

Mass Earthwork & Subgrade Preparation QTO

Sector S3 – Tennessee Infrastructure Project

Senior Civil Engineer & Quantity Surveyor Audit

Prepared by TGR Tunnel Geotechnical Railways

Executive Summary & Project Scope



Included Scope

Focus: Mass Earthwork Operations & Subgrade Preparation strictly up to the Subgrade level.

Objective: Deliver a definitive Black and White summary of quantities and geometric assumptions for professional client review.

Compliance: Aligned with U.S. Standards & TDOT Framework metrics.



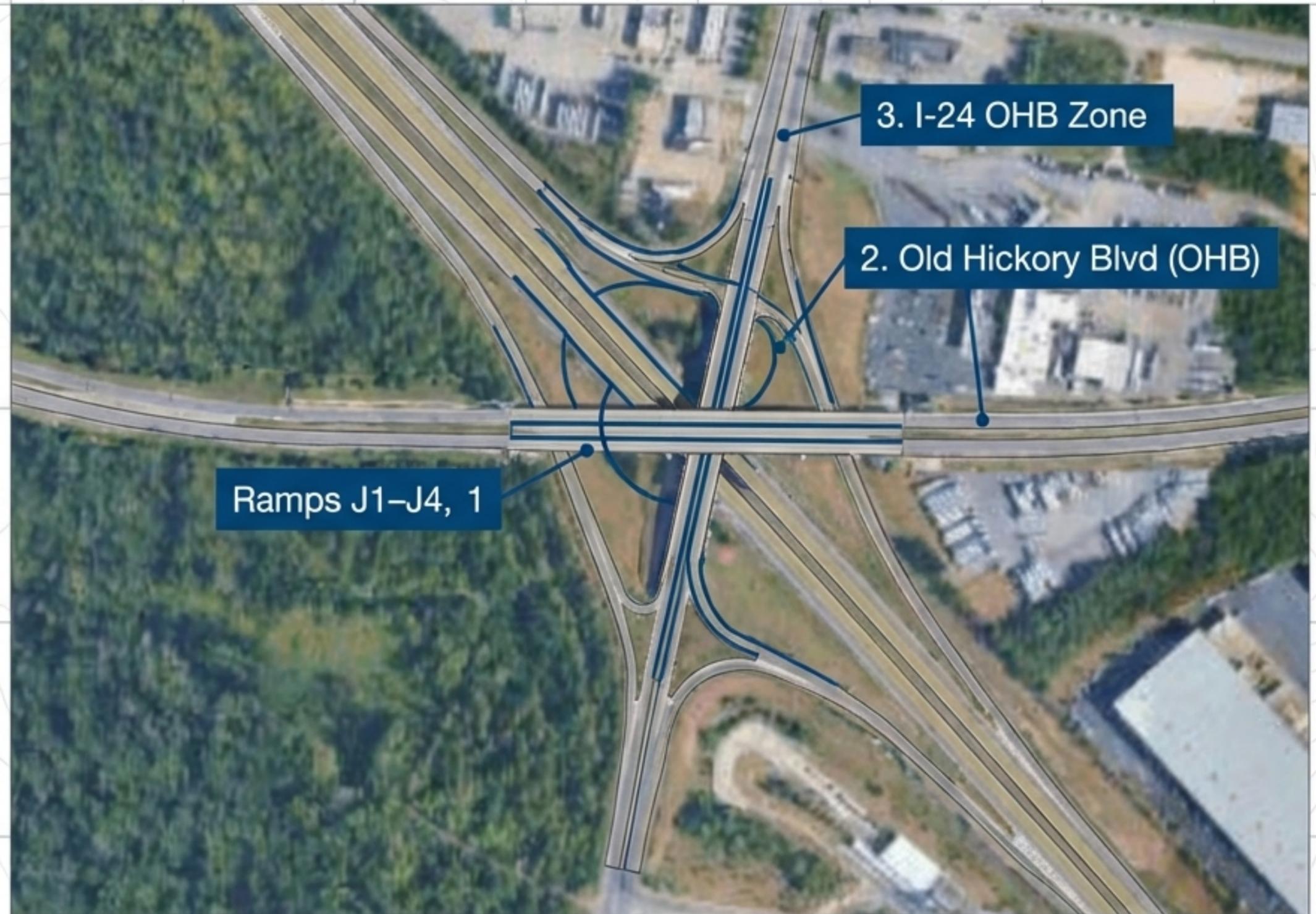
Strict Exclusions

Pavement Structure (Base, Sub-base, Asphalt/Concrete) is NOT included in this QTO.

