Comprehensive Operational Documentation – Cover Sheet v2

Objective:

Develop a fully data-driven, defender-aware NFL player performance prediction engine capable of producing granular player statline forecasts, fantasy projections, matchup-based recommendations, and game-level evaluations. The system integrates offensive and defensive player modeling, archetype clustering, coverage probability estimation, multi-model prediction pipelines, and final ensemble meta-learning.

Final Product Description:

This application synthesizes structured NFL game data, player statistics, defender performance metrics, archetype-based behavioral modeling, and modern machine-learning methods to generate highly accurate predictive outputs. It includes:

- Offensive + defensive archetypes (behavior-derived clusters)
- Defender-level modeling (CB/S/LB individual performance deltas)
- Coverage probability modeling to estimate primary defenders faced
- Baseline deterministic predictor enhanced with archetype and defender adjustments
- Multiple ML engines (linear regression, gradient boosting, matchup submodels)
- A trained ensemble meta-model combining all engine outputs into a final forecast
- A user-facing interface (local desktop/web hybrid)
- Integrated natural-language reasoning and explanation via Ollama

Action Plan (High-Level):

Phase 1: Build database, ETL pipelines, ingestion routines, and data validation.

Phase 2: Engineer full feature space (offensive deltas, defensive deltas, defender deltas, archetypes, coverage models).

Phase 3: Construct baseline predictor with behavior-aware and defender-aware influences.

Phase 4: Train ML engines + matchup/defender submodels + ensemble stacker.

Phase 5: Generate projections, start/sit logic, waivers, trades, and game predictions.

Phase 6: Build final UI, API, inference flow, and integrate Ollama for narrative explanations.

Additional Systems: Archetype Modeling, Ensemble Training Engine, Defender Data Architecture, Coefficient Weighting Framework, and Data Extraction Infrastructure.