

# Sector S6 Earthwork & Subgrade Preparation

## Diagnostic Audit & Quantity Take-Off (QTO)

Tennessee, USA (TDOT Compliance Review)

### SCOPE & LIMITS:

- **FOCUS:** Mass Earthwork Operations strictly up to Subgrade Level.
- **EXCLUSION:** Pavement Structure (Base, Sub-base, Asphalt/Concrete) is explicitly excluded from this quantification.

## S6 Earthwork Overview

Total Unclassified Excavation (Cut):

**75,673.60 CY**

Total Embankment (Fill):

**33,967.85 CY**

Total Subgrade Prep Area:

**138,184.55 SY**

*\*Values represent calculable in-place yardage across all Sector S6 alignments.\**

### CRITICAL SYSTEMATIC DEFICIENCY

The digital twin for Sector S6 presents a dual liability risk:

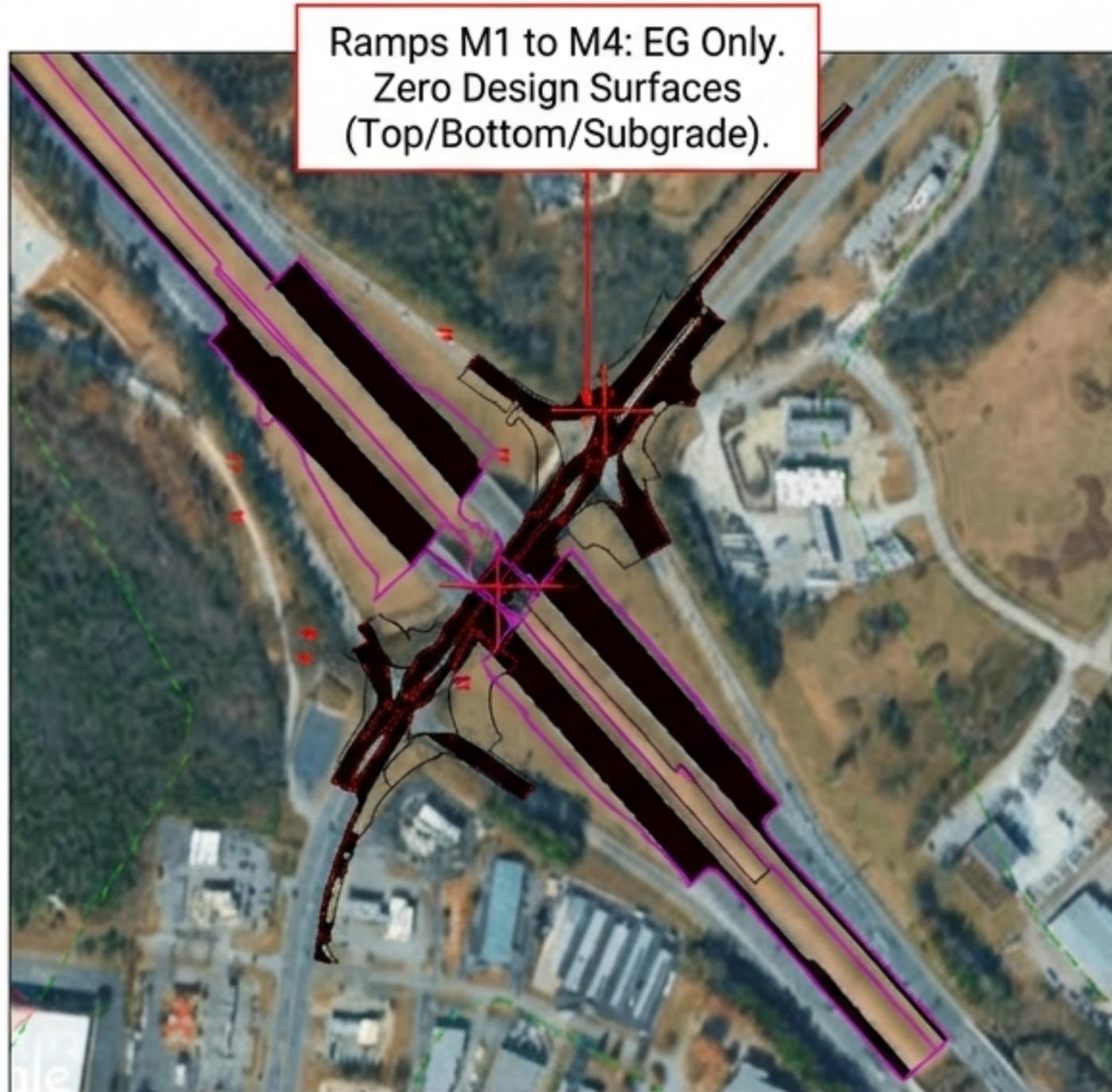
1. Total Subgrade Omission: 100% of Sector S6 elements lack a subgrade surface, blocking all calculations for soil stabilization (Undercut).
2. Total Design Blackout: Ramps M1, M2, M3, and M4 have no design surfaces whatsoever, preventing preliminary cubing and posing an imminent risk of massive change orders.

# Digital Twin Integrity Audit: Surface Identification

| Element                                   | Existing Ground (EG) | Top Surface    | Bottom Surface | Bottom Subgrade |
|---|----------------------|----------------|----------------|-----------------|
| I-24 WB-Ramp M5, Ramp M6, I-24 EB         | EXIST                | EXIST          | EXIST          | <b>MISSING</b>  |
| NB Almaville, SB Almaville                | EXIST                | EXIST          | EXIST          | <b>MISSING</b>  |
| Ramps M1-M1A, M2A-M2B, M3A-M3B, M4-M4A    | EXIST                | EXIST          | EXIST          | <b>MISSING</b>  |
| Ramps M1, M2, M3, M4 - Core Intersections | EXIST                | <b>MISSING</b> | <b>MISSING</b> | <b>MISSING</b>  |

The universal absence of **Bottom Subgrade (XML)** forces the mathematical assumption that all subgrade is perfectly stable. Undercut Roadway Subgrade yields a forced result of 0.00 SY.

# Spatial Risk Mapping: The Design Blackout Zones



Unquantifiable Zone:  
Substantial earthwork variability  
expected upon receipt of final  
structural design.

While main axes (I-24 EB, Almadillo) have validated Top and Bottom files allowing pavement structure bypass, the connecting intersections (M-series ramps) are total design voids.

# Technical Methodology & Calculation Parameters



## TDOT Compliance & Geometric Rules

- Processing of raw LandXML/DGN models using strict Composite Surface-to-Surface methodologies.
- Exclusion of Pavement Structure volume by measuring strictly below the "Bottom" surface.



## U.S. Estimating Groupings

- "Road & Drainage Excavation" + "Rock Excavation" are mathematically combined into a single U.S. Standard "Unclassified Excavation (Cut)" metric for the consolidated dashboards.



## The 0.00 SY Anchor & Geotechnical Assumptions

- Calculations represent **pure In-place Yardage**.
- **No Geotechnical Factors** applied: Shrinkage and Swell factors are excluded pending final reports.
- **Undercut Subgrade**: Recorded strictly as 0.00 SY across all S6 elements, reflecting the missing digital twin data rather than field reality.

## S6 Master Quantity Take-Off (Cubic Yards)

| Alignment       | Unclassified Excavation (Cut) | Embankment (Fill) | Topsoil Placement | Subgrade Prep (SY) |
|-----------------|-------------------------------|-------------------|-------------------|--------------------|
| I-24 EB         | 19,586.52 CY                  | 18,375.07 CY      | 6,123.07 CY       | 57,287.50 SY       |
| I-24 WB-Ramp M5 | 11,256.28 CY                  | 11,345.66 CY      | 4,022.07 CY       | 44,686.66 SY       |
| NB Almadillo    | 2,060.25 CY                   | 371.85 CY         | 200.23 CY         | 7,905.32 SY        |
| SB Almadillo    | 8,085.52 CY                   | 508.81 CY         | 393.33 CY         | 10,029.31 SY       |
| Ramps M1-M1A    | 534.98 CY                     | 1,576.70 CY       | 289.76 CY         | 3,220.28 SY        |
| Ramps M2A-M2B   | 8,003.81 CY                   | 206.40 CY         | 362.53 CY         | 3,732.08 SY        |
| Ramps M3A-M3B   | 417.15 CY                     | 1,516.64 CY       | 236.86 CY         | 2,444.01 SY        |
| Ramps M4-M4A    | 10,795.23 CY                  | 16.71 CY          | 593.15 CY         | 4,685.61 SY        |
| Ramp M6         | 14,933.86 CY                  | 50.01 CY          | 584.04 CY         | 4,193.78 SY        |

**Sector S6 Undercut Roadway Subgrade: 0.00 SY (Refer to Integrity Audit)**

# Earthwork Balance Detail: Main Axes & Corridors

| <b>I-24 EB</b>         |           |    |
|------------------------|-----------|----|
| Road & Drainage (Cut): | 17,262.42 | CY |
| Rock Excavation:       | 2,324.10  | CY |
| Embankment (Fill):     | 18,375.07 | CY |
| Subgrade Prep:         | 57,287.50 | SY |

| <b>I-24 WB-Ramp M5</b> |           |    |
|------------------------|-----------|----|
| Road & Drainage (Cut): | 11,212.82 | CY |
| Rock Excavation:       | 43.46     | CY |
| Embankment (Fill):     | 11,345.66 | CY |
| Subgrade Prep:         | 44,686.66 | SY |

| <b>NB Almaville</b>    |          |    |
|------------------------|----------|----|
| Road & Drainage (Cut): | 2,029.40 | CY |
| Rock Excavation:       | 30.85    | CY |
| Embankment (Fill):     | 371.85   | CY |
| Subgrade Prep:         | 7,905.32 | SY |

| <b>SB Almaville</b>    |           |    |
|------------------------|-----------|----|
| Road & Drainage (Cut): | 4,396.81  | CY |
| Rock Excavation:       | 3,688.71  | CY |
| Embankment (Fill):     | 508.81    | CY |
| Subgrade Prep:         | 10,029.31 | SY |

## Earthwork Balance Detail: Interchanges & Ramps

### Ramps M2A-M2B

Road & Drainage: 5,084.17 CY | Rock: 2,919.64 CY | Fill: 206.40 CY

### Ramps M1-M1A

Road & Drainage: 534.87 CY | Rock: 0.11 CY | Fill: 1,576.70 CY

### Ramps M3A-M3B

Road & Drainage: 416.69 CY | Rock: 0.46 CY | Fill: 1,516.64 CY

### Ramps M4-M4A

Road & Drainage: 6,852.27 CY | Rock: 3,942.96 CY | Fill: 16.71 CY

### Ramp M6

Road & Drainage: 11,922.18 CY | Rock: 3,011.68 CY | Fill: 50.01 CY

*\*Note: Intersections M1, M2, M3, and M4 excluded from this detail due to 100% missing design geometry.*

## Critical Technical Notes & Professional Disclaimer

Quantities are mathematically derived exclusively from the provided digital models. Due to the total absence of 'Bottom Subgrade' XML files across Sector S6, all calculations inherently assume stable subgrade conditions.

- No geotechnical correction factors (Shrinkage/Swell) have been applied.
- Zero (0.00 SY) Undercut values are a reflection of missing digital data, not field reality.

**FINAL FIELD VERIFICATION AND ANY FINANCIAL RISKS ARISING FROM UNIDENTIFIED UNDERCUT REQUIREMENTS OR SUBSEQUENT RAMP REDESIGNS ARE THE SOLE RESPONSIBILITY OF THE CLIENT.**