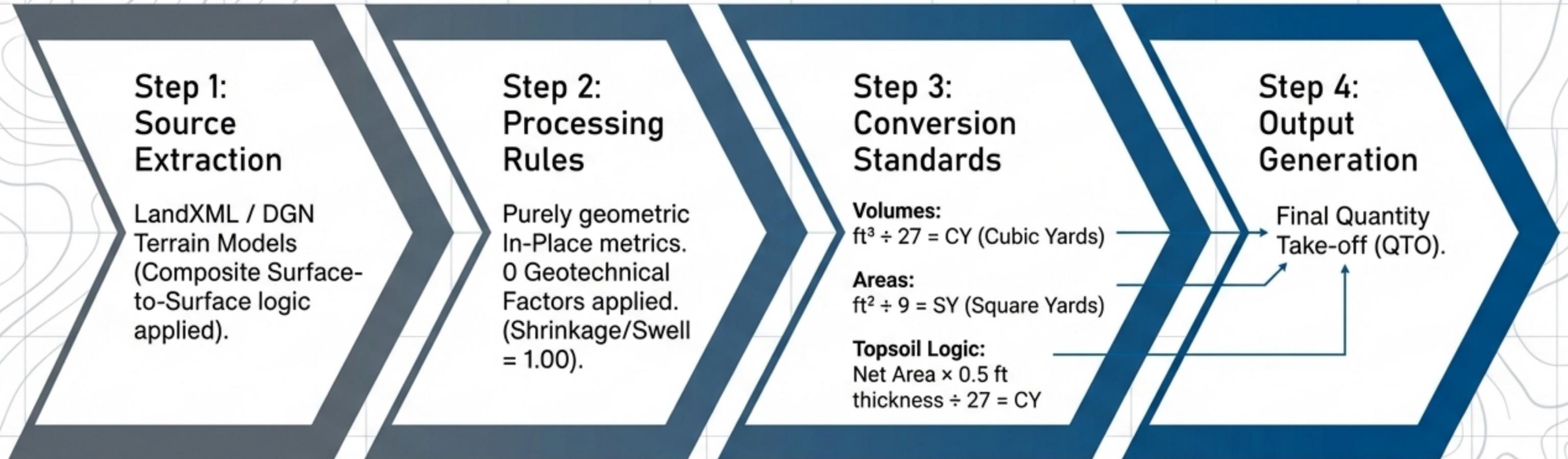
Site Context & Geometric Limits

Sector S3 Bounds

The highlighted areas constitute the exact physical and geometric limits of Sector S3 for this earthwork calculation. Operations are confined strictly to these identified corridors.



Technical Methodology & Pipeline



Global Earthwork Balance (S3 Summary)

Total Unclassified Excavation (Cut)

126,623.48 CY (Road/Drainage)
+ 30,829.91 CY (Rock)

157,453.39 CY

Total Embankment (Fill)

Aggregated Roadway Subgrade
Embankment

107,564.50 CY

Net Volume (Balance)

Surplus Export Value

+ 49,888.89 CY

Data reflects geometric In-Place Yardage. No Shrinkage/Swell factors applied.

