Dev B Phase 3 Completion Specification

## Overview

This document certifies the full completion of Dev B Phase 3 for the Slice project risk engine.

The implementation has been fully executed, validated, and committed. Below is a structured summary

of what was built and how it satisfies the Phase 3 scope across metrics, factor modeling, scenario

analysis, risk rails, portfolio aggregation, and unified reporting.

## 1. Risk Metrics Engine

Implemented in **src/slice/risk/metrics.py**:

Total return

CAGR

Annualized volatility

Sharpe ratio

Maximum drawdown

Rolling volatility (configurable windows)

Rolling Sharpe ratios

All metrics are aligned to the specification provided in DevB_Phase3_Scope.pdf and Phase
Architecture.

## 2. Factor Regression Engine

Implemented in **src/slice/risk/factor.py**:

OLS regression via statsmodels

Outputs FactorModel with betas, t-stats, p-values, and $R^2$

Supports any factor set provided by Dev C

3. Scenario Engine

Implemented in **src/slice/risk/scenarios.py**:

Linear beta * shock model

Supports ScenarioConfig → ScenarioResult conversion

Supports multiple shocks per scenario

4. Risk Rails

Implemented in **src/slice/risk/rails.py**:

Concentration screening

Correlation clustering via connected components

Historical 1-month VaR using rolling compounded returns

Macro-driven regime warnings (yield curve, inflation, VIX)

5. Portfolio Aggregation

Implemented in **src/slice/risk/aggregator.py**:

Adapter for BacktestResult → StrategyReturnSeries → PortfolioReturnSeries

Supports weighted blending of strategy-level returns

Required for Dev A → Dev B handoff

6. Unified Risk Report

Implemented in **src/slice/risk/report.py**:

Builds RiskReport Pydantic model

Includes metrics, factor model, scenarios, rails, correlation matrix, metadata

Defines Dev B's primary output: RiskReportJSON

7. Schema Fixes

All mutable defaults replaced with Field(default_factory=...)

Added BacktestResult and StrategyReturnSeries

Added correlation_matrix to RiskReport

8. Validation

The following test files were created and successfully executed:

scripts/test_scenarios.py

scripts/test_rails.py

scripts/test_full_risk_report.py

scripts/test_aggregator.py

Conclusion

Dev B Phase 3 is fully implemented, tested, and compliant with the architecture and scope documents.