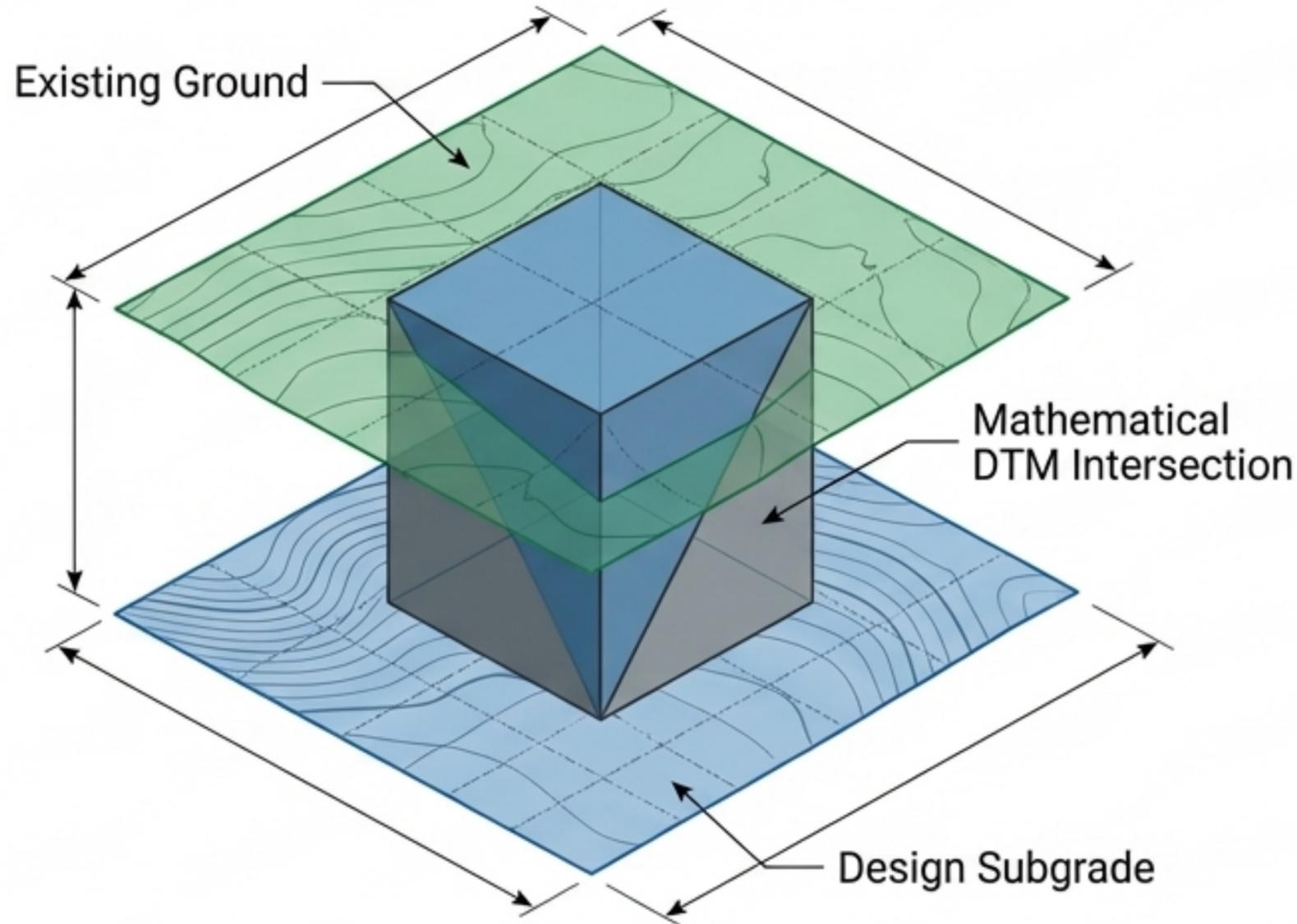


TDOT Compliance Framework

Mass Earthwork & Subgrade Preparation: Sector S4 QTO

I-24 Waldron Zone – DTM Volumetric Analysis & Integrity Audit

Composite Surface-to-Surface (TIN-to-TIN) Methodology



Volumetric Conversions:

$$\frac{\text{ft}^3}{27} = \text{CY (Cubic Yards)}$$

Area Conversions:

$$\frac{\text{ft}^2}{9} = \text{SY (Square Yards)}$$

Topsoil Logic:

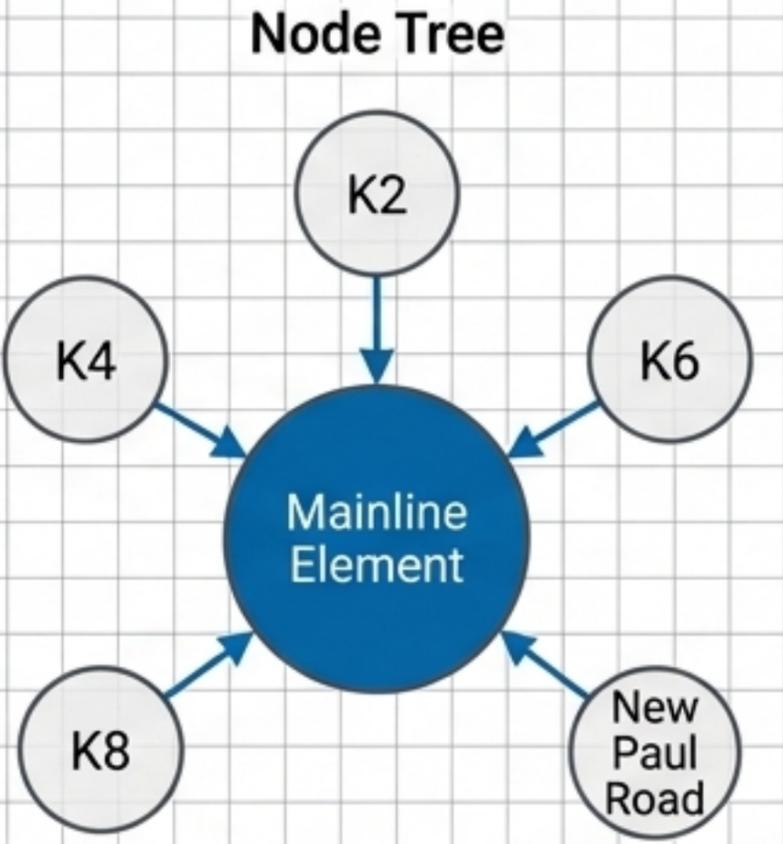
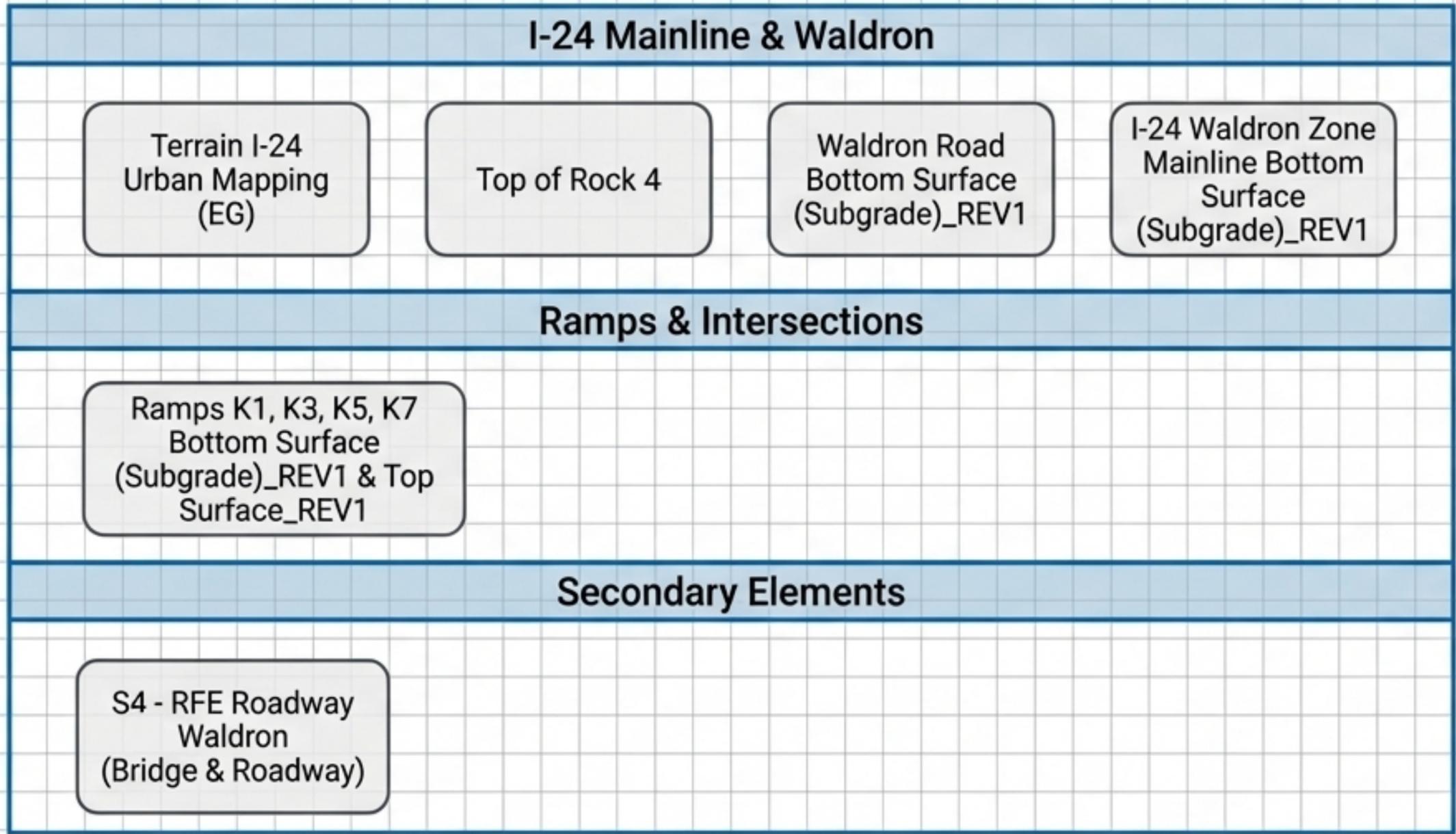
Net Area Difference × 0.5 ft thickness → CY



Strictly 0.00% Factors.
 All quantities are reported as geometric "In-Place" yardage. No Shrinkage or Swell factors have been applied due to the absence of geotechnical reports.

Verified DTM / TIN Surface Inventory

The following raw .xml surfaces were identified and processed to generate the QTO:



Dependency Note:
Ramps K2, K4, K6, K8, and New Paul Road lack independent surface files and are structurally absorbed into the Mainline surface model.

Diagnostic Matrix

	EG	Top	Bottom	Bottom Subgrade
Waldron Rd / Mainline	 Exist	 Exist	 Missing	 Exist
Ramps (K1, K3, K5, K7)	 Exist	 Exist	 Exist	 Missing

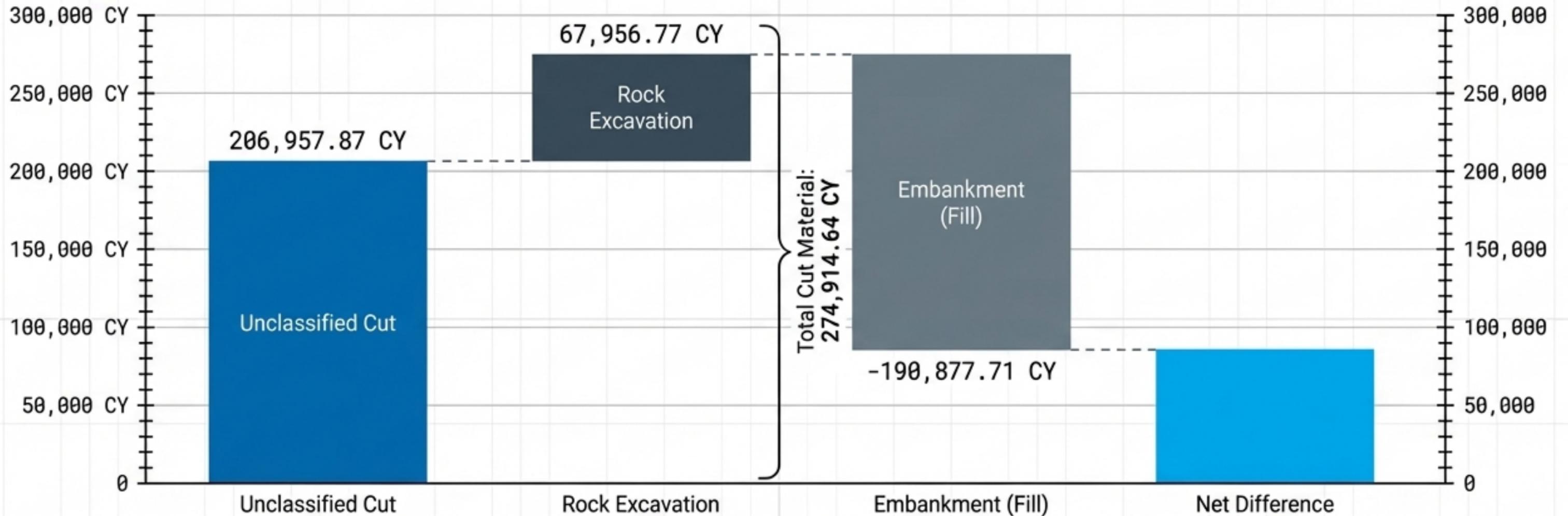
Technical Risk Statement

Sector S4 suffers from **fragmented information**.

- **Mainline/Waldron:** Lack the intermediate "Bottom" file.
- **Ramps:** Lack the "Bottom Subgrade" file.

Impact: This disconnect prevents a closed volumetric calculation for pavement thickness and creates blind spots for subgrade stabilization needs.

Global QTO Summary: Earthwork Balance



NET VOLUME (BALANCE): +84,036.93 CY (Surplus / Export)

 Topsoil Placement:
33,034.06 CY

 Subgrade Construction & Prep:
517,038.78 SY

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QTO Detail: I-24 Mainline & Waldron Road

I-24 Waldron Zone Mainline	
Pay Item	Quantity
Unclassified Cut	186,075.67 CY
Embankment Fill	149,408.65 CY
Rock	65,482.11 CY
Topsoil	27,724.16 CY
Subgrade Prep	452,851.13 SY

Waldron Road	
Pay Item	Quantity
Unclassified Cut	3,784.80 CY
Embankment Fill	37,289.75 CY
Rock	4.81 CY
Topsoil	1,837.93 CY
Subgrade Prep	28,591.55 SY



Engineering Note: Zones K2, K4, K6, K8, and New Paul Road are geometrically absorbed into the Mainline calculations above.

QTO Detail: Intersecting Ramps K1, K3, K5, K7

Ramp K5	
Cut:	6,502.44 CY
Fill:	1,552.28 CY
Rock:	2,368.28 CY
Subgrade:	10,646.27 SY

Ramp K3	
Cut:	6,715.22 CY
Fill:	921.90 CY
Rock:	0.00 CY
Subgrade:	13,066.30 SY



Ramp K1	
Cut:	1,852.03 CY
Fill:	476.84 CY
Rock:	0.00 CY
Subgrade:	5,378.31 SY

Ramp K7	
Cut:	2,027.71 CY
Fill:	1,228.29 CY
Rock:	101.57 CY
Subgrade:	6,505.22 SY

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38.0" 2.3" 1.2"

TITLE

Technical Note: Undercut Roadway Subgrade Stability



0.00 CY

Current Model Status

Based strictly on the provided DTM geometries, the Undercut Roadway Subgrade volume calculates to 0.00 CY across all project sectors. The model geometrically assumes a perfectly stable subgrade.

Technical Warning

As established in the Model Audit, the central I-24 Mainline and Waldron Road lack proper 'Bottom Subgrade' models.

Implication

Without these files, it is impossible to digitally quantify necessary soil stabilization or undercut for the highest-traffic project zones. The 0.00 CY figure represents a model limitation, not necessarily a geotechnical reality.

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Engineering Disclaimer & Limitations

Quantities are based on provided digital models. Final field verification and any risks arising from unidenied undercut requirements are the responsibility of the client.

Calculations are exclusively derived from digital CAD/BIM environments. Due to the absence of supplemental geotechnical reporting, no correction factors for soil type (Shrink/Swell) have been applied. All outputs are strictly geometric "In-Place" yardages.

TGR Engineering Review

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TITLE