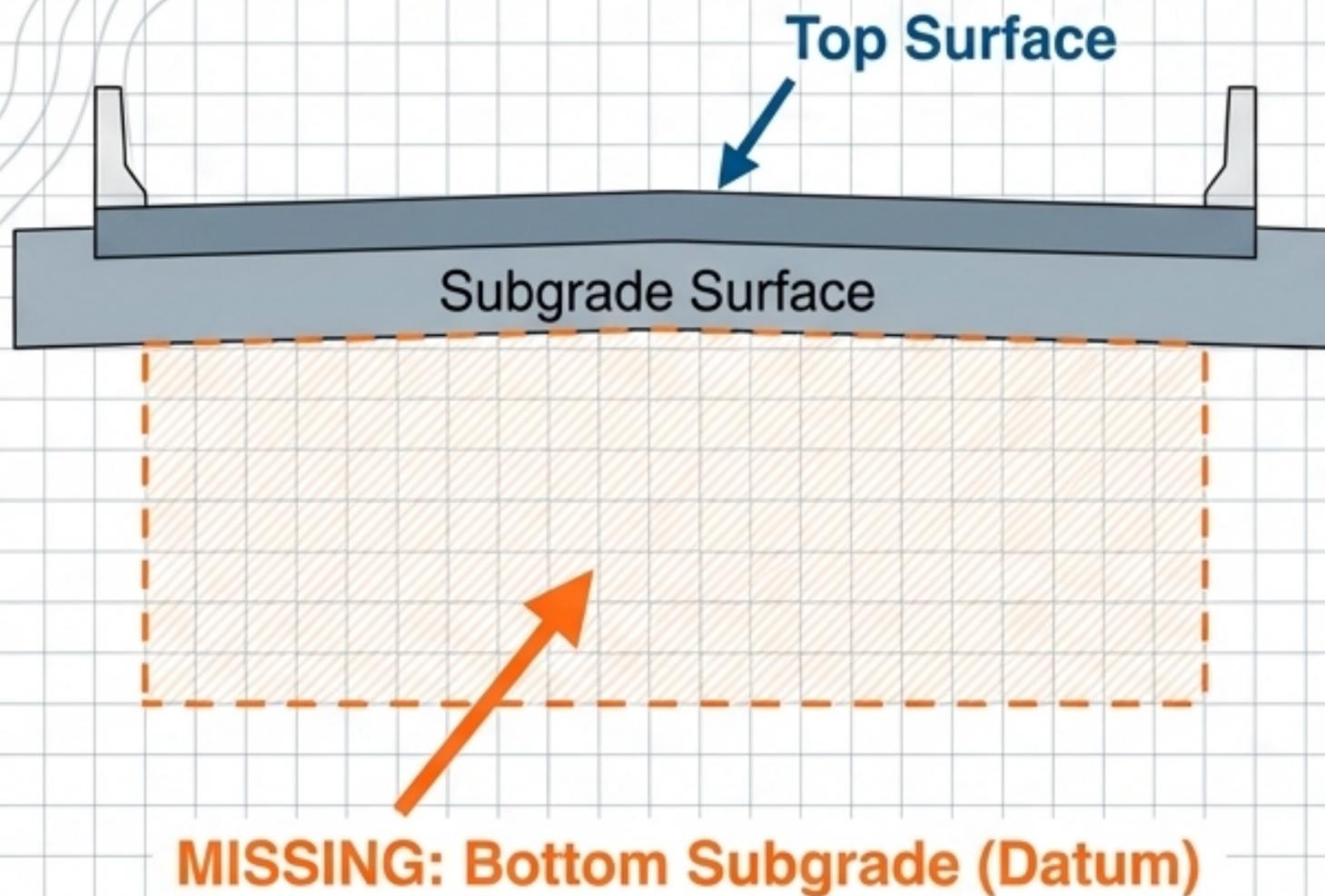
Area Breakdown Matrix (CY & SY)

| Sector | Road/Drainage Cut (CY) | Embank Fill (CY) | Rock Cut (CY) | Topsoil (CY) | Subgrade Prep (SY) |
|----------------------|------------------------|------------------|------------------|------------------|--------------------|
| Ramp J4 | 4,030.19 | 1,431.93 | 0.00 | 933.17 | 10,445.81 |
| Ramp J3 | 6,153.56 | 5,803.53 | 197.07 | 1,439.79 | 18,509.03 |
| Ramp J2 | 7,071.60 | 189.79 | 0.00 | 827.00 | 8,860.68 |
| Ramp J1 | 5,222.08 | 2,323.80 | 28.20 | 864.36 | 9,824.56 |
| Old Hickory Blvd | 5,552.23 | 7,157.79 | 3.27 | 1,040.48 | 21,232.30 |
| I-24 OHB Zone | 98,593.82 | 90,657.66 | 30,601.37 | 16,586.65 | 275,434.16 |

Model & Surface Integrity Audit

| Sector | Top Surface | Bottom Surface | Bottom Subgrade | Existing Ground (EG) |
|------------------|-------------|----------------|-----------------|----------------------|
| Ramps J4, J3, J2 | ✓ | ✓ | ✗ | ✓ |
| Old Hickory Blvd | ✓ | ✗ | ✗ | ✓ |
| I-24 OHB Zone | ✓ | ✗ | ✓ | ✓ |
| Ramp J1 | ✓ | ✓ | ✓ | ✓ |

Critical Technical Risk: The Undercut Gap



The Issue

Bottom Subgrade is missing or ambiguously labeled for major project zones (J2-J4, OHB).

The Impact

Because the distinction between Subgrade and Bottom Datum is absent, Undercut Roadway Subgrade metrics are forced to report as 0.00 SY (Roboto Mono).

The Risk

The current model implies the subgrade is perfectly stable. It is mathematically impossible to calculate the volume/thickness of select fill or stone required for soil improvement without these surfaces, risking significant underestimation of high-cost materials.

DIN Alternate

Engineering Baseline

Quantities are calculated purely geometrically 'In-Place'. No geotechnical studies were provided; therefore, no correction factors for soil type (Shrink/Swell) have been applied.

Professional Disclaimer (Liability)

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