

Sector S2 Earthwork Audit & Quantity Take-off

Mass Earthwork & Subgrade Preparation Analysis

Project Location: Tennessee, USA

Report Standard: TDOT Compliance Framework

Mass Earthwork Operations (IN SCOPE)

- Unclassified Excavation (Cut)
- Embankment & Borrow (Fill)
- Rock Excavation
- Topsoil Placement
- Subgrade Preparation (SY)



Strictly calculated up to Subgrade level.

Pavement Structure (EXCLUDED)

- ~~Base layers~~
- ~~Sub-base aggregates~~
- ~~Asphalt/Concrete paving~~

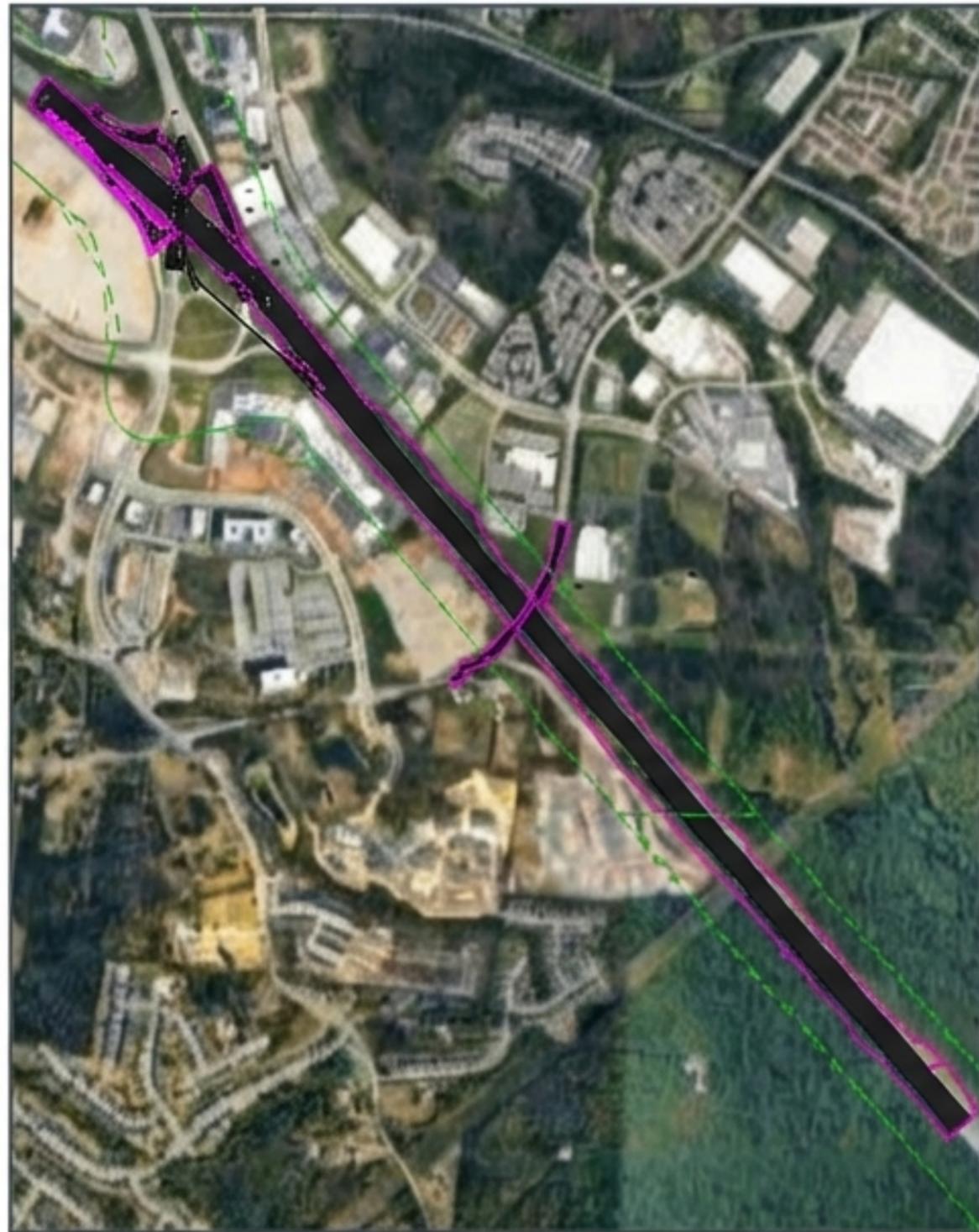
Deliver a strictly **'Black and White'** summary of in-place yardage quantities and technical assumptions for executive review.

Sector S2 Alignment Footprint

Analyzed models include primary roadways and 5 connectivity ramps.



I-24 HH Zone & Mainline



Connectivity Ramps H1-H5



Technical Methodology & Standards

Step 1: Digital Volume Extraction

- **Method:** Composite Surface-to-Surface Analysis
- **Metrics:** In-place geometry (TDOT Compliance)

Step 2: Conversion Matrix

**Cubic Yardage
(Earthwork & Rock):**
 $\text{ft}^3 \div 27 = \text{CY}$

**Square Yardage
(Subgrade Prep):**
 $\text{ft}^2 \div 9 = \text{SY}$

Topsoil Calculation:
 $|\text{Area 1} - \text{Area 2}| \times$
 0.5ft thickness
 $\div 27 = \text{CY}$

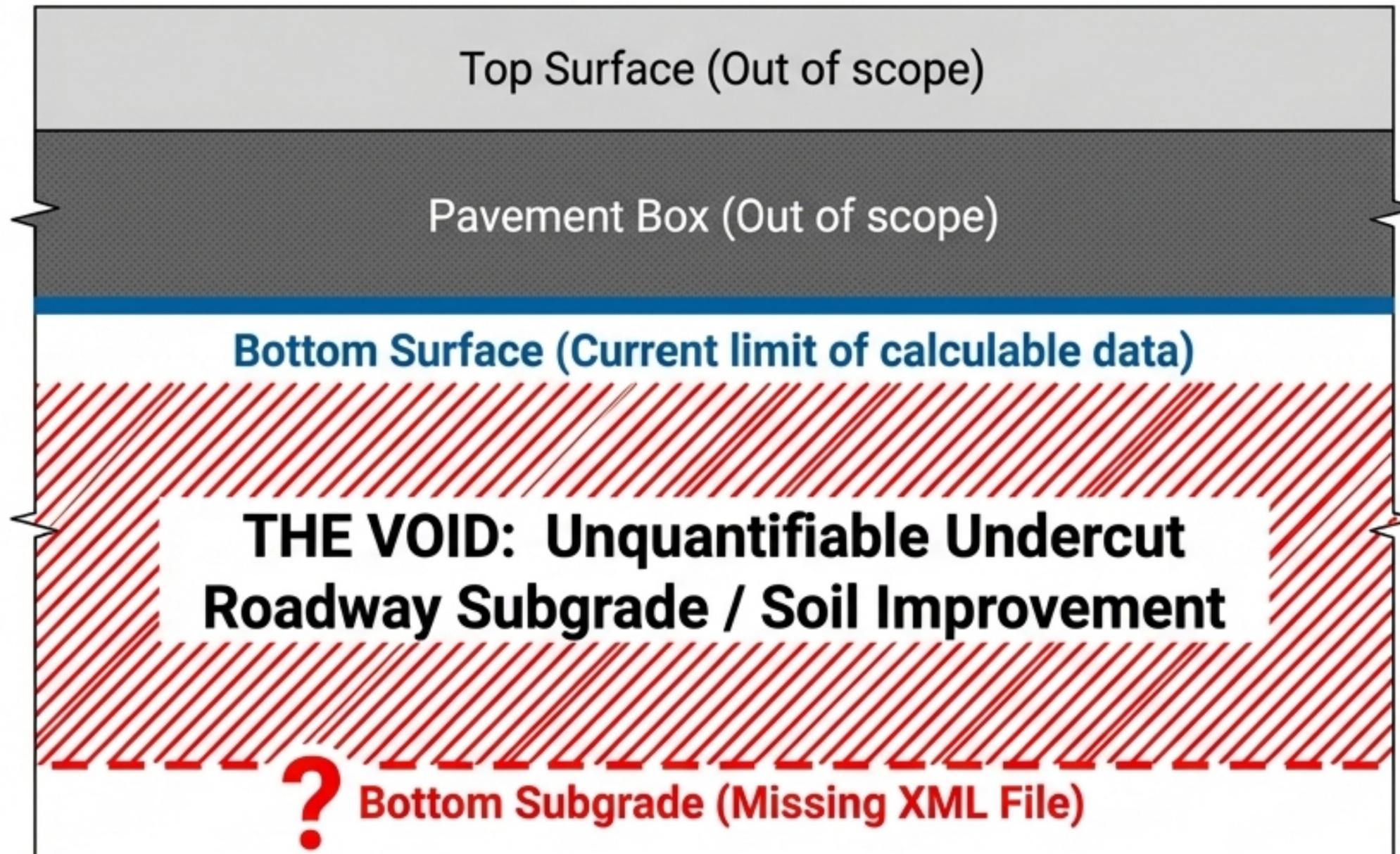
Note: Calculations strictly utilize provided terrain XML files: Existing Terrain (I-24 Urban Mapping / Top of Rock 5) vs. Design Bottom Surfaces.

Model & Surface Integrity Matrix

Alignment	Existing Ground (EG)	Top Surface	Bottom Surface	Bottom Subgrade
I-24 HHP Zone	EXIST ✓	EXIST ✓	EXIST ✓	MISSING ✗
Hickory Hollow & Old Franklin	EXIST ✓	EXIST ✓	EXIST ✓	MISSING ✗
Ramps H1-H5	EXIST ✓	EXIST ✓	EXIST ✓	MISSING ✗
Pedestrian Bridge	EXIST ✓	MISSING ✗	MISSING ✗	MISSING ✗
Ramps H1-A, H2-A, H3-A	EXIST ✓	MISSING ✗	MISSING ✗	MISSING ✗

Critical Data Gap:
Bottom Subgrade definitions are 100% absent across the entire S2 digital model delivery.

CRITICAL TECHNICAL NOTE: The Subgrade Gap



Technical Risk: Omitting the Bottom Subgrade surface forces the modeling assumption that it is identical to the Bottom. This effectively zeroes out Undercut volumes.

High-cost materials required for subgrade stabilization cannot be quantified and represent a severe unmitigated project risk.

Sector S2 Master Earthwork Balance

Total Unclassified Excavation (Cut)

222,936 CY

Total Embankment (Fill)

95,125 CY

Total Rock Excavation

133,978 CY

Net Earthwork Balance

+127,811 CY

(Net Excavation/Export)

Total Subgrade Preparation: 456,925 SY

Total Topsoil Placement: 26,861 CY

Totals aggregate I-24 Mainline, local roads, and Ramps H1-H5 based solely on in-place digital geometry.

Detailed QTO: Mainline & Primary Corridors

Alignment	Cut (CY)	Fill (CY)	Rock (CY)	Topsoil (CY)	Subgrade (SY)
I-24 HH Zone	210,948.93	68,135.95	130,539.68	23,354.85	377,406.07
Hickory Hollow Pkwy	1,053.28	4,802.67	4.23	69.70	14,048.28
Old Franklin Rd	688.78	4,541.39	1,996.01	1,049.22	13,949.54

Context Note: The I-24 HH Zone accounts for over 94% of the Sector S2 total excavation volume.

Detailed QTO: Connectivity Ramps (H1 - H5)

Alignment	Cut (CY)	Fill (CY)	Rock (CY)	Topsoil (CY)	Subgrade (SY)
Ramp H1	1,714.11	3,976.51	420.16	702.08	10,027.21
Ramp H2	307.72	8,034.36	8.02	633.33	11,169.64
Ramp H3	3,391.86	5,535.99	0.68	743.68	14,583.11
Ramp H4	3,555.75	98.02	758.99	233.38	6,893.26
Ramp H5	1,275.86	0.59	250.68	76.59	1,817.55

Professional Assumptions & Liability Demarcation



Geotechnical Limitation: Due to the absence of comprehensive geotechnical studies, no Shrinkage or Swell factors have been applied to these volumetric calculations. All quantities represent raw, in-place digital geometry.



Digital Model Dependency: All presented yardages are derived exclusively from the provided XML surface models.



Client Responsibility: Quantities are based on provided digital models. Final field verification and any financial or schedule risks arising from unidentified undercut roadway subgrade requirements are the sole responsibility of the client.