CAMPO APEX RAIL SWITCHING OPERATIONS RELOCATION STUDY

Durham Spur Track Upgrades Evaluation Summary Report

June 2026

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Prepared by: A. Morton Thomas and Assoc. **Date:** June 19, 2026

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1. EXECUTIVE SUMMARY

1.1 Purpose of Study

The purpose of this study is to evaluate the technical feasibility, scope, and cost of upgrading the existing CSX Railroad owned and operated Durham-Apex (Durham Spur) rail corridor from approximately Mile Post SDS 2.15 (near Durham) to Mile Post freight SDS 20.7 (near Apex) from **Federal Railroad Administration (FRA) Class 1 to Class 2 track standards**. The upgrade is intended to improve operating efficiency, safety, and reliability by increasing maximum allowable freight train speed from **10 mph to 25 mph**, reducing travel time, and supporting more consistent service for current and potential rail customers. The upgrade is also intended to allow for the potential relocation of CSX's existing rail switching operations further south and out of downtown Apex. The study will identify existing infrastructure deficiencies relative to Class 2 requirements, define necessary track and supporting system improvements, and establish the recommended next steps. The results will inform capital programming, grant applications, and coordination with CSX, CAMPO, NCDOT Rail Division and the FRA.

1.2 Engineering Approach

The engineering approach used for this study included an evaluation of existing conditions, comparison against FRA Class 2 track safety standards, and development of anticipated improvements and associated costs. Key tasks included:

1.2.1 Existing Conditions Assessment

- Conducted a field inspection to document current conditions of:
  - Rail section, wear
  - Crossties (type, spacing, condition)
  - Ballast section
  - Drainage
  - Grade Crossings
- Identified current speed restrictions and operational constraints.
- Reviewed the current track chart which includes track geometry (alignment, superelevation), detailed rail data, and most recent crosstie and surfacing work.

1.2.2 Design Criteria Review

- Identified applicable FRA Class 2 requirements under **49 CFR Part 213**, and CSX design standards including limits for:
  - Track geometry tolerances
  - Minimum rail weight and condition
  - Tie condition and spacing
  - Ballast support
  - Drainage

1.2.3 Deficiency Analysis

- Compared existing conditions to Class 2 standards to identify non-compliant elements.
- Categorized deficiencies by track structure component
- Determined whether deficiencies require full replacement, rehabilitation, or spot treatment.

1.2.4 Anticipated Improvements

- Developed anticipated improvements, which may include:
  - Rail replacement
  - Crosstie replacement to meet spacing and condition requirements
  - Ballast undercutting, cleaning, or replacement
  - Surfacing, lining, and tamping to achieve geometry compliance
  - Drainage improvements to support long-term track stability

1.2.5 Cost Estimation

- Prepared planning-level capital cost estimate

1.2.6 Conclusions and Recommendations

- Summarized findings with regard to the ultimate goal of relocating CSX's existing rail switching operations out of downtown Apex
- Provided recommendations for next steps

1.3 Study Limits and Rail Line Description

The **study limits** for this rail line include approximately 18.55 miles of track beginning at the r**ail junction in Durham (MP SDS 2.15)**, proceeding southeast along the single-track alignment through communities Genlee, Carpenter, and Upchurch and terminating at the CSX **Apex Yard in downtown Apex (MP SDS 20.7)**.

The rail line description is as follows:

- The entire corridor is owned and operated by CSX Railroad
- The rail line is predominantly single track and is Class 1 track as classified by FRA requirements. From Durham, the alignment runs southeast to Apex connecting industrial customers and interchanging as part of CSX's broader freight network. Existing track speeds for this rail line are a maximum of 10 mph.
- At the southeastern terminus in Apex, CSX maintains a rail yard and associated switching tracks that support local freight moves and provide operational flexibility.

1.4 Summary of Existing Conditions

Based on the limited access site visit performed on January 21, 2026, below is a summary of the existing conditions observed with respect to each critical component along the Durham Spur. A more thorough inspection of these components will need to be completed to determine if there are any deficiencies where the existing track structure does not meet or potentially exceed the requirements for FRA Class 2 track safety standards.

Rail

- Observed to be in good overall condition.
- Rail head exhibited uniform wear consistent with normal operations
- No evidence of excessive side wear, corrugation, spalling, or surface defects.
- No visible cracks, fractures, or other structural irregularities
- Rail alignment appeared consistent
- Running surface was smooth and continuous

Crossties

- Observed to be in good overall condition
- Ties appeared structurally sound
- No visible signs of significant cracking, splitting, decay, or excessive plate cutting
- Tie spacing was consistent (ranging from 18 inches to 21 inches)
- Tie plates and rail spikes appeared to be in good condition, with no missing, broken, or excessively corroded components
- Rail spikes and plates were properly seated and secured

Ballast

- Observed to be in generally good condition
- Majority of the track structure was well supported
- Appeared to provide adequate drainage and stability beneath the ties.
- Several areas where new ballast has recently been installed.
- No widespread fouling or significant deterioration was observed

Drainage

- Observed to be in good working condition
- Existing drainage ditches appeared to be functioning properly
- No widespread standing water noted along the corridor.
- A few isolated locations where minor ponding was occurring, appear to be manageable
- The existing culverts that cross underneath the tracks were not evaluated during the site visit; therefore, their condition and hydraulic performance was not determined. A full inspection will be completed as part of a future phase of this study.

Structures

- Two existing rail bridges along the corridor, one structure over Morrisville Carpenter Road (MP SDS 14.4) and one structure over N. Salem Street (MP SDS 19.6)
- Bridge over Morrisville Carpenter Road was recently constructed and appears to be in relatively new condition.
- Bridge over N. Salem Street appeared to be in good condition.
- No formal structural analysis was completed as part of this study, assuming these structures are in good working condition and would not require any improvements associated with a track class upgrade. A full inspection will be completed as part of a future phase of this study.

Grade Crossings

- 25 existing at-grade crossings
- All were observed to be in good working condition with no significant operational deficiencies.
- The crossing surfaces were generally intact and properly aligned with the adjacent roadway pavement.
- The at-grade crossing at E. Pettigrew Street appears to require minor spot asphalt repairs
- The at-grade crossing at Carpenter Fletcher Road is a humped crossing and exhibited signs of pavement damage consistent with impacts from low-clearance vehicles.

1.5 Anticipated Improvements

Based on the site conditions observed along the Durham Spur, below is a summary of the anticipated improvements needed to upgrade to Class 2 track. A more thorough inspection of these components will need to be completed to determine if there are any additional improvements needed to meet the requirements for FRA Class 2 track safety standards.

Rail:

- Track alignment and track gauge adjustments along a portion of the corridor
- Replacement of a portion of the existing rail
- Rail joint repairs along a portion of the corridor
- Rail defect removal along a portion of the corridor

Crossties:

- Tie replacement along a portion of the corridor
- Tie spacing adjustment along the entire corridor
- Tie plate and spike replacement along a portion of the corridor

Ballast:

- Ballast replacement for a portion of the corridor
- Tamping, lining, and surfacing for the entire corridor

Drainage:

- Ditch cleaning for a portion of the corridor
- Culvert repair at a few cross culvert locations
- Railroad shoulder restoration for a portion of the corridor

1.6 Planning-Level Capital Costs

Based on the anticipated improvements needed, below is a summary of the planning level capital costs to upgrade the Durham Spur from Class 1 to Class 2 track:

Upgrade Item	Item Cost ($)
Rail – alignment and gauge adjustments, rail joint repair, rail defect removal, possible rail replacement	$3,710,000
Ties – tie replacement, tie spacing adjustment, tie plate and spike replacements	$5,565,000
Ballast – replacement, tamping, lining, surfacing	$1,855,000
Drainage – ditch cleaning, culvert repair, railroad shoulder restoration	$927,500
Subtotal	$12,057,500
Contingency	$6,028,750
Total Cost	$18,086,250
Say	**$18,100,000**

Note: These costs are in 2026 dollars. Annual inflation must be applied to target year of construction.

2. INTRODUCTION

2.1 Project Background

In June 2024, A. Morton Thomas and Associates (AMT) was selected by CAMPO to study the feasibility of moving CSX's existing rail switching operations out of downtown Apex, North Carolina. The study would include evaluation and documentation of CSX's operational requirements for their rail switching operations and looking for opportunities to benefit the CSX network and operations as well as evaluating the feasibility and associated costs of alternate locations for CSX's rail switching operations. The intent behind this effort is to address the safety, traffic congestion, diesel engine emissions, vibration, and noise issues created by the CSX switching operations in downtown Apex.

In July 2024, AMT and CAMPO met with CSX to discuss their current operations within the Apex area. CSX stated that due to the slow operations along the Durham spur, the current facility in Apex cannot move any further south because of their crew's 12-hour work shift limit. The current maximum authorized speed on the Durham Spur is 10 mph (FRA Class 1).

In February 2025, CAMPO, in coordination with CSX, approved AMT's adjusted scope of work to focus on the evaluation of the Durham Spur track speeds and determine the feasibility to upgrade the track from Class 1 (10 mph) to Class 2 (25 mph).

Based on conversations with CSX regarding the Durham Spur upgrade from Class 1 to Class 2 track, CSX has acknowledged that the maintenance requirements and standards for Class 2 track are higher and more stringent as compared to Class 1 track. These higher maintenance requirements could result in higher operating costs, which CSX has agreed to take responsibility for these additional costs. Therefore, this track upgrade evaluation will only include capital costs needed to upgrade the Durham Spur track class.

2.2 Operational Context and Characteristics

Below is a summary of CSX's current operations within the Apex area:

- The section of track with the current CSX facility in Apex is within the Aberdeen Subdivision, connects to the Norlina Subdivision on the north side, and the Hamlet Subdivision on the south side
- Trains coming north from Hamlet will travel up the Durham Spur track to serve customers between Apex and Durham
  - 10 current customers (2 customers closer to Apex, remaining 8 in Durham County)
  - Most of the car switching occurs south of Apex, but some train building occurs in the yard near Apex
  - Frequency of trains: Daily, one local train leaves Apex, travels north on Durham Spur and then back south to Apex
  - Crews that provide service to the customers along the Durham spur cannot work more than a 12-hour shift; shifts that start and end at the current facility and yard location in

Apex to serve the Durham spur customers are already close to that 12-hour time frame. Time is a critical component to these operations.

- The slow operations along the Durham spur is mainly due to the current track speed of 10 mph
- There is a track maintenance gang that operates out of the facility in Apex
- The rail switching yard is located south of the building
  - 3 track section from Chatham Street to Moore Street, second track continues south to near Sugarland Drive

2.3 Regulatory Framework

2.3.1 FRA Track Safety Standards (49 CFR Part 213)

49 CFR Part 213 – FRA Track Safety Standards establishes the minimum federal safety requirements for railroad track used in the United States. This regulation sets standards for track structure, geometry, inspection, maintenance, and maximum allowable operating speeds. It classifies track into different classes (Class 1 through Class 9), with each class having specific limits for speed and detailed requirements for alignment, surface, gauge, cross level, curvature, and track components such as rails, crossties, ballast, and fasteners. These standards will be the primary regulatory guidelines used in establishing the requirements necessary for upgrading the Durham Spur from Class 1 to Class 2 track.

2.3.2 CSX Standards

In addition to the FRA Track Safety Standards, the applicable CSX standards will be used as part of this track upgrade evaluation to ensure the recommendations align with CSX's standard track structure and system.

2.4 Study Objectives and Intended Use

The objectives for the Durham Spur track upgrade evaluation include the following:

- Identify deficiencies in the existing track structure
- Define the track upgrade requirements
- Develop anticipated improvements needed and associated planning level capital costs

The intended use for this evaluation is to determine feasibility of upgrading the existing Durham Spur track from Class 1 (MAS 10 mph) to Class 2 (MAS 25 mph) and thereby allowing for the opportunity to relocate the existing CSX rail switching operations to be relocated to the south and out of downtown Apex, NC.

3. STUDY AREA AND EXISTING INFRASTRUCTURE

3.1 Rail Line Location and Limits (Milepost Limits)

The location of the existing Durham Spur track is approximately 2.15 miles southeast of the Durham Amtrak station. The milepost limits for this evaluation begin near Durham at Milepost SDS 2.15 and end near Apex at Milepost SDS 20.7 (approximately 18.55 miles of track).

3.2 Track Ownership and Operating Responsibility

The Durham and Southern Railway operated 56.8 miles of railroad from Dunn to Durham, North Carolina. It was originally chartered as the Cape Fear and Northern Railway in 1892 and construction began in 1898. The name was changed to Durham and Southern in 1906. In 1979 it became part of the Seaboard Coast Line Railroad, a predecessor to the CSX system. The tracks between Apex and Erwin Junction were removed in 1981 and the Dunn to Erwin segment was sold by CSX to the Aberdeen and Rockfish Railroad in 1987 who operated it as a separate entity, the Dunn-Erwin Railway, until merging it into their operations in 1990. The closure of the cotton and denim mill in Erwin in 2000 led to the abandonment of these tracks and the conversion of the right-of-way to a rail trail. The Durham to Apex segment, which is the segment to be evaluated for track upgrade is in current use by CSX. CSX owns and has operating responsibility of the entire Durham Spur.

3.3 Track Configuration

3.3.1 Main Track, Sidings, and Industry Sidings/Spurs

The main track configuration of the Durham Spur is a single track from Milepost SDS 2.15 to Milepost SDS 20.7.

There are sidings located at the following locations:

- Milepost SDS 5.8, approximately 1,365 LF long siding track (from switch point to switch point), labeled as the “FEW” siding on the track chart
- Milepost SDS 20.2, approximately 2,265 LF long siding track (from switch point to switch point), labeled as the “OOS” siding on the track chart
- Milepost SDS 20.5, approximately 1,525 LF long siding track (from switch point to switch point), labeled as the “BIDS TRACK” siding on the track chart

There are industry sidings/spurs located at the following locations:

- Milepost SDS 3.4, approximately 1,805 LF long industry siding track (from switch point to switch point), labeled as “GIANT CEMENT” on the track chart
- Milepost SDS 3.8, approximately 1,240 LF long industry spur track labeled as “N&S” on the track chart
- Milepost SDS 5, approximately 680 LF long industry spur track labeled as "84 LUMBER” on the track chart
- Milepost SDS 6.2, approximately 1,375 LF long industry siding track labeled as “READY MIX”, on the track chart

- Milepost SDS 8.5, approximately 600 LF long industry spur track labeled as “VALASSIS” on the track chart
- Milepost SDS 19.4, approximately 445 LF long industry spur track labeled as “BMC BUILDING” on the track chart
- Milepost SDS 19.4, approximately 330 LF long industry spur track labeled as “BMC BUILDING” on the track chart

3.3.2 Rail Section, Age, and Condition

The existing rail along the Durham Spur is jointed rail and has a rail weight range from 75 lbs to 100 lbs and a rail age of 70 years to 125 years based on the information shown on the track chart. See the track chart included in the Appendix for more details related to the existing rail section.

Based on the visual inspection performed on January 21, 2026, the existing rail appeared to be in good working condition.

3.4 Operational Characteristics

3.4.1 Current FRA Track Class and Maximum Authorized Speeds

The current FRA Track Class for the Durham Spur is Class 1 track with a maximum authorized speed of 10 mph.

4. FIELD INVESTIGATIONS AND DATA COLLECTION

4.1 Track Inspection Methodology

4.1.1 Visual and Walking Inspection

A visual inspection of the Durham Spur was conducted on January 21, 2026 to assess the current condition of the track structure and related components. The track was accessed at public right-of-way crossing locations along the entire corridor which provided a high level overall representative condition assessment of the track. Due to the Durham Spur being located on CSX owned property and this being an active track, we did not have access to assess the full corridor length. During the visual inspection, the following items were assessed:

- Rail conditions
- Tie and Fastener conditions
- Current Tie Spacing
- Ballast conditions
- Drainage conditions
- Grade Crossing conditions

4.1.2 Geometry Data Review

Based on the information provided in the Durham Spur track chart, we have compiled the following existing horizontal alignment information:

Curve Number	Milepost (located at approx. center of curve)	Degree of Curve	Curve Direction	Actual Superevelation (Ea)
1	SDS 2.6	2° 00’	Right	1.0”
2	SDS 3.6	4° 00’	Right	1.0”
3	SDS 4.4	4° 00’	Left	1.0”
4	SDS 6.4	1° 00’	Left	1.0”
5	SDS 8.9	3° 00’	Left	1.0”
6	SDS 9.8	3° 00’	Right	1.0”
7	SDS 11.5	3° 00’	Left	1.0”
8	SDS 12.5	2° 00’	Right	1.0”
9	SDS 13.1	2° 00’	Right	1.0”
10	SDS 13.5	2° 00’	Left	1.0”
11	SDS 13.9	2° 00’	Right	1.0”
12	SDS 15.5	2° 00’	Left	1.0”
13	SDS 17.4	2° 00’	Right	1.0”
14	SDS 18.1	2° 00’	Right	1.0”
15	SDS 19.7	2° 00’	Left	1.0”
16	SDS 20.5	2° 00’	Left	1.0”
17	SDS 20.6	3° 00’	Right	1.0”

4.2 Rail Condition Assessment

The existing rail along the Durham Spur was observed to be in good overall condition. Visual inspection indicated that the rail head exhibited uniform wear consistent with normal operations, with no evidence of excessive side wear, corrugation, spalling, or surface defects. There were no visible cracks, fractures, or other structural irregularities that would suggest fatigue or distress. The rail alignment appeared consistent, and the running surface was smooth and continuous. Overall, the condition of the rail suggests it is being properly maintained and remains suitable for continued service.

4.3 Crosstie and Fastener Condition Survey

The existing crossties and fasteners along the Durham Spur were observed to be in good overall condition. The ties appeared structurally sound, with no visible signs of significant cracking, splitting, decay, or excessive plate cutting. Tie spacing was consistent, and the ties provided adequate support and gauge restraint for the rail. The fasteners also appeared to be in good condition, with no missing, broken, or excessively corroded components noted during the inspection. Rail spikes and plates were properly seated and secured, indicating that the track structure is being effectively maintained and remains suitable for continued service.

4.4 Ballast Observations

The ballast along the Durham Spur appeared to be in generally good condition at the time of inspection. The majority of the track structure was well supported and appeared to provide adequate drainage and stability beneath the ties. There were several areas where new ballast had recently been installed along the corridor. These sections appeared properly distributed and tamped, contributing to consistent track alignment and overall structural integrity. No widespread fouling or significant deterioration was observed, indicating that the ballast is currently being maintained to an acceptable standard.

4.5 Drainage Assessment

The overall drainage condition of the Durham Spur was observed to be good at the time of inspection. The existing drainage ditches appeared to be functioning properly, with no widespread standing water noted along the corridor. While there were a few isolated locations where minor ponding was occurring, these areas appear manageable and could likely be corrected through routine maintenance and cleaning of the ditches to restore full conveyance capacity. The existing culverts that cross underneath the tracks were not evaluated during the site visit; therefore, their condition and hydraulic performance was not determined.

4.6 Structures Inspections

The Durham Spur includes two rail bridges along the corridor, one structure over Morrisville Carpenter Road (MP SDS 14.4) and one structure over N. Salem Street (MP SDS 19.6). The bridge over Morrisville Carpenter Road was recently constructed and appears to be in relatively new condition. The bridge over N. Salem Street appeared to be in good condition. No formal structural analysis was completed as part of this study and the assumption used for the purposes

of determining track upgrade deficiencies is that these structures are in good working condition and would not require any improvements associated with a track class upgrade.

4.7 Grade Crossing Inventory and Condition

Below is a summary of the existing at-grade crossing locations along the Durham Spur corridor:

DOT Crossing No.	Location	Milepost	Crossing Gates	Flashers	Crossing Material	Overall Condition
845861M	E. Pettigrew St.	SDS 2.65	Yes	Yes	Asphalt	Fair – needs spot asphalt repair
845863B	Lucky Strike (Private)	SDS 2.95	No	No	Asphalt	Fair
845864H	Riddle Rd.	SDS 4.04	Yes	Yes	Asphalt	Good
845865P	S. Alston St.	SDS 4.83	Yes	Yes	Asphalt	Good
845866W	E. Cornwallis Rd.	SDS 5.90	Yes	Yes	Asphalt	Good
845869S	Carpenter Fletcher Rd.	SDS 7.09	Yes	Yes	Asphalt	Fair – humped crossing
846060X	Westpark Dr. (Private)	SDS 7.59	No	Yes	Asphalt	Good
845871T	NC 54 – Chapel Hill Rd.	SDS 8.00	Yes	Yes	Asphalt	Good
845873G	Sedwick Rd.	SDS 8.87	Yes	Yes	Asphalt	Good
927724J	Hopson Rd.	SDS 10.10	Yes	Yes	Concrete	Good
633906F	Kit Creek Rd.	SDS 11.01	Yes	Yes	Asphalt	Good
937598U	O'Kelly Chapel Rd.	SDS 12.26	Yes	Yes	Asphalt	Good
926247P	Morrisville Pkwy.	SDS 14.68	Yes	Yes	Concrete	Good
845882F	Private Road	SDS 14.80	No	No	Asphalt	Good
845884U	Private Road	SDS 15.65	No	No	Asphalt	Good
845888B	Private Road	SDS 15.75	No	No	Asphalt	Good

DOT Crossing No.	Location	Milepost	Crossing Gates	Flashers	Crossing Material	Overall Condition
845886H	Private Road	SDS 15.95	No	No	Asphalt	Good
845891E	Waldo Rood Blvd.	SDS 17.15	Yes	Yes	Asphalt	Good
845892L	Davis Dr.	SDS 17.40	Yes	Yes	Concrete	Good
845893T	Private Road	SDS 18.30	No	No	Asphalt	Good
845894A	Private Road	SDS 18.62	No	No	Asphalt	Good
845895G	Private Road	SDS 18.72	No	No	Asphalt	Good
845896N	Salem Church Rd.	SDS 19.25	No	Yes	Asphalt	Good
915262L	Apex Peakway	SDS 20.10	Yes	Yes	Asphalt, Concrete	Good
845902P	Hunter St.	SDS 20.58	Yes	Yes	Asphalt, Concrete	Good

Along the Durham Spur, there are 25 at-grade crossings, and nearly all were observed to be in good working condition with no significant operational deficiencies. The crossing surfaces were generally intact and properly aligned with the adjacent roadway pavement. The at-grade crossing at E. Pettigrew Street appears to require minor spot asphalt repairs to address localized surface wear. In addition, the at-grade crossing at Carpenter Fletcher Road is a humped crossing and exhibited signs of pavement damage consistent with impacts from low-clearance vehicles. Overall, aside from these isolated maintenance needs, the at-grade crossings along the corridor are in satisfactory condition.

Revisions may be required to the crossing signal circuits at grade crossings that have traffic signal interconnection to accommodate the speed increase from Class 1 MAS 10 mph to Class 2 MAS 25 mph. The following grade crossing locations will need to be further evaluated for these revisions as part of a future phase of this study:

- Carpenter Fletcher Road (845869S at SDS 7.09)
- Hunter Street (845902P at SDS 20.58)
- Apex Peakway (915262L at SDS 20.1)
- Morrisville Parkway (926247P at SDS 14.68)

The private crossings, 845863B at SDS 2.95, 845895G at SDS 18.72, 845894A at SDS 18.62, and 845893T at SDS 18.3, appear to have alternate access and closure should be evaluated as part of a future phase of this study.

It is noted that the grade crossing location at Hunter Street (845902P at SDS 20.58) currently has a Quiet Zone designation. Since this designation is based on a risk calculation considering existing conditions including train speeds, this calculation will need to be updated if the Durham Spur is upgraded to Class 2 track safety standards and increased maximum authorized speed of 25 mph. The updated calculation may result in grade crossing protection equipment upgrades in order to maintain the Quiet Zone designation. This will need to be evaluated as part of a future phase of this study.

5. EXISTING CONDITIONS AND DEFICIENCY ANALYSIS

5.1 Comparison to FRA Class 2 Track Safety Standards

The evaluation of the Durham Spur involves a comparative review of field-observed existing conditions documented during the site visit and the existing track geometry data presented in the track chart against the regulatory requirements set forth in FRA's track safety standards, 49 CFR Part 213 along with CSX's track design standards. This comparison assesses compliance with federal track safety standards governing geometry, alignment, surface, gauge, crosslevel, and related structural components. By correlating on-site observations such as visible defects, drainage conditions, ballast integrity, and rail wear with the quantitative measurements documented in the track chart, this analysis establishes whether the Durham Spur meets the applicable criteria to be upgraded to Class 2 track and identifies any conditions requiring action needed to operationally upgrade to Class 2 track. Sections 5.2 through 5.7 below summarizes the comparison of the existing Durham Spur to FRA Class 2 track safety standards for each component of the track structure. A more thorough inspection of each component will need to be completed to determine if there are any deficiencies where the existing track structure does not meet or potentially exceed the requirements for FRA Class 2 track safety standards.

5.2 Track Geometry Deficiencies

5.2.1 Track Alignment

Below is the track alignment criteria as stated in FRA 49 CFR Part 213, Section 213.55 for Class 1 and Class 2 track:

Class of Track	Tangent Track	Curved Track
	The deviation of the mid-offset from a 62-foot line may not be more than (inches)	The deviation of the mid-ordinate from a 62-foot chord may not be more than (inches)
Class 1	5	5
Class 2	3	3

On tangent sections of track, the ends of the line shall be at points on the gauge side of the line rail, five-eighths of an inch below the top of the railhead. Either rail may be used as the line rail. However, the same rail shall be used for the full length of that tangential segment of the track. On curved sections of track, the ends of the chord shall be points on the gauge side of the outer rail, five-eighths of an inch below the top of the railhead.

Due to limited access to the existing track and since inspection of the existing track alignment was not included in the scope of this study, the Durham Spur track alignment was not fully evaluated as compared to FRA's Class 2 track alignment criteria. However, assumptions have been used to capture any costs associated with inspecting and correcting the existing Durham Spur track alignment to meet FRA's Class 2 track

alignment criteria. The details of these costs are included in Sections 6 and 7 of this report.

5.2.2 Track Surface

Below is the track surface criteria as stated in FRA 49 CFR Part 213, Section 213.63 for Class 1 and Class 2 track:

Track surface (inches)	Class of Track	
	1	2
The runoff in any 31 feet of rail at the end of a raise may not be more than	3 ½	3
The deviation from uniform profile on either rail at the mid-ordinate of a 62-foot chord may not be more than	3	2 ¾
The deviation from zero crosslevel at any point on tangent or reverse crosslevel elevation on curves may not be more than	3	2
The difference in crosslevel between any two points less than 62 feet apart may not be more than	3	2 ¼
Where determined by engineering decision prior June 22, 1998, due to physical restrictions on spiral length and operating practices and experience, the variation in crosslevel on spirals per 31 feet may not be more than	2	1 ¾

Due to limited access to the existing track and since the formal inspection of the existing track surface was not included in the scope of this study, the Durham Spur track surface was not fully evaluated as compared to FRA's Class 2 track alignment criteria. However, assumptions have been used to capture any costs associated with inspecting and correcting the existing Durham Spur track surface to meet FRA's Class 2 track surface criteria. The details of these costs are included in Sections 6 and 7 of this report.

5.2.3 Track Gauge

Below is the track gauge criteria as stated in FRA 49 CFR Part 213, Section 213.53 for Class 1 and Class 2 track:

Class of Track	The gauge must be at least	But not more than
Class 1	4' 8"	4' 10"
Class 2	4' 8"	4' 9 ¾"

The track gauge is measured between the heads of the rails at right angles to the rails in a plane five-eighths of an inch below the top of the rail head.

Due to limited access to the existing track and since inspection of the existing track gauge was not included in the scope of this study, the Durham Spur track gauge was not fully

evaluated as compared to FRA's Class 2 track gauge criteria. However, assumptions have been used to capture any costs associated with inspecting and correcting the existing Durham Spur track gauge to meet FRA's Class 2 track gauge criteria. The details of these costs are included in Sections 6 and 7 of this report.

5.2.4 Superelevation

Below is a summary of the Actual Superelevation along the Durham Spur as documented in the track chart as it compares to CSX's standards for Superelevation of Curves, Standard Drawing 2511:

Curve Number	Milepost	Degree of Curve	Exist. Actual Superelevation	Required Actual Superelevation for Class 1 (10mph)	Required Actual Superelevation for Class 2 (25 mph)
1	SDS 2.6	2° 00'	1.0"	0.5"	0.5"
2	SDS 3.6	4° 00'	1.0"	0.5"	0.5"
3	SDS 4.4	4° 00'	1.0"	0.5"	0.5"
4	SDS 6.4	1° 00'	1.0"	0"	0.5"
5	SDS 8.9	3° 00'	1.0"	0.5"	0.5"
6	SDS 9.8	3° 00'	1.0"	0.5"	0.5"
7	SDS 11.5	3° 00'	1.0"	0.5"	0.5"
8	SDS 12.5	2° 00'	1.0"	0.5"	0.5"
9	SDS 13.1	2° 00'	1.0"	0.5"	0.5"
10	SDS 13.5	2° 00'	1.0"	0.5"	0.5"
11	SDS 13.9	2° 00'	1.0"	0.5"	0.5"
12	SDS 15.5	2° 00'	1.0"	0.5"	0.5"
13	SDS 17.4	2° 00'	1.0"	0.5"	0.5"
14	SDS 18.1	2° 00'	1.0"	0.5"	0.5"
15	SDS 19.7	2° 00'	1.0"	0.5"	0.5"
16	SDS 20.5	2° 00'	1.0"	0.5"	0.5"
17	SDS 20.6	3° 00'	1.0"	0.5"	0.5"

Since the Durham Spur's existing actual superelevation values for each curve exceed the required actual superelevation for a maximum authorized speed of 25 mph, as specified in CSX's Superelevation of Curves standard, the current track geometry satisfies the applicable criteria for Class 2 track. Accordingly, the existing track curvature and corresponding actual superelevation are in full compliance with the requirements governing Class 2 operations.

5.3 Rail Deficiencies

5.3.1 Wear, Section Loss, and Defects

Based on the visual inspection, the existing rail along the Durham Spur was observed to be in good overall condition with no evidence of excessive wear, surface defects or visible cracks that would suggest fatigue or distress. The rail alignment appeared consistent, and the running surface was smooth and continuous. Therefore, the existing rail conditions appear to be in compliance with the requirements of FRA's Class 2 rail condition requirements. However, since a proper rail surface inspection was not completed (was not part of the scope of this study) assumptions have been used to capture any costs associated with inspecting and replacing sections of the existing rail to meet FRA's Class 2 criteria. The details of these costs are included in Sections 6 and 7 of this report.

5.3.2 Rail Joints Condition

As per FRA 49 CFR Part 213, Section 213.121, in the case of conventional jointed track, each rail shall be bolted with at least two bolts at each joint for Class 2 track, and with at least one bolt for Class 1 track. Based on the visual inspection, the existing rail joints along the Durham Spur appeared to be in good overall condition. The rail joint locations observed appear to have at least two bolts at each joint which complies with FRA's Class 2 requirements. However, since every rail joint was not inspected (was not part of the scope of this study) assumptions have been used to capture any costs associated with inspecting and correcting rail joints to meet FRA's Class 2 criteria. The details of these costs are included in Sections 6 and 7 of this report.

As stated in FRA 49 CFR Part 213, Section 213.115, any mismatch of rail ends at joints may not be more than that prescribed below for Class 1 and Class 2 track:

Class of Track	Any mismatch of rails at joints may not be more than the following	
	On the tread of the rail ends (inch)	On the gauge side of the rail ends (inch)
1	1/4	1/4
2	1/4	3/16

Since a proper inspection of rail ends at joints was not completed (was not part of the scope of this study) assumptions have been used to capture any costs associated with inspecting and correcting any rail ends at joints to meet FRA's Class 2 criteria. The details of these costs are included in Sections 6 and 7 of this report.

5.4 Crosstie and Fastener Deficiencies

Based on the visual inspection, the existing crossties along the Durham Spur were observed to be in good overall condition with no visible signs of significant cracking, splitting, decay, or excessive plate cutting. The existing tie spacing was measured at various locations and ranged between 18 inches to 21 inches. Below is the minimum number of crossties required as stated in FRA 49 CFR Part 213, Section 213.109 for Class 1 and Class 2 track:

FRA Track Class	Tangent track, turnouts, and curves	
	Tangent track and curved track less than or equal to 2 degrees	Turnouts and curved track greater than 2 degrees
1	5	6
2	8	9

Additionally, CSX has provided guidance on tie spacing which is required to be 20 inches measured between the center of each crosstie. In order to ensure that the existing tie spacing meets both FRA's and CSX's tie spacing requirements for upgrade to Class 2 track, assumptions have been used to capture any costs associated with inspecting and adjusting existing ties and/or installing additional ties to meet these requirements. The details of these costs are included in Sections 6 and 7 of this report.

The existing fasteners, tie plates and rail spikes were also observed to be in good overall condition, indicating that the track structure is being effectively maintained. However, since a proper inspection of these components was not completed (was not part of the scope of this study) assumptions have been used to capture any costs associated with inspecting, repairing and/or replacing fasteners, tie plates, and rail spikes to meet FRA's Class 2 track safety standards. The details of these costs are included in Sections 6 and 7 of this report.

5.5 Ballast Deficiencies

Based on the visual inspection at various locations along the corridor, the ballast appeared to be in generally good condition and appeared to provide adequate drainage and stability beneath the ties. There were several areas where new ballast had recently been installed along the corridor denoting that the ballast is currently being maintained to an acceptable operating standard. However, since the ballast including depths was not fully inspected (was not part of the scope of this study) assumptions have been used to capture any costs associated with inspecting and correcting the ballast such that the entire corridor meets the appropriate operating standards. The details of these costs are included in Sections 6 and 7 of this report.

5.6 Drainage Deficiencies

Based on visual inspection at various locations along the corridor, the existing drainage ditches appeared to be functioning properly, with no widespread standing water aside from a few isolated locations where minor ponding was occurring. The existing culverts that cross underneath the tracks were not evaluated during the site visit; therefore, their condition and hydraulic performance was not determined. Since not all of the existing drainage ditches nor any of the existing cross

culverts were inspected (was not part of the scope of this study), assumptions have been used to capture any costs associated with inspecting and correcting any drainage issues to ensure the corridor meets the appropriate drainage operating standards. The details of these costs are included in Sections 6 and 7 of this report.

5.7 Grade Crossing Deficiencies

Based on visual inspection, the 25 existing at-grade crossings were all observed to be in good working condition with no significant operational deficiencies. There were a few locations with minor issues, which includes the minor asphalt spot repair needs at E. Pettigrew Street and the humped crossing at Carpenter Fletcher Road. Neither of these issues are required to be addressed in order to upgrade the Durham Spur to Class 2 track safety standards. However, it is recommended to further evaluate the humped crossing at Carpenter Fletcher Road, which could create issues long term from low clearance vehicles damaging the crossing surface, rail boot, and/or the rails.

Revisions may be required to the crossing signal circuits at grade crossings that have traffic signal interconnection to accommodate the speed increase from Class 1 MAS 10 mph to Class 2 MAS 25 mph. The following grade crossing locations will need to be further evaluated for these revisions as part of a future phase of this study:

- Carpenter Fletcher Road (845869S at SDS 7.09)
- Hunter Street (845902P at SDS 20.58)
- Apex Peakway (915262L at SDS 20.1)
- Morrisville Parkway (926247P at SDS 14.68)

Additionally, all at-grade crossings and their respective crossing protection equipment will need to be evaluated to determine if equipment upgrades will be required to accommodate the speed increase from Class 1 MAS 10 mph to Class 2 MAS 25 mph. Further evaluation will be required as part of a future phase of this study:

6. RECOMMENDED UPGRADE PROGRAM

The basis used to develop the unit cost ranges shown below were derived from various state rail plan costs that were available along with FRA research information. The intent was to develop a planning level estimate to better understand order of magnitude costs associated with upgrading the Durham Spur to FRA Class 2 track safety standards. The assumptions used with regards to the condition of the infrastructure subject to upgrade from Class 1 to Class 2 track safety standards were based on the high level visual inspection performed.

6.1 Anticipated Improvements and Typical Cost Ranges

6.1.1 Rail

Based on the FRA Track Safety Standards, Class 2 track requires stricter track geometry, reduced rail wear tolerances, better rail joint conditions and an overall stronger, more uniform track structure as compared to Class 1 track. Typical work needed to bring the rail up to the Class 2 track safety standards include track alignment adjustments, track gauge adjustments, rail joint repair, rail defect removal and possibly spot rail replacement. Typical cost ranges for this rail work is approximately $200,000 to $700,000 per mile of track if installing good condition used rail and approximately $800,000 to $1,500,000 per mile of track if installing new rail. Based on the site visit observation, the following rail improvements are anticipated:

- Track alignment, track surface, and track gauge adjustments along a portion of the corridor
- Replacement of a portion of the existing rail
- Rail joint repairs along a portion of the corridor
- Rail defect removal along a portion of the corridor

Based on these anticipated improvements, it is recommended to use an approximate cost of $200,000 per mile of track for the purpose of determining the planning level cost to upgrade the Durham Spur from Class 1 to Class 2 track safety standards.

6.1.2 Crossties

Based on the FRA Track Safety Standards and the CSX tie spacing requirements, Class 2 track requires more non-defective crossties and shorter tie spacing than as compared to Class 1 track. Typical work needed to bring the crossties up to the Class 2 track safety standards include tie replacement, tie spacing adjustments, and tie plate and spike replacements. Typical cost ranges for this work is approximately $150,000 to $300,000 per mile of track for spot tie, tie plate and spike replacement and approximately $300,000 to $450,000 per mile to track for a full systematic program upgrade. Based on the site visit observation, the following crosstie improvements are anticipated:

- Tie replacement along a portion of the corridor
- Tie spacing adjustment along the entire corridor
- Tie plate and spike replacement along a portion of the corridor

Based on these anticipated improvements, it is recommended to use an approximate cost of $300,000 per mile of track for the purpose of determining the planning level cost to upgrade the Durham Spur from Class 1 to Class 2 track safety standards.

6.1.3 Ballast

Based on the FRA Track Safety Standards, Class 2 track requires an overall stronger, more uniform track structure as compared to Class 1 track. Typical work needed to bring the ballast up to the Class 2 requirements includes ballast replacement, undercutting, tamping, lining, and surfacing. Typical cost ranges for this work is approximately $100,000 to $250,000 per mile of track for surfacing work and approximately $300,000 to $600,000 per mile of track for ballast undercut or heavy ballast work. Based on the site visit observation, the following ballast related improvements are anticipated:

- Ballast replacement for a portion of the corridor
- Tamping, lining, and surfacing for the entire corridor

Based on these anticipated improvements, it is recommended to use an approximate cost of $100,000 per mile of track for the purpose of determining the planning level cost to upgrade the Durham Spur from Class 1 to Class 2 track safety standards.

6.1.4 Drainage

Based on the FRA Class 2 track safety standards, an effective track drainage system will provide long term protection for the increased track speeds along the upgraded corridor. Typical work needed to ensure a properly functioning drainage system includes ditch cleaning, culvert repair, railroad shoulder restoration and possibly culvert replacement. Typical cost range for this work is approximately $50,000 to $200,000 per mile of track where the lower cost would be for minor repairs and the higher costs for where wet subgrade is encountered or for major culvert work. Based on the site visit observation, the following drainage related improvements are anticipated:

- Ditch cleaning for a portion of the corridor
- Culvert repair at a few cross culvert locations
- Railroad shoulder restoration for a portion of the corridor

Please note that a full inspection and hydraulic analysis of the existing cross culverts will need to be completed to determine the actual drainage related improvements required.

Based on these anticipated improvements, it is recommended to use an approximate cost of $50,000 per mile of track for the purpose of determining the planning level cost to upgrade the Durham Spur from Class 1 to Class 2 track safety standards.

7. PLANNING-LEVEL CAPITAL COSTS

Based on the anticipated improvements needed and the recommended approximate unit costs, below is a summary of the planning level capital costs to upgrade the Durham Spur from Class 1 to Class 2 track:

Upgrade Item	Unit Cost ($ per mile)	Corridor Length (miles)	Item Cost ($)
Rail – alignment and gauge adjustments, rail joint repair, rail defect removal, possible rail replacement	$200,000	18.55	$3,710,000
Ties – tie replacement, tie spacing adjustment, tie plate and spike replacements	$300,000	18.55	$5,565,000
Ballast – replacement, tamping, lining, surfacing	$100,000	18.55	$1,855,000
Drainage – ditch cleaning, culvert repair, railroad shoulder restoration	$50,000	18.55	$927,500
		Subtotal	$12,057,500
	Contingency	50% of subtotal	$6,028,750
		Total Cost	$18,086,250
		Say	**$18,100,000**

Note: These costs are in 2026 dollars. Annual inflation must be applied to target year of construction.

A contingency value (50% of the subtotal cost) was included in the total cost to account for any unknown or unforeseen costs and the level of engineering used to develop this planning level cost estimate. Please note that a full inspection and analysis of the Durham Spur will be needed to determine actual costs for the upgrade to FRA Class 2 track safety standards.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Rail Switching Operations Relocation

Based on the findings of this report, it has been determined that the existing Durham Spur can be upgraded from Class 1 to Class 2 track safety standards. Therefore, there is an opportunity to relocate CSX's existing rail switching operations to the south and out of downtown Apex. Upgrading the spur will allow trains to operate at higher permissible speeds, improving efficiency and reducing dwell time within the downtown corridor. By shifting rail switching activities away from the town center, the community can benefit from reduced congestion, fewer blocked crossings, and enhanced pedestrian and vehicular safety, while CSX gains a more streamlined and modernized operational layout. This strategic relocation aligns infrastructure improvements with both transportation performance goals and Apex's long-term downtown development vision.

Based on the information provided by CSX, the daily service runs along the Durham Spur would take approximately 10-12 hours. With an increased maximum authorized speed of 25 mph along the Durham Spur, it appears that all of the potential relocation sites identified south of the existing facility can still be considered for future study. In July 2024, twelve sites were selected as possible locations, the furthest one from the current facility being 10.7 miles, and the closest approximately 4.6 miles away.

8.2 Recommended Next Steps

Based on the findings of the Durham Spur track upgrade evaluation detailed in this report, below are the recommended next steps towards obtaining the ultimate goal of relocating CSX's existing rail switching operations out of downtown Apex:

- Complete rail operations analysis of rail network including trackage north and south of the Durham Spur along with the Durham Spur upgraded to Class 2 track safety standards.
- Complete full inspection of the Durham Spur to include:
    - Identify locations of track alignment. surface, and gauge adjustments needed to meet and potentially exceed FRA Class 2 track safety standards
    - Assess condition of the rail, crossties and ballast along the entire corridor
    - Inspection and hydraulic analysis of existing cross culverts
    - