Section 5. Canonical Gravity Law and Equation Ladder

The previous sections prepared the ground in a deliberate sequence. Section 2 showed why the language of force is an observer-facing compression of constrained descent. Section 3 built a stable intuition-map using basins, ridges, saddles, channels, and ring-like pathways. Section 4 introduced the minimum mathematical toolkit required to turn that intuition into controlled symbolic form. The present section states the core result in its shortest and deepest form, and then expands it into an equation ladder that shows where it comes from and how it recovers familiar classical appearances.

This section therefore marks the true mechanical center of A-14. From this point onward, gravity is no longer being introduced by analogy alone. It is stated as a canonical law, traced back to source-to-landscape generation, and then translated forward into classical and observer-level force language without surrendering the deeper CUWF interpretation.

5.1 The Canonical One-Line Statement

The core statement of Paper A-14 may be written in its shortest form as:

$$g(x) := -\nabla\Phi^{E}(x)$$

This is the canonical CUWF law of gravity. The gravitational field g(x) is not a primitive pulling force. It is the descent direction, that is, the negative slope of the entropic or collapse potential $\Phi^{E}(x)$.

The importance of this statement lies in its layer-status. In CUWF, $\Phi^{E}(x)$ is not postulated as an arbitrary background potential. It is itself a generated landscape produced by entropic geometry together with collapse regularization. Accordingly, g(x) is not an independently assumed field. It is implied once the landscape exists.

5.2 The Equation Ladder

The same mechanism can be expressed at increasing depth through an equation ladder. The ladder is methodological rather than ornamental. It allows readers with different levels of comfort to stop at different depths without losing the logic of the mechanism.

Level 0 is the canonical slope definition:

$$g = -\nabla\Phi^{E}$$

At this level, gravity is simply the negative gradient of the generated landscape.

Level 1 expresses gravity as descent dynamics sequenced by collapse order:

$$dx/d\tau = -\kappa\nabla\Phi^{E}(x)$$

Here the system evolves by descending along the landscape as τ advances. The parameter κ captures effective mobility, responsiveness, or accessibility of motion under the relevant degrees of freedom and constraints.

Level 2 expresses source-to-landscape generation in a CUWF-native form:

$$\Delta^{E}\Phi^{E}(x) = S\_E(x)$$

The source term S_E(x) is the collapse-source field. It encodes the structural factors that generate the landscape in the relevant regime. The essential point is logical separation: S_E generates Φ^{E}; Φ^{E} generates slope; slope generates descent.

Level 3 expresses the same relation in operator form:

$$\Phi^{E} = (\Delta^{E})^{-1}\ S\_E$$

and therefore

$$g = -\nabla(\Delta^{E})^{-1}[S\_E]$$

This is a compact statement of the full CUWF mechanism. The source does not pull directly. It sculpts the terrain. The observed gravitational field is the slope of that sourced-and-regularized terrain.

Level 4 expresses the classical appearance. In weak-field, slowly varying, approximately isotropic regimes around an isolated source, the generated landscape reproduces the familiar effective radial scaling laws:

$$\Phi\_app(r) \propto -\ M / r$$

and therefore

$$g\_app(r) = |\nabla\Phi\_app| \propto M / r^2$$

The important methodological point is that proportional calibration is kept separate from the generative law. Newtonian constants and SI-scale matching belong to the reporting or calibration layer, not to the primary CUWF mechanism itself.

5.3 Translation Rule: Force-Language as Observer Convention

At the observer-facing level, it remains useful to speak in force-language. CUWF does not prohibit that. It reclassifies it.

In free descent, the system follows the slope directly. The force-feeling becomes weak or disappears, even though the gravitational structure is still present. Under local constraint, such as standing on the ground or supporting a rigid body, descent is blocked. Constraint responses then arise and the observer experiences weight or pressure. Force-language is therefore a naming convention applied to slope-driven motion under particular interface conditions.

If one wishes to preserve classical bookkeeping, one may define the familiar force form:

$$F := m\ g$$

But in CUWF this F is not the fundamental mechanism. It is a derived interface-level quantity used to describe how stable macroscopic bodies respond when slope-driven descent is either followed or locally resisted.

5.4 A CUWF-Form Force Equation

Once the canonical gravity law is accepted, the corresponding force-form follows immediately at the observer or interface level:

$$F\_g(x) := m\, g(x) = -m\, \nabla\Phi^{E}(x)$$

Here m is the effective inertial or gravitational mass parameter appearing in classical description. CUWF interprets m not as a primitive source of pull, but as an emergent coupling-and-inertia measure: it quantifies how strongly a stable macro-structure couples to the generated landscape and how much resistance it exhibits to collapse-sequenced reconfiguration.

If one wishes to introduce a scalar effective potential energy, the same translation may be written as:

$$U^{E}(x) := m\, \Phi^{E}(x)$$

$$F\_g(x) = -\nabla U^{E}(x)$$

This makes the bookkeeping transparent. Force is the negative gradient of an effective potential energy, and that effective potential energy is itself built from the deeper entropic or collapse potential Φ^{E}.

If the source-to-landscape ladder is inserted directly, one may also write the force in sourced operator form:

$$F\_g(x) = -m\, \nabla(\Delta^{E})^{-1}[S\_E]$$

This is the most compact interface-level summary of the mechanism: the source sculpts the landscape, the landscape defines the slope, and the experienced gravitational force is the mass-weighted expression of that slope.

5.5 Constraint Interpretation: Why Weight Exists

The force-form becomes especially useful in static or constrained situations. If a body standing on the ground cannot descend along $-\nabla\Phi^E$, the contact condition produces a reaction force N that balances the landscape-coupling force: $N + F_g = 0$

Weight is therefore not evidence of a primitive pulling agent. It is the reaction generated when slope-driven descent is locally blocked. This is one of the most important observer-level clarifications of A-14. It explains why gravity feels force-like in ordinary life while remaining non-fundamental at the deeper structural level.

5.6 Optional Generalization: Direction-Dependent Response

For ordinary point-like or isotropic classical discussion, the scalar m is sufficient. But CUWF naturally allows richer response structure. If an extended body or structured system couples differently along different directions, one may replace the scalar mass parameter with an effective coupling tensor M(x):

$$F(x) = -M(x)\,\nabla\Phi^E(x)$$

This generalization is not required for the main narrative of A-14. It is included only to show that the framework naturally accommodates anisotropic or direction-dependent accessibility response in structured entropic landscapes.

5.7 Core Claim of Section 5

The result of this section may therefore be stated clearly. Gravity in CUWF is not a primitive force. It is the slope of a generated entropic or collapse landscape. The canonical law $g(x) := -\nabla\Phi^E(x)$ expresses this in its shortest form. The equation ladder shows how source, landscape, slope, descent, and classical appearance fit into one mechanism. The force-form $F = m\,g$ remains available, but only as an interface-level bookkeeping language.

From this point onward, the rest of the paper no longer needs to ask what gravity is. It can ask what this single slope-based mechanism explains across different regimes.

