



Mass Earthwork & Subgrade Preparation: Sector S7

Quantity Take-Off (QTO) Audit & Technical Baseline Report

Location:	Tennessee, USA
Framework:	TDOT Compliance
Audit Standard:	In-Place Geometric Validation
Prepared by:	TGR Tunnel Geotechnical Railways

QTO SCOPE: AUTHORIZED VS. EXCLUDED

PROJECT: SITE DEVELOPMENT | REPORT DATE: 2024.01.01 | STATUS: PRECISION REVIEW

SCOPE DEFINITION

AUTHORIZED SCOPE OF WORK

✓	Mass Earthwork Operations
✓	Subgrade Preparation & Construction
✓	Road & Drainage Excavation
✓	Embankment & Borrow
✓	Topsoil Placement

[WARNING] CONSTRAINT NOTE: Operations strictly limited to Subgrade level.

SCOPE APPROVED

EXCLUSION CRITERIA

EXPLICIT EXCLUSIONS

✗	Base Layer Construction
✗	Sub-Base Materials
✗	Asphalt / Concrete Placement

[WARNING] CONSTRAINT NOTE: Pavement Structure volume is entirely excluded from this QTO.

SCOPE DENIED

ZONE 1: I-24 Mainline Corridor Limits



ZONE 2: Basin and Access Driveway Footprint



TECHNICAL NOTE: Digital Terrain Models (DTM) extracted via Urban Mapping boundaries. Geographic context establishes absolute calculation limits.

DTM/TIN SURFACE AVAILABILITY & AUDIT (REV 1)

SECTOR	EG (EXISTING)	TOP	BOTTOM	BOTTOM SUBGRADE
RFE - Roadway I-24	✓ EXIST	✗ MISSING	✓ EXIST	✓ EXIST
<div style="border: 1px solid red; padding: 5px; text-align: center;"> STRUCTURAL VOID: Cannot determine pavement structure volume (Base/Sub-base vs. common fill) due to missing Top surface. </div>				
Basin & Access Driveway	✓ EXIST	✗ MISSING	✓ EXIST	✗ MISSING
<div style="border: 1px solid red; padding: 5px; text-align: center;"> DATA INVERSION: Missing Top surface leaves calculation vertically open, invalidating budget precision. </div>				

Technical Methodology & Assumptions



Locked Assumptions

Geotechnical Factor Applied (Shrinkage):	0.00%
Geotechnical Factor Applied (Swell):	0.00%
Rule Enforcement: Calculations are strictly geometric per provided models (TDOT "In-Place" compliance).	

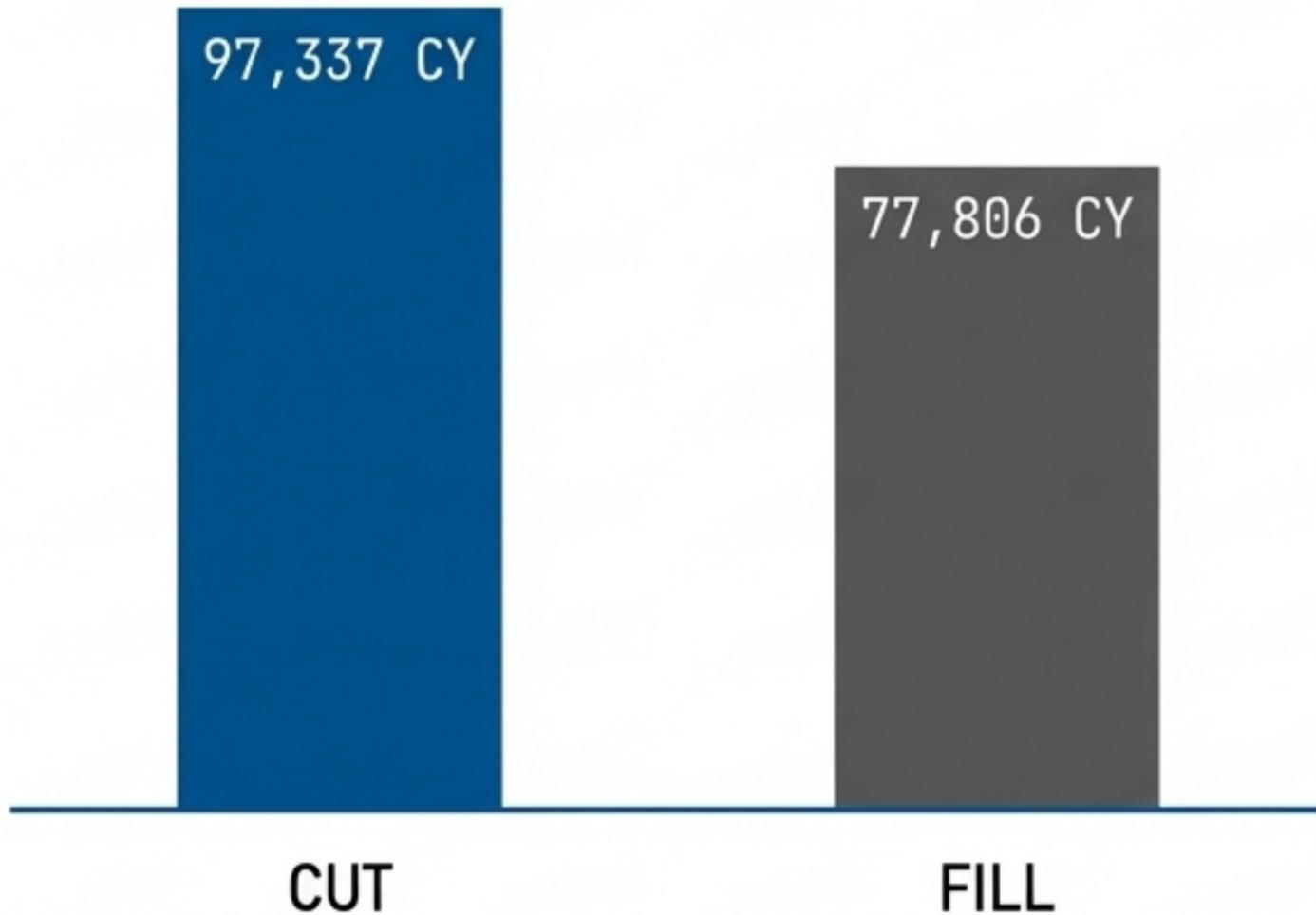
Unit Conversion Ledger

Volumes reported in Cubic Yards (CY) -> [ft³ / 27]

Areas reported in Square Yards (SY) -> [ft² / 9]

QTO Summary: S7 - RFE - Roadway - I-24

Earthwork Balance

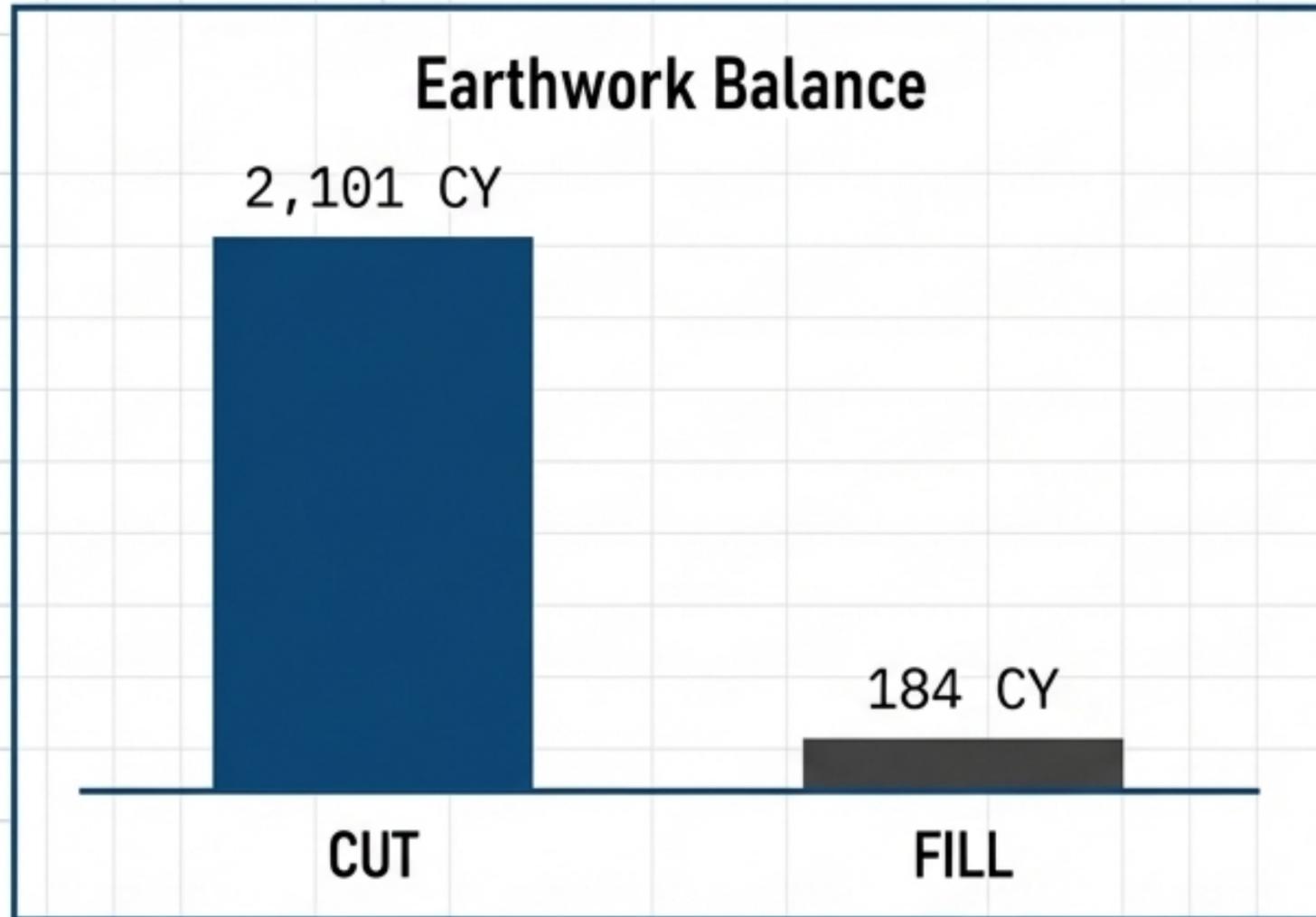


Operation	Volume
Unclassified Excavation (Cut)	97,285.94 CY
Rock Excavation (Cut)	51.06 CY
Embankment & Borrow (Fill)	77,806.03 CY
Topsoil Placement	26,696.26 CY

NET VOLUME BALANCE: 19,530.97 CY (Net Cut / Export)

WARNING: OPEN CALCULATION RISK. Top surface missing. Volumes represent best-available geometric interpretation.

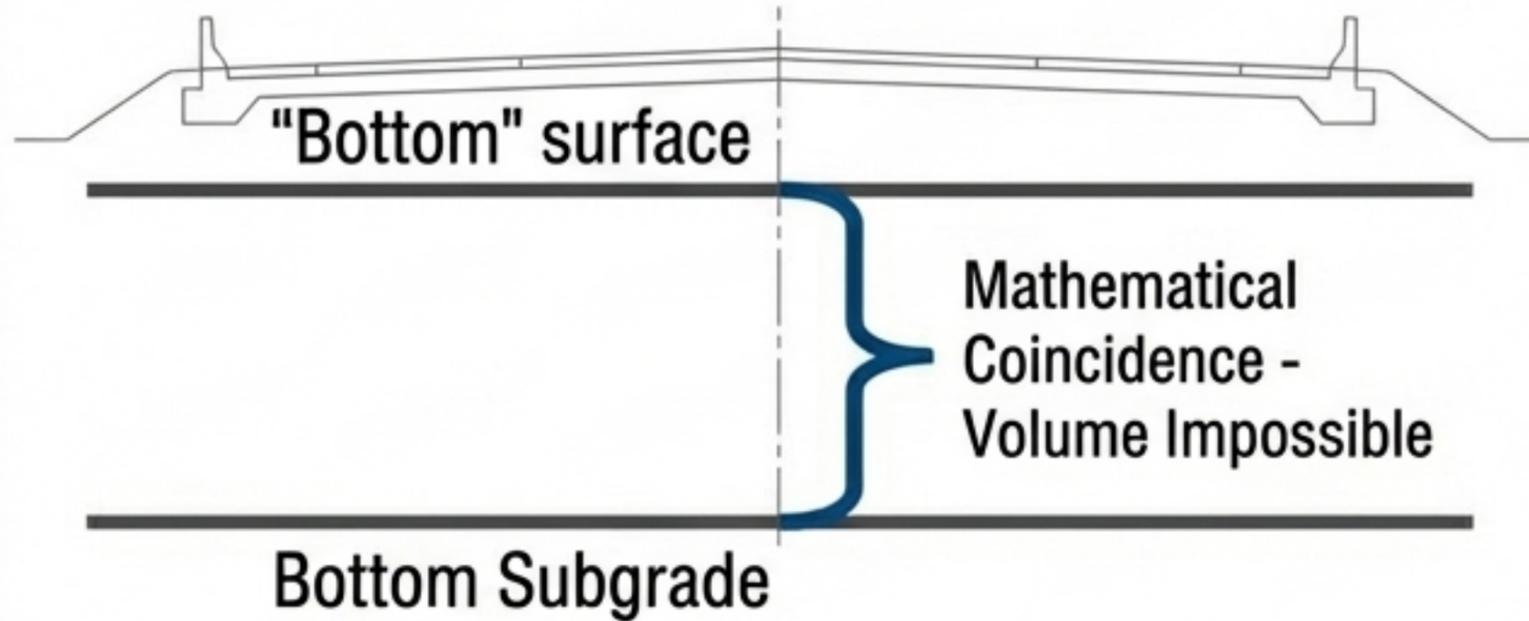
QTO Summary: S7 - Basin & Access Driveway



Operation	Volume
Unclassified Excavation (Cut)	2,101.21 CY
Embankment & Borrow (Fill)	184.08 CY
Topsoil Placement	718.24 CY

NET VOLUME BALANCE: 1,917.13 CY (Net Cut / Export)

Critical Technical Notes: Subgrade & Undercut



Total Subgrade Preparation Area:	454,221.75 SY
Undercut Roadway Subgrade Modeled:	0.00 SY

Analytical Conclusion

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- **The Subgrade Coincidence Issue:** Current XML models do not clearly differentiate between the design Bottom and Bottom Subgrade surfaces. They are mathematically coincident.
- **Finding:** The subgrade appears stable as modeled. If physical Undercut is actually required on-site, it is unequivocally not reflected in the provided digital models.



Professional Disclaimer & Liability Notice

DATA RELIANCE

Quantities are based exclusively on the provided digital XML/DGN models. No geotechnical soil correction factors (Shrink/Swell) have been applied.

LIABILITY TRANSFER

Final field verification and any risks arising from unidentified undercut requirements or structural voids (due to missing TOP surfaces) are the sole responsibility of the client.

CERTIFICATION LIMITATION

Variations in total volumes and mass balance resulting from insufficient surface differentiation (BOTTOM vs. BOTTOM SUBGRADE) run at the client's risk.



Mass Earthwork QTO Audit Complete.

S7 Sector Baseline Established.

Prepared by TGR Tunnel Geotechnical Railways.