


TENNESSEE
DEPARTMENT OF TRANSPORTATION



TECHNICAL REPORT
INTERSTATE 24
FROM I-59 TO I-124
L.M. 1.63 (GEORGIA) TO L.M. 7.33 (TENNESSEE)
DADE COUNTY, GEORGIA
HAMILTON COUNTY, TENNESSEE
PIN 124072.00

PREPARED BY ALFRED BENESCH & COMPANY
for the
Strategic Transportation Investments Division

| Recommended by: | Signature | DATE |
|---|--|---------|
| TRANSPORTATION DIRECTOR STRATEGIC TRANSPORTATION INVESTMENTS DIVISION |  | 8-21-18 |

This document is covered by 23 USC § 409 and its production pursuant to fulfilling public planning requirements does not waive the provisions of § 409.

Executive Summary

Purpose of Study

The purpose of this Technical Report is to provide an overview of the existing route deficiencies, define the preliminary purpose and need for the project, and provide a preliminary design that is feasible, cost effective, and provides improved mobility for this segment of Interstate 24 from Interstate 59 (L.M. 1.63) in Georgia to Interstate 124 (L.M. 7.33) in Tennessee. The proposed project was initiated as result of the Improving Manufacturing, Public Roads and Opportunities for a Vibrant Economy (IMPROVE) Act project delivery commitments.

Description of the Existing Routes

This section of I-24 is functionally classified as an Urban Interstate and consists primarily of a four (4) lane depressed grass median divided Urban section. The typical section consists of two (2) twelve (12) foot travel lanes in each direction, four (4) to twelve (12) foot paved outside shoulders and four (4) to eighteen (18) foot paved inside shoulders. The existing road is a major interstate entering Chattanooga and the adjacent land use primarily consists of commercial developments. The speed limit along the existing roadway ranges from 55 MPH to 70 MPH. Overall the route has an inadequate number of travel lanes to handle the current and future traffic volumes.

Existing Traffic and Safety Conditions

The base year (2022) annual average daily traffic (AADT) for the section of I-24 under study is 69,630 vehicles per day. The design year (2042) AADT is projected to be 89,230 vehicles per day. The route was analyzed utilizing methodologies from the Highway Capacity Manual (HCM) to evaluate existing operating conditions.

The analysis indicates that much of the route either currently operates at or will eventually reach a Level of Service (LOS) F during the peak hours. This means that the route is likely at or near capacity, which will result in congestion and delay.

Crash data was reviewed and crash rates were calculated for individual segments along I-24. Total crash rates are consistently below the Tennessee statewide average rate throughout the route and the severe crash rates never exceed the statewide severe crash rate average.

Conceptual Alternatives

After evaluating the safety, operational, and geometric conditions on the existing route within the study limits, two (2) conceptual alternatives were considered to address the deficiencies: No Build and Widen Interstate 24 to three (3) lanes in each direction.

The No Build alternative assumes that only routine maintenance and that no major modifications or improvements will be implemented.

The Build alternative adds one (1) travel lane in each direction to increase the total number of lanes to six (6) along this section of I-24. The proposed typical section will include three (3) twelve (12) foot travel lanes in each direction, twelve (12) foot inside shoulders and twelve (12) foot outside shoulders. From the I-59 (L.M. 1.63) in Georgia to just east of the Browns Ferry Road interchange (approx. L.M. 4.70) in Tennessee, the interstate will be widened towards the inside median, with guardrail and barrier/retaining walls as needed due to grade difference. The remainder of the route will widen mostly to the south with a median barrier and a retaining wall along the eastbound edge of outside shoulder. As per the direction of TDOT Structures and GDOT Structures, the Build alternative will replace six (6) sets of side by side bridges in Tennessee and widen two (2) sets of side by side bridges in Georgia.

Existing right-of-way (ROW) varies from approximately two hundred (200) feet to three hundred (300) feet wide and it appears that most of the improvements can be completed within existing ROW. A small portion (approx. 0.40 acres) of ROW will be required near the end of the project as it ties into I-124 (US-27).

In addition to the proposed roadway improvements in the build alternative, twelve (12) structures within the project limits will be replaced and two (2) will be widened. Any culverts, or other concrete structures under I-24 that are impacted by the widening will be extended or replaced. The existing Box Culvert / Access Road (L.M. 1.27 in Tennessee) that connects areas of the quarry split by the interstate will need to be evaluated by TDOT Structures to determine if it needs modification or upgrading due to the additional loading.

Approximately five (5) ITS poles located in the median and two (2) Dynamic Message Signs (DMS) will need to be replaced/relocated. Railroad coordination will be necessary to ensure that impacts to railroad operations are minimized and access during construction is available as needed. Design Exceptions for limited stopping sight distance due to proposed median barrier on the inside of horizontal curves may be required in the proposed build alternative.

Traffic and Operation Comparison

The proposed build alternative will reduce congestion and delays throughout this section of I-24. The additional travel lane in both the eastbound and westbound directions will reduce the vehicular density along the route and improve overall travel time. Below is a table showing the Level of Service (LOS) difference between the No Build and the Build alternative. It is important to note that the segment from Browns Ferry Road to U.S. 27 fails prior to the design year of 2042. A LOS of D is maintained until 2031 and an E is maintained until 2040.

| Level of Service Comparison | | | | |
|---------------------------------------|------|-----------|----------------|-------------|
| Segment | Year | Peak Hour | LOS (No Build) | LOS (Build) |
| I-24 from I-59 to GA State Line | 2022 | AM | D | C |
| | | PM | D | C |
| | 2042 | AM | F | C |
| | | PM | F | C |
| I-24 from GA State Line to S.R. 2 | 2022 | AM | D | C |
| | | PM | E | C |
| | 2042 | AM | F | D |
| | | PM | F | D |
| I-24 from S.R. 2 to Browns Ferry Rd. | 2022 | AM | E | C |
| | | PM | E | C |
| | 2042 | AM | F | D |
| | | PM | F | D |
| I-24 from Browns Ferry Rd. to U.S. 27 | 2022 | AM | F | D |
| | | PM | F | D |
| | 2042 | AM | F | F* |
| | | PM | F | F** |

* LOS E in 2031, LOS F in 2040

** LOS E in 2032, LOS F in 2041

Cost Estimate

Due to overall length and cost of the project, the I-24 corridor has been divided into three (3) segments:

Segment 1: From the I-59 interchange to the Georgia State Line

Segment 2: From the Georgia State Line to just east of Browns Ferry Road

Segment 3: From just east of Browns Ferry Road to I-124 (U.S. 27)

The total estimated planning level cost for preliminary engineering, right-of-way and utilities, and construction for this project (per segment) is broken down below:

| Segment | Description | Length (Miles) | PE | ROW & UTIL. | CONST | Preliminary Cost |
|-----------|--|----------------|-------------|-------------|---------------|----------------------|
| Segment 1 | From I-59 to GA State Line | 2.47 | \$2,406,000 | \$0 | \$33,691,000 | \$36,097,000 |
| Segment 2 | From GA State Line to East of Browns Ferry Rd. | 4.73 | \$3,564,000 | \$94,000 | \$82,112,000 | \$85,770,000 |
| Segment 3 | From East of Browns Ferry Rd. to I-124 (US-27) | 2.60 | \$3,555,000 | \$250,000 | \$83,591,000 | \$87,396,000 |
| Totals | | 9.80 | \$9,525,000 | \$344,000 | \$199,394,000 | \$209,263,000 |

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1.0 Introduction

The Technical Report process involves a comprehensive study of all historic, current, and projected highway data. An assembled team reviews the project to validate identified deficiencies and determine cost effective measures to resolve the existing conditions with an emphasis placed on motorist safety, mobility and operations.

The purpose of this Technical Report is to provide an overview of the existing route deficiencies, define the preliminary purpose and need for the project, and to provide preliminary design that is feasible, cost effective, and provides improved mobility for this segment of Interstate 24. The proposed project was initiated as result of the Improving Manufacturing, Public Roads and Opportunities for a Vibrant Economy (IMPROVE) Act project delivery commitments.

1.1 Study Area, Vicinity, Existing Roadway Network Maps

I-24 is being evaluated from I-59 in Georgia to I-124 in Tennessee. This section of I-24 is located within Dade County, Georgia, Hamilton County, Tennessee and the City of Chattanooga. I-24 is a major east/west route through the City of Chattanooga.

Within the project limits there are three (3) interchanges, a rest area, and seventeen (17) bridges. The area surrounding the interchanges is mostly commercial and industrial with the rest of the corridor being mainly undeveloped. CSX and Norfolk Southern have railroad facilities within the project limits. CSX has a line that crosses underneath I-24 in Georgia and both railroads have lines paralleling the interstate along the south edge for the last 2.5 miles of the project. Also in that area, the Tennessee River runs along the north side of I-24.

Figure 1 presents an area map, Figure 2 presents a location specific map, and Figures 3 through 3C detail the corridors geographic features on United States Geographical Survey Map.

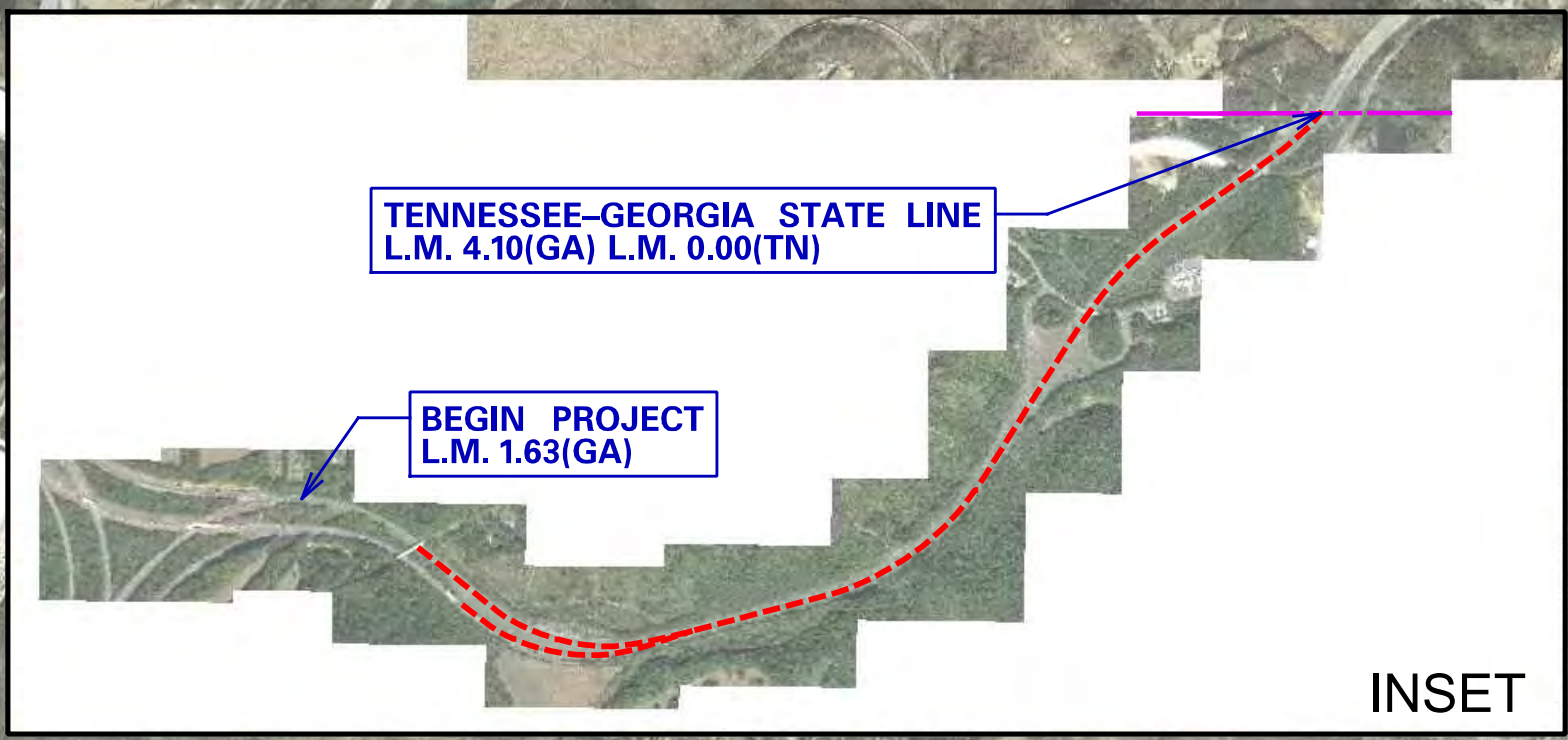


END PROJECT
L.M. 7.33(TN)

TENNESSEE-GEORGIA STATE LINE
L.M. 4.10(GA) L.M. 0.00(TN)

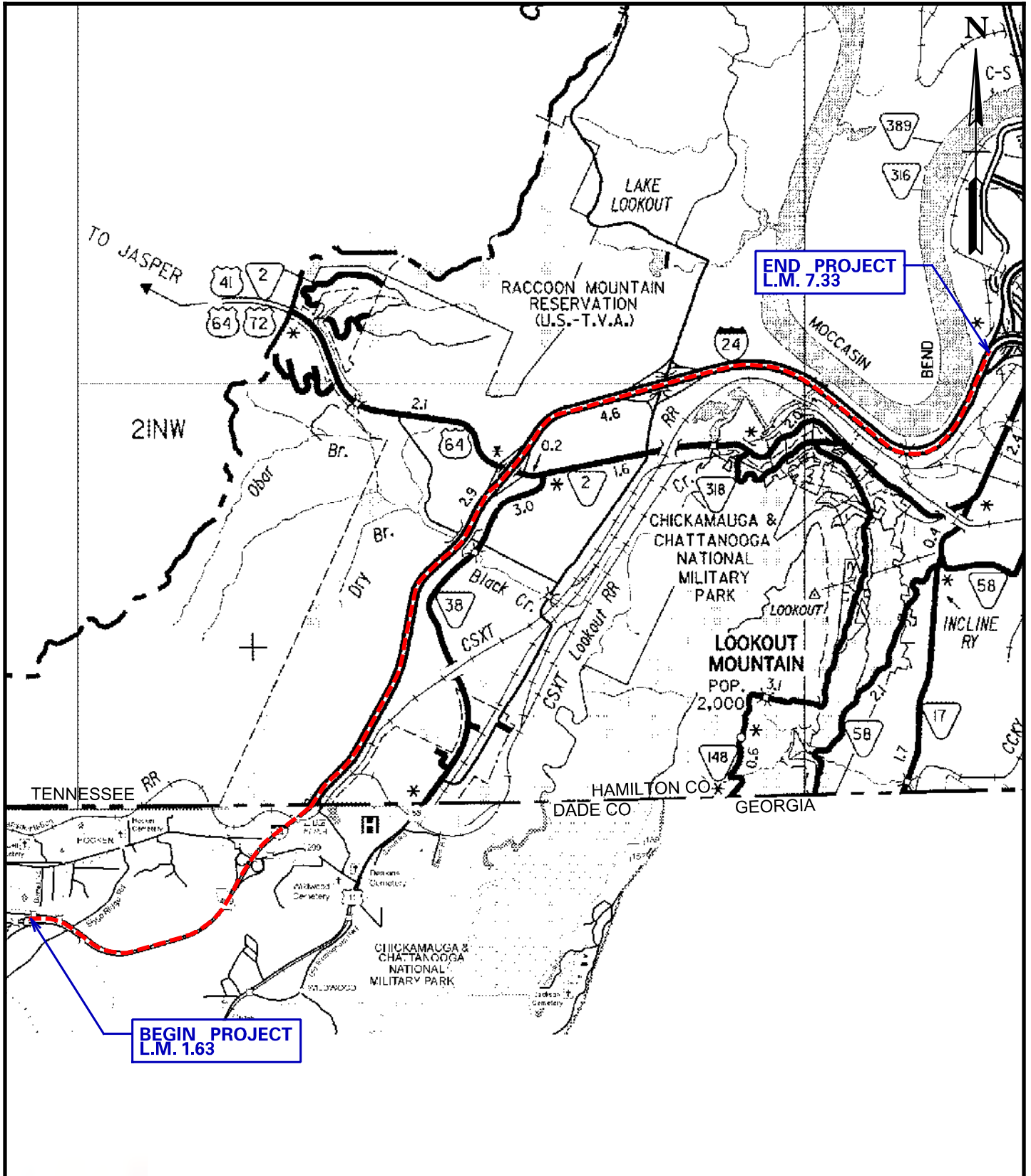
BEGIN PROJECT
L.M. 1.63(GA)

TENNESSEE-GEORGIA STATE LINE
L.M. 4.10(GA) L.M. 0.00(TN)
(SEE INSET FOR CONTINUATION)



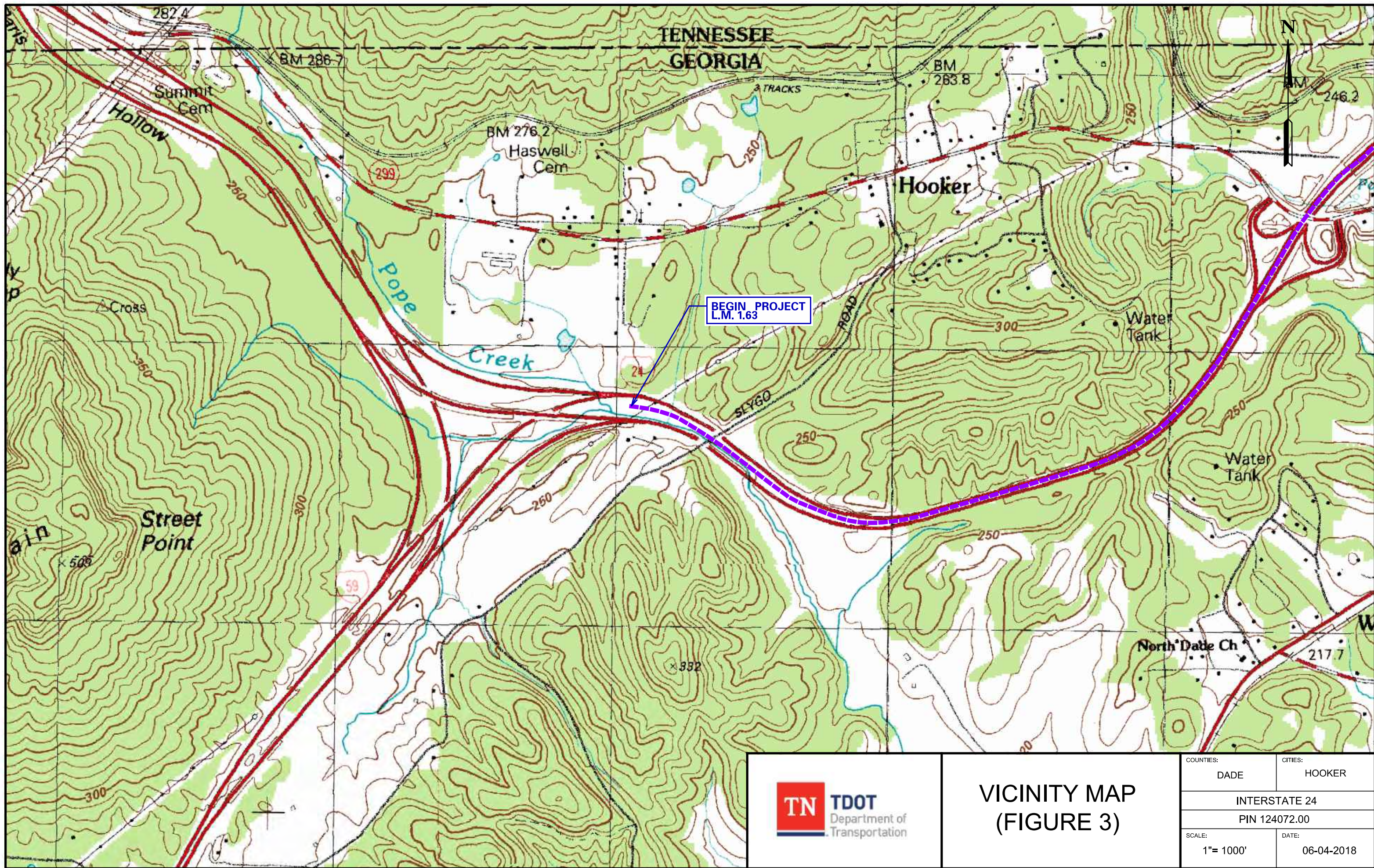
AREA MAP (FIGURE 1)

| | |
|---|----------------------|
| COUNTIES: HAMILTON (TN) DADE (GA) | CITY: CHATTANOOGA |
| INTERSTATE 24 | |
| PIN 124072.00 | |
| SCALE: 1"= 2000' | DATE: 06-04-18 |



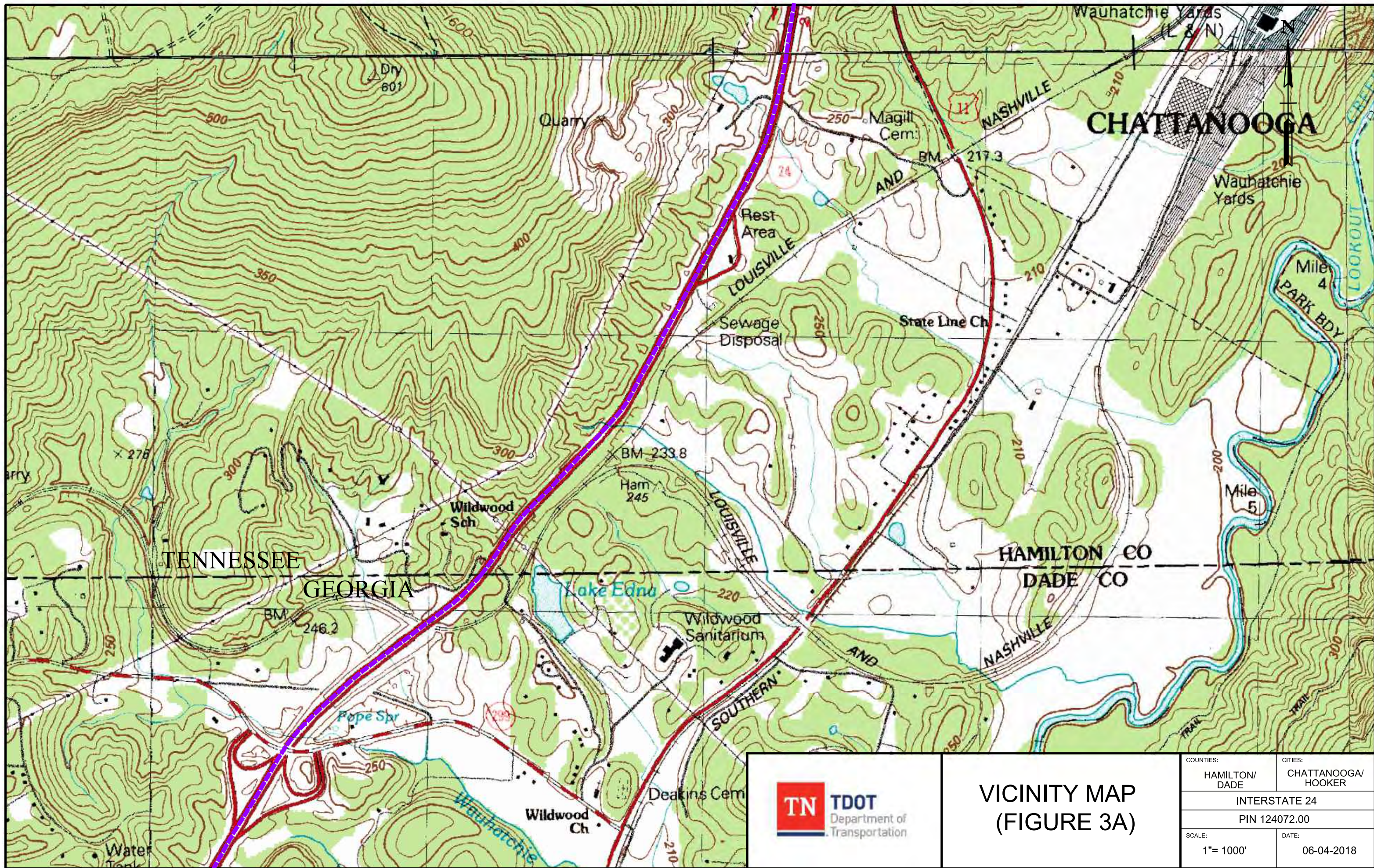
LOCATION MAP (FIGURE 2)

| | |
|---------------------------------------|----------------------|
| COUNTY: HAMILTON (TN) DADE (GA) | CITY: CHATTANOOGA |
| INTERSTATE 24 | |
| PIN 124072.00 | |
| SCALE: 1" = 1 MILE | DATE: 06-04-18 |



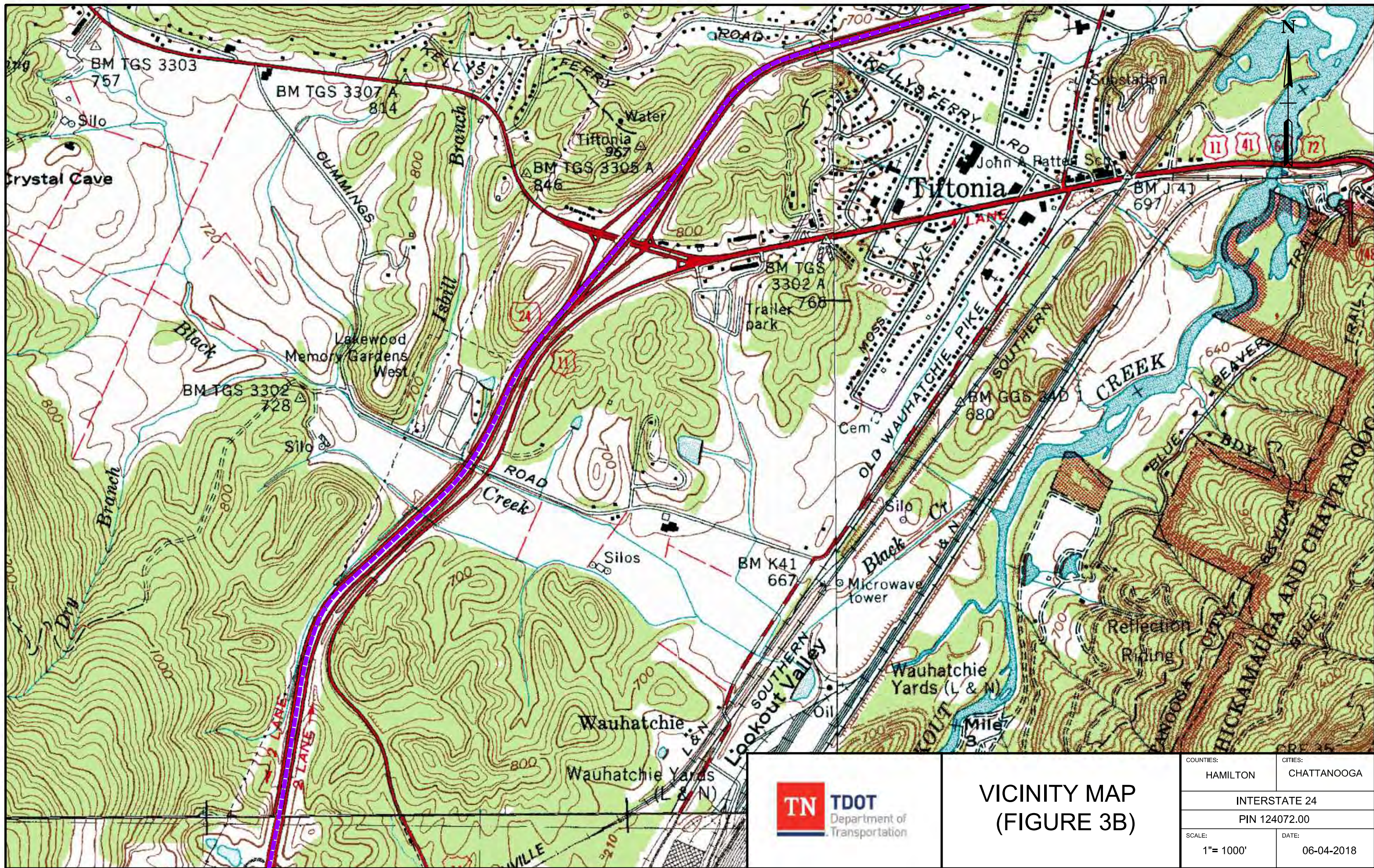
VICINITY MAP
(FIGURE 3)

| | |
|---------------|------------|
| COUNTIES: | CITIES: |
| DADE | HOOKER |
| INTERSTATE 24 | |
| PIN 124072.00 | |
| SCALE: | DATE: |
| 1" = 1000' | 06-04-2018 |



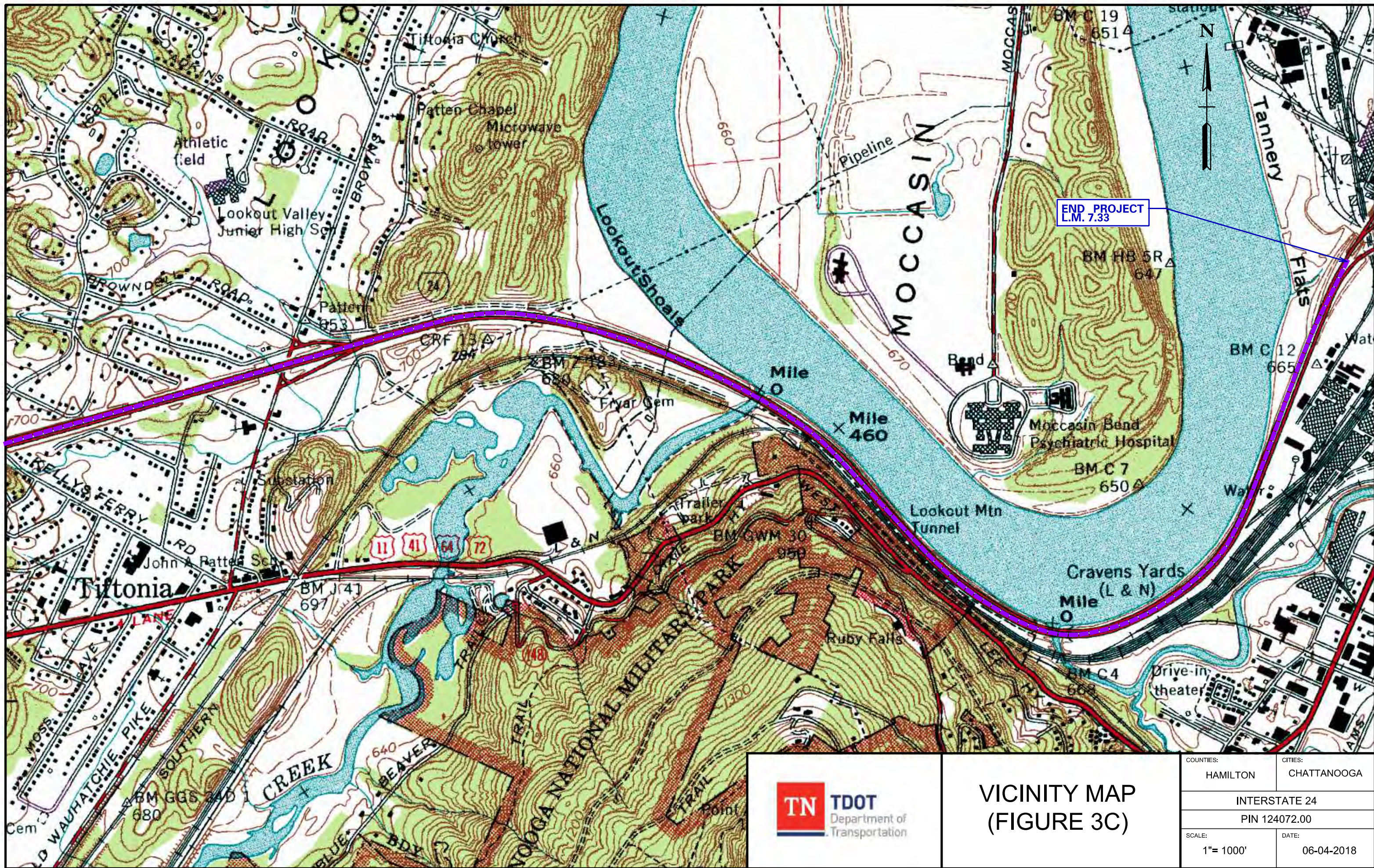
**VICINITY MAP
(FIGURE 3A)**

| | |
|--------------------------------|-----------------------------------|
| COUNTIES: HAMILTON/ DADE | CITIES: CHATTANOOGA/ HOOKER |
| INTERSTATE 24 | |
| PIN 124072.00 | |
| SCALE: 1" = 1000' | DATE: 06-04-2018 |



**VICINITY MAP
(FIGURE 3B)**

| | |
|-----------------------|------------------------|
| COUNTIES: HAMILTON | CITIES: CHATTANOOGA |
| INTERSTATE 24 | |
| PIN 124072.00 | |
| SCALE: 1" = 1000' | DATE: 06-04-2018 |



VICINITY MAP
(FIGURE 3C)

| | |
|--------------------------------|------------------------|
| COUNTIES: HAMILTON | CITIES: CHATTANOOGA |
| INTERSTATE 24 PIN 124072.00 | |
| SCALE: 1" = 1000' | DATE: 06-04-2018 |

1.2 Demographics

The 2016 population of Hamilton County was estimated by the US Census Bureau as 357,738. This is a 6.3% increase from the 2010 population of 336,463. Select demographics are provided in Table 1. Equivalent demographics for Tennessee and the United States are provided for comparative purposes.

Table 1: Tennessee Demographics

| Characteristic | Hamilton County | Tennessee | United States |
|---|------------------------|------------------|----------------------|
| Population Growth Rate | 6.30% | 4.80% | 4.70% |
| Unemployment (April 2017) | 6.90% | 4.70% | 4.40% |
| Minority Population (2016) | 28.50% | 21.30% | 23.10% |
| Median Household Income (2012-2016) | \$47,898.00 | \$48,457.00 | \$55,322.00 |
| Persons Below Poverty Level (2012-2016) | 13.20% | 15.80% | 12.70% |
| Median Age (2016) | 39.3 | 38.6 | 37.9 |

Sources: U.S. Census Bureau, QuickFacts

As shown in the table, Hamilton County has similar demographics as both Tennessee and the United States. Unemployment rates and the median household income are slightly lower in Hamilton County when compared to Tennessee. The minority population in Hamilton County is significantly higher than the population percentage for Tennessee and the United States and the median age for Hamilton County is older than both Tennessee and the United States.

Table 2: Georgia Demographics

| Characteristic | Dade County | Georgia | United States |
|---|--------------------|----------------|----------------------|
| Population Growth Rate | -2.30% | 6.40% | 4.70% |
| Unemployment (April 2017) | 4.00% | 4.90% | 4.40% |
| Minority Population (2016) | 4.10% | 28.80% | 23.10% |
| Median Household Income (2012-2016) | \$43,463.00 | \$51,037.00 | \$55,322.00 |
| Persons Below Poverty Level (2012-2016) | 15.60% | 16.00% | 12.70% |
| Median Age (2016) | 40.3 | 36.5 | 37.9 |

Sources: U.S. Census Bureau, QuickFacts

As shown in the table, Dade County has significantly different demographics when compared to both Georgia and the United States. Unemployment rates are slightly lower and the median household income is much lower in Dade County when compared to Georgia and the United States. The minority population in Hamilton County is significantly lower than the population percentage for Georgia and the United States and the median age for Hamilton County is older than both Tennessee and the United States.

1.3 Existing Land Use and Zoning

Interstate 24 is a major east/west route through Tennessee (and a small portion of Georgia) and the City of Chattanooga. The adjacent land use in this section of the route is primarily commercial with some light industrial and the CXS/NS railroad. A quarry is located on both sides of I-24, approximately one (1) mile east of the Georgia State Line. There is also a park property on the south side of I-24 immediately north of the Browns Ferry Road interchange.

1.4 Other Projects in Vicinity

TDOT Region 2 representatives indicated that there are multiple projects that could impact this I-24 project: Widening of I-24 in Georgia, Interchange improvements at both State Route 2 and Browns Ferry, and a Ramp realignment at I-124. Any of these other potential improvement projects should be coordinated and open communication maintained to minimize the chance for overlap.

In the past (approx. 2007) the Georgia Department of Transportation communicated with TDOT about possible improvements along the I-24 corridor. These discussions were tabled at the time as improvements in Tennessee were not feasible due to lack of funding. Any improvements recommended as part of this study, especially improvements within the State of Georgia, should be coordinated with GDOT to ensure continuity along the interstate facility.

There is a current TDOT project (PIN 118452.00) at the I-24 interchange with SR-2 (Cummings Highway). The project will redesign the intersections of the On & Off ramps at Cummings Highway and there will be a minor realignment of a portion of each ramp. The project is not expected to be in conflict with any improvements proposed as part of this report.

There is a current TDOT project (PIN 112833.00) at the I-24 interchanges with SR-2 (Broad Street) and SR-58 (Market Street) that realigns the I-24 Eastbound Off Ramp to SR-2. This project is in the Right-Of-Way (R.O.W.) phase and will likely be constructed prior to any proposed improvements recommended in this study. Coordination with current plans will be necessary to ensure the ramp realignment is incorporated into this report.

2.0 Existing Conditions

Within the study area, this section of I-24 is functionally classified as an Urban Interstate. It consists of two (2) twelve (12) foot travel lanes in each direction, a variable width depressed grass median, two (2) to eight (8) foot outside shoulders and zero (0) to two (2) foot inside shoulders within 200 to 300 feet of existing ROW. The speed limit along the existing roadway is posted as 70 MPH for the section from the

Interstate 59 Interchange (L.M. 1.63) to the Georgia State Line (L.M.4.10 / L.M. 0.00), 65 MPH for the section from the Georgia State Line (L.M. 0.00) to Lookout Creek (L.M. 6.25), and 55 MPH for the section from Lookout Creek (L.M. 6.25) to I-124 (L.M. 7.33).

There are three (3) interchanges within the study area: State Route 299 in Georgia, State Route 2 (US-11/41/64) and Browns Ferry Road, both in Tennessee. The State Route 299 interchange is a two (2) quadrant partial cloverleaf, with both quadrants on the same side of State Route 299. Both of the interchanges in Tennessee are diamond interchanges, with only one of the ramp termini currently signalized.

2.1 Structures and Bridges Conditions

There are seventeen (17) existing bridges within the project limits:

1. Georgia - Bridge ID 083-0016-0: Slygo Road over I-24 (sufficiency rating 50.8). Steel structure with a length of 427 feet and a maximum span length of 90 feet. The structure is in good condition.
2. Georgia - Bridge ID 083-0043-0: I-24 Eastbound over Pope Creek (sufficiency rating 94.7). Concrete structure with a length of 124 feet and a maximum span length of 51 feet. The structure is in good condition.
3. Georgia - Bridge ID 083-0020-0: Georgia State Route 299 over I-24 (New Construction). Concrete structure with a length of 202 feet and a maximum span length of 104 feet. The structure is in excellent condition.
4. Georgia - Bridge ID 083-0044-0: I-24 Eastbound over CSX (sufficiency rating 83.7). Steel structure with a length of 221 feet and a maximum span length of 77 feet. The structure is in good condition.
5. Georgia - Bridge ID 083-0045-0: I-24 Westbound over CSX (sufficiency rating 83.7). Steel structure with a length of 189 feet and a maximum span length of 66 feet. The structure is in good condition.
6. Tennessee - Structures Number 33I00240001: I-24 Northbound bridge over Black Creek and Cummings Road (sufficiency rating 86.6). Concrete Tee Beam structure with a length of 152 feet and a maximum span length of 44 feet. The structure is in good condition.
7. Tennessee - Structures Number 33I00240002: I-24 Southbound bridge over Black Creek and Cummings Road (sufficiency rating 86.6). Concrete Tee Beam structure with a length of 152 feet and a maximum span length of 44 feet. The structure is in good condition.

Dade County (Georgia) & Hamilton County (Tennessee)
I-24 Improvements
From I-59 to I-124

8. Tennessee - Structures Number 33I00240003: I-24 Northbound bridge over Cummings Hwy (S.R. 2) (sufficiency rating 86.2). Continuous Steel structure with a length of 178 feet and a maximum span length of 56 feet. The structure is in fair condition.
9. Tennessee - Structures Number 33I00240004: I-24 Southbound bridge over Cummings Hwy (S.R. 2) (sufficiency rating 74.6). Continuous Steel structure with a length of 178 feet and a maximum span length of 56 feet. The structure is in fair condition.
10. Tennessee - Structures Number 33I00240005: I-24 Eastbound bridge over Kelley's Ferry Road (sufficiency rating 83.1). Steel structure with a length of 116 feet and a maximum span length of 53 feet. The structure is in fair condition.
11. Tennessee - Structures Number 33I00240006: I-24 Westbound bridge over Kelley's Ferry Road (sufficiency rating 73.5). Steel structure with a length of 116 feet and a maximum span length of 53 feet. The structure is in fair condition.
12. Tennessee - Structures Number 33I00240007: I-24 Eastbound bridge over Brown's Ferry Road (sufficiency rating 59.0). Steel structure with a length of 139 feet and a maximum span length of 77 feet. The structure is in fair condition.
13. Tennessee - Structures Number 33I00240008: I-24 Westbound bridge over Brown's Ferry Road (sufficiency rating 71.8). Steel structure with a length of 139 feet and a maximum span length of 77 feet. The structure is in fair condition.
14. Tennessee - Structures Number 33I00240009: I-24 Eastbound bridge over Lookout Creek (sufficiency rating 82.2). Continuous Prestressed Concrete structure with a length of 198 feet and a maximum span length of 66 feet. The structure is in fair condition.
15. Tennessee - Structures Number 33I00240010: I-24 Westbound bridge over Lookout Creek (sufficiency rating 82.2). Continuous Prestressed Concrete structure with a length of 198 feet and a maximum span length of 66 feet. The structure is in fair condition.
16. Tennessee - Structures Number 33I00240011: I-24 Eastbound bridge over Chattanooga Creek (sufficiency rating 82.2). Continuous Prestressed Concrete structure with a length of 228 feet and a maximum span length of 76 feet. The structure is in fair condition.
17. Tennessee - Structures Number 33I00240012: I-24 Westbound bridge over Chattanooga Creek (sufficiency rating 82.2). Continuous Prestressed Concrete structure with a length of 228 feet and a maximum span length of 76 feet. The structure is in fair condition.
18. Tennessee – Structures Number 33CULV01019: Access Road underneath I-24 (L.M. 1.27), connecting areas of the quarry on either side of the interstate. Box Culvert is 16 feet wide and is in fair condition.

2.2 Existing Utility Infrastructure

There are minimal utilities along the corridor, with most occurring in the vicinity of the interchanges and rest area. There are also TVA Power lines crossing the interstate at multiple locations. TDOT ITS cameras are located along the outside edge, with a few located in the medians near bridges, and will need to be considered during the design process. Additional field survey during the design will determine if there are any other underground utilities within the project area.

2.3 Preliminary Environmental Constraints

The National Wetlands Inventory Wetlands Mapper indicated one (1) wetland potentially within the project limits. This wetland is located between the Tennessee River and I-24 near the interchange with I-124 and has an approximate size of 5.89 acres. There are multiple blue line streams that either run along or cross underneath I-24. Four (4) of those streams are considered impaired for various reasons. An Unnamed Tributary to Lookout Creek (approx. L.M. 1.30) and Black Creek (approx. L.M. 2.25) are impaired for E. Coli and loss of streamside and littoral vegetation, Chattanooga Creek (approx. L.M. 6.25) is impaired for multiple items including but not limited to: Dioxin, E. Coli, PCB, Creosote and other anthropogenic substrate alterations, and the Tennessee River/Nickajack Reservoir is impaired for Dioxin and PCB. Precautions should be taken around streams to avoid contamination or destruction. As the project progresses through the National Environmental Policy Act (NEPA) process an ecology field survey will be conducted and a report generated to identify any aquatic features within the proposed project limits.

The Environmental Protection Agency (EPA) classifies geographic areas as “attainment” or “nonattainment” areas with respect to the National Ambient Air Quality Standards (NAAQS). A geographical area with air quality that meets the NAAQS for certain pollutants is referred to as an attainment area, and an area that does not meet the NAAQS is classified as a nonattainment area. A geographical area that is a nonattainment area that then later meets the NAAQS is referred to as a “maintenance” area. The EPA and Tennessee Department of Environment and Conservation (TDEC) Division of Air Pollution and Control have designated Hamilton County as a maintenance area for a few NAAQS criteria pollutants. Dade County in Georgia is classified as an attainment area.

3.0 Existing Condition Analysis

3.1 Crash Analysis on Existing Route

Utilizing the Enhanced Tennessee Roadway Information Management System (ETRIMS) database from June 1, 2014 to May 30, 2017, a crash rate (crashes per one million vehicle miles) was calculated. Table 3 shows the crash rates of the three (3) segments along the route.

Table 3: Crash Rate Comparison

| Crash Rates | | |
|---|-------------------|----------------------|
| From I-59 Interchange (L.M. 1.63) to GA State Line (L.M. 4.10) | | |
| Type | Crash Rate | TN SW Average |
| Total | 1.061 | 1.828 |
| Severe (Fatal + Incap) | 0.017 | 0.057 |
| From GA State Line (L.M. 0.00) to S.R. 2 (L.M. 2.90) | | |
| Type | Crash Rate | TN SW Average |
| Total | 1.106 | 1.828 |
| Severe (Fatal + Incap) | 0.019 | 0.057 |
| From S.R. 2 (L.M. 2.90) to Browns Ferry Rd (L.M. 4.22) | | |
| Type | Crash Rate | TN SW Average |
| Total | 1.516 | 1.828 |
| Severe (Fatal + Incap) | 0.01 | 0.057 |
| From Browns Ferry Rd (L.M. 4.22) to U.S. 27 (L.M. 7.33) | | |
| Type | Crash Rate | TN SW Average |
| Total | 1.477 | 1.828 |
| Severe (Fatal + Incap) | 0.033 | 0.057 |

The calculated crash rate (A) for all segments of I-24 were lower than the Tennessee statewide average. The crash rate calculations are provided in the appendix.

To analyze crashes more in depth, Table 4 on the following page shows distributions of crash severity, type of crash, weather conditions, and more.

Table 4: Crash Statistics

| CRASH STATISTICS | | |
|---|-----------------------------|----------------------------|
| Condition | 6/1/2014 - 5/31/2017 | |
| | Number of Crashes | Percentage of Total |
| Lighting Conditions | | |
| Daylight | 510 | 69% |
| Dark - Not Lighted | 67 | 9% |
| Dark - Lighted | 59 | 8% |
| Dusk/Dawn | 18 | 3% |
| Other / Not Indicated | 83 | 11% |
| Crash Severity | | |
| Property Damage | 627 | 85% |
| Non-Incap Injury | 97 | 13% |
| Incap Injury | 10 | 2% |
| Fatality | 3 | 1% |
| Manner of Collision | | |
| Rear-End | 378 | 51% |
| Lane Departure | 121 | 16% |
| Angle | 19 | 3% |
| Sideswipe | 113 | 15% |
| Head On | 3 | 1% |
| Overturn | 6 | 1% |
| Animal | 9 | 2% |
| Other / Not Indicated | 88 | 12% |
| Weather Conditions | | |
| Clear | 514 | 70% |
| Rain | 136 | 19% |
| Snow | 2 | 0% |
| Sleet/Hail | 1 | 0% |
| Other / Not Indicated | 84 | 11% |
| * Details for crashes on I-24 in Georgia were not available | | |

During the study period, 737 crashes took place along I-24 in Tennessee. The majority of the crashes that occurred were rear-end, lane departure and sideswipes, which is typical for interstate facilities. It is also important to note that a majority of the crashes occurred in clear, dry and daylight conditions. While

almost 20% of the crashes occurred during rainy conditions, there were no significant clusters of crashes that would indicate a specific concern for wet weather travel along the corridor. There were ten (10) incapacitating injury crashes and three (3) fatal crashes within the study area. Crash diagram figures are provided in the appendix.

3.2 Traffic Analysis on Existing Route

The base year (2022) annual average daily traffic (AADT) for the section of I-24 under study varies from 59,880 to 84,330 vehicles per day. The design year (2042) AADT is projected to be between 68,400 and 111,600 vehicles per day. Project traffic for the entire route is provided in the appendix.

Level of service (LOS) for interstate segments is defined by the density of traffic. Density describes the proximity to other vehicles and is related to the freedom to maneuver within the traffic stream. Table 5 below shows the Highway Capacity Manual (HCM) definitions of LOS for freeway segments.

Table 5: LOS Definitions

| LOS | Density (pc/mi/ln) |
|-----|--------------------------------|
| A | ≤ 11 |
| B | > 11 - 18 |
| C | > 18 - 26 |
| D | > 26 - 35 |
| E | > 35 - 45 |
| F | > 45 (Demand exceeds capacity) |

Source: HCM 2010

The capacity and operation along I-24 was evaluated as an urban interstate facility utilizing the Highway Capacity Software (HCS2010) to determine a level of service (LOS) for each segment. Both AM and PM peak hours in both travel directions were evaluated and the results are summarized in the table on the following page.

Table 6: Existing Level of Service

| Level of Service | | | | |
|---------------------------------------|-----------|-----|-----------|-----|
| Segment | 2022 | | 2042 | |
| | Peak Hour | LOS | Peak Hour | LOS |
| I-24 from I-59 to GA State Line | AM | D | AM | F |
| | PM | D | PM | F |
| I-24 from GA State Line to S.R. 2 | AM | D | AM | F |
| | PM | E | PM | F |
| I-24 from S.R. 2 to Browns Ferry Rd. | AM | E | AM | F |
| | PM | E | PM | F |
| I-24 from Browns Ferry Rd. to U.S. 27 | AM | F | AM | F |
| | PM | F | PM | F |

As shown in the previous table, LOS for the segments of I-24 range from a LOS D to a LOS F. This indicates that much of the route is near or above capacity with the existing laneage.

3.3 Geometric Analysis on Existing Route

The existing geometry of I-24 is appropriate for the current posted speeds. The overall horizontal and vertical alignments meet the required design speed parameters.

3.4 Deficiencies of Existing Route

The main deficiency of I-24 within the project limits is an insufficient capacity to meet demand of the vehicular volume. With just two (2) travel lanes in each direction, vehicles become congested and drivers become impatient. This often leads to sideswipes and rear-end collisions (as indicated by the crash data) as drivers begin following much closer and making more maneuvers to get through traffic.

4.0 Preliminary Purpose and Need

The need for improvements along I-24 is due to the high volumes of traffic and the inability of the route to handle the current and projected traffic volumes. The current deficiencies that need to be addressed include an insufficient number of lanes on I-24 leading to congested conditions.

The purpose of this project is to ease congestion, improve mobility, and increase capacity along this section of I-24. Widening I-24 to include an additional lane in each travel direction will lead to an improved operation (Level of Service) throughout the corridor and increased mobility along the route.

5.0 Proposed Conceptual Alternatives

After evaluating the safety, operational, and geometric conditions on the existing route within the study limits, two (2) conceptual alternatives were considered to address the deficiencies: No Build alternative and Build Alternative.

The No Build Alternative denotes that only routine maintenance would be made to the existing corridor. No improvements or substantial modifications would be made with the No Build Alternative.

The Build alternative adds one (1) travel lane in each direction to increase the total number of lanes to six (6) along this section of I-24. The proposed typical section will include three (3) twelve (12) foot travel lanes in each direction, twelve (12) foot inside shoulders and twelve (12) foot outside shoulders. From the Interstate 59 Interchange (L.M. 1.63) in Georgia to just east of the Browns Ferry Road interchange (approx. L.M. 4.70), the interstate will be widened towards the inside median, with guardrail and barrier/retaining walls as needed due to grade difference. The remainder of the route will widen mostly to the south with a median barrier and a retaining wall along the eastbound edge of outside shoulder. As per the direction of TDOT Structures and GDOT Structures, the Build alternative will replace six (6) sets of side by side bridges in Tennessee and widen two (2) sets of side by side bridges in Georgia.

Existing right-of-way (ROW) varies from approximately two hundred (200) feet to three hundred (300) feet wide and it appears that most of the improvements can be completed within existing ROW. A small portion (approx. 0.40 acres) of ROW will be required near the end of the project as it ties into I-124 (US-27).

In addition to the proposed roadway improvements in the build alternative, twelve (12) structures in the Tennessee section will be replaced and two (2) structures in the Georgia section will be widened. TDOT Structures and TDOT Environmental have requested that the replacement of the structures over Lookout Creek and Chattanooga Creek attempt to minimize impacts to the streams. If possible, existing piers and abutments should be re-used/modified to keep construction out of the stream. Any culverts, or other concrete structures under I-24 that are impacted by the widening will be extended or replaced. The existing Box Culvert / Access Road (L.M. 1.27 in Tennessee) that connects areas of the quarry split by

the interstate will need to be evaluated by TDOT Structures to determine if it needs modification or upgrading due to the additional loading.

Approximately five (5) ITS poles located in the median and two (2) Dynamic Message Signs (DMS) will need to be replaced/relocated. Railroad coordination will be necessary to ensure that impacts to railroad operations are minimized and access during construction is available as needed. Design Exceptions for limited stopping sight distance due to proposed median barrier on the inside of horizontal curves may be required in the proposed build alternative.

Because the available topographic information is limited at this phase and the desire is to remain within existing ROW, some of the proposed design elements (shoulder width, guardrail location, retaining walls, etc...) could be revised as part of the NEPA/Design phase when a more detailed field survey is available.

5.1 Proposed Alternative Layouts

The following pages show the conceptual design of the proposed Build alternative. Layouts were not developed for No Build alternative as there are no proposed improvements. The conceptual design layouts are followed by the Environmental Technical Study Area figures.

Index Of Sheets

| SHEET NO. | DESCRIPTION |
|-----------|-------------------|
| 1 | TITLE SHEET |
| 2 | TYPICAL SECTIONS |
| 3-17 | BUILD ALTERNATIVE |

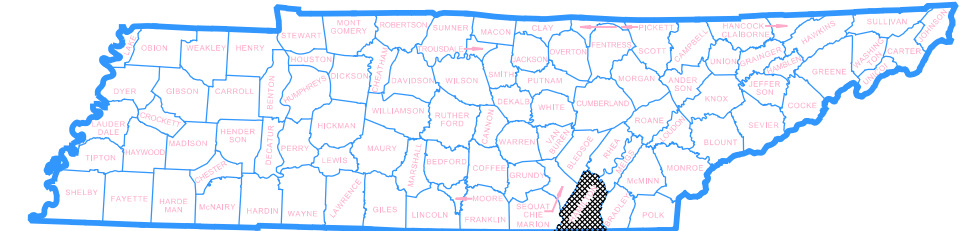
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION BUREAU OF ENGINEERING

| TENN. | YEAR | SHEET NO. |
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| | 2018 | 1 |
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| STATE PROJ. NO. | | 33002-0175-04 |

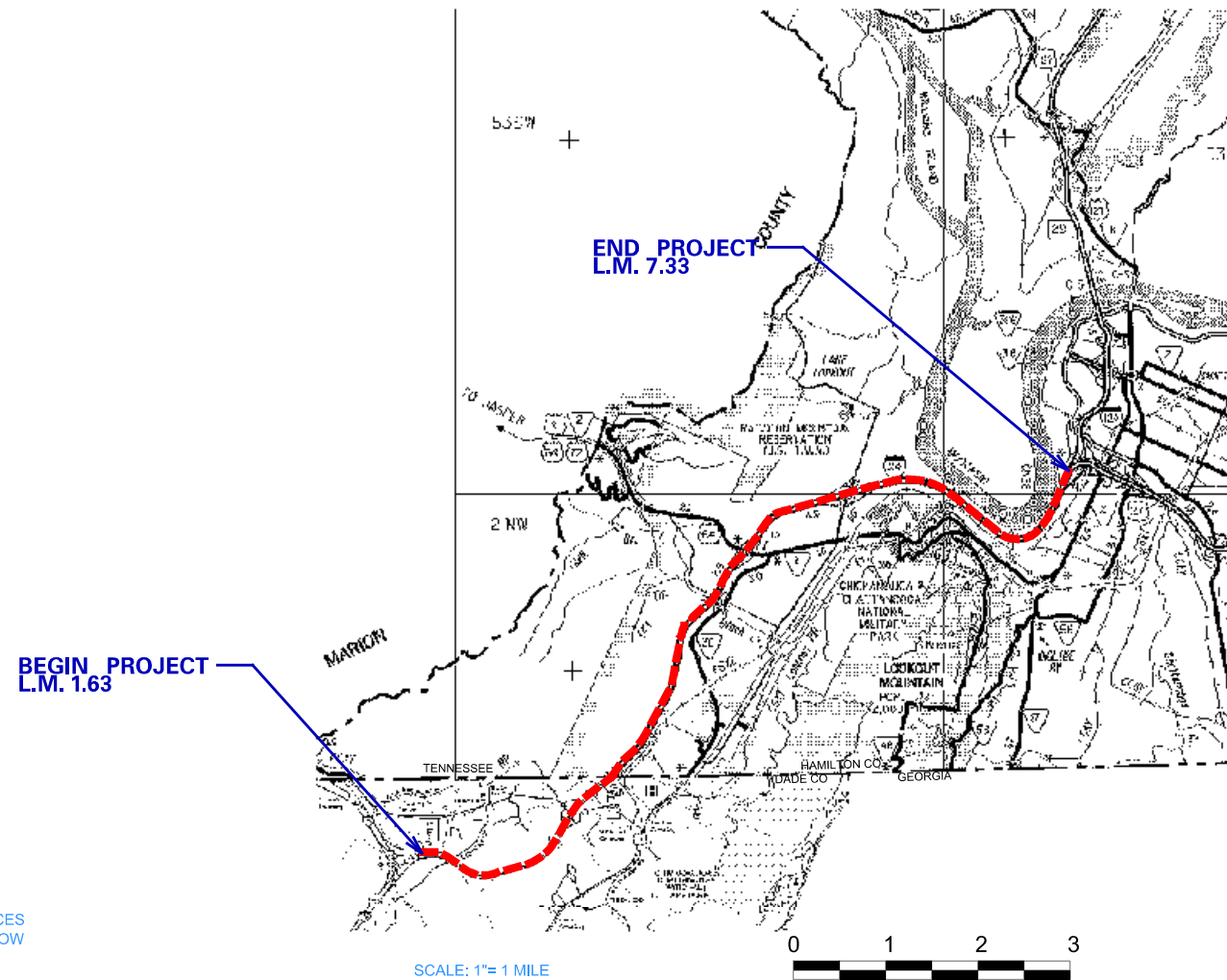
HAMILTON COUNTY

INTERSTATE 24 FROM I-59 TO I-124
L.M. 1.63(GA) TO L.M. 7.33(TN)
DADE COUNTY, GEORGIA &
HAMILTON COUNTY, TENNESSEE
TECHNICAL REPORT

STATE HIGHWAY NO. F.A.H.S. NO.



PROJECT LOCATION



SPECIAL NOTES

PROPOSALS MAY BE REJECTED BY THE COMMISSIONER IF ANY OF THE UNIT PRICES CONTAINED THEREIN ARE OBVIOUSLY UNBALANCED, EITHER EXCESSIVE OR BELOW THE REASONABLE COST ANALYSIS VALUE.

THIS PROJECT TO BE CONSTRUCTED UNDER THE STANDARD SPECIFICATIONS OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION DATED JANUARY 1, 2015 AND ADDITIONAL SPECIFICATIONS AND SPECIAL PROVISIONS CONTAINED IN THE PLANS AND IN THE PROPOSAL CONTRACT.

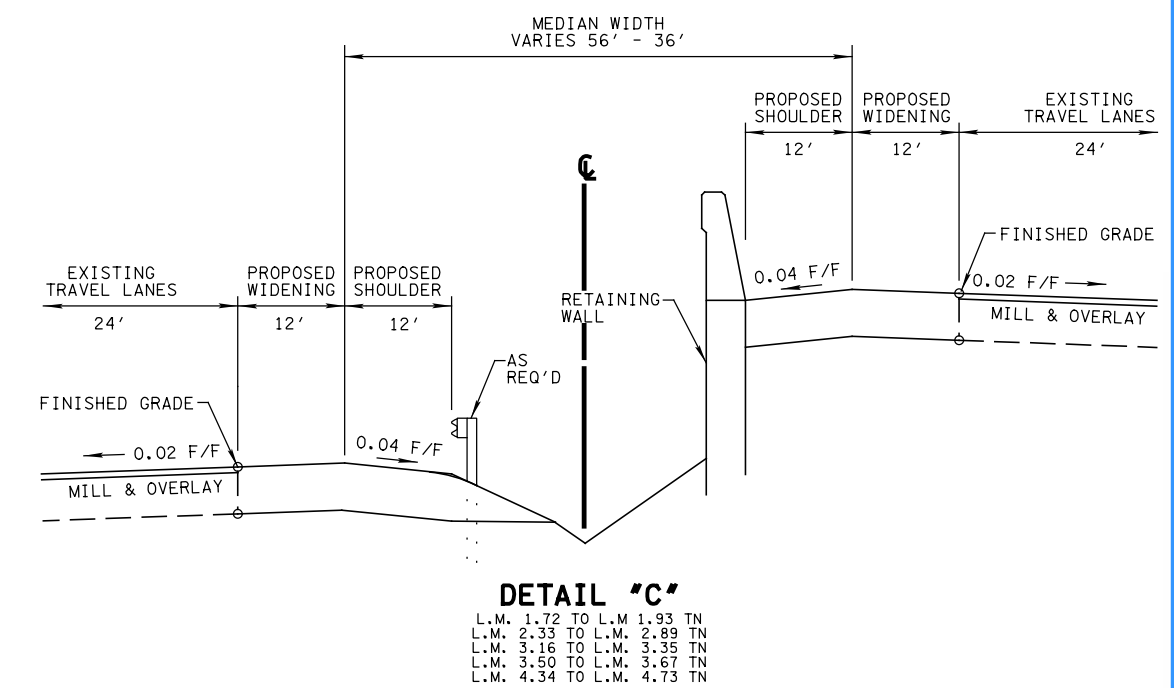
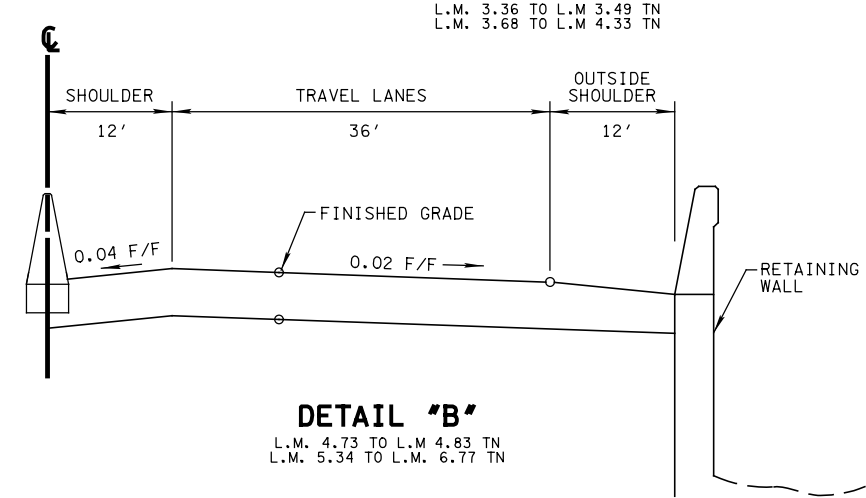
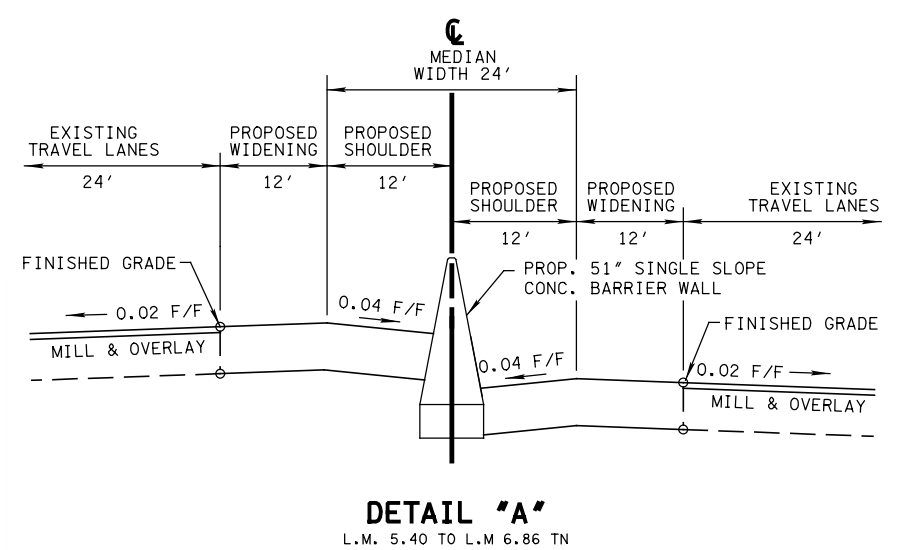
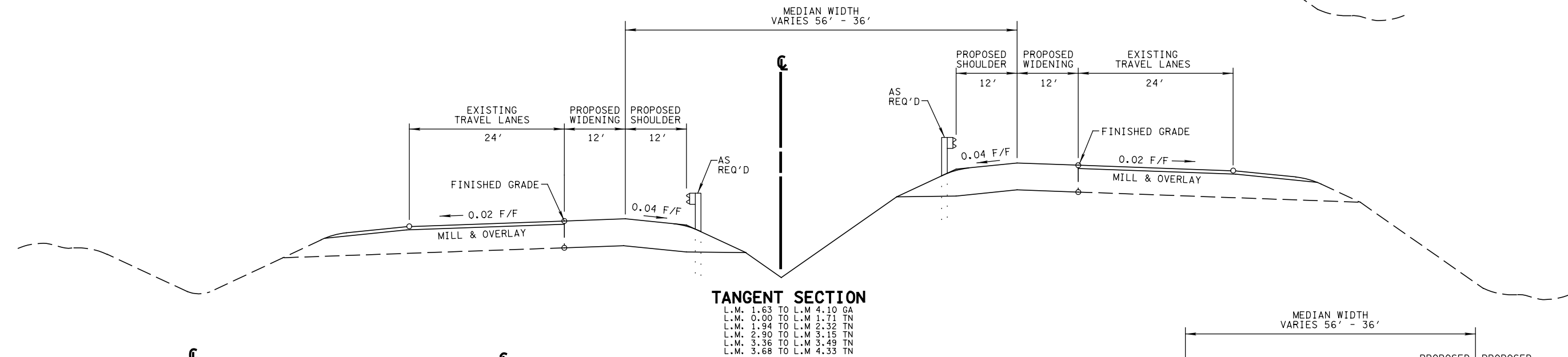
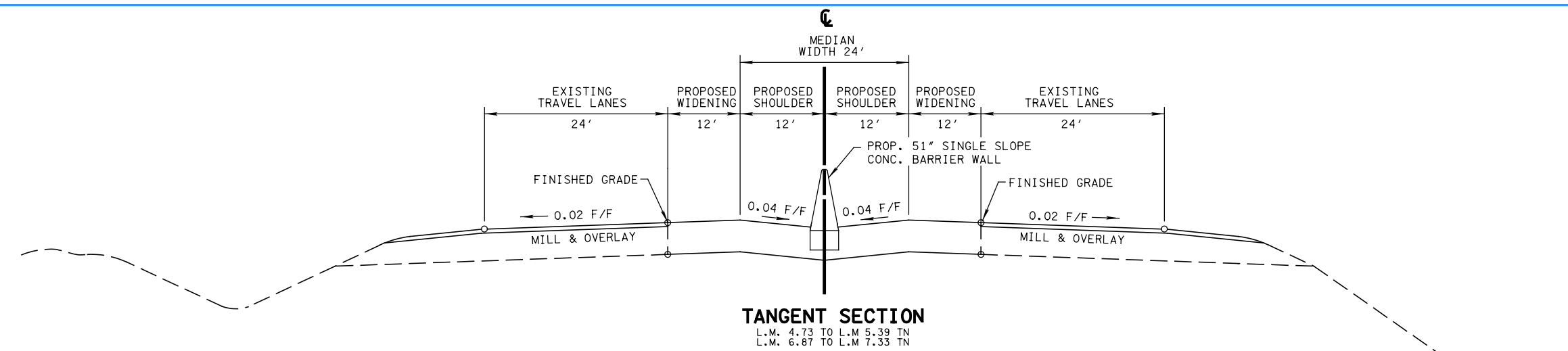
PROJECT LENGTH 9.80 MILES

TDOT PROJECT MANAGER : SHAUN ARMSTRONG
 DESIGNED BY : ALFRED BENESCH & COMPANY
 DESIGNER : BRIAN N. GAFFNEY, P.E.
 P.E. NO. 33002-0175-04
 PIN NO. 124072.00

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

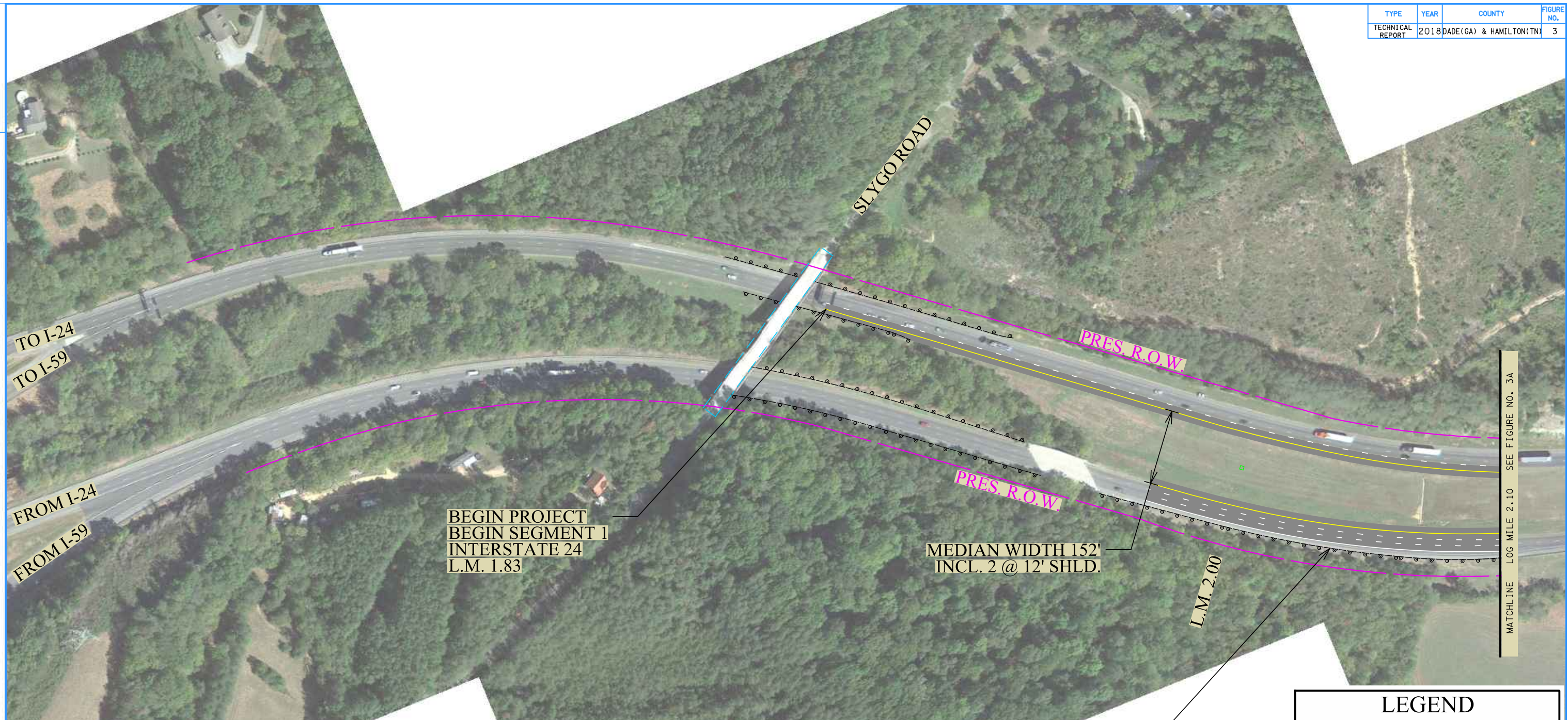
APPROVED: _____

DIVISION ADMINISTRATOR DATE



TECHNICAL REPORT
INTERSTATE 24
L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)

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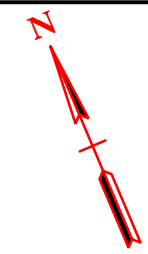
NOTES

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EASTBOUND CURVATURE WILL BE MODIFIED AND ADDITIONAL PAVEMENT DESIGN MAY BE NECESSARY TO COMPLETE WIDENING.

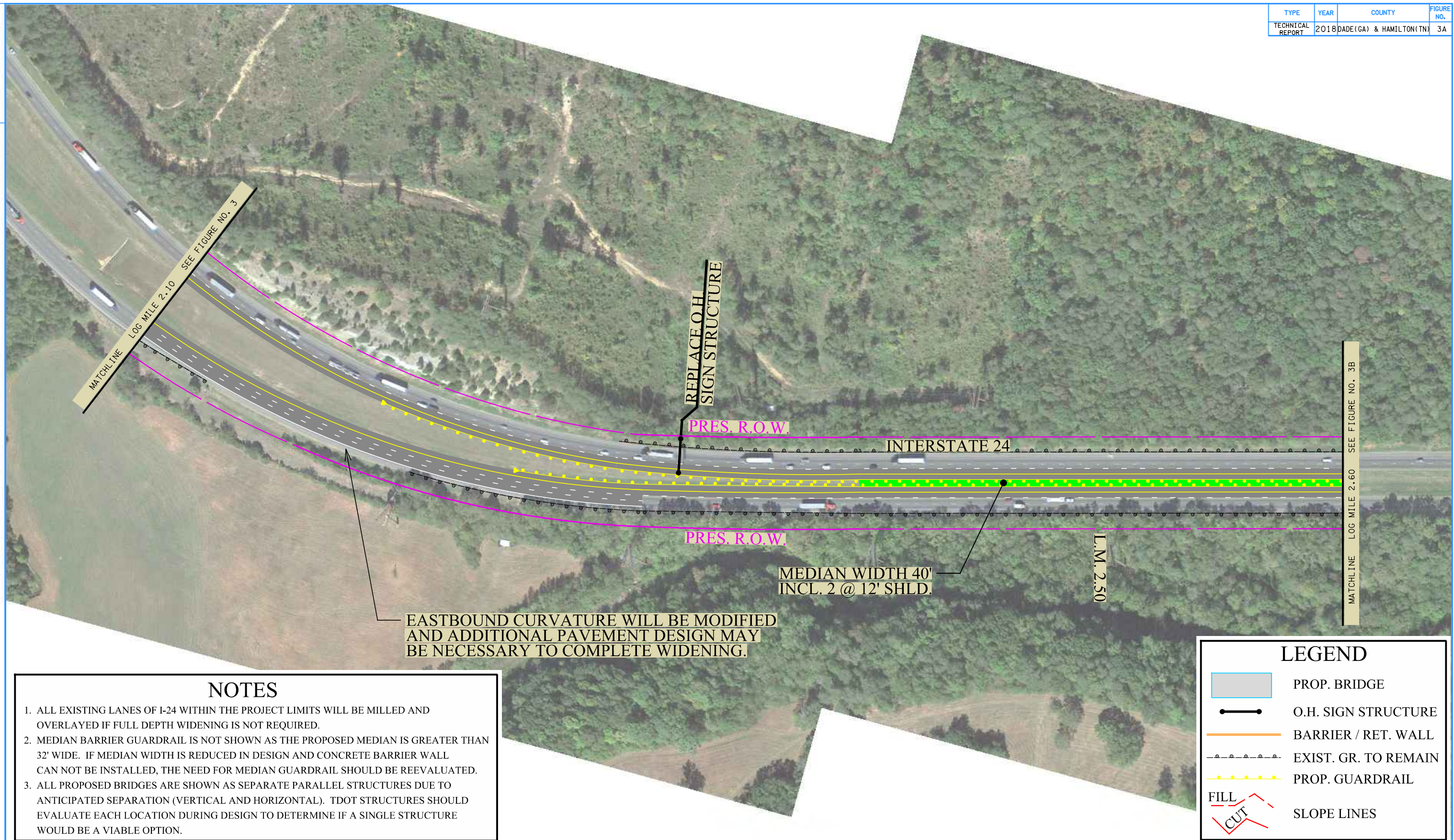
LEGEND

- PROP. BRIDGE
- O.H. SIGN STRUCTURE
- BARRIER / RET. WALL
- EXIST. GR. TO REMAIN
- PROP. GUARDRAIL
- SLOPE LINES
- FILL
- CUT



TECHNICAL REPORT
INTERSTATE 24
 L.M. 1.63(GA) to L.M. 7.33(TN)
 DADE CO.(GA) & HAMILTON CO.(TN)

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MATCHLINE LOG MILE 2.10 SEE FIGURE NO. 3

REPLACE O.H. SIGN STRUCTURE

PRES. R.O.W.

INTERSTATE 24

PRES. R.O.W.

MEDIAN WIDTH 40'
INCL. 2 @ 12' SHLD.

L.M. 2.50

MATCHLINE LOG MILE 2.60 SEE FIGURE NO. 3B

EASTBOUND CURVATURE WILL BE MODIFIED AND ADDITIONAL PAVEMENT DESIGN MAY BE NECESSARY TO COMPLETE WIDENING.

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LEGEND

- PROP. BRIDGE
- O.H. SIGN STRUCTURE
- BARRIER / RET. WALL
- EXIST. GR. TO REMAIN
- PROP. GUARDRAIL
- FILL
- CUT
- SLOPE LINES



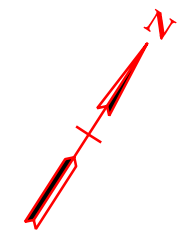
TECHNICAL REPORT
INTERSTATE 24
L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)



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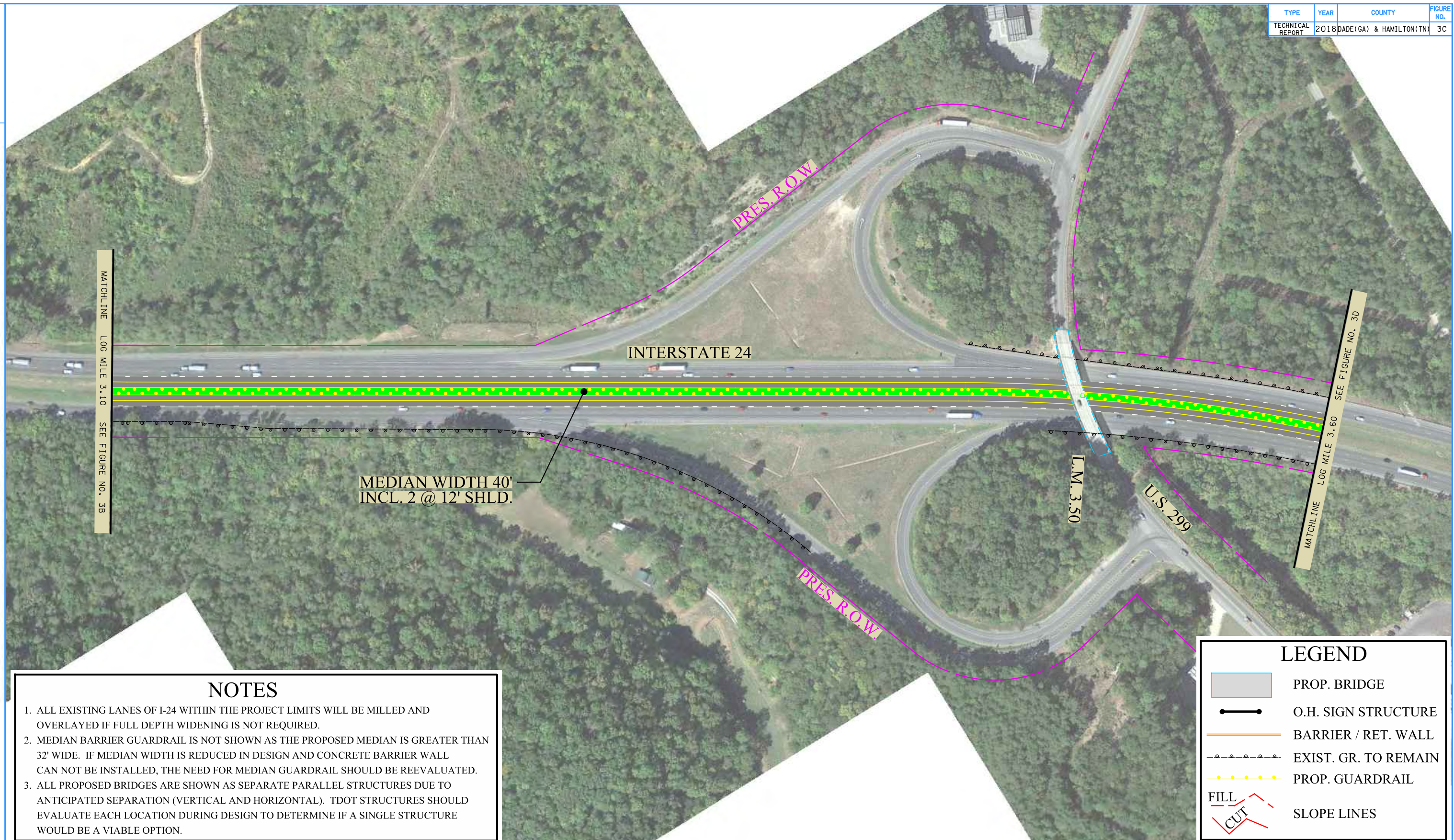
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| | BARRIER / RET. WALL |
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| | PROP. GUARDRAIL |
| | SLOPE LINES |



TECHNICAL REPORT

INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
 DADE CO.(GA) & HAMILTON CO.(TN)

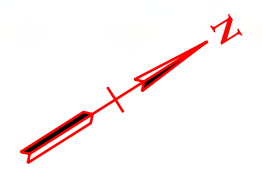


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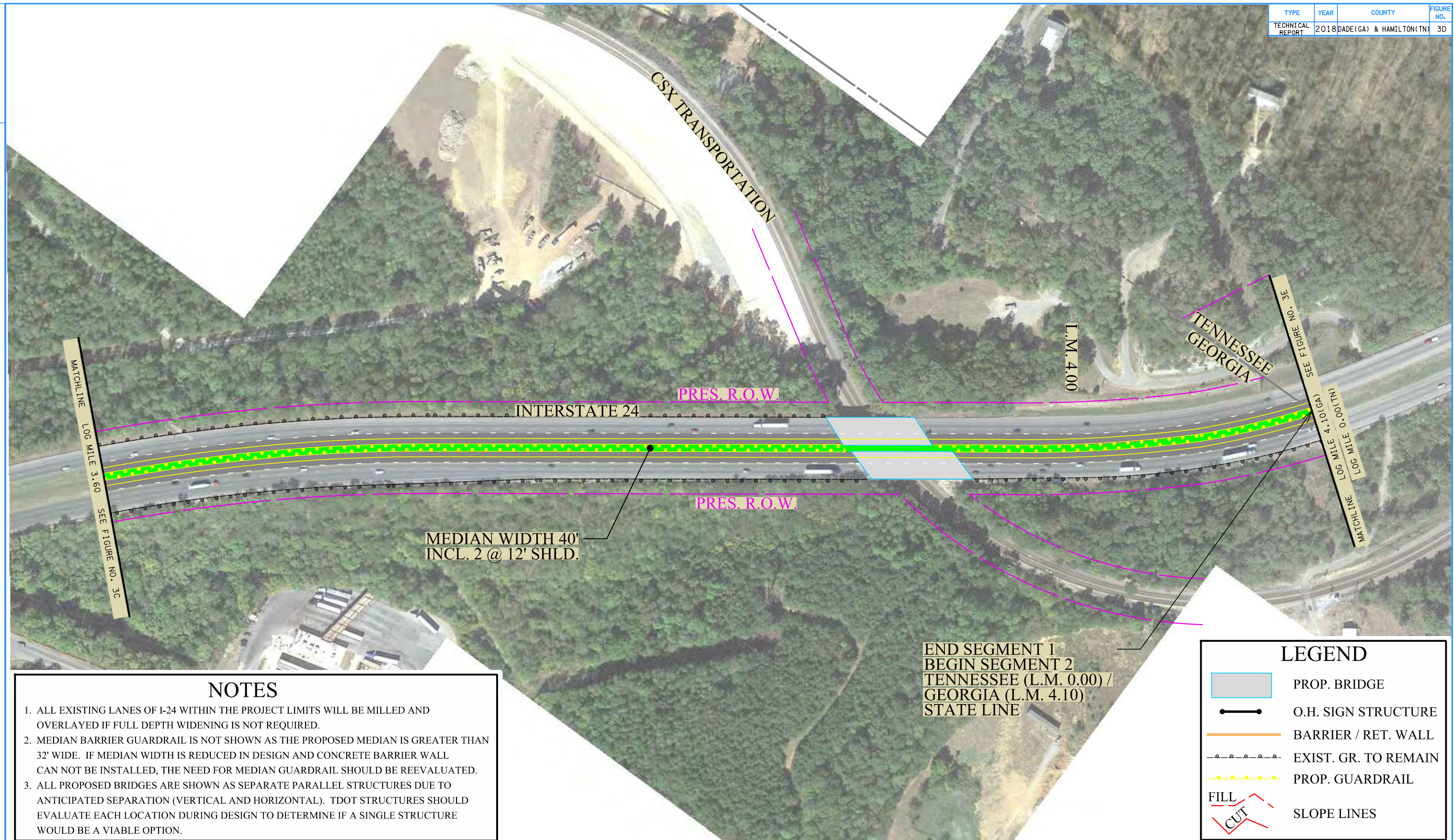
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| | BARRIER / RET. WALL |
| | EXIST. GR. TO REMAIN |
| | PROP. GUARDRAIL |
| | SLOPE LINES |



TECHNICAL REPORT

INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
 DADE CO.(GA) & HAMILTON CO.(TN)



NOTES

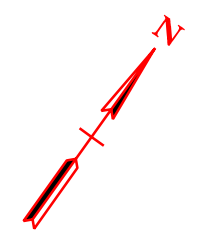
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END SEGMENT 1
BEGIN SEGMENT 2
TENNESSEE (L.M. 0.00) /
GEORGIA (L.M. 4.10)
STATE LINE

LEGEND

- PROP. BRIDGE
- O.H. SIGN STRUCTURE
- BARRIER / RET. WALL
- EXIST. GR. TO REMAIN
- PROP. GUARDRAIL
- SLOPE LINES

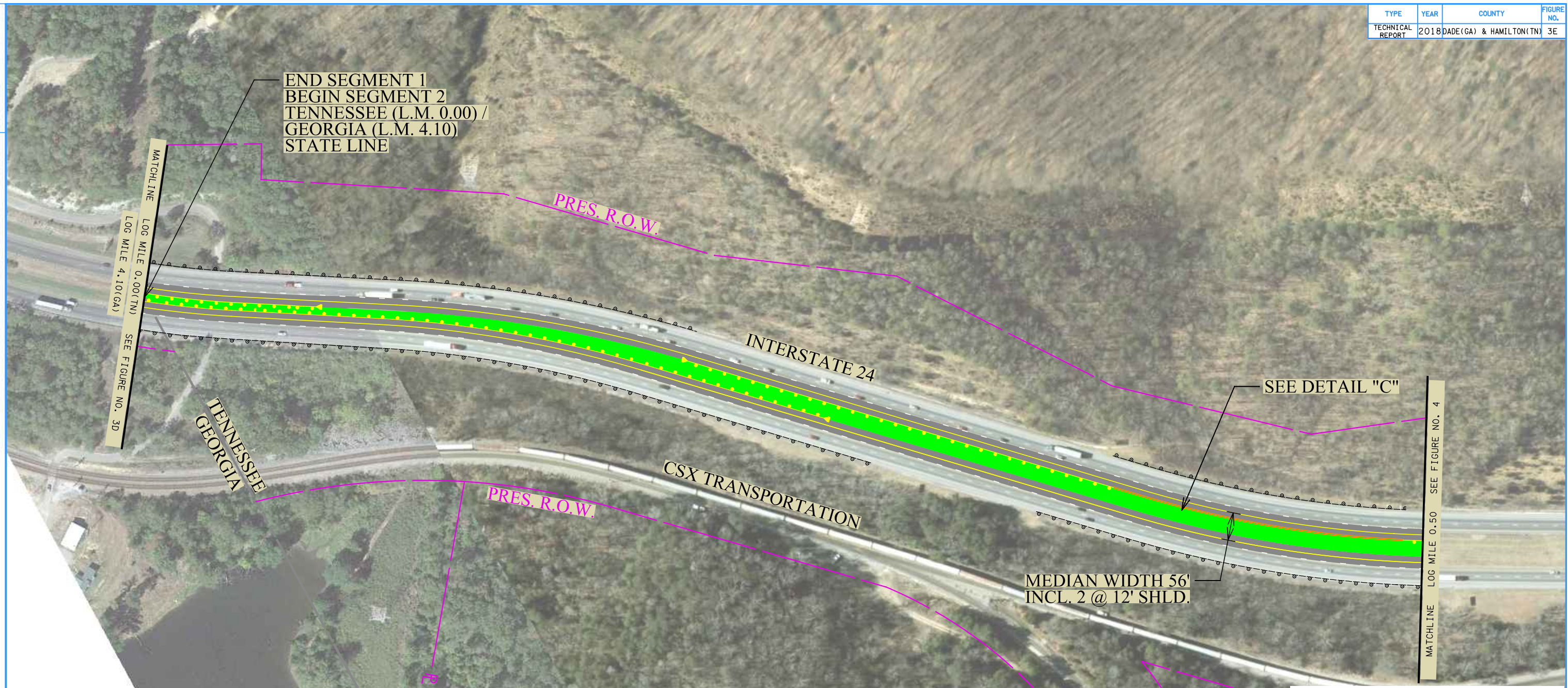
FILL
CUT



TECHNICAL REPORT

INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)



END SEGMENT 1
BEGIN SEGMENT 2
TENNESSEE (L.M. 0.00) /
GEORGIA (L.M. 4.10)
STATE LINE

MATCHLINE
LOG MILE 0.00(TN) /
LOG MILE 4.10(GA)
SEE FIGURE NO. 3D

TENNESSEE
GEORGIA

PRES. R.O.W.

INTERSTATE 24

CSX TRANSPORTATION

PRES. R.O.W.

SEE DETAIL "C"

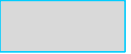





MEDIAN WIDTH 56'
INCL. 2 @ 12' SHLD.

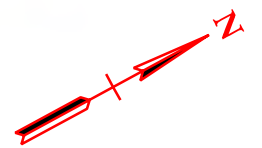
MATCHLINE
LOG MILE 0.50
SEE FIGURE NO. 4

NOTES

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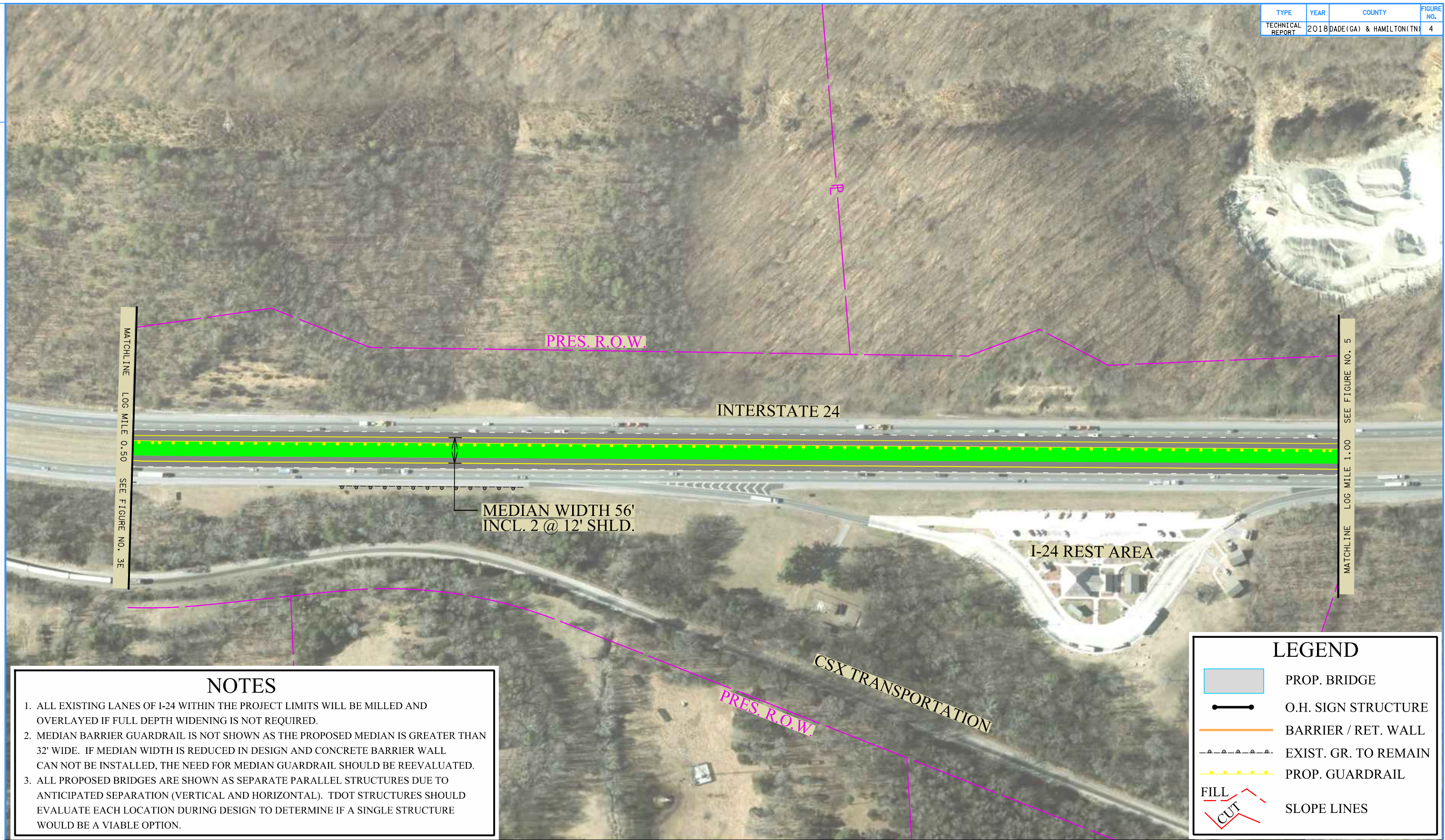
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-  O.H. SIGN STRUCTURE
-  BARRIER / RET. WALL
-  EXIST. GR. TO REMAIN
-  PROP. GUARDRAIL
-  SLOPE LINES



TECHNICAL REPORT

INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)



MATCHLINE LOG MILE 0.50 SEE FIGURE NO. 3E

MATCHLINE LOG MILE 1.00 SEE FIGURE NO. 5

MEDIAN WIDTH 56'
INCL. 2 @ 12' SHLD.

I-24 REST AREA

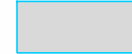







CSX TRANSPORTATION
PRES. R.O.W.

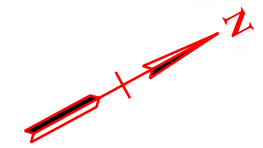
PRES. R.O.W.

INTERSTATE 24

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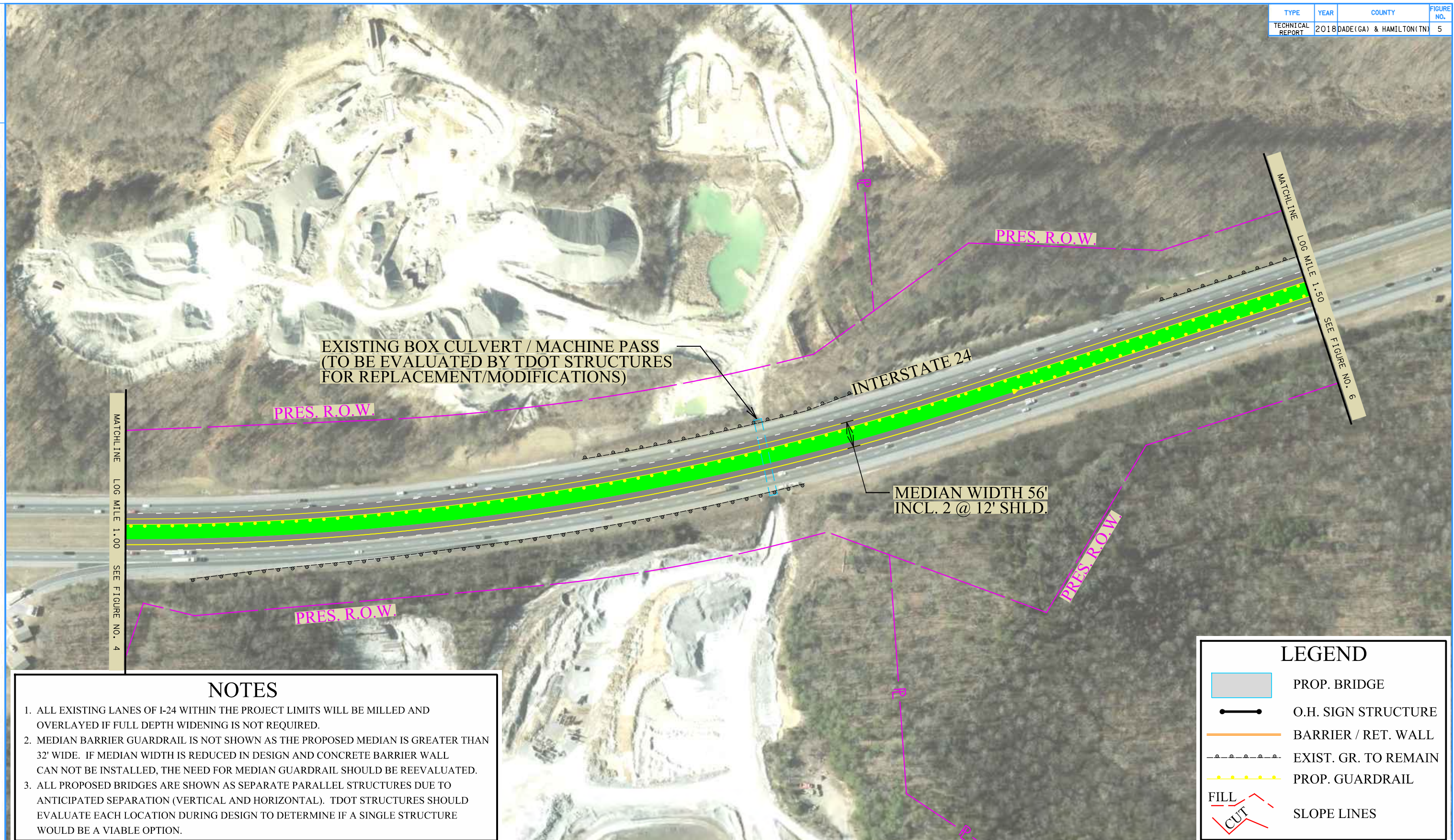
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-  O.H. SIGN STRUCTURE
-  BARRIER / RET. WALL
-  EXIST. GR. TO REMAIN
-  PROP. GUARDRAIL
-  FILL
-  CUT
-  SLOPE LINES



TECHNICAL REPORT

INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)



MATCHLINE LOG MILE 1.00 SEE FIGURE NO. 4

MATCHLINE LOG MILE 1.50 SEE FIGURE NO. 6

EXISTING BOX CULVERT / MACHINE PASS
(TO BE EVALUATED BY TDOT STRUCTURES
FOR REPLACEMENT/MODIFICATIONS)

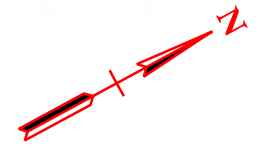
INTERSTATE 24

MEDIAN WIDTH 56'
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LEGEND

| | |
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| | PROP. BRIDGE |
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| | BARRIER / RET. WALL |
| | EXIST. GR. TO REMAIN |
| | PROP. GUARDRAIL |
| | SLOPE LINES |



TECHNICAL REPORT

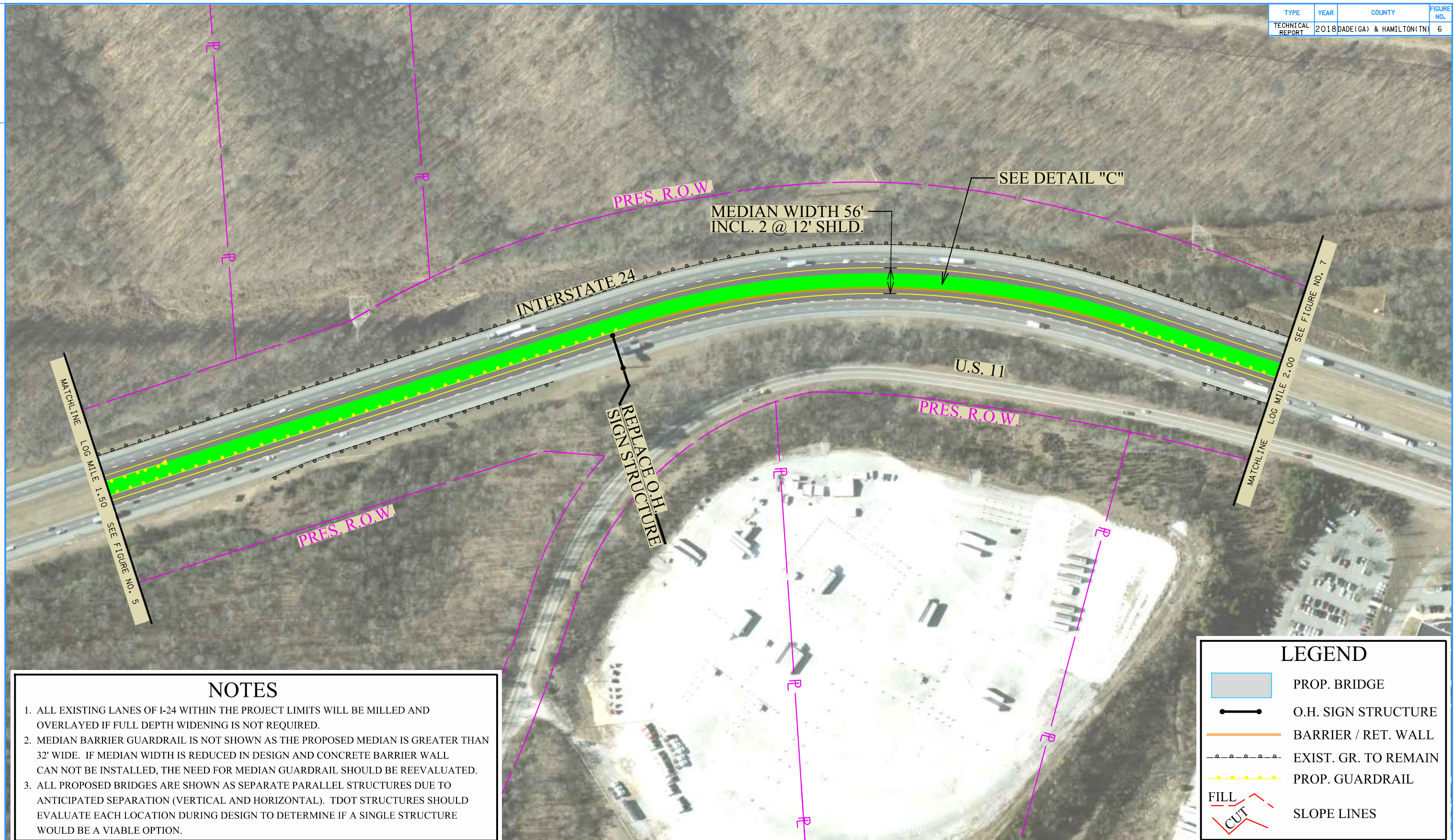
INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 5

I-24
L.M. 1.00 to
L.M. 1.50



NOTES

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LEGEND

| | |
|--|----------------------|
| | PROP. BRIDGE |
| | O.H. SIGN STRUCTURE |
| | BARRIER / RET. WALL |
| | EXIST. GR. TO REMAIN |
| | PROP. GUARDRAIL |
| | SLOPE LINES |
| | |

TECHNICAL REPORT

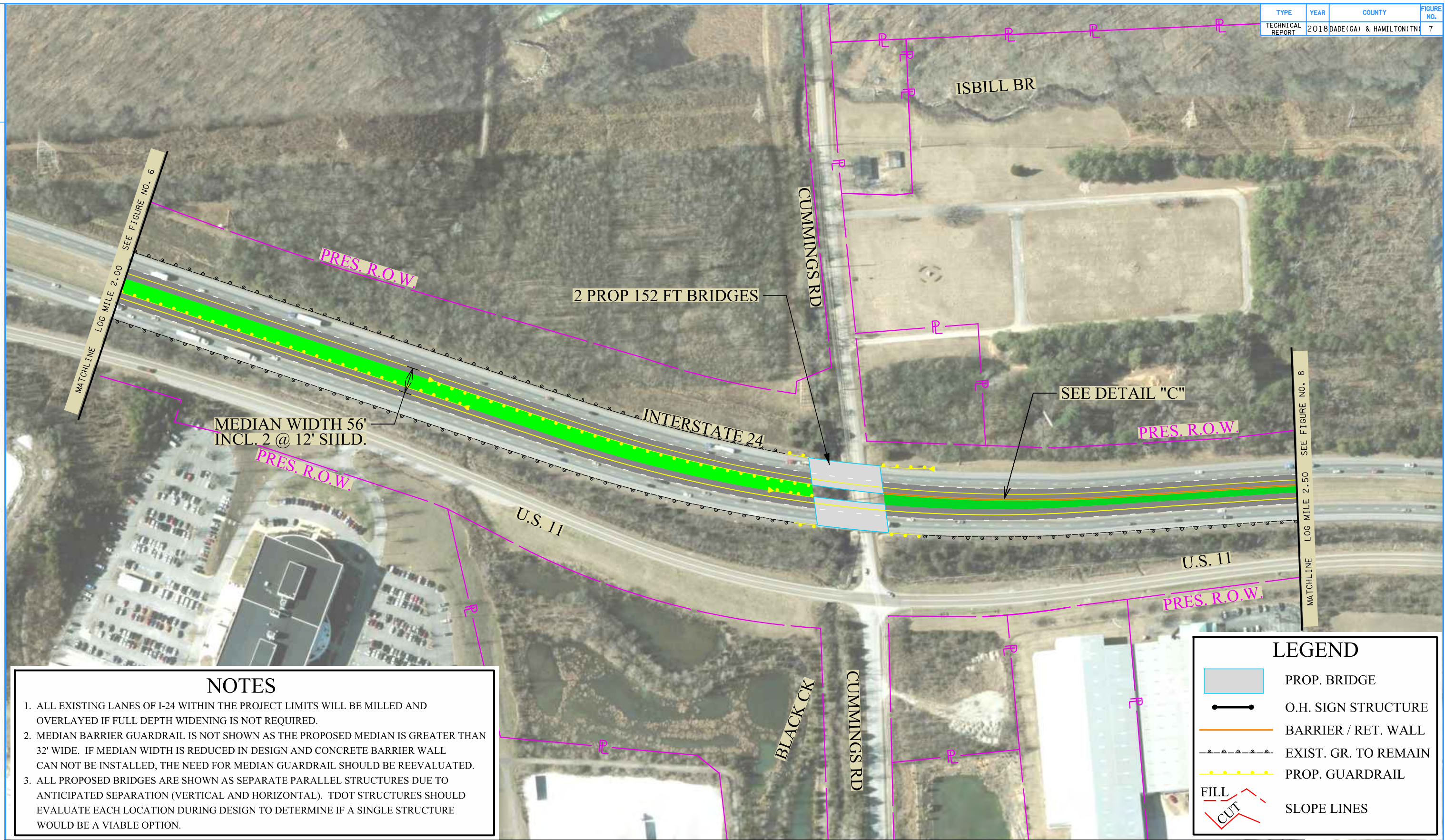
INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 6

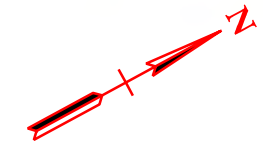
I-24
L.M. 1.50 to
L.M. 2.00



- NOTES**
1. ALL EXISTING LANES OF I-24 WITHIN THE PROJECT LIMITS WILL BE MILLED AND OVERLAYED IF FULL DEPTH WIDENING IS NOT REQUIRED.
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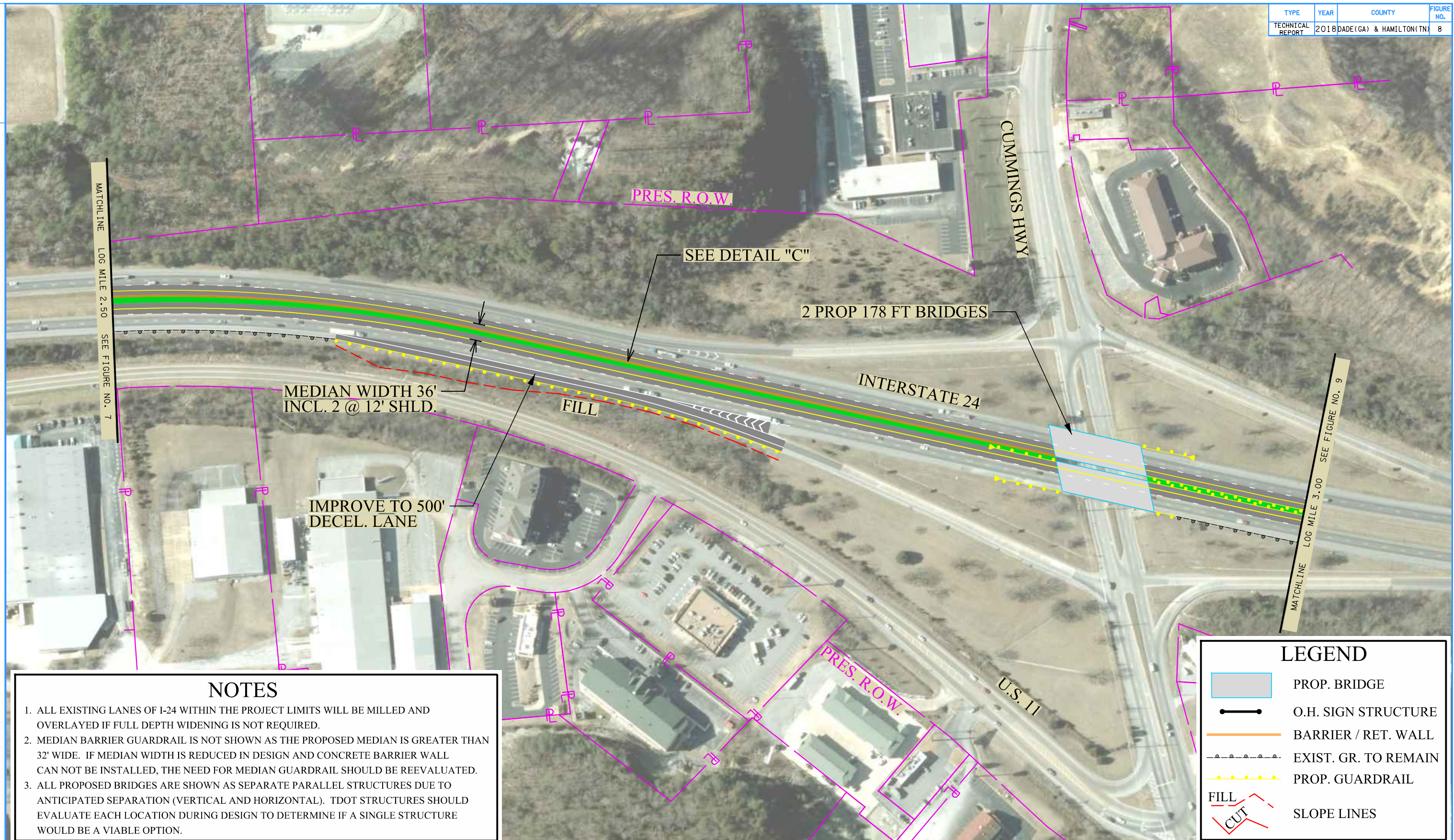
LEGEND

| | |
|--|----------------------|
| | PROP. BRIDGE |
| | O.H. SIGN STRUCTURE |
| | BARRIER / RET. WALL |
| | EXIST. GR. TO REMAIN |
| | PROP. GUARDRAIL |
| | FILL |
| | CUT |
| | SLOPE LINES |



TECHNICAL REPORT
INTERSTATE 24
 L.M. 1.63(GA) to L.M. 7.33(TN)
 DADE CO.(GA) & HAMILTON CO.(TN)

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION
FIGURE 7
I-24
 L.M. 2.00 to
 L.M. 2.50



MEDIAN WIDTH 36'
INCL. 2 @ 12' SHLD.

IMPROVE TO 500'
DECEL. LANE

2 PROP 178 FT BRIDGES

INTERSTATE 24

FILL

PRES. R.O.W.

CUMMINGS HWY

PRES. R.O.W.

U.S. 11




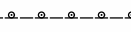




MATCHLINE LOG MILE 2.50
SEE FIGURE NO. 7

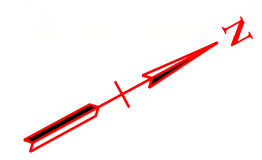
MATCHLINE LOG MILE 3.00
SEE FIGURE NO. 9

NOTES

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LEGEND

-  PROP. BRIDGE
-  O.H. SIGN STRUCTURE
-  BARRIER / RET. WALL
-  EXIST. GR. TO REMAIN
-  PROP. GUARDRAIL
-  FILL
-  CUT
-  SLOPE LINES

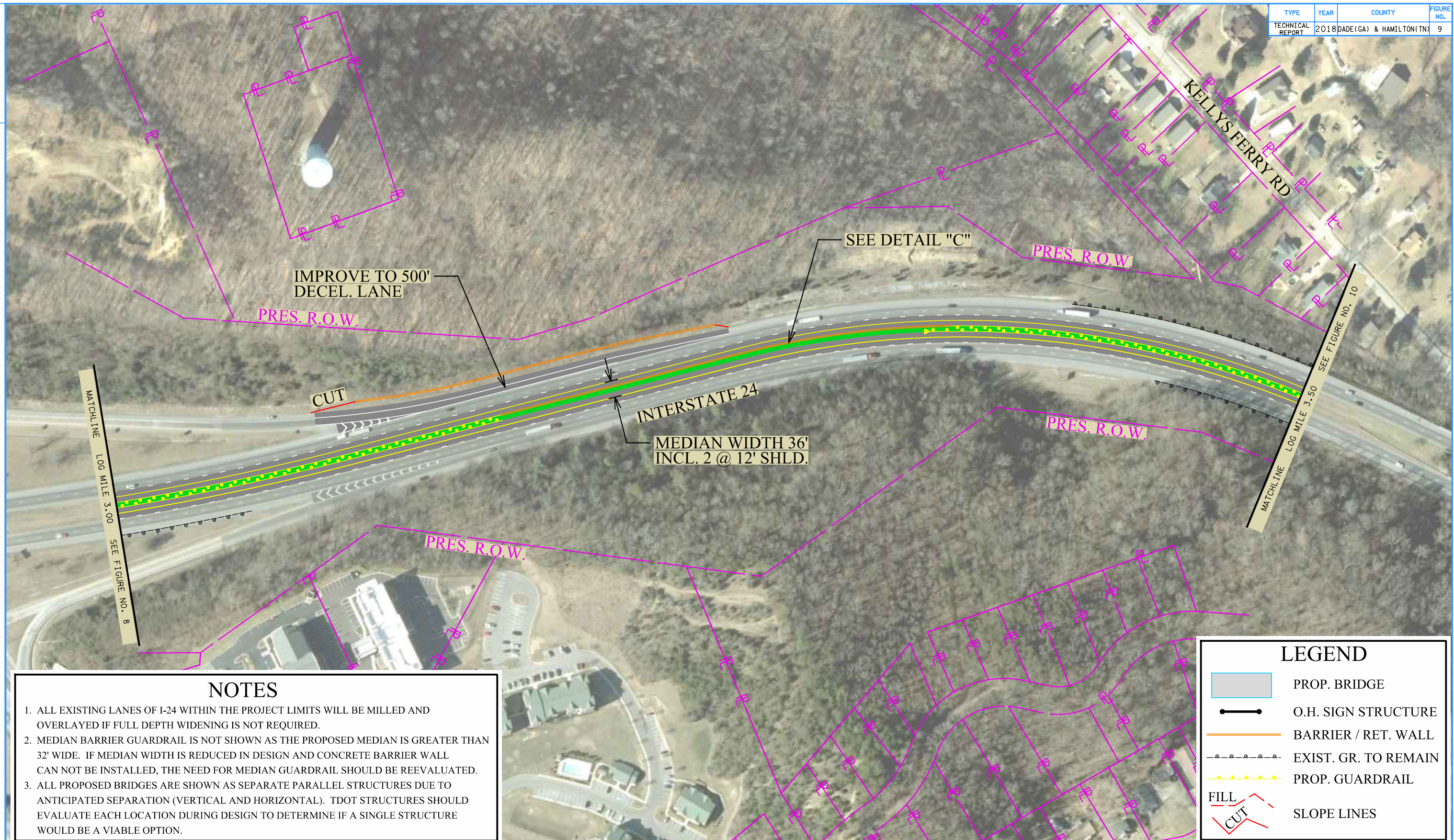


TECHNICAL REPORT

INTERSTATE 24
L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 8
I-24
L.M. 2.50 to
L.M. 3.00



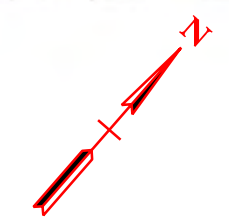
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LEGEND

- PROP. BRIDGE
- O.H. SIGN STRUCTURE
- BARRIER / RET. WALL
- EXIST. GR. TO REMAIN
- PROP. GUARDRAIL
- SLOPE LINES

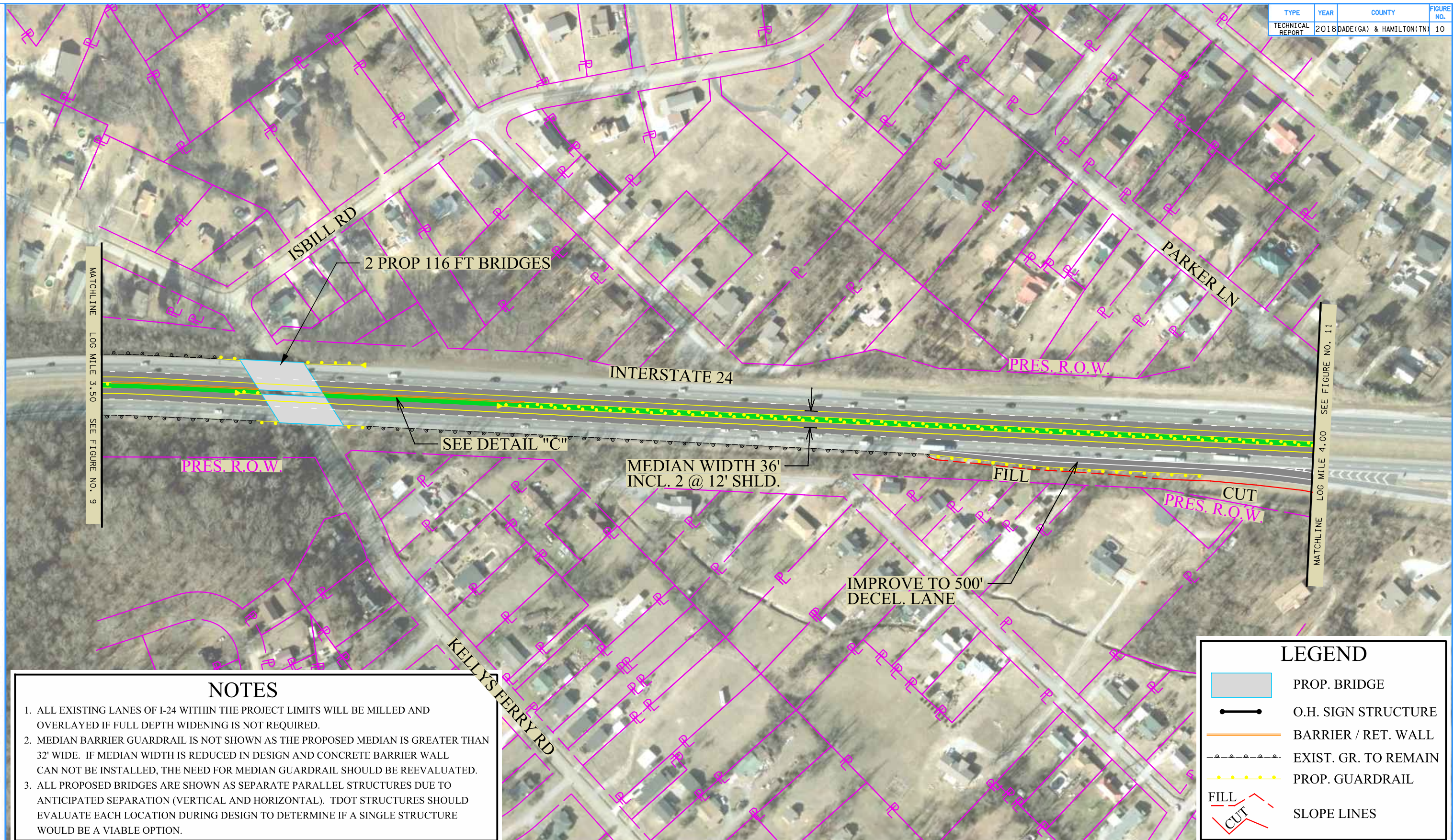
FILL
 CUT



TECHNICAL REPORT

INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
 DADE CO.(GA) & HAMILTON CO.(TN)



MATCHLINE LOG MILE 3.50 SEE FIGURE NO. 9

MATCHLINE LOG MILE 4.00 SEE FIGURE NO. 11

PRES. R.O.W.

ISBILL RD

2 PROP 116 FT BRIDGES

INTERSTATE 24

PARKER LN

PRES. R.O.W.

SEE DETAIL "C"

MEDIAN WIDTH 36'
INCL. 2 @ 12' SHLD.

FILL

CUT
PRES. R.O.W.




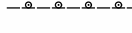



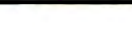
IMPROVE TO 500'
DECEL. LANE

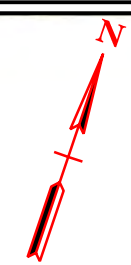
KELLYS FERRY RD

NOTES

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LEGEND

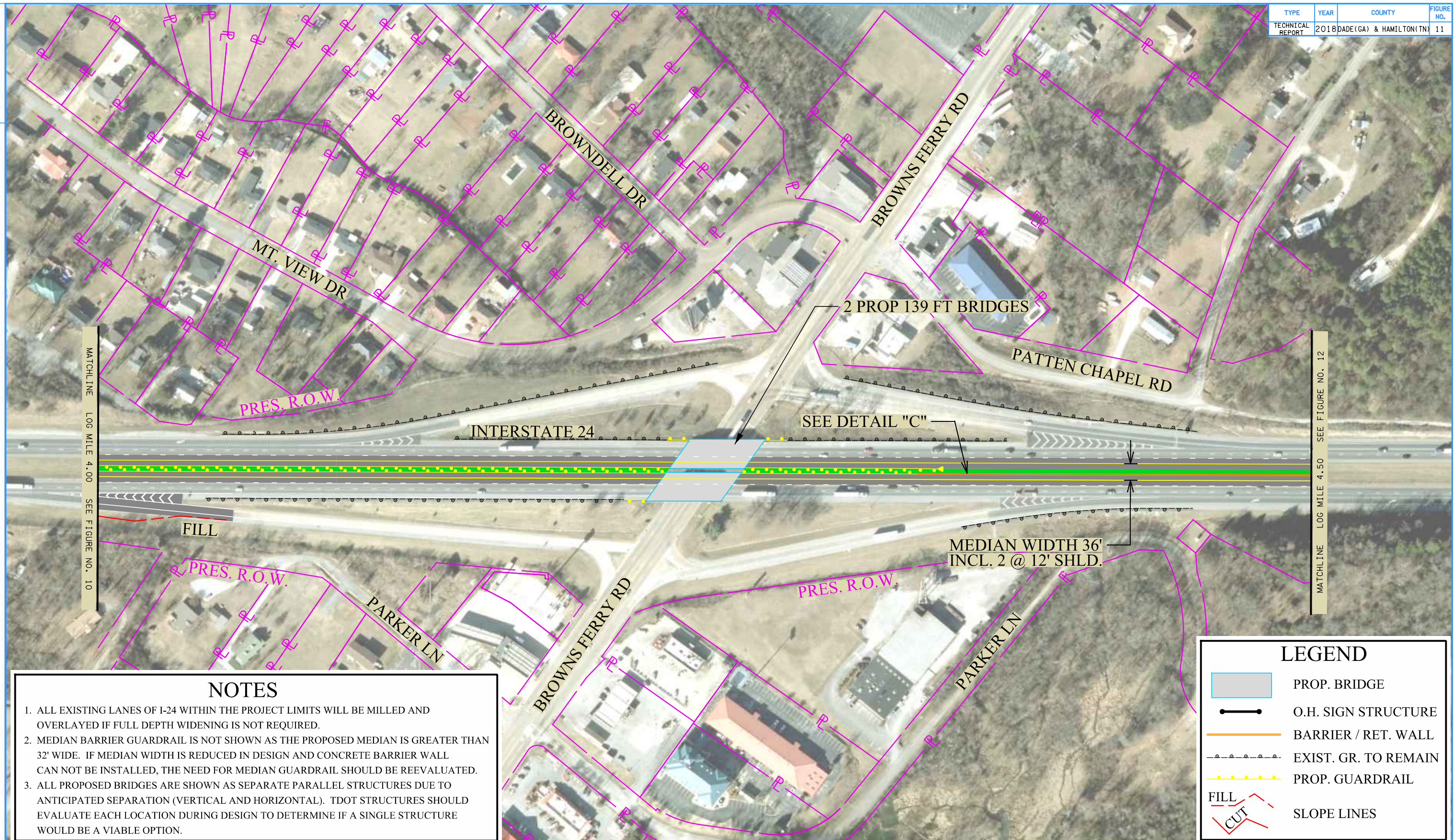
-  PROP. BRIDGE
-  O.H. SIGN STRUCTURE
-  BARRIER / RET. WALL
-  EXIST. GR. TO REMAIN
-  PROP. GUARDRAIL
-  FILL
-  CUT
-  SLOPE LINES



TECHNICAL REPORT

INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)



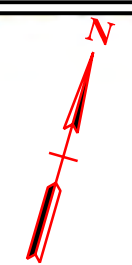
MATCHLINE LOG MILE 4.00 SEE FIGURE NO. 10

MATCHLINE LOG MILE 4.50 SEE FIGURE NO. 12

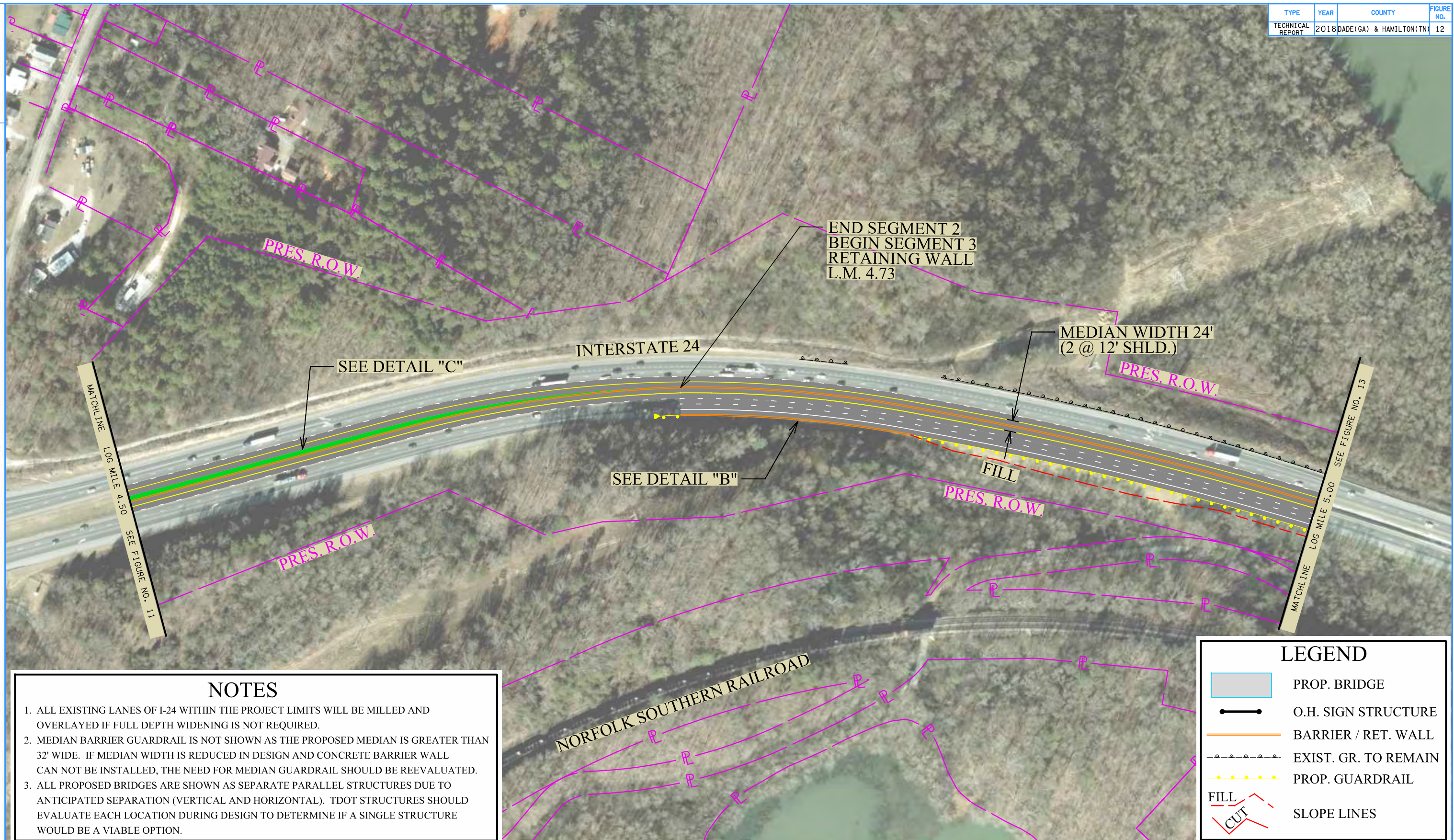
- NOTES**
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LEGEND

| | |
|--|----------------------|
| | PROP. BRIDGE |
| | O.H. SIGN STRUCTURE |
| | BARRIER / RET. WALL |
| | EXIST. GR. TO REMAIN |
| | PROP. GUARDRAIL |
| | FILL |
| | CUT |
| | SLOPE LINES |











TECHNICAL REPORT
INTERSTATE 24
L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)



NOTES

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LEGEND

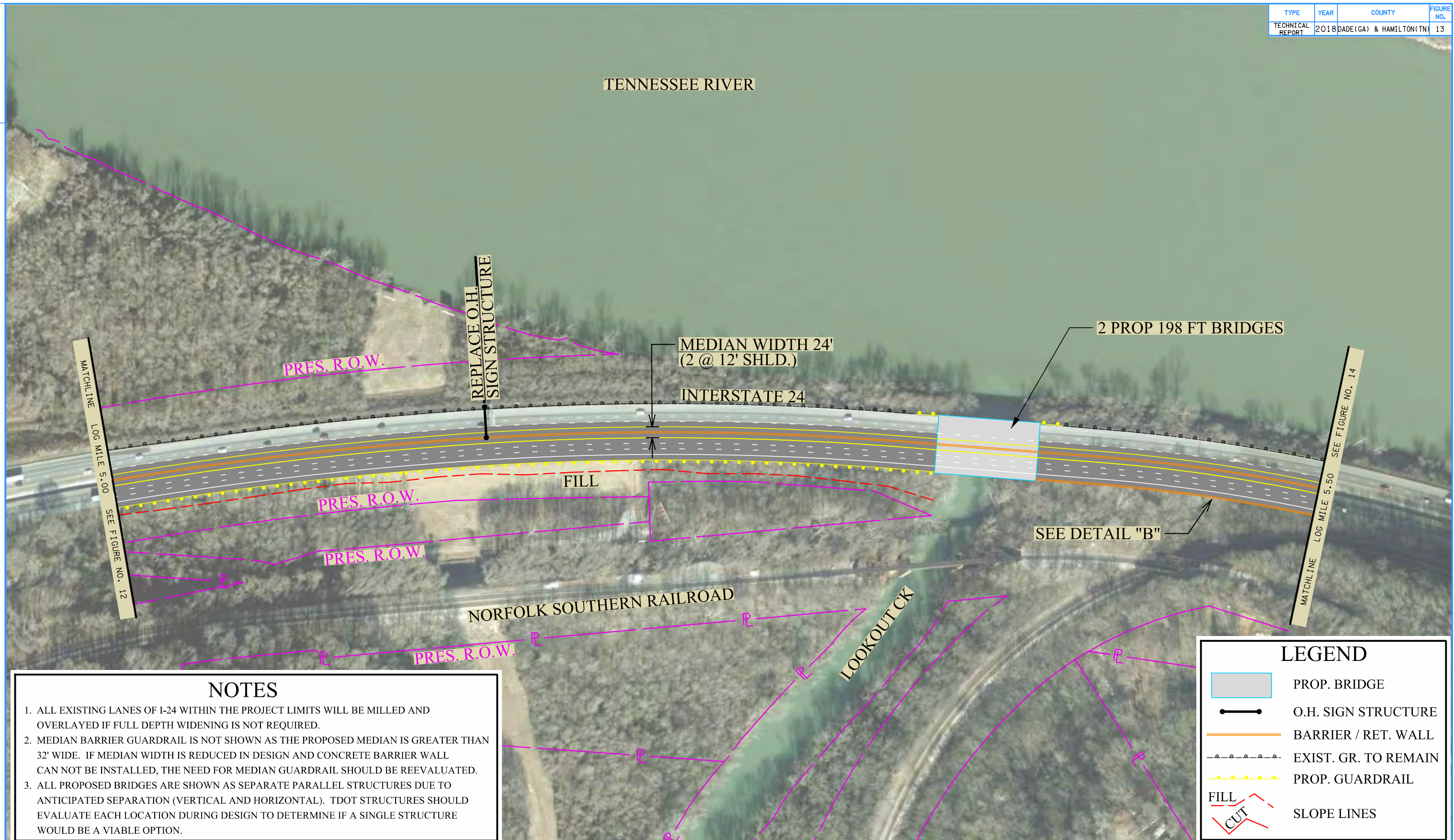
-  PROP. BRIDGE
-  O.H. SIGN STRUCTURE
-  BARRIER / RET. WALL
-  EXIST. GR. TO REMAIN
-  PROP. GUARDRAIL
-  FILL
-  CUT
-  SLOPE LINES



TECHNICAL REPORT

INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)

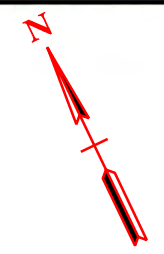


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LEGEND

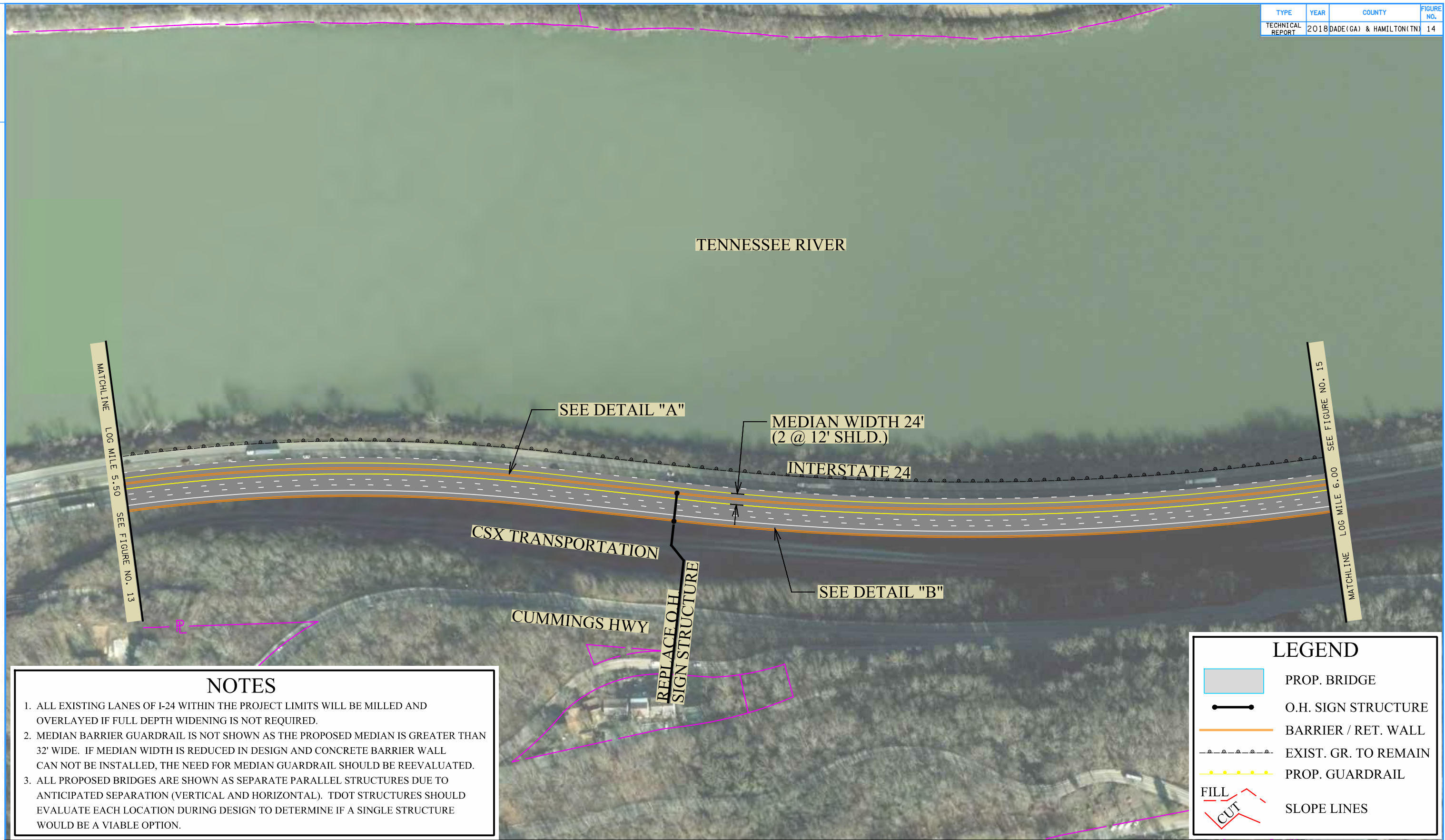
- PROP. BRIDGE
- O.H. SIGN STRUCTURE
- BARRIER / RET. WALL
- EXIST. GR. TO REMAIN
- PROP. GUARDRAIL
- FILL
- CUT
- SLOPE LINES



TECHNICAL REPORT

INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)

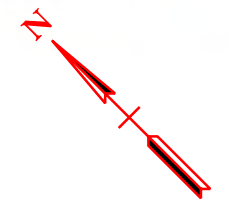


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LEGEND

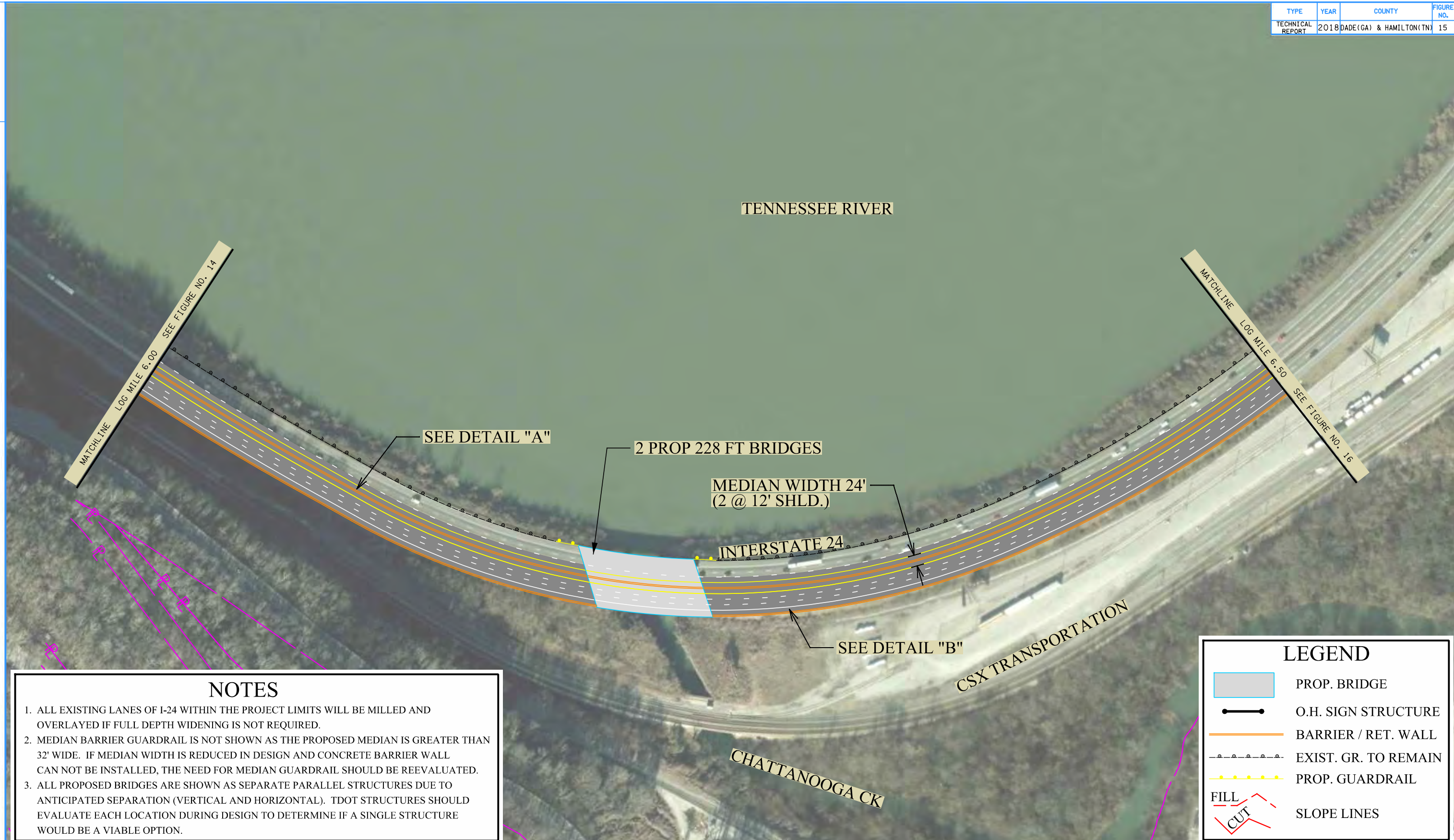
- PROP. BRIDGE
- O.H. SIGN STRUCTURE
- BARRIER / RET. WALL
- EXIST. GR. TO REMAIN
- PROP. GUARDRAIL
- SLOPE LINES
- FILL
- CUT



TECHNICAL REPORT

INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)



NOTES

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LEGEND

- PROP. BRIDGE
- O.H. SIGN STRUCTURE
- BARRIER / RET. WALL
- EXIST. GR. TO REMAIN
- PROP. GUARDRAIL
- FILL
- CUT
- SLOPE LINES

TECHNICAL REPORT
INTERSTATE 24
L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FIGURE 15
I-24
L.M. 6.00 to
L.M. 6.50



NOTES

1. ALL EXISTING LANES OF I-24 WITHIN THE PROJECT LIMITS WILL BE MILLED AND OVERLAYED IF FULL DEPTH WIDENING IS NOT REQUIRED.
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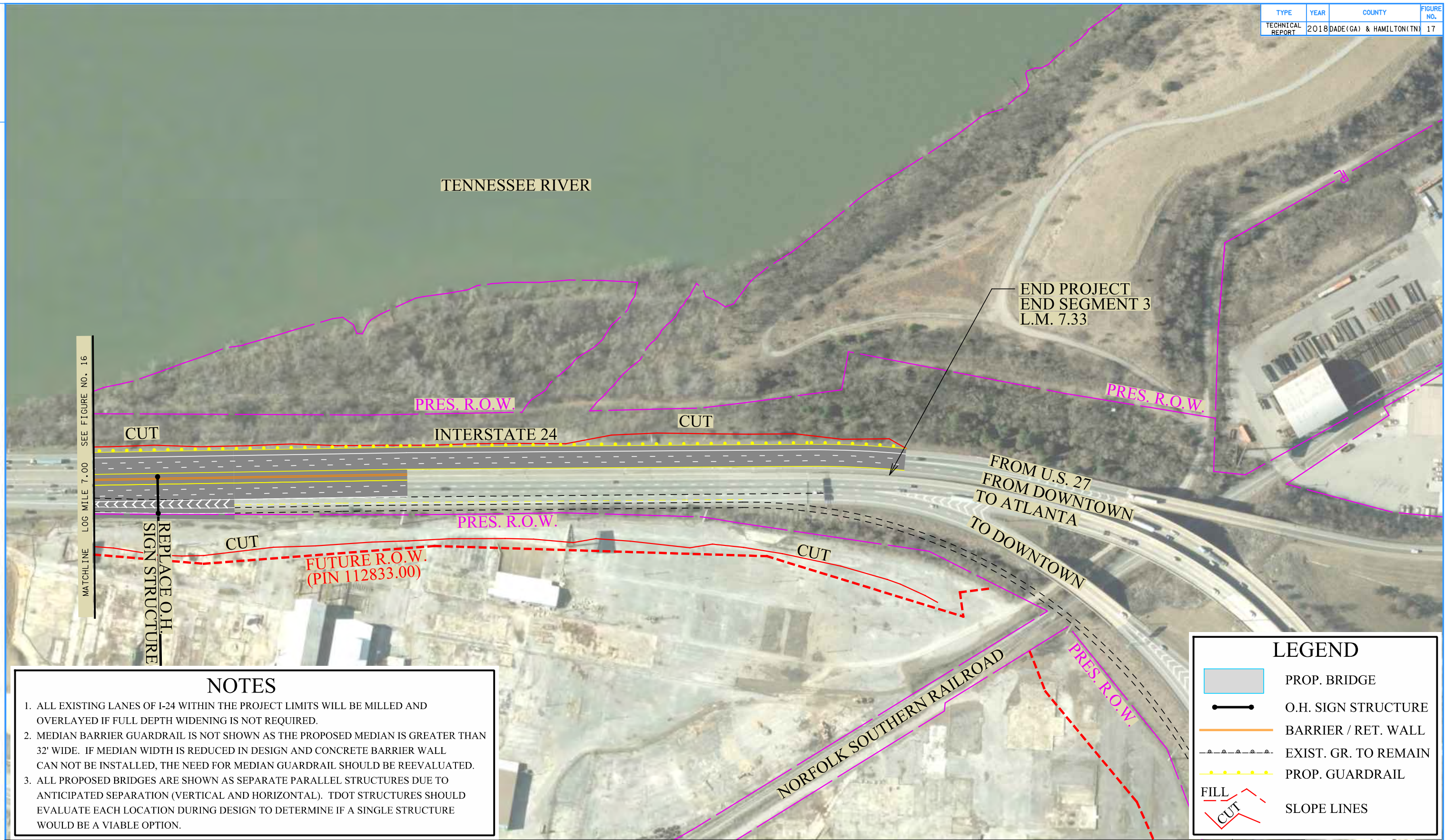
TECHNICAL REPORT
INTERSTATE 24
L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)

LEGEND

| | |
|--|----------------------|
| | PROP. BRIDGE |
| | O.H. SIGN STRUCTURE |
| | BARRIER / RET. WALL |
| | EXIST. GR. TO REMAIN |
| | PROP. GUARDRAIL |
| | FILL |
| | CUT |
| | SLOPE LINES |

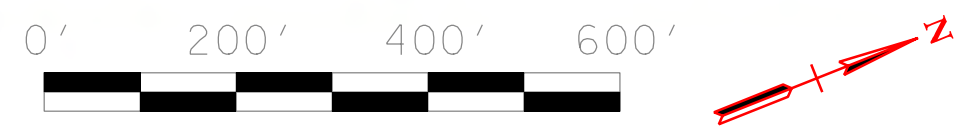
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION
FIGURE 16
I-24
L.M. 6.50 to
L.M. 7.00

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NOTES

1. ALL EXISTING LANES OF I-24 WITHIN THE PROJECT LIMITS WILL BE MILLED AND OVERLAYED IF FULL DEPTH WIDENING IS NOT REQUIRED.
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TECHNICAL REPORT

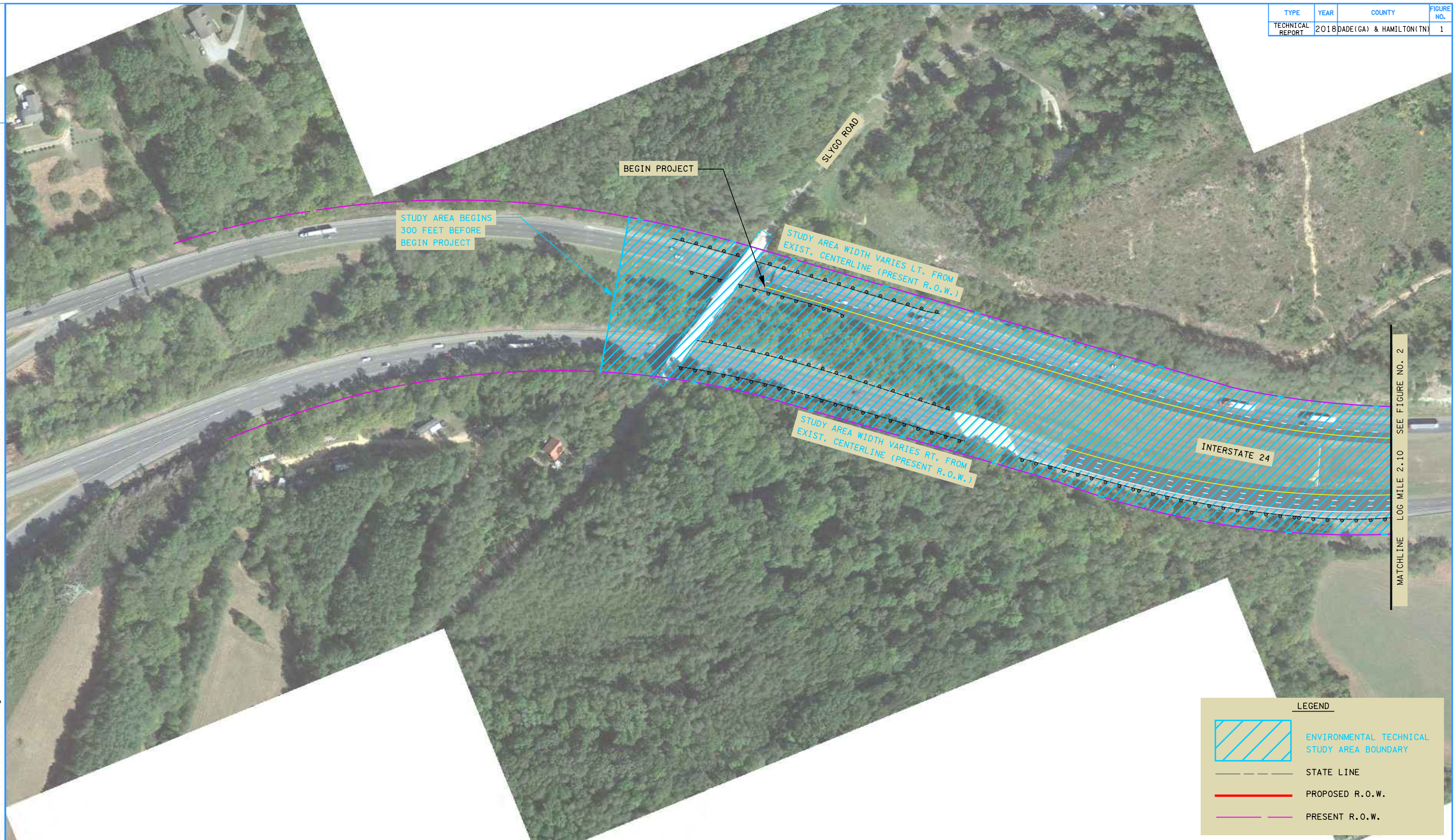
INTERSTATE 24

L.M. 1.63(GA) to L.M. 7.33(TN)
DADE CO.(GA) & HAMILTON CO.(TN)

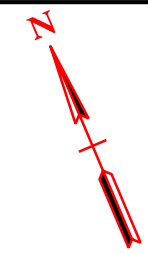
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 17
I-24
L.M. 7.00 to
L.M. 7.33

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8/10/2018 12:27:51 PM Y:\nashville\16070005\1607023.00\1607023.74\1607023-74.ETS-1\Figure01.sht



ENVIRONMENTAL TECHNICAL STUDY AREA

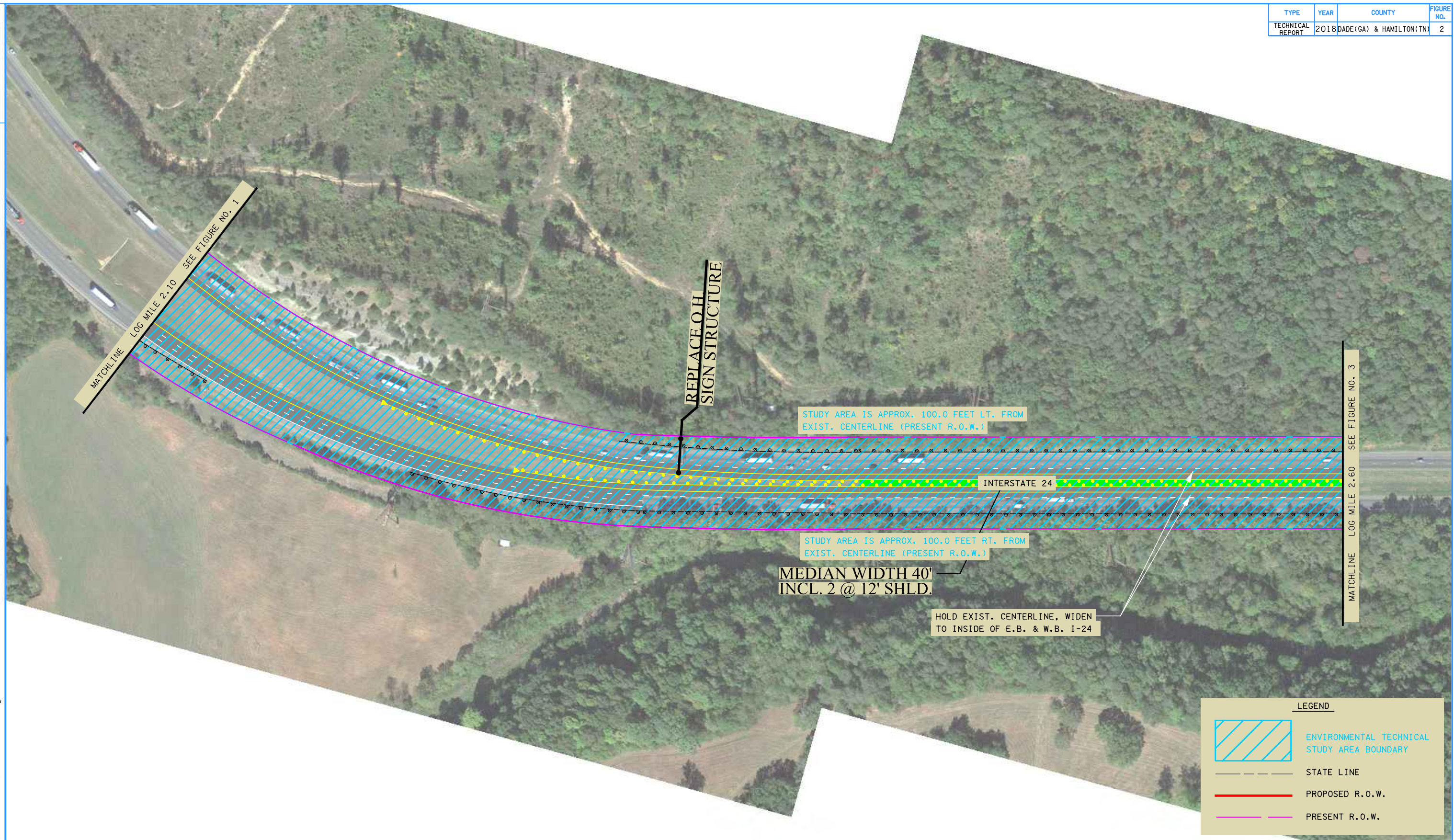
INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

LEGEND



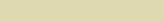
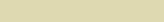
- ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
- STATE LINE
- PROPOSED R.O.W.
- PRESENT R.O.W.

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 1
I-24
L.M. 1.63 to
L.M. 2.10



LEGEND

-  ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
-  STATE LINE
-  PROPOSED R.O.W.
-  PRESENT R.O.W.

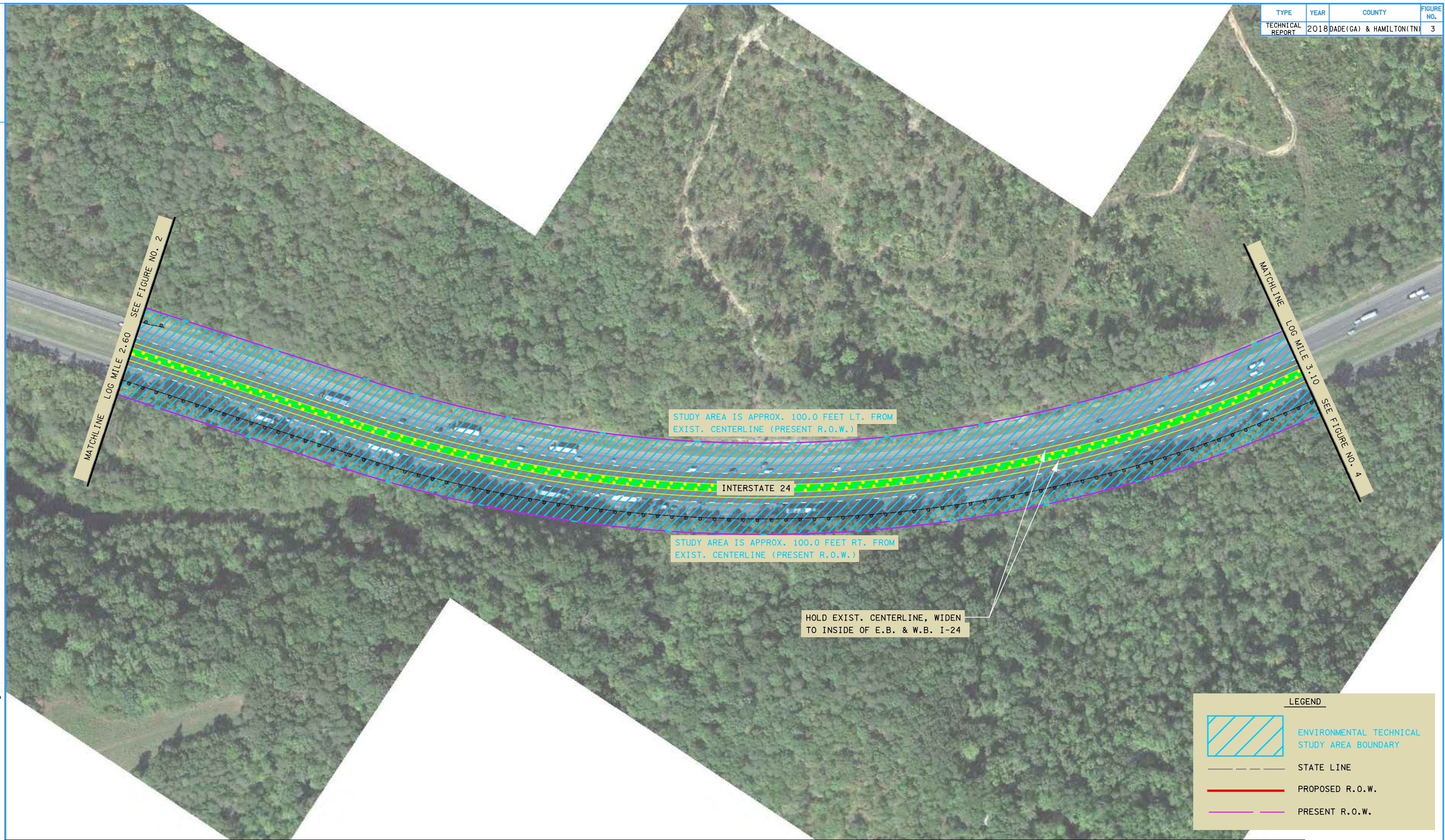


ENVIRONMENTAL TECHNICAL STUDY AREA

INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

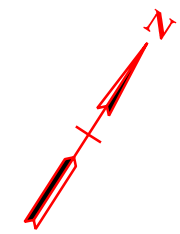
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 2
I-24
 L.M. 2.10 to
 L.M. 2.60



LEGEND

- ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
- STATE LINE
- PROPOSED R.O.W.
- PRESENT R.O.W.

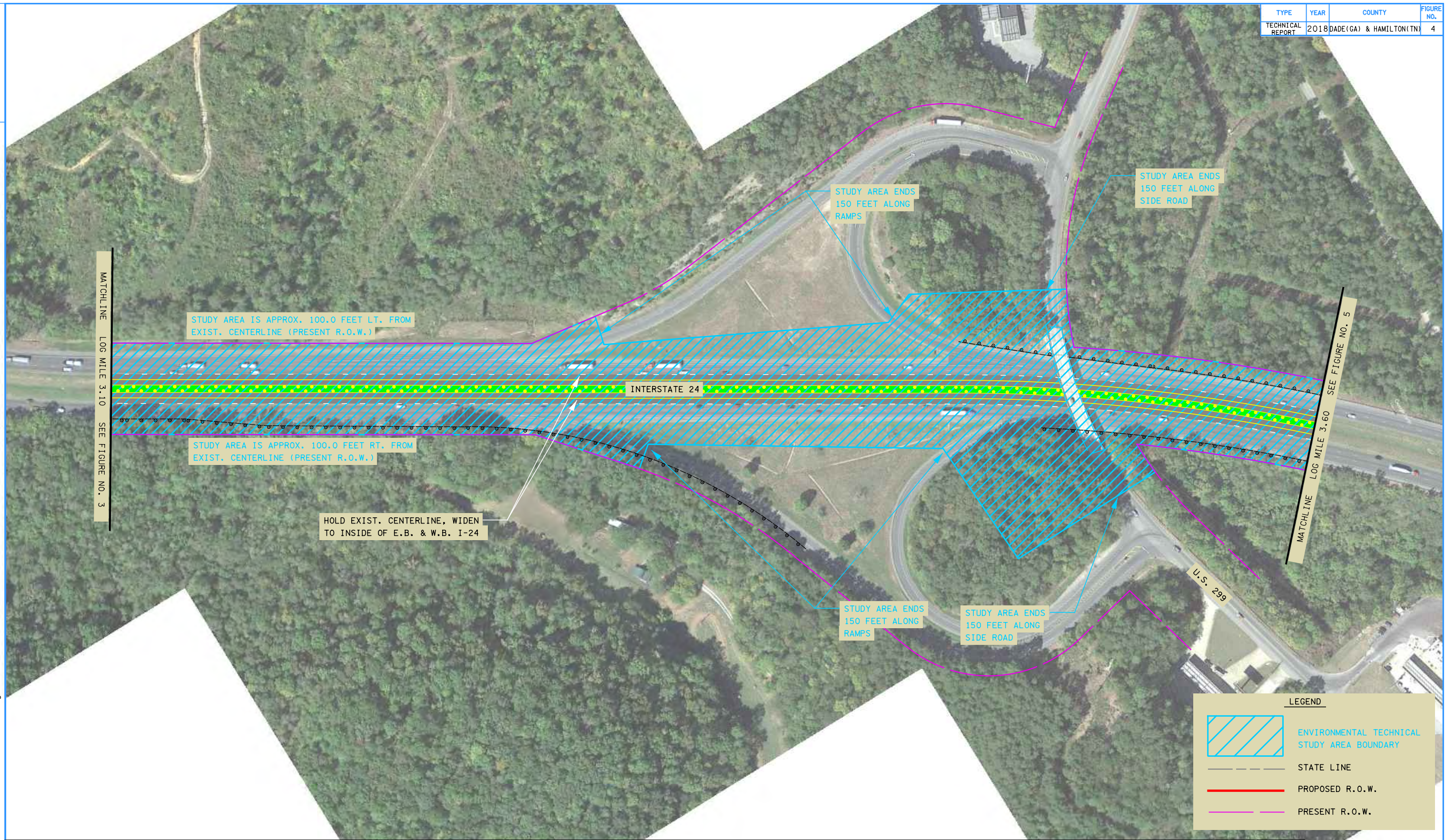


ENVIRONMENTAL TECHNICAL STUDY AREA

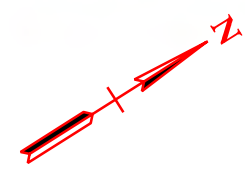
INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO.(GA) & HAMILTON CO.(TN)

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 3C
I-24
 L.M. 2.60 to
 L.M. 3.10





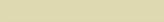
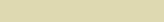
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ENVIRONMENTAL TECHNICAL STUDY AREA

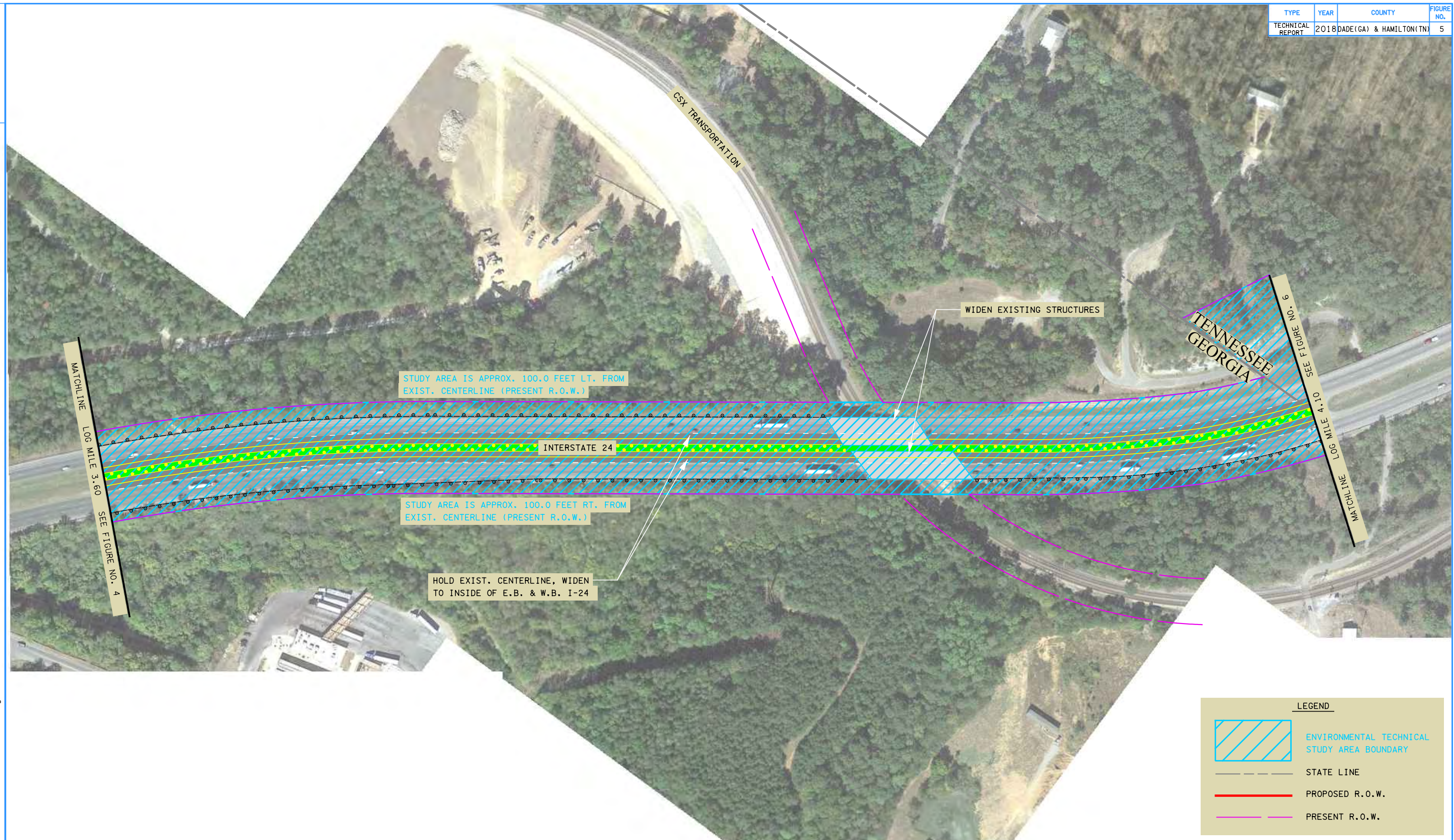
INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

LEGEND





-  ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
-  STATE LINE
-  PROPOSED R.O.W.
-  PRESENT R.O.W.

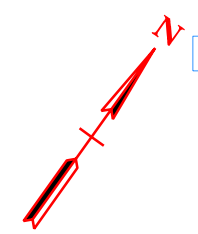
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 4
I-24
L.M. 3.10 to
L.M. 3.60



LEGEND

-  ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
-  STATE LINE
-  PROPOSED R.O.W.
-  PRESENT R.O.W.

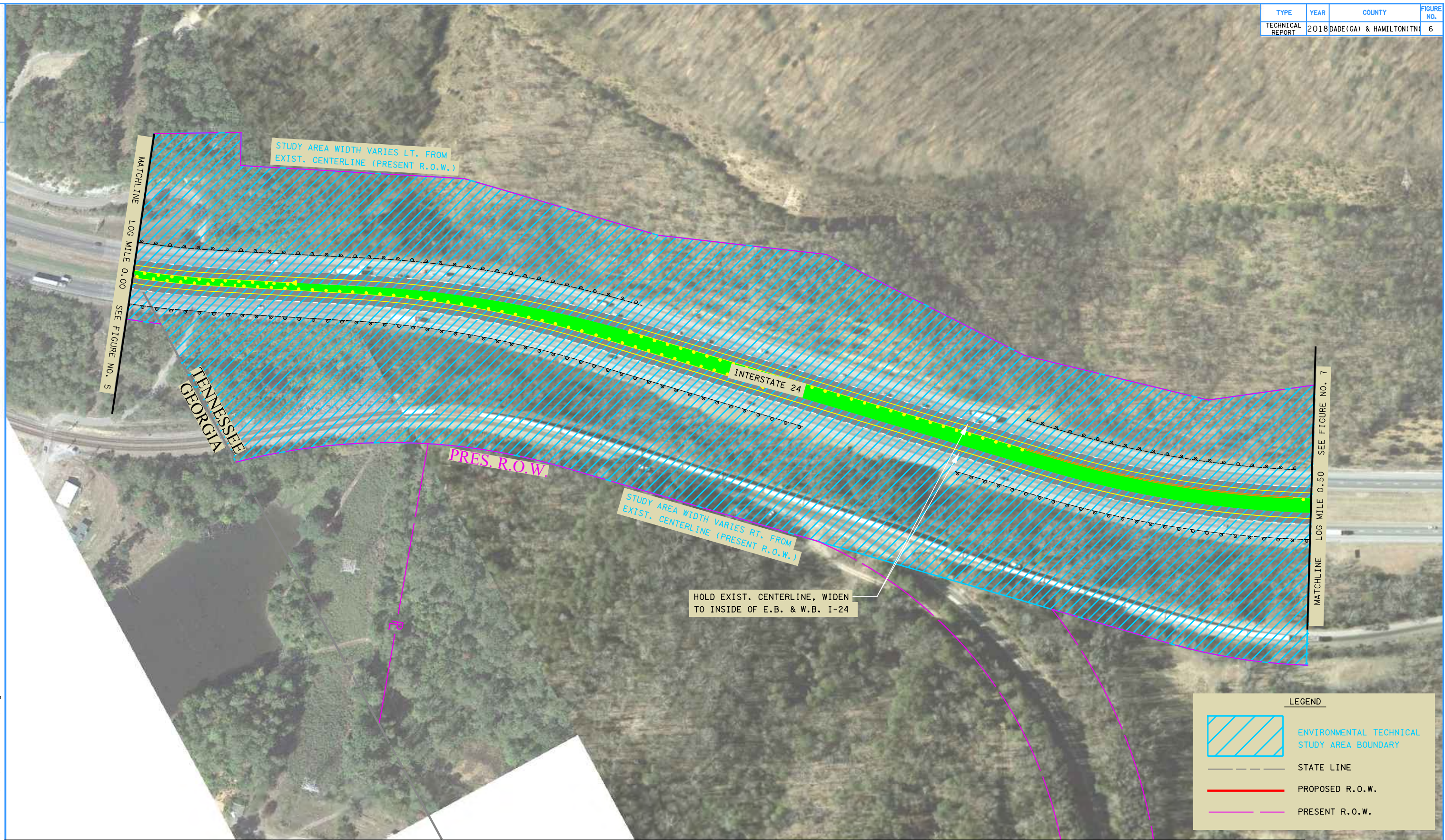


ENVIRONMENTAL TECHNICAL STUDY AREA

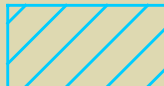

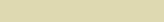
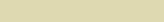
INTERSTATE 24
L.M. 1.63 to L.M. 7.33
DADE CO. (GA) & HAMILTON CO. (TN)

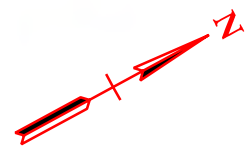
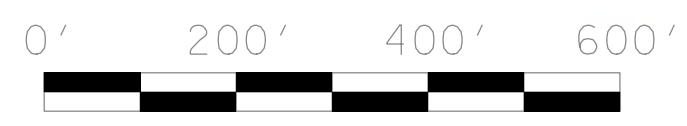
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 5
I-24
L.M. 3.60 to
L.M. 4.10



LEGEND

-  ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
-  STATE LINE
-  PROPOSED R.O.W.
-  PRESENT R.O.W.



ENVIRONMENTAL TECHNICAL STUDY AREA

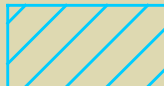

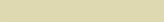
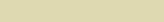
INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

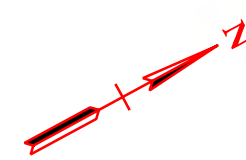
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 6
I-24
 L.M. 0.00 to
 L.M. 0.50



LEGEND

-  ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
-  STATE LINE
-  PROPOSED R.O.W.
-  PRESENT R.O.W.





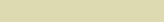
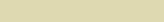
ENVIRONMENTAL TECHNICAL STUDY AREA
 INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO.(GA) & HAMILTON CO.(TN)

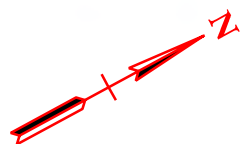
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 7
 I-24
 L.M. 0.50 to
 L.M. 1.00



LEGEND

-  ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
-  STATE LINE
-  PROPOSED R.O.W.
-  PRESENT R.O.W.

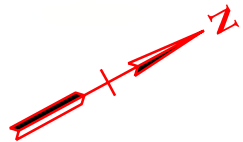
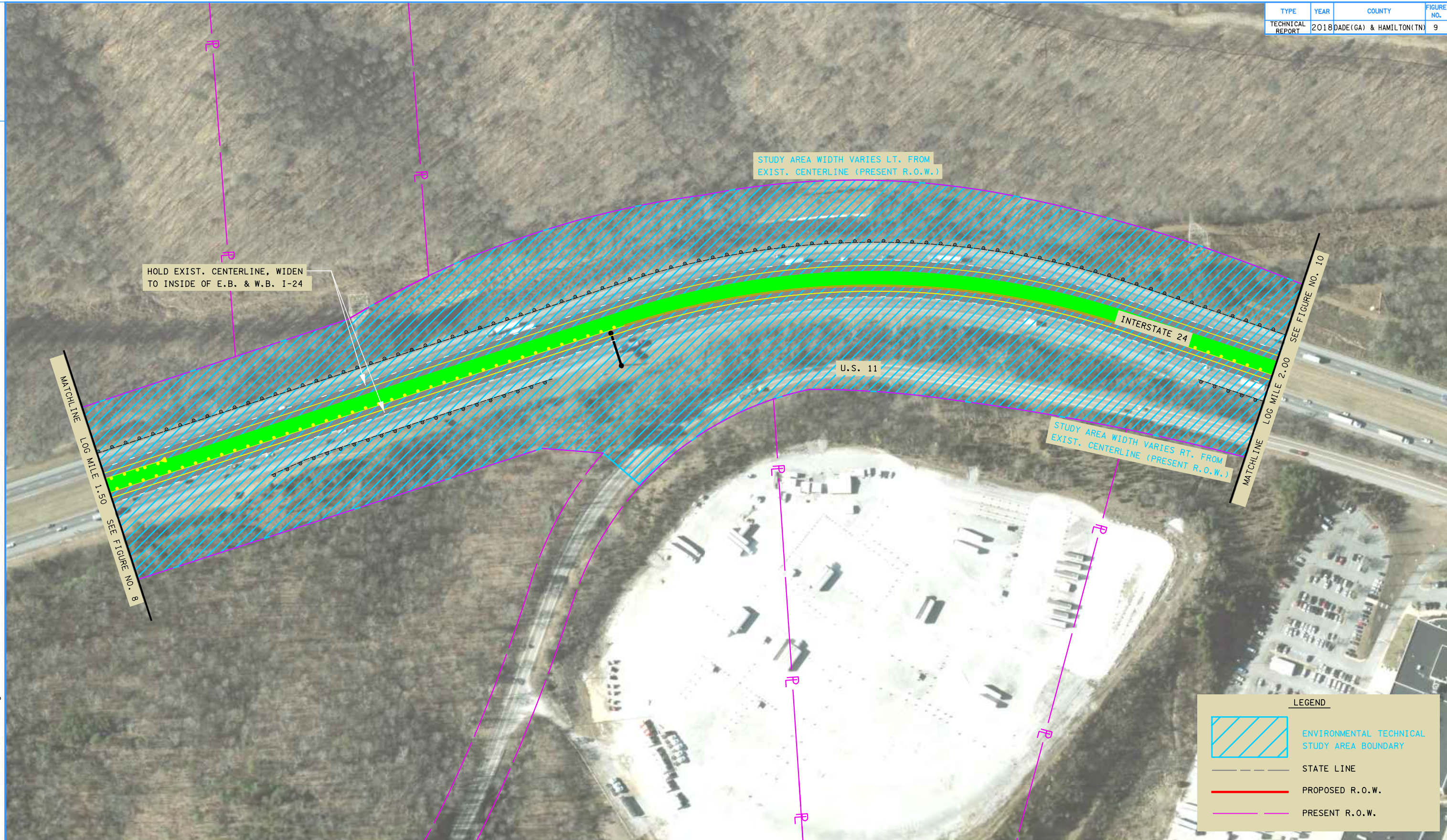


ENVIRONMENTAL TECHNICAL STUDY AREA

INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

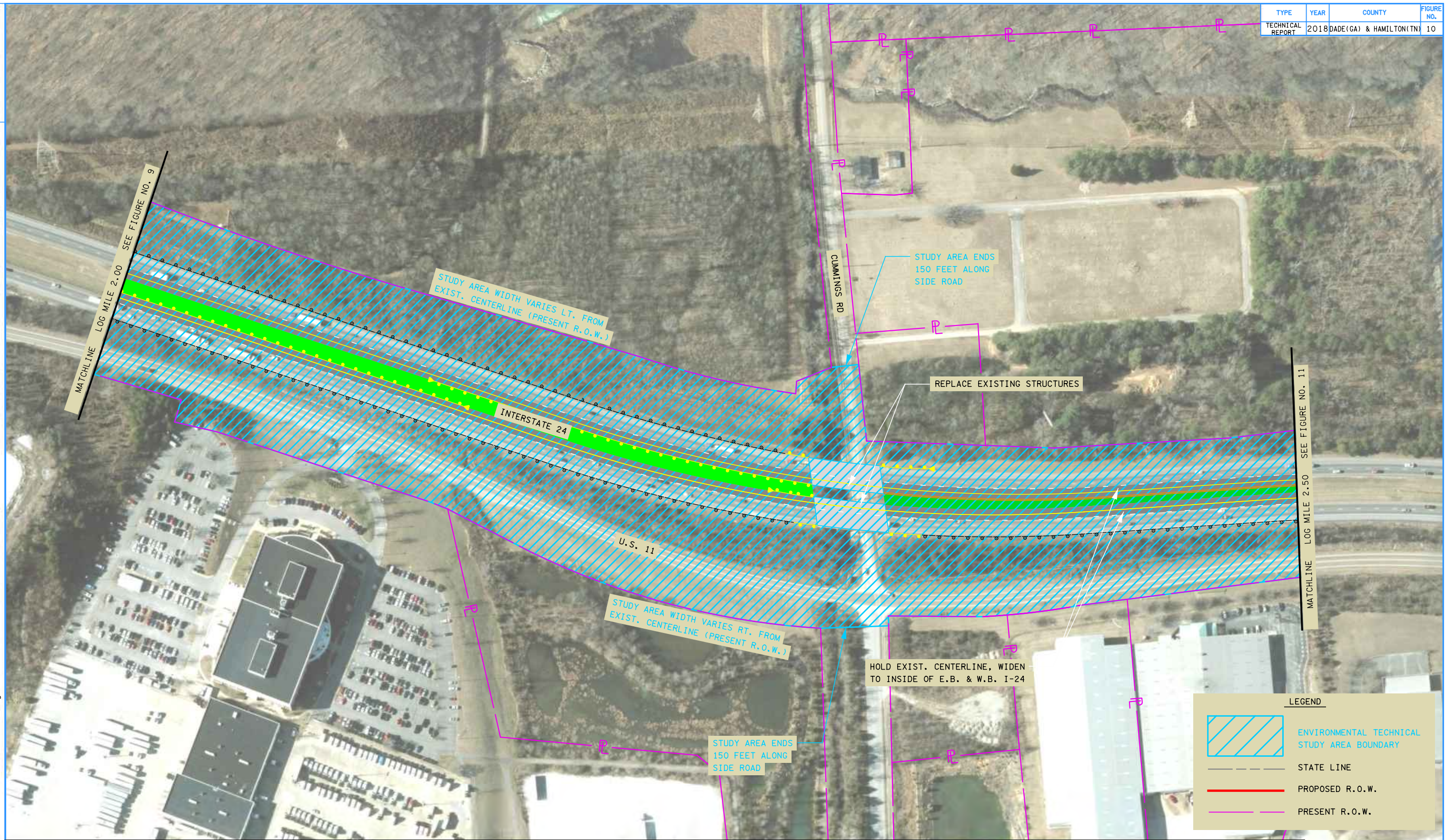
FIGURE 8
I-24
 L.M. 1.00 to
 L.M. 1.50







ENVIRONMENTAL TECHNICAL STUDY AREA
INTERSTATE 24
L.M. 1.63 to L.M. 7.33
DADE CO. (GA) & HAMILTON CO. (TN)

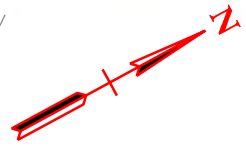
| LEGEND | |
|--------|---|
| | ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY |
| | STATE LINE |
| | PROPOSED R.O.W. |
| | PRESENT R.O.W. |

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION
FIGURE 9
I-24
L.M. 1.50 to
L.M. 2.00



LEGEND

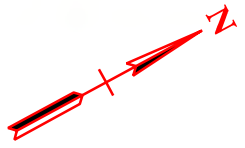
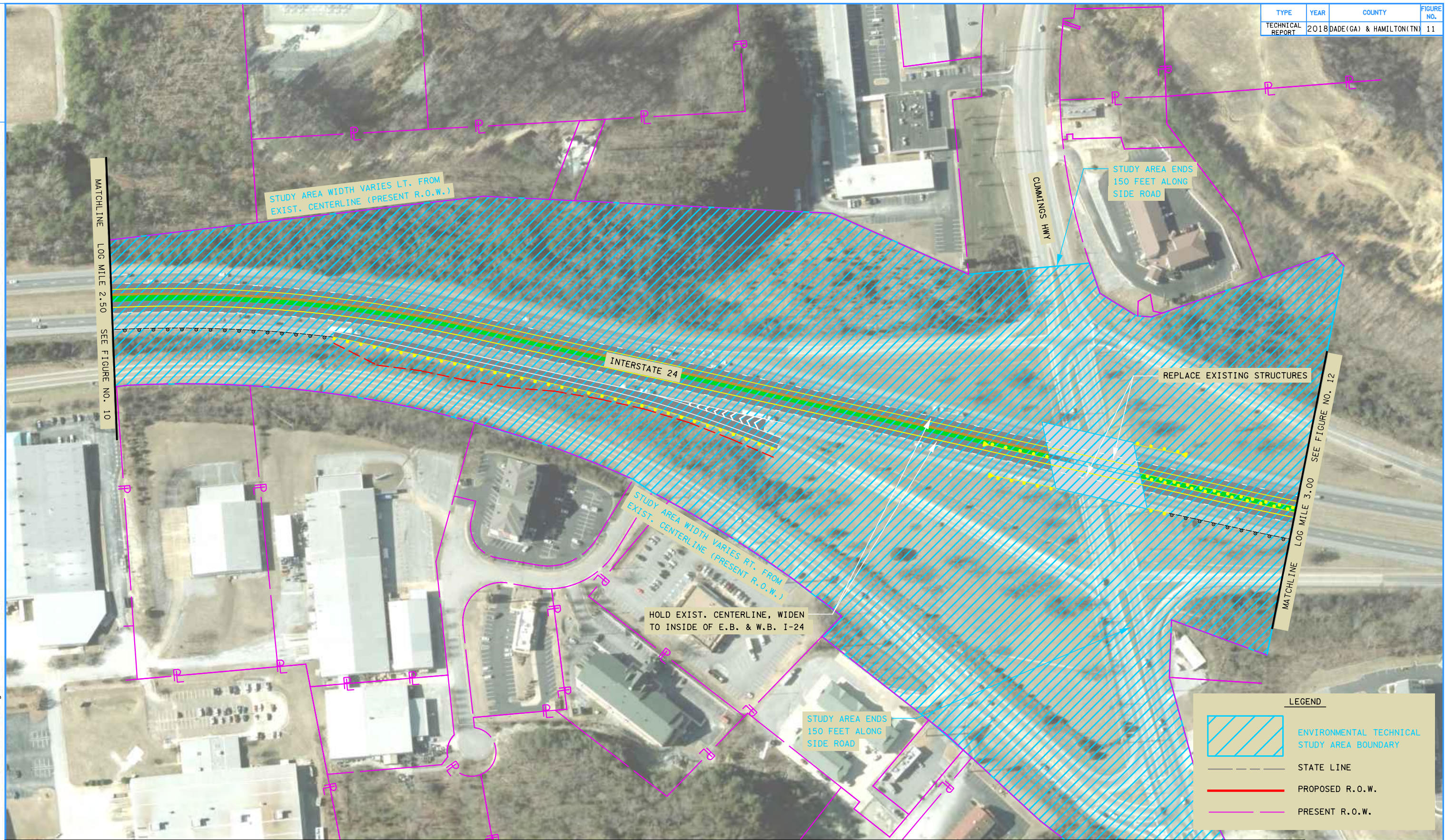
-  ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
-  STATE LINE
-  PROPOSED R.O.W.
-  PRESENT R.O.W.



ENVIRONMENTAL TECHNICAL STUDY AREA

INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO.(GA) & HAMILTON CO.(TN)

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION
FIGURE 10
I-24
L.M. 2.00 to
L.M. 2.50



ENVIRONMENTAL TECHNICAL STUDY AREA

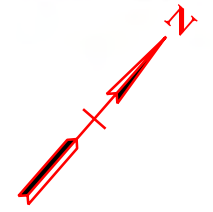
INTERSTATE 24
L.M. 1.63 to L.M. 7.33
DADE CO. (GA) & HAMILTON CO. (TN)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 11
I-24
L.M. 2.50 to
L.M. 3.00



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 Y:\nashville\16070005\1607023.00\1607023.74\DGN\1607023-74-ETSA-Figure12.sht



ENVIRONMENTAL TECHNICAL STUDY AREA

INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

LEGEND

- ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
- STATE LINE
- PROPOSED R.O.W.
- PRESENT R.O.W.

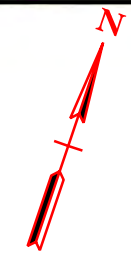
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 12
I-24
L.M. 3.00 to
L.M. 3.50



LEGEND

- ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
- STATE LINE
- PROPOSED R.O.W.
- PRESENT R.O.W.



ENVIRONMENTAL TECHNICAL STUDY AREA


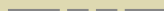
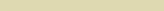
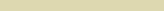
INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 13
I-24
 L.M. 3.50 to
 L.M. 4.00



LEGEND

-  ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
-  STATE LINE
-  PROPOSED R.O.W.
-  PRESENT R.O.W.

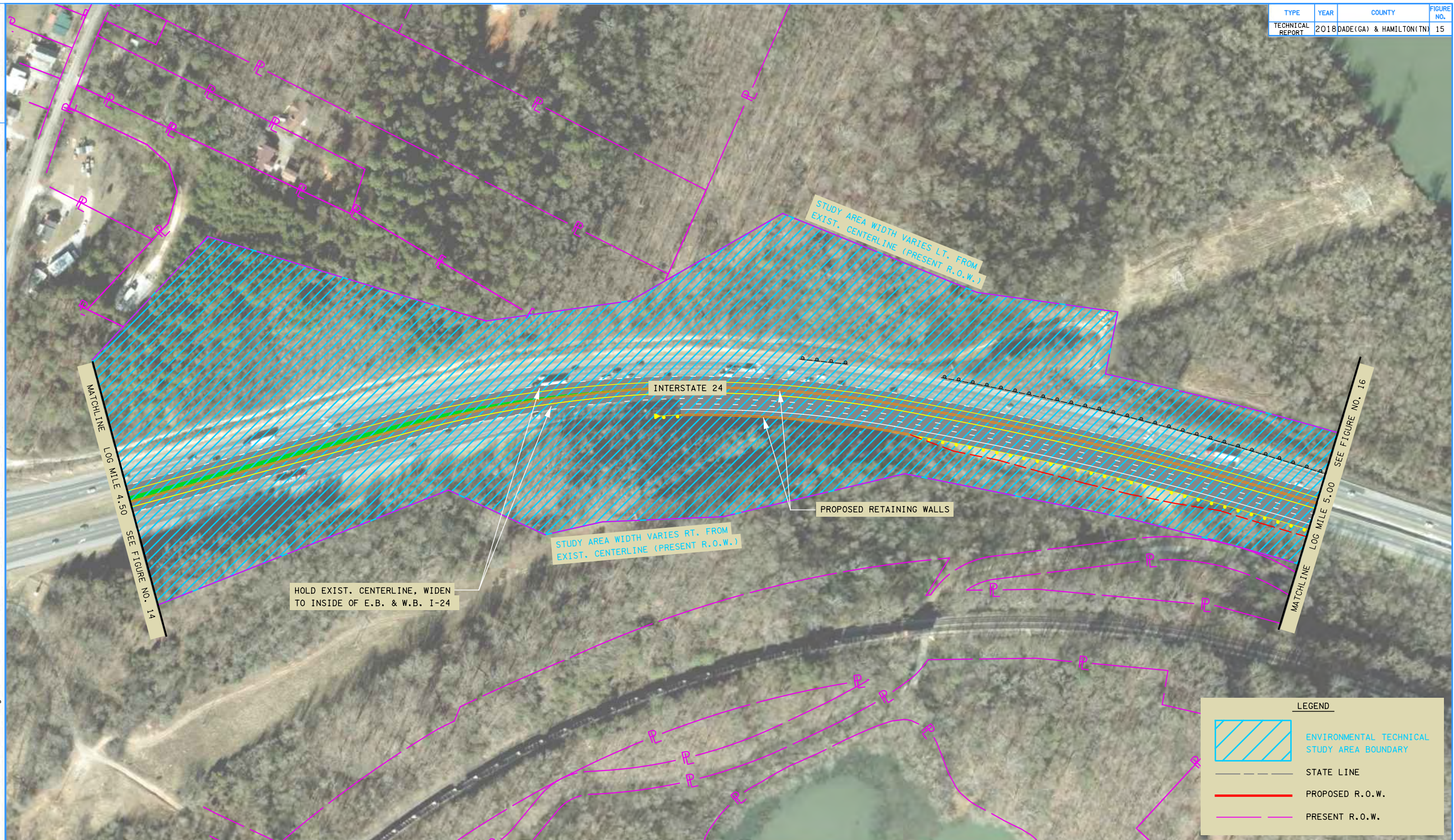


ENVIRONMENTAL TECHNICAL STUDY AREA

INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 14
 I-24
 L.M. 4.00 to
 L.M. 4.50



LEGEND

- ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
- STATE LINE
- PROPOSED R.O.W.
- PRESENT R.O.W.

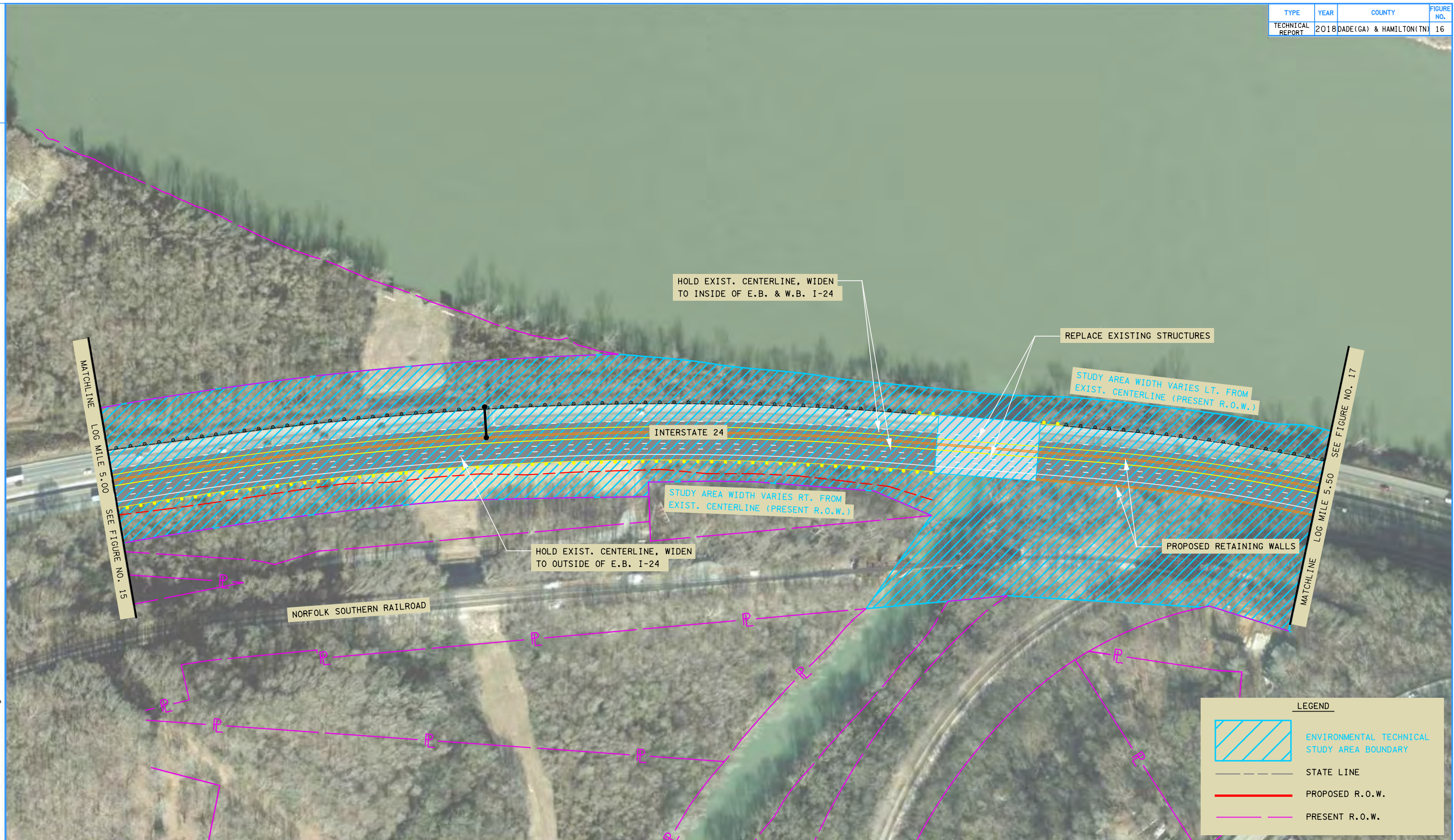


ENVIRONMENTAL TECHNICAL STUDY AREA



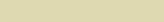
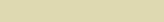
INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO.(GA) & HAMILTON CO.(TN)

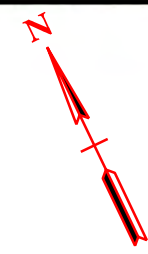
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 15
I-24
L.M. 4.50 to
L.M. 5.00



LEGEND

-  ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
-  STATE LINE
-  PROPOSED R.O.W.
-  PRESENT R.O.W.



ENVIRONMENTAL TECHNICAL STUDY AREA

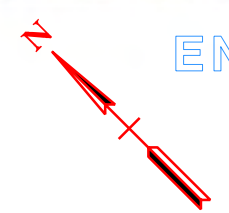
INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO.(GA) & HAMILTON CO.(TN)

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 16
I-24
L.M. 5.00 to
L.M. 5.50



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 Y:\nashville\16070005\1607023.00\1607023.74\DN\1607023-74.ETS\Figure17.sht



ENVIRONMENTAL TECHNICAL STUDY AREA

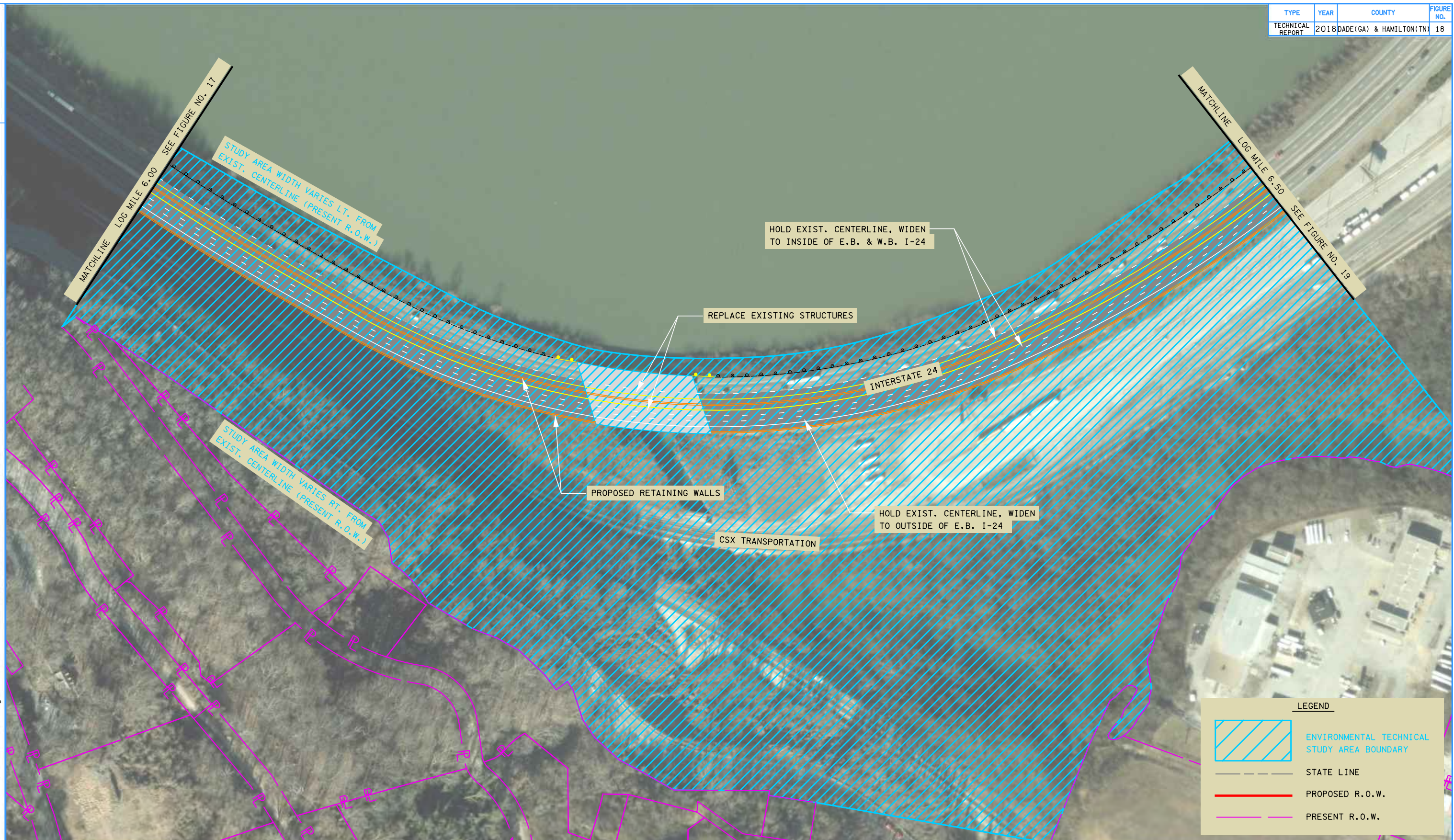
INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

LEGEND

- ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
- STATE LINE
- PROPOSED R.O.W.
- PRESENT R.O.W.

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 17
I-24
L.M. 5.50 to
L.M. 6.00



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ENVIRONMENTAL TECHNICAL STUDY AREA

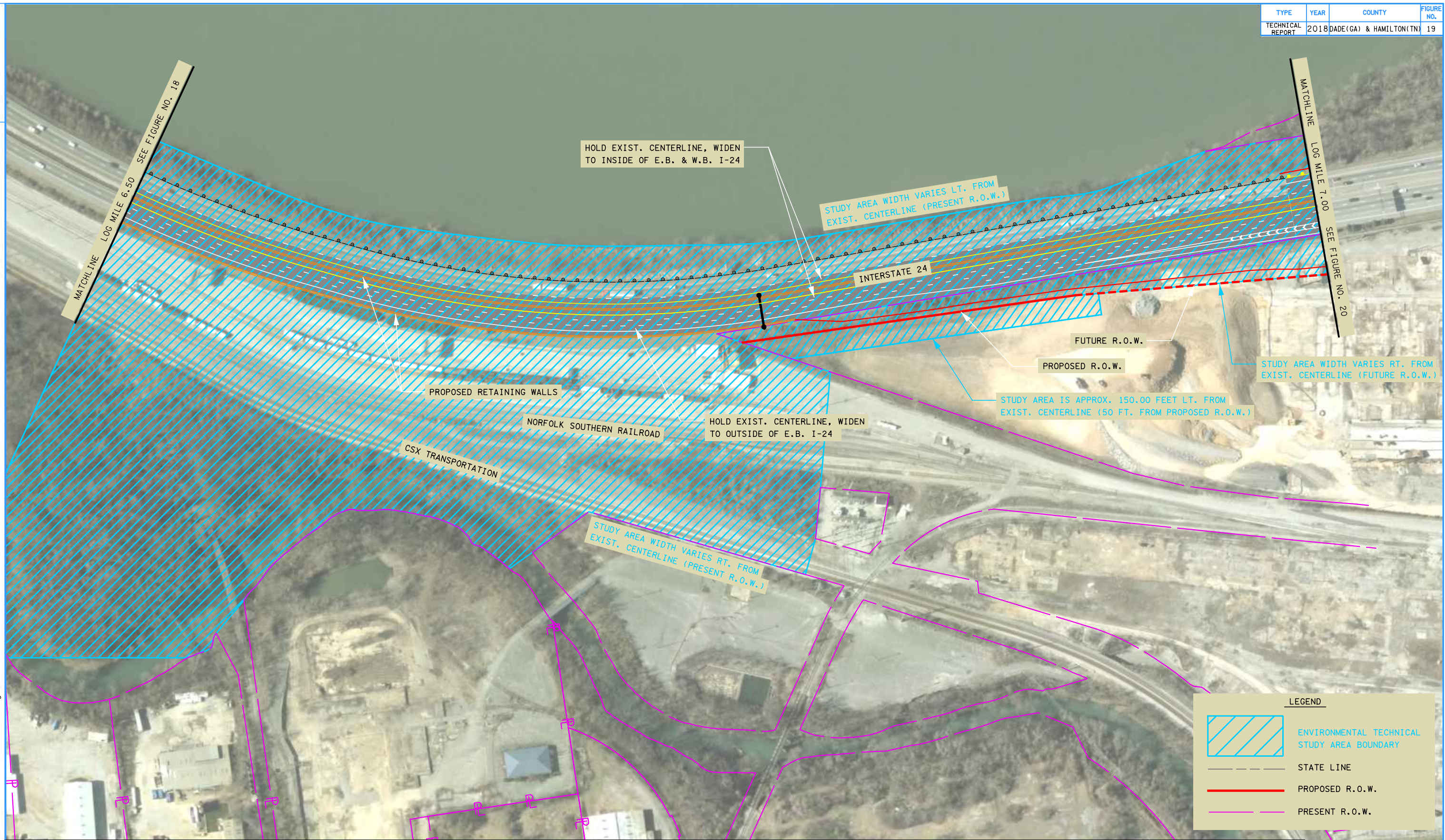
INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

LEGEND

- ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
- STATE LINE
- PROPOSED R.O.W.
- PRESENT R.O.W.

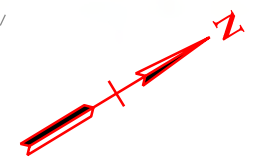
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 18
I-24
 L.M. 6.00 to
 L.M. 6.50



LEGEND

- ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
- STATE LINE
- PROPOSED R.O.W.
- PRESENT R.O.W.

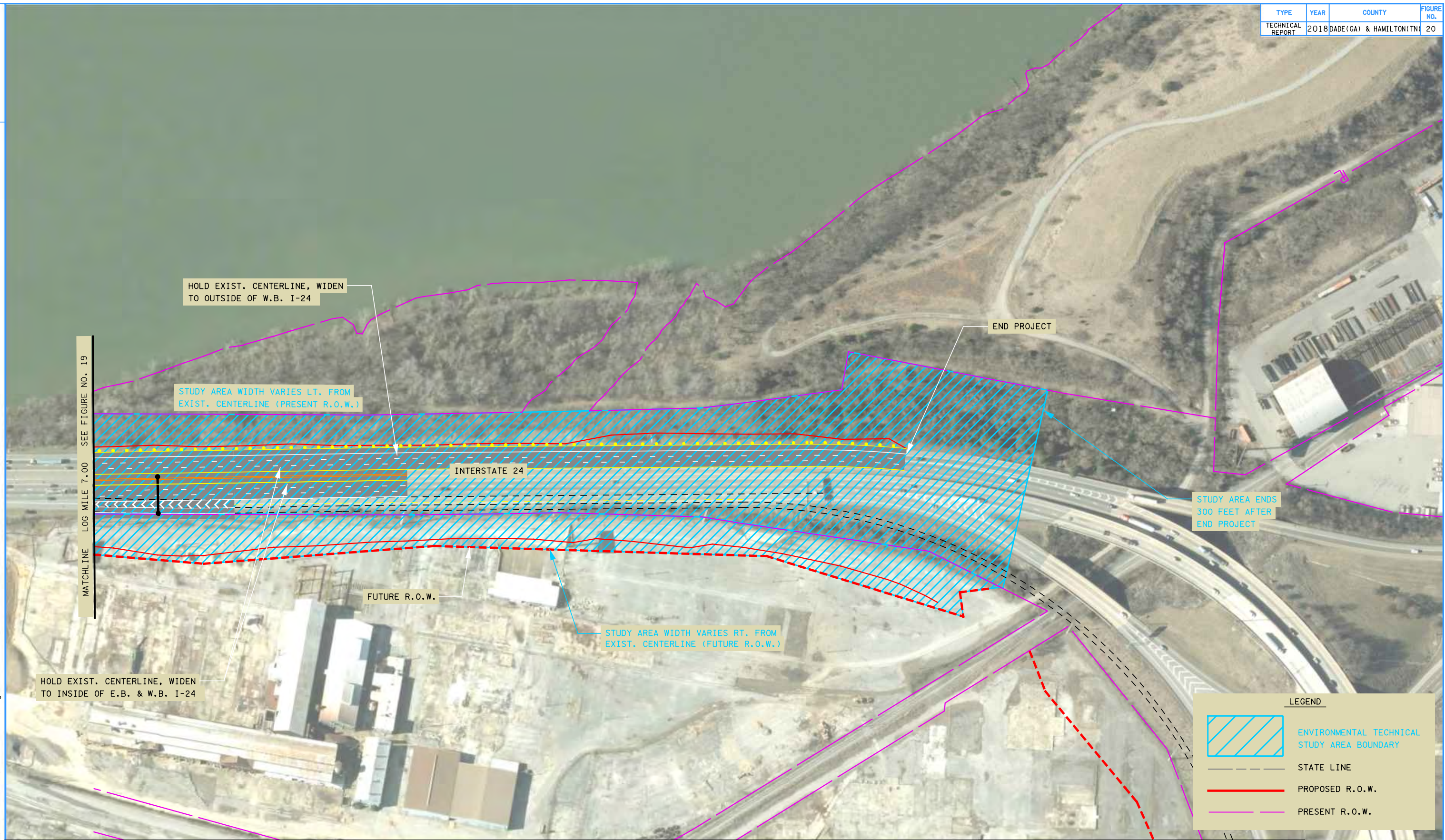


ENVIRONMENTAL TECHNICAL STUDY AREA

INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 19
I-24
L.M. 6.50 to
L.M. 7.00



HOLD EXIST. CENTERLINE, WIDEN TO INSIDE OF E.B. & W.B. I-24

HOLD EXIST. CENTERLINE, WIDEN TO OUTSIDE OF W.B. I-24

STUDY AREA WIDTH VARIES LT. FROM EXIST. CENTERLINE (PRESENT R.O.W.)

INTERSTATE 24

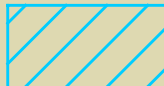



FUTURE R.O.W.

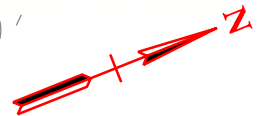
STUDY AREA WIDTH VARIES RT. FROM EXIST. CENTERLINE (FUTURE R.O.W.)

END PROJECT

STUDY AREA ENDS 300 FEET AFTER END PROJECT

LEGEND

-  ENVIRONMENTAL TECHNICAL STUDY AREA BOUNDARY
-  STATE LINE
-  PROPOSED R.O.W.
-  PRESENT R.O.W.



ENVIRONMENTAL TECHNICAL STUDY AREA

INTERSTATE 24
 L.M. 1.63 to L.M. 7.33
 DADE CO. (GA) & HAMILTON CO. (TN)

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 STRATEGIC TRANSPORTATION
 INVESTMENTS DIVISION

FIGURE 20
 I-24
 L.M. 7.00 to
 L.M. 7.33

5.2 Proposed Alternative Costs

The total estimated planning level cost required for preliminary engineering, right-of-way and utilities, and construction for this alternative is presented in Tables 7-10 for each segment and grand total.


Table 7: Preliminary Cost Estimates

| Segment | Description | Length (Miles) | PE | ROW & UTIL. | CONST | Preliminary Cost |
|-----------|--|----------------|-------------|-------------|---------------|----------------------|
| Segment 1 | From I-59 to GA State Line | 2.47 | \$2,406,000 | \$0 | \$33,691,000 | \$36,097,000 |
| Segment 2 | From GA State Line to East of Browns Ferry Rd. | 4.73 | \$3,564,000 | \$94,000 | \$82,112,000 | \$85,770,000 |
| Segment 3 | From East of Browns Ferry Rd. to I-124 (US-27) | 2.60 | \$3,555,000 | \$250,000 | \$83,591,000 | \$87,396,000 |
| Totals | | 9.80 | \$9,525,000 | \$344,000 | \$199,394,000 | \$209,263,000 |

Approximately 0.40 acres of ROW acquisition in Segment 3 is anticipated, but there will likely need to be temporary construction easements to accommodate the proposed widening. Table 7, 8 & 9 on the following pages show the cost estimate summaries for each segment. See appendix for detailed itemization of cost estimates


Dade County (Georgia) & Hamilton County (Tennessee)
I-24 Improvements
From I-59 to I-124

Table 8: Segment 1 Preliminary Cost Estimate Summary

| Route: | Interstate 24 (Section 1) | | |  |
|--|---|-------------|---------------|---|
| Description: | From Interstate 59 (L.M. 1.63) | | | |
| | To the Tennessee State Line (L.M. 4.10) | | | |
| County: | Dade | | | |
| Length: | 2.47 Miles | | | |
| Date: | August 10, 2018 | | | |
| DESCRIPTION | LOCAL 0% | STATE 0% | FEDERAL 0% | TOTAL |
| Construction Items | | | | |
| Pavement Removal | \$0 | \$0 | \$0 | \$809,700 |
| Asphalt Paving | \$0 | \$0 | \$0 | \$7,762,800 |
| Concrete Pavement | \$0 | \$0 | \$0 | \$0 |
| Drainage | \$0 | \$0 | \$0 | \$721,100 |
| Appurtenances | \$0 | \$0 | \$0 | \$0 |
| Structures | \$0 | \$0 | \$0 | \$4,190,200 |
| Fencing | \$0 | \$0 | \$0 | \$0 |
| Signalization | \$0 | \$0 | \$0 | \$19,500 |
| Railroad Crossing or Separation | \$0 | \$0 | \$0 | \$600,000 |
| Earthwork | \$0 | \$0 | \$0 | \$1,456,000 |
| Clearing and Grubbing | \$0 | \$0 | \$0 | \$79,400 |
| Seeding & Sodding | \$0 | \$0 | \$0 | \$131,800 |
| Rip-Rap or Slope Protection | \$0 | \$0 | \$0 | \$45,600 |
| Guardrail | \$0 | \$0 | \$0 | \$325,400 |
| Signing | \$0 | \$0 | \$0 | \$165,400 |
| Pavement Markings | \$0 | \$0 | \$0 | \$126,200 |
| Maintenance of Traffic | \$0 | \$0 | \$0 | \$2,147,700 |
| Mobilization (10%) | \$0 | \$0 | \$0 | \$1,858,100 |
| Other Items = 20% | \$0 | \$0 | \$0 | \$4,087,800 |
| Const. Contingency = 30% | \$0 | \$0 | \$0 | \$6,101,000 |
| Construction Estimate | \$0 | \$0 | \$0 | \$30,627,700 |
| Interchanges & Unique Intersections | | | | |
| Roundabouts | \$0 | \$0 | \$0 | \$0 |
| Interchanges | \$0 | \$0 | \$0 | \$0 |
| Right-of-Way & Utilities | LOCAL 0% | STATE 0% | FEDERAL 0% | TOTAL |
| Right-of-Way | \$0 | \$0 | \$0 | \$0 |
| Utilities | \$0 | \$0 | \$0 | \$0 |
| Preliminary & Construction Engineering and Inspection | | | | |
| Prelim. Eng. 8% | \$0 | \$0 | \$0 | \$2,406,000 |
| Const. Eng. & Inspec. 10% | \$0 | \$0 | \$0 | \$3,063,000 |
| Total Project Cost | \$0 | \$0 | \$0 | \$ 36,097,000 |


Dade County (Georgia) & Hamilton County (Tennessee)
I-24 Improvements
From I-59 to I-124

Table 9: Segment 2 Preliminary Cost Estimate Summary

| Route: | Interstate 24 (Section 2) | | | |
|---|---|------------|------------|----------------------|
| Description: | From the Georgia State Line (L.M. 0.00) | | | |
| | To East of Browns Ferry (L.M. 4.73) | | | |
| County: | Hamilton | | | |
| Length: | 4.73 Miles | | | |
| Date: | August 10, 2018 | | | |
|  | | | | |
| DESCRIPTION | LOCAL | STATE | FEDERAL | TOTAL |
| | 0% | 0% | 0% | |
| Construction Items | | | | |
| Pavement Removal | \$0 | \$0 | \$0 | \$1,238,200 |
| Asphalt Paving | \$0 | \$0 | \$0 | \$14,156,900 |
| Concrete Pavement | \$0 | \$0 | \$0 | \$0 |
| Drainage | \$0 | \$0 | \$0 | \$1,404,300 |
| Appurtenances | \$0 | \$0 | \$0 | \$0 |
| Structures | \$0 | \$0 | \$0 | \$22,740,600 |
| Fencing | \$0 | \$0 | \$0 | \$0 |
| Signalization | \$0 | \$0 | \$0 | \$319,000 |
| Railroad Crossing or Separation | \$0 | \$0 | \$0 | \$0 |
| Earthwork | \$0 | \$0 | \$0 | \$2,559,100 |
| Clearing and Grubbing | \$0 | \$0 | \$0 | \$198,300 |
| Seeding & Sodding | \$0 | \$0 | \$0 | \$181,800 |
| Rip-Rap or Slope Protection | \$0 | \$0 | \$0 | \$76,500 |
| Guardrail | \$0 | \$0 | \$0 | \$494,400 |
| Signing | \$0 | \$0 | \$0 | \$220,000 |
| Pavement Markings | \$0 | \$0 | \$0 | \$189,800 |
| Maintenance of Traffic | \$0 | \$0 | \$0 | \$3,692,700 |
| Mobilization (10%) | \$0 | \$0 | \$0 | \$4,747,200 |
| Other Items = 20% | \$0 | \$0 | \$0 | \$10,443,800 |
| Const. Contingency = 30% | \$0 | \$0 | \$0 | \$11,976,600 |
| Construction Estimate | \$0 | \$0 | \$0 | \$74,639,200 |
| Interchanges & Unique Intersections | | | | |
| Roundabouts | \$0 | \$0 | \$0 | \$0 |
| Interchanges | \$0 | \$0 | \$0 | \$0 |
| Right-of-Way & Utilities | LOCAL | STATE | FEDERAL | TOTAL |
| | 0% | 0% | 0% | |
| Right-of-Way | \$0 | \$0 | \$0 | \$0 |
| Utilities | \$0 | \$0 | \$0 | \$94,000 |
| Preliminary & Construction Engineering and Inspection | | | | |
| Prelim. Eng. 5% | \$0 | \$0 | \$0 | \$3,564,000 |
| Const. Eng. & Inspec. 10% | \$0 | \$0 | \$0 | \$7,473,000 |
| Total Project Cost | \$0 | \$0 | \$0 | \$ 85,770,000 |

Dade County (Georgia) & Hamilton County (Tennessee)
I-24 Improvements
From I-59 to I-124

Table 10: Segment 3 Preliminary Cost Estimate Summary

| Route: | Interstate 24 (Section 3) | | |  |
|--|---------------------------------------|-------------|---------------|---|
| Description: | From East of Browns Ferry (L.M. 4.73) | | | |
| | To I-124 (US-27) (L.M. 7.33) | | | |
| County: | Hamilton | | | |
| Length: | 2.60 Miles | | | |
| Date: | August 10, 2018 | | | |
| DESCRIPTION | LOCAL 0% | STATE 0% | FEDERAL 0% | TOTAL |
| Construction Items | | | | |
| Pavement Removal | \$0 | \$0 | \$0 | \$561,400 |
| Asphalt Paving | \$0 | \$0 | \$0 | \$9,314,900 |
| Concrete Pavement | \$0 | \$0 | \$0 | \$0 |
| Drainage | \$0 | \$0 | \$0 | \$2,054,200 |
| Appurtenances | \$0 | \$0 | \$0 | \$2,191,200 |
| Structures | \$0 | \$0 | \$0 | \$31,043,900 |
| Fencing | \$0 | \$0 | \$0 | \$9,400 |
| Signalization | \$0 | \$0 | \$0 | \$291,900 |
| Railroad Crossing or Separation | \$0 | \$0 | \$0 | \$750,000 |
| Earthwork | \$0 | \$0 | \$0 | \$1,488,100 |
| Clearing and Grubbing | \$0 | \$0 | \$0 | \$92,600 |
| Seeding & Sodding | \$0 | \$0 | \$0 | \$107,800 |
| Rip-Rap or Slope Protection | \$0 | \$0 | \$0 | \$45,600 |
| Guardrail | \$0 | \$0 | \$0 | \$163,900 |
| Signing | \$0 | \$0 | \$0 | \$628,700 |
| Pavement Markings | \$0 | \$0 | \$0 | \$159,700 |
| Maintenance of Traffic | \$0 | \$0 | \$0 | \$3,161,300 |
| Mobilization (10%) | \$0 | \$0 | \$0 | \$2,603,200 |
| Other Items = 20% | \$0 | \$0 | \$0 | \$10,933,600 |
| Const. Contingency = 30% | \$0 | \$0 | \$0 | \$10,367,300 |
| Construction Estimate | \$0 | \$0 | \$0 | \$75,969,000 |
| Interchanges & Unique Intersections | | | | |
| Roundabouts | \$0 | \$0 | \$0 | \$0 |
| Interchanges | \$0 | \$0 | \$0 | \$0 |
| Right-of-Way & Utilities | LOCAL 0% | STATE 0% | FEDERAL 0% | TOTAL |
| Right-of-Way | \$0 | \$0 | \$0 | \$250,000 |
| Utilities | \$0 | \$0 | \$0 | \$0 |
| Preliminary & Construction Engineering and Inspection | | | | |
| Prelim. Eng. 5% | \$0 | \$0 | \$0 | \$3,555,000 |
| Const. Eng. & Inspec. 10% | \$0 | \$0 | \$0 | \$7,622,000 |
| Total Project Cost | \$0 | \$0 | \$0 | \$ 87,396,000 |

5.3 Proposed Alternatives Traffic Benefit Analysis

The segments of I-24 were analyzed with the HCS2010 software for the proposed build alternative detailed previously. The LOS for both existing and proposed conditions are summarized in the table below:

Table 11: LOS Comparison

| Level of Service Comparison | | | | |
|---------------------------------------|------|-----------|----------------|-------------|
| Segment | Year | Peak Hour | LOS (No Build) | LOS (Build) |
| I-24 from I-59 to GA State Line | 2022 | AM | D | C |
| | | PM | D | C |
| | 2042 | AM | F | C |
| | | PM | F | C |
| I-24 from GA State Line to S.R. 2 | 2022 | AM | D | C |
| | | PM | E | C |
| | 2042 | AM | F | D |
| | | PM | F | D |
| I-24 from S.R. 2 to Browns Ferry Rd. | 2022 | AM | E | C |
| | | PM | E | C |
| | 2042 | AM | F | D |
| | | PM | F | D |
| I-24 from Browns Ferry Rd. to U.S. 27 | 2022 | AM | F | D |
| | | PM | F | D |
| | 2042 | AM | F | F* |
| | | PM | F | F** |

* LOS E in 2031, LOS F in 2040

** LOS E in 2032, LOS F in 2041

By adding one (1) travel lane in each direction (eastbound and westbound) on I-24, the LOS improves throughout most of the route and only the 2042 peak hours for the segment between Browns Ferry Road and U.S. 27 are worse than a LOS D. It is important to note that a LOS D is maintained in this segment

until the year 2031 and a LOS E until 2040. These results indicate that the additional lane allows vehicles to travel much closer to the base free flow speed and the route will experience less congestion.

5.4 Proposed Alternatives Safety Implications

HSM PART C PREDICTIVE METHOD CONSIDERATION FOR FREEWAYS

Although safety is not included in the purpose and need for this study, Highway Safety Manual (HSM) methodology for freeways was reviewed to help better understand the safety implications of the preferred alternative and help mitigate overall crash risk and crash severity.

“The *Highway Safety Manual* (HSM) is a resource that provides safety knowledge and tools in a useful form to facilitate improved decision making based on safety performance. The focus of the HSM is to provide quantitative information for decision making. The HSM assembles currently available information and methodologies on measuring, estimating and evaluating roadways in terms of crash frequency (number of crashes per year) and crash severity (level of injuries due to crashes).” [HSM – Preface to the Highway Safety Manual, pg. xxiii]

Because the HSM does not account for jurisdiction-specific differences, it contains calibration techniques to modify tools for local use. This is necessary because of differences in factors, such as: driver populations, local roadway roadside conditions, traffic composition, typical geometrics, and traffic control measures. There are also variations in how each state or jurisdiction reports crashes and manages crash data. The HSM calibration method should be applied to each individual facility type. Examples of facility types associated with this project are freeway segments, ramp segments, and ramp terminals (i.e. where the ramp intersects with the surface street).

Since local calibration factors were unavailable for the various facility types associated with freeway analysis at the time this report was developed, it was determined that a cumulative HSM Part C predictive method analysis comparing the existing conditions to the proposed alternative would not yield accurate results.

However, a preliminary investigation of the number of crashes and severity distribution was completed for freeway segments being widened from four (4) to six (6) travel lanes [three (3) in each direction] to help understand the safety implications for the proposed alternative. It should be noted that this investigation does not account for the influence of ramps and weaving areas within the project limits. Also, this investigation is not intended to be a substitute for cumulative project HSM Part C predictive method procedures to quantify overall safety performance. The safety performance investigated is a

function of the AADT, geometric design features, traffic control features, and site characteristics for isolated freeway segments. Tables found in the appendix demonstrate crashes per mile per year based on varying AADTs and typical section types which derive the key findings shown below.

Key Findings of Investigation using Interstate Safety Analysis Tool enhance (ISATe) for Isolated Freeway Segments:

- Overall: Safety performance calculations using ISATe for widening projects that meet TDOT design standards will predict an overall reduction in crashes and the percent reduction is a function of the AADT, geometric design features, traffic control features, and site characteristics.
- Widening with a Reduction in Median Width: Assuming that the horizontal alignment and clear zones do not change, there will be a small increase in fatal and serious injury crashes if the depressed grass median width is reduced for median widths less than 90 feet.
- Changing Median Type: Assuming that the horizontal alignment and clear zones do not change, there will be a small increase in fatal and serious injury crashes when widening to the inside from a standard 48 foot depressed grass median to a standard 26 foot barrier wall separated median.
- Increasing Inside Shoulder Width for Barrier Wall Separated Medians: Assuming that the horizontal alignment and clear zones do not change when widening from four (4) travel lanes with barrier wall separation to six (6) travel lanes with barrier wall separation, and the inside shoulder width is improved, then it is predicted that there will be a small decrease in fatal and serious injury crashes.

Note: The HSM is not a legal standard. Instead, the HSM provides analytical tools and techniques for quantifying the potential effects of decisions made in planning, design, operations and maintenance.

Crash rate statistics were analyzed within the study areas.

Crash Modification Factors (CMF's) are defined as *“an index of how much crash experience is expected to change following a modification in design or traffic control. CMF is the ratio between the number of crashes per unit of time expected after a modification or measure is implemented and the number of crashes per unit of time estimated if the change does not take place.”* The CMF Clearinghouse (www.cmfclearinghouse.org) provides a quantitative basis for estimating how a given CMF might improve safety. The CMF Clearinghouse is a website funded by the U.S. Department of Transportation Federal Highway Administration and is maintained by the University of North Carolina Highway Safety

Research Center. The website provides a database of CMFs to assist in selecting appropriate improvements based on safety.

According to the CMF Clearinghouse, extending Off Ramp deceleration lanes along I-24 by approximately 100 feet is predicted to improve safety with a crash reduction factor (CRF) of 7.0 percent for all crash types as shown in the table below:

Table 12: CMFs

| Crash Modification Factors that Apply to the Conceptual Alternatives | | | | | | | |
|--|--|-------------------------------|-------------|------------|------|------|------------|
| Source | Treatment | Setting | Star Rating | Crash Type | CMF | CRF | Std. Error |
| CMF Clearinghouse, CMF ID: 475 | Extend deceleration lane by approx. 100 ft | Principal Arterial Interstate | 3/5 | All | 0.93 | 7.0% | 0.06 |

A CRF is a way to represent the expected effect of a countermeasure in terms of percentage decrease in crashes based on the CMF. This CRF had a three (3) / five (5) star rating with an unadjusted standard error of 0.06. See Table 12 on the following page for an explanation on the CMF clearinghouse star ratings.

Table 13: CMF Star Ratings

| Relative Rating | Excellent | Fair | Poor |
|-----------------|---|--|--|
| Study Design | Statistically rigorous study design with reference group or randomized experiment and control | Cross sectional study or other coefficient based analysis | Simple before / after study |
| Sample Size | Large sample, multiple years, diversity of sites | Moderate sample size, limited years, and limited diversity of sites | Limited homogeneous sample |
| Standard Error | Small compared to CRF | Relatively large SE, but confidence interval does not include zero | Large SE and confidence interval includes zero |
| Potential Bias | Controls for all sources of known potential bias <i>See below for a list of potential biases</i> | Controls for some sources of potential bias | No consideration of potential bias |
| Data Source | Diversity in States representing different geographies | Limited to one State, but diversity in geography within State (e.g., CA) | Limited to one jurisdiction in one State |

To provide a more quantitative translation from these categories to the star rating, a point-based system was developed. Points are assigned to each CMF characteristic based on the level of rigor (excellent = 2 points, fair = 1 point, or poor = 0 points). While the points decrease from excellent to poor, not all characteristics receive equal weight. For example, the study design is more important than the data source. Therefore, the final quality rating is based on a weighted score. Study design and sample size categories receive twice the weight of the other characteristics (see equation below).

Score = (2 * study design) + (2 * sample size) + standard error + potential bias + data source

The star rating is assigned based on the score and the ranges in the table below. It should be noted that information may be missing from a study report for specific characteristics such as sample size. In these cases, the rating is based on available information and the CMF will likely receive a lower rating due to the lack of information.

| Score | Star Rating |
|-------------------|-------------|
| 14 (max possible) | 5 Stars |
| 11 - 13 | 4 Stars |
| 7 - 10 | 3 Stars |
| 3 - 6 | 2 Stars |
| 1 - 2 | 1 Star |
| 0 | 0 Stars |

5.5 Proposed Alternatives Geometric Benefit Analysis

As there were no current geometric (horizontal and vertical alignment) deficiencies noted, the only anticipated geometric benefits from the proposed build alternatives are the additional lanes and shoulder widening along the route.

6.0 Recommendations

The proposed improvements will improve congestion, mobility, and increase capacity along the study corridor. The ultimate build alternative should improve operations by:

- Increasing travel speed and reducing congestion along I-24
- Reducing crashes by up to 7.0% for Ramp merge/diverge areas based on the CMF Clearinghouse

The construction of the proposed widening is essential in the overall transportation network.

Based on the information and analyses contained in this report, it is recommended to complete the proposed Build Alternative, which includes the addition of one (1) travel lane in both the eastbound and westbound directions along I-24, replace twelve (12) bridges in Tennessee, widen two (2) bridges in Georgia and replace ITS equipment as needed.