

Master Documentation: Smart Routing (Phase 2 Updates)

Project: Emergency Coordination & Management System

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Status: Active Development (Phase 2 Navigation HUD Implementation)

1. Core Infrastructure & Logic Shift


- **Dynamic Waypoints:** Transitioned from a static simulation with predefined starting locations to a **Dynamic Map Listener**, allowing paramedics to click anywhere on the map to set a custom "Emergency Start Location".
 - **Real-Time Data Engine:** Integrated detailed turn-by-turn maneuvers and ETA calculations directly from the **OpenRouteService (ORS)** API.
 - **Containerized Deployment:** Managed via **Docker Compose**, with the backend serving API requests on port **6005** over the internal emsync-network.
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2. Functional Refinements

A. Navigation & Simulation

- **Simulation Engine:** Restored the ambulance animation using `setInterval` and `animationRef` to ensure smooth movement along the decoded path at a tuned interval of **100ms**.
- **Dynamic HUD:** Directions are calculated and displayed in a **Floating Navigation HUD** (top-right corner) that tracks the ambulance position in real-time and remains hidden until the simulation starts.
- **Route Locking:** Implemented a global **"Lock" toggle** that freezes both the hospital selector and map click handler to secure navigation during active transit.

B. Visual Intelligence & Traffic

- **Real-World Density Layer:** Integrated dynamic road classification to highlight urban and residential segments (ORS categories 1 and 3) in a bold **Amber Overlay (#f97316)** to signify potential bottlenecks.
- **Enhanced Visibility:** Increased the primary route polyline opacity to **0.9** and added high-visibility symbols, including a custom  **DivIcon** and updated Leaflet markers.
- **Instruction Logic:** Implemented Google-style behavior where the current instruction is

highlighted based on the ambulance's real-time coordinate matching.

3. Technical Specification Summary

Component	Technology	Update Log
Backend	Flask / ORS API	Integrated waycategory and extra_info for density detection.
Mapping	Leaflet / React-Leaflet	Corrected tile rendering via explicit CSS injection and z-index hardening.
Frontend	React / Lucide-React	Created a Floating HUD and Route Lock system.
Simulation	JavaScript (Ref-based)	Restored ambulance animation tracking at 100ms speed.

4. Current Baseline Statistics

- **ETA Calculation:** Switched to Math.ceil to ensure accurate arrival predictions.
- **Distance Tracking:** Maintained **1-decimal precision** for KM distances to reflect accurate travel metrics.

Would you like me to move on to documenting the Phase 1: Severity Module updates next?