly those that are less commonly used.  
FR-8-002 The system shall make ratings and reviews optional, with a toggle option for users to enable or disable them.  
FR-9-001 The system shall display historical reliability data for alternative routes, showing past performance during disruptions.  
FR-10-001 The system shall rank route recommendations based on real-time conditions and user preferences.  
FR-10-002 The system shall highlight the top recommendation with a quick action button to select it in urgent situations.

# External Description

# 5. Constraints  
  
## 5.1 Regulatory/Legal Constraints  
  
The system shall comply with all applicable data protection regulations, including but not limited to the General Data Protection Regulation (GDPR) for users in the European Union.   
- \*\*Priority\*\*: Must Have   
- \*\*Rationale\*\*: To ensure legal compliance and protect user privacy, especially when handling location data and user feedback.   
- \*\*Source\*\*: SRL-4.3 (Security Requirements)   
- \*\*Acceptance Criteria\*\*: The system shall pass a regulatory compliance audit and provide a privacy policy that aligns with GDPR and similar regulations.  
  
The system shall conform to the accessibility standards outlined in the Web Content Accessibility Guidelines (WCAG) 2.1.   
- \*\*Priority\*\*: Should Have   
- \*\*Rationale\*\*: To provide a usable experience for accessibility users, including those with visual or mobility impairments.   
- \*\*Source\*\*: SRL-2.3 (User Classes and Characteristics)   
- \*\*Acceptance Criteria\*\*: The system shall pass an automated accessibility testing tool and receive a score of at least AA on WCAG 2.1.  
  
## 5.2 Hardware Constraints  
  
The system shall operate on smartphones with a minimum of \*\*2 GB RAM\*\* and \*\*32 GB storage\*\* capacity.   
- \*\*Priority\*\*: Must Have   
- \*\*Rationale\*\*: To ensure smooth performance and accommodate the caching of route data and historical information.   
- \*\*Source\*\*: SRL-5.1 (System Hardware)   
- \*\*Acceptance Criteria\*\*: The system shall function without performance degradation on devices meeting the specified minimum hardware requirements.  
  
The system shall not require any \*\*external hardware components\*\* beyond the built-in GPS and camera for landmark recognition.   
- \*\*Priority\*\*: Must Have   
- \*\*Rationale\*\*: To ensure broad compatibility and reduce the barrier to entry for users with standard smartphones.   
- \*\*Source\*\*: SRL-5.1 (System Hardware)   
- \*\*Acceptance Criteria\*\*: The system shall operate fully on devices without the need for external accessories.  
  
## 5.3 Interface Constraints  
  
The system shall \*\*not provide spoken alerts\*\* for route disruptions or changes.   
- \*\*Priority\*\*: Must Have   
- \*\*Rationale\*\*: To align with the assumption that users will not interact with the app while driving, and to avoid unnecessary feature complexity.   
- \*\*Source\*\*: SRL-5.4 (Assumptions and Dependencies)   
- \*\*Acceptance Criteria\*\*: The system shall not include any audio output features for route alerts.  
  
The system shall \*\*not support offline route planning\*\* for dynamic disruptions.   
- \*\*Priority\*\*: Could Have   
- \*\*Rationale\*\*: Dynamic route recalculation requires access to real-time data, which is not available in an offline state.   
- \*\*Source\*\*: SRL-5.4 (Assumptions and Dependencies)   
- \*\*Acceptance Criteria\*\*: The system shall display a message indicating that dynamic route updates are not available when offline.  
  
## 5.4 Design & Implementation Constraints  
  
The system shall \*\*not suggest routes involving dangerous or physically demanding paths\*\* in any context.   
- \*\*Priority\*\*: Must Have   
- \*\*Rationale\*\*: To ensure the safety of all users, particularly accessibility users.   
- \*\*Source\*\*: SRL-4.3.1 (Safety)   
- \*\*Acceptance Criteria\*\*: The system shall exclude such routes from its recommendation list and provide a rationale for this exclusion in the user interface.  
  
The system shall \*\*not use proprietary mapping platforms\*\* that restrict integration with third-party data sources.   
- \*\*Priority\*\*: Must Have   
- \*\*Rationale\*\*: To maintain flexibility and ensure access to diverse and up-to-date mapping and geolocation data.   
- \*\*Source\*\*: SRL-5.5 (Third-Party Tools)   
- \*\*Acceptance Criteria\*\*: The system shall use open-source or open-licensed mapping and geolocation services.  
  
The system shall \*\*not rely on manual input for disruption updates\*\*.   
- \*\*Priority\*\*: Must Have   
- \*\*Rationale\*\*: To ensure timely and accurate route recalculations based on real-time conditions.   
- \*\*Source\*\*: SRL-3.1.1 (Real-Time Disruption Alerts)   
- \*\*Acceptance Criteria\*\*: The system shall automatically pull disruption data from integrated APIs.  
  
## 5.5 Other Constraints  
  
The system shall \*\*not require users to sign up for an account to access core navigation features\*\*.   
- \*\*Priority\*\*: Should Have   
- \*\*Rationale\*\*: To reduce the barrier to entry and encourage wider adoption.   
- \*\*Source\*\*: SRL-5.3 (Software Dependencies)   
- \*\*Acceptance Criteria\*\*: The system shall allow route planning and disruption alerts without user authentication.  
  
The system shall \*\*not prioritize user ratings and reviews over real-time data\*\* in route recommendations.   
- \*\*Priority\*\*: Must Have   
- \*\*Rationale\*\*: To ensure that users always receive the most up-to-date and accurate route options.   
- \*\*Source\*\*: SRL-3.8.1 (Optional User Ratings and Reviews)   
- \*\*Acceptance Criteria\*\*: The system shall use ratings as supplementary data only and not as a primary factor in route selection.  
  
The system shall \*\*not support integration with private transport APIs\*\* (e.g., ride-sharing services).   
- \*\*Priority\*\*: Must Have   
- \*\*Rationale\*\*: To maintain a focus on public transportation and avoid diluting the system's purpose.   
- \*\*Source\*\*: SRL-3.5 (Integration with Local Transit Data Sources)   
- \*\*Acceptance Criteria\*\*: The system shall not include features or settings related to private transport services.