

# Earthwork & Subgrade Preparation: Sector S1

High-Level Technical QTO Summary & Risk Audit

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Location: Tennessee, USA

Regulatory Framework: TDOT Compliance Review

Prepared by  
TGR Tunnel Geotechnical Railways

# Executive Summary & Audit Parameters

## Scope & Limits

- Focus: Mass Earthwork & Subgrade Preparation (Sector S1).
- Exclusion: Pavement Structure (Base, Sub-base, Asphalt/Concrete) omitted per project parameters.

## Objective

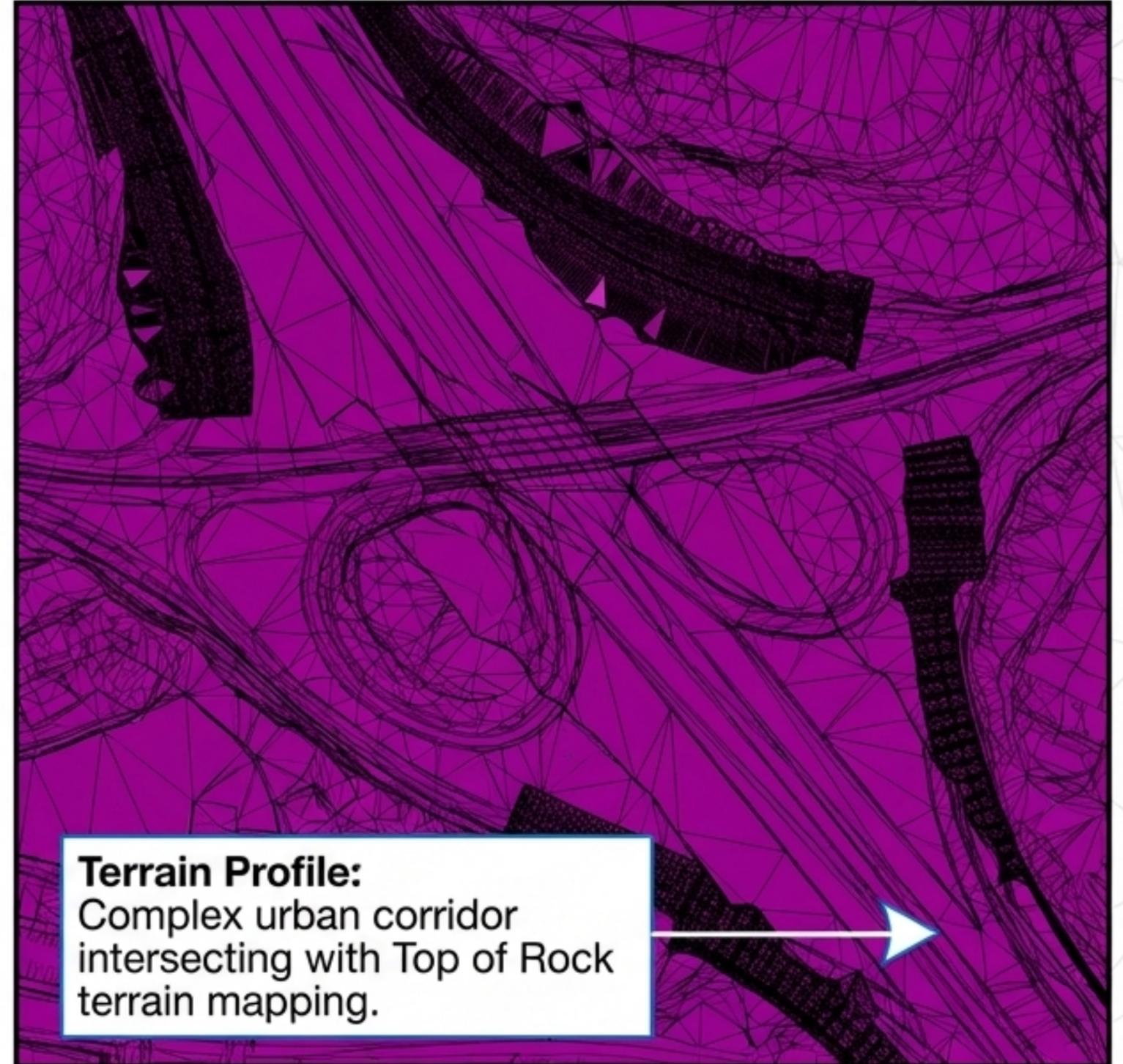
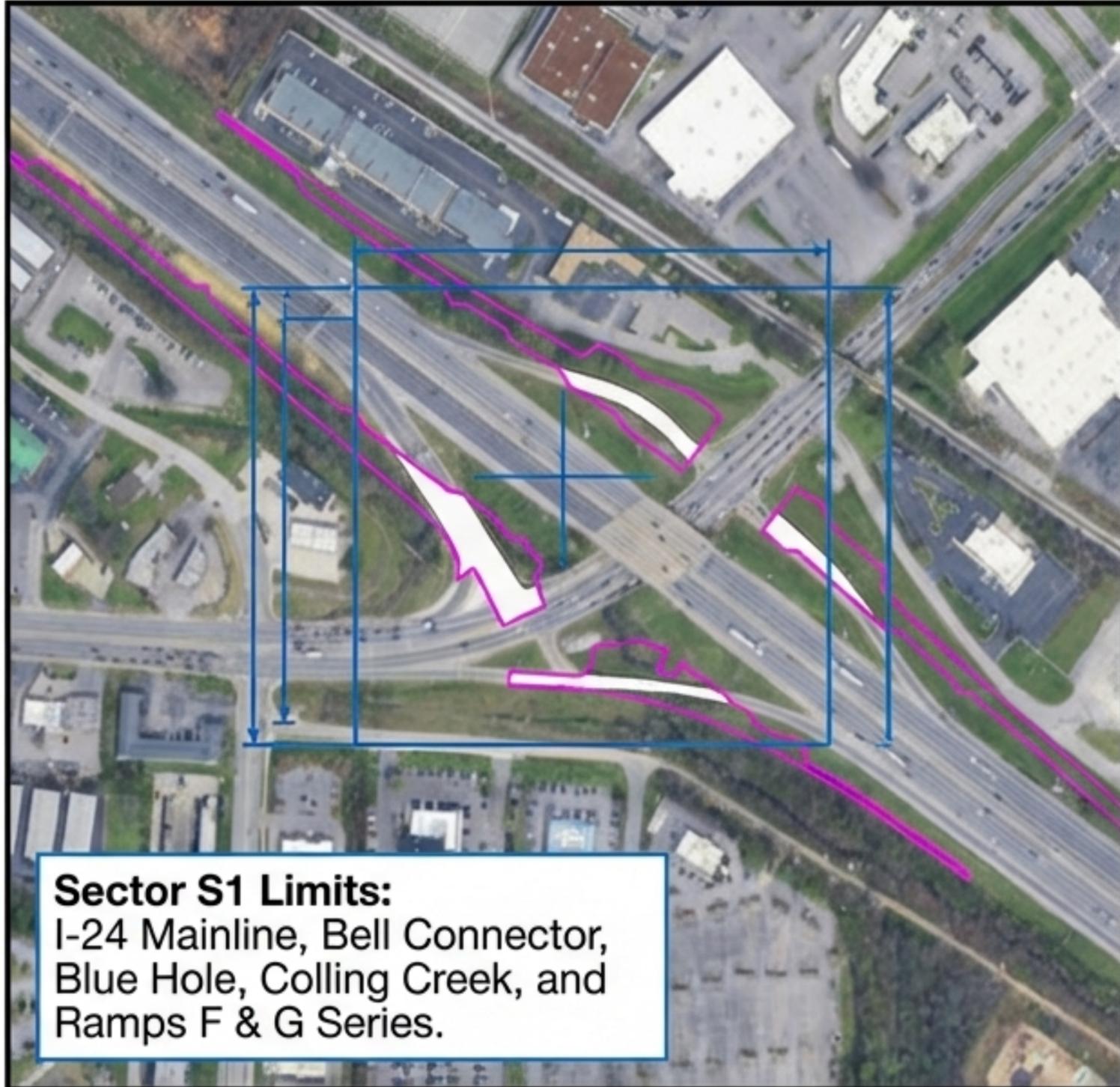
Deliver a definitive, data-driven summary of in-place yardages and critical assumptions based on provided S1 digital models.



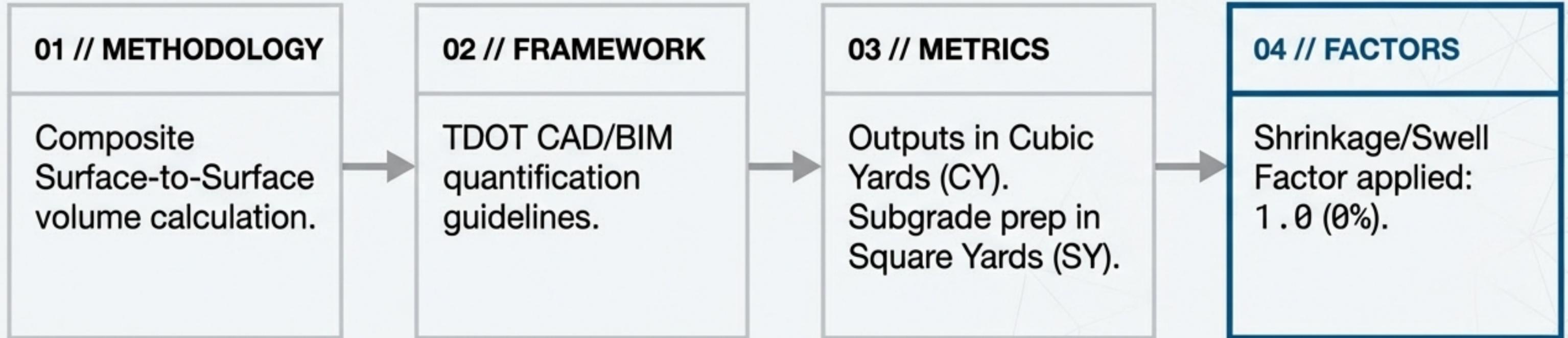
**BLUF: Critical Risk Alert**

**Earthwork takeoff reveals significant omissions in provided DTM/TIN surfaces, directly impacting undercut and soil stabilization estimations.**

# Project Scope & Spatial Context



# Technical Methodology & Parameters



*Note: No correction factors applied due to the absence of supporting geotechnical reports.*

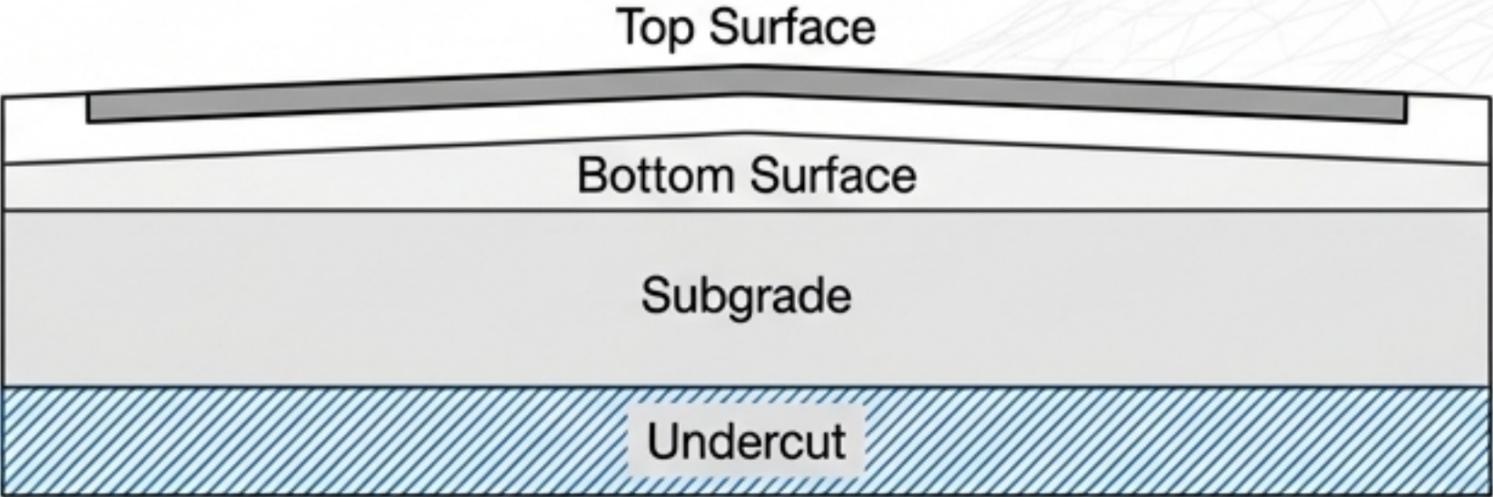
# Model & Surface Integrity Audit

SECTOR	TOP SURFACE	BOTTOM SURFACE	BOTTOM SUBGRADE	EXISTING GROUND
Blue Hole & Ramps F/G	EXIST ✓	EXIST ✓	MISSING ✗	EXIST ✓
I-24 Mainline & Bell Connector	EXIST ✓	MISSING ✗	MISSING ✗	EXIST ✓
Colling Creek (South & North)	EXIST ✓	MISSING ✗	MISSING ✗	EXIST ✓
Stormwater	DAMAGED ⚠	DAMAGED ⚠	MISSING ✗	EXIST ✓

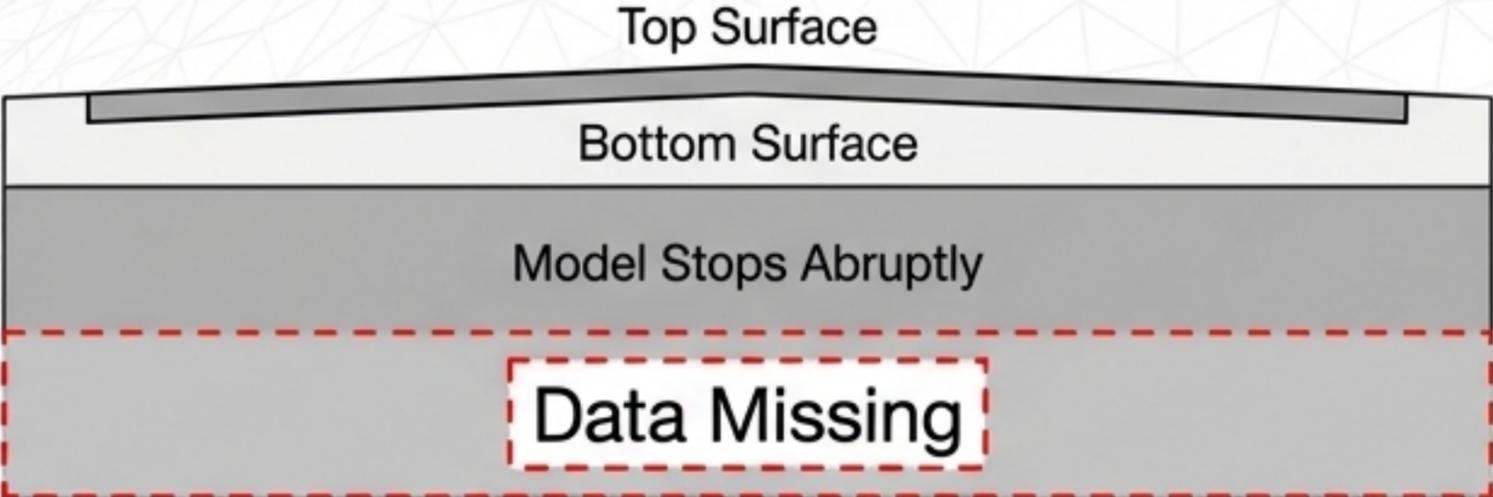
Systemic Data Gap Identified across all Sector S1 elements.

# Critical Technical Notes: The Subgrade Risk

Ideal TDOT Standard



Current S1 Data



**1 The Issue: Bottom vs. Bottom Subgrade**

The intermediate subgrade surface is pervasively absent from the provided XML files.

**2 The Result: Undercut Roadway Subgrade**

Accurric, Undercut Roadway currently calculates at 0.00 SY. The software assumes the bottom is perfectly stable.

**3. Technical Risk Statement:**

Without the subgrade level, calculating roadway undercut (soil improvement) is impossible. Assuming the Bottom surface is identical to the Subgrade zeroes out undercut quantities, causing a significant underestimation of high-cost material volumes and the overall project budget.

# Red Alert Sectors (Data Gaps)

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## Stormwater Systems

**STATUS: SURFACES DAMAGED**

Unable to generate valid surface-to-surface volumetric comparisons for drainage network integration.



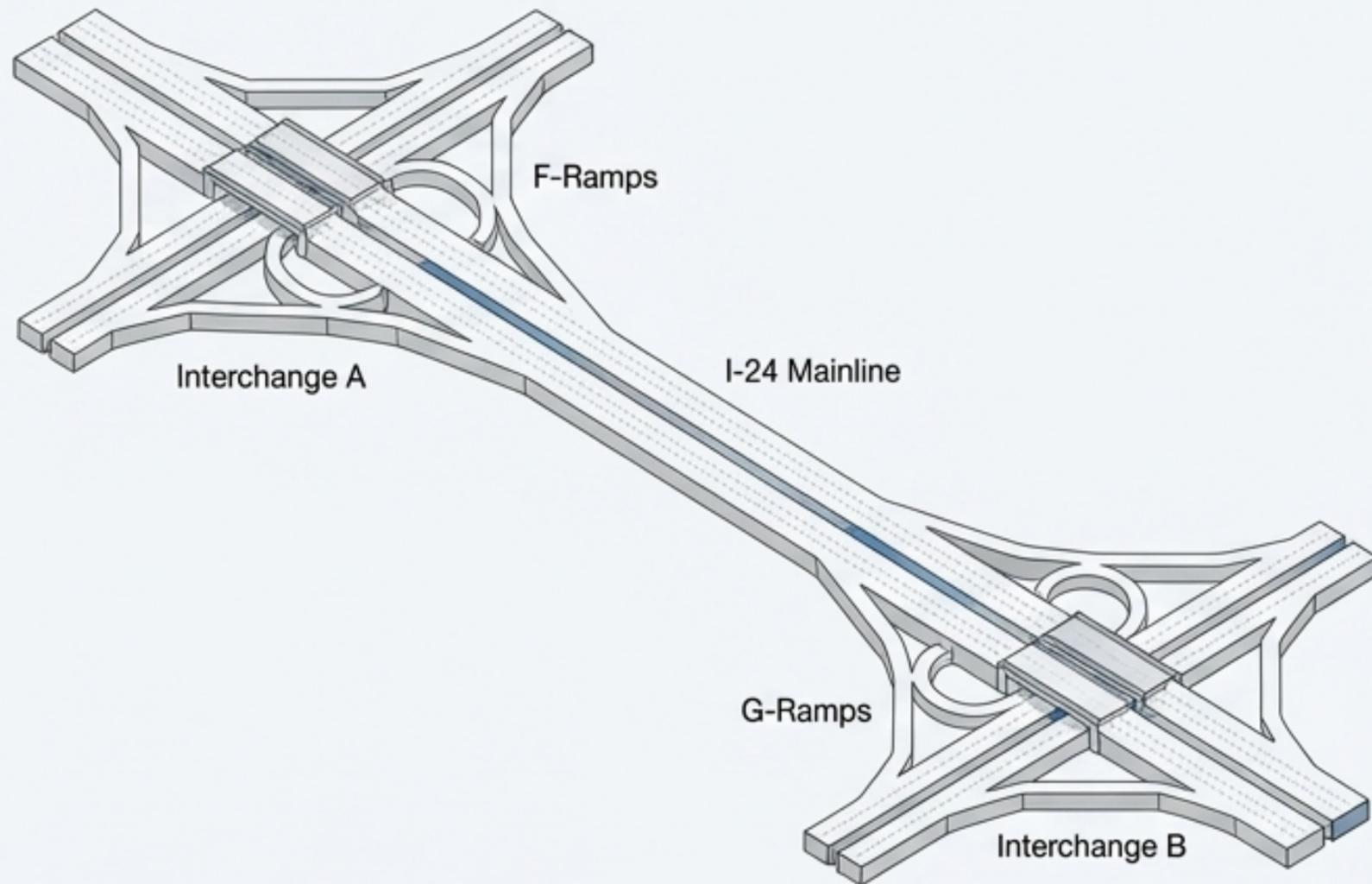
## Colling Creek (South & North)

**STATUS: FILES COMPLETELY MISSING**

Null data for this geographic footprint; earthwork balance will be fundamentally incomplete until files are supplied.

# Mass Earthwork QTO: I-24 Mainline

Note: Includes Ramps F1, F3, F5, F7, G5, G7, G6, G8 (Included in Mainline Surface)



Unclassified Excavation (Cut)

**340,410.30 CY**

Embankment (Fill)

**558,791.20 CY**

Rock Excavation

**151,963.78 CY**

# Mass Earthwork QTO: Interchanges & Ramps (F-Series)

RAMP	CUT (CY)	FILL (CY)	ROCK (CY)
Ramp F4	26,065.56	6,745.71	13,677.26
Ramp F6	26,905.95	8,705.21	9,281.07
Ramp F8	11,361.10	9.59	8,063.55
Ramp F2	2,631.02	3,723.39	2,176.75



**Critical Insight:** Exceptionally high rock excavation volumes are required specifically at Ramps F4 and F6.

# Mass Earthwork QTO: Interchanges & Ramps (G-Series & Blue Hole)

ELEMENT	CUT (CY)	FILL (CY)	ROCK (CY)
Blue Hole	0.26	23,793.65	0.00
Ramp G4	1,603.71	18,576.63	57.13
Ramp G2	1,822.73	11,627.58	9.60
Ramp G1	2,554.85	11,898.55	12.14
Ramp G3	356.16	10,270.62	2.95

 **Critical Insight:** Massive embankment fill requirements are highly concentrated at Blue Hole and Ramp G4.

# Master Quantity Take-off Summary (Earthwork Balance)

Project-Wide Totals (Sector S1 Provisional)

Total Unclassified  
Excavation (Cut)

413,711.64 CY

Total Rock  
Excavation

185,244.23 CY

Total Embankment  
(Fill)

654,142.13 CY

Calculation Indicator: (Fill) - (Cut + Rock)

**Net Import Required: ~55,186.26 CY**

(Based on current TIN geometries).

# Subgrade Preparation & Topsoil Summary

Subgrade Construction & Prep

**726,748.39 SY**

*Note: Consolidated square yardage across all S1 sectors. Represents surface preparation only; zero base material included.*

Topsoil Placement

**65,538.19 CY**

*Footnote: Values supplied as direct inputs; standard surface-area subtraction calculations bypassed per project directive.*



## Professional Disclaimer & Liability Notice

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

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TGR Tunnel Geotechnical Railways assumes no liability for the financial underestimation of undercut or soil stabilization materials resulting directly from the systemic omission of subgrade TIN files in the provided Sector S1 data package.



**Prepared by TGR Tunnel Geotechnical Railways**  
End of Sector S1 Earthwork Audit & QTO Summary.