Appendices

Appendix A. Core Variables and Notation

This appendix consolidates the principal variables, structural objects, and interpretation rules used throughout Paper A-13. Its function is not to introduce new theory, but to keep the reconstruction disciplined and terminologically consistent when the paper is compiled into final form.

A.1 Foundational Relational Objects

$\mathbf{\Omega}$: The set of collapsed relational states: $\Omega = \{S_1, S_2, \ldots, S_n\}$. Each S_i is a stable distinguishable configuration, not a point in coordinate space.

S_i: An individual collapsed relational state within the substrate.

$A(S_i, S_j)$: Relational accessibility cost between states S_i and S_j under collapse-coherence constraints.

Π_{ij}: The set of admissible collapse-compatible pathways from S_i to S_j.

$C(p)$: Total collapse-path cost for pathway p, defined schematically by cumulative configurational or entropic disturbance.

$\Delta\Omega_k$: Local entropic or configurational disturbance increment between successive collapse nodes along a pathway.

A.2 Emergent Geometric Variables

$d(S_i, S_j)$: Emergent relational distance, interpreted as minimum accessibility cost rather than primitive geometric length.

ρ(S_i): Local accessibility density around state S_i; a coarse measure of how richly and cheaply S_i is connected to its relational neighborhood.

∇A, **∇ρ**: Accessibility-gradient and density-gradient structure; these encode relational bias prior to geometric projection.

g_**μν**: Effective metric tensor at the projection layer; not primitive, but a shadow-variable emerging from stable relational accessibility structure.

R_**μν**^(eff), R^(eff), G_**μν**^(eff): Effective curvature objects derived from the emergent metric in stable projection regimes.

T_**μν**^(eff): Effective coarse-grained stress pattern of stabilized relational collapse modes.

κ: Effective coupling constant in the proto-Einstein closure. Its relation to Einsteinian 8πG remains a future derivational task.

A.3 Layer-Status Terms

Relational Collapse Substrate: The ontological layer of collapsed states, accessibility structure, pathway organization, and compatibility selection.

Projection Layer: The descriptive layer in which geometry, metric, curvature, and spacetime appear as stable compressions of relational structure.

Shadow Quantity: A real but non-fundamental variable that faithfully encodes deeper structure within a stable regime.

Projection Failure: A regime in which geometry ceases to remain a valid or unique compression of the underlying relational field.

Fundamental Wave Basin (FWB): The foundational wave-basin regime used across CUWF ontology. In A-13, any references to substrate-level field behavior should remain consistent with Basin, not Background, terminology.

A.4 Language Discipline for A-13

Do not describe spacetime as primitive except when summarizing the standard view being challenged.

Do not describe the metric as substrate; describe it as emergent, effective, or projection-layer.

Do not describe curvature as literal bending of a fundamental container in CUWF interpretation.

Use Fundamental Wave Basin consistently across CUWF papers when referring to the foundational wave-regime.

Use terms such as structural reconstruction, emergence mapping, proto-Einstein framework, or effective closure when discussing GR derivation claims that are not yet rigorous first-principles derivations.

Appendix B. Layer Logic and Minimal Equation Docking

The following compact relations summarize the layer logic of A-13. They are not offered as a completed tensor derivation, but as docking statements that make the emergence pipeline explicit.

$A : \Omega \times \Omega \longrightarrow \mathbb{R}_+ \cup \{\infty\}$

$C(p) = \Sigma_k \, \Delta\Omega_k$

$d(S_i, S_j)$ = min over $p \in \Pi_{ij}$ of $C(p)$

$\rho(S_i) = \Sigma_j \exp[-A(S_i, S_j)]$

g_$\mu\nu$ = F_$\mu\nu$[ρ, A, ∇A, C]

G_$\mu\nu$^(eff) = G_$\mu\nu$[g[F_$\mu\nu$[ρ, A, ∇A, C]]]

$G_{\mu\nu}^{(\text{eff})} = \kappa\, T_{\mu\nu}^{(\text{eff})}$

Read in sequence, these relations express the full ontological inversion of A-13: relational accessibility precedes geometry; geometry precedes metric compression; metric precedes effective curvature closure; and Einsteinian form appears only after stable projection has already emerged.

Appendix C. Reference Guide for Final Integration

When A-13 is compiled into final form, the following reference clusters should be harmonized with the rest of the CUWF series.

C.1 Internal CUWF Cross-Links

CUWF Framework Overview — for the foundational ontology and layer architecture.

Paper A-12 — for stillness boundaries, projection failure, and Cosmic Breathing context.

Gravity-focused CUWF paper(s) — for the accessibility-gradient interpretation of gravity.

Time-focused CUWF paper(s) — for the non-primitive status of temporal ordering and recordability.

C.2 Suggested Front-Matter Consistency Checks

Keep the subtitle of A-13 aligned with the exact final thesis wording adopted in the CUWF series.

Ensure terminology uses Fundamental Wave Basin consistently.

Keep GR-related language careful: effective theory, projection-layer closure, or proto-Einstein reconstruction where appropriate.

If a full references section is added later, separate standard physics references from internal CUWF manuscripts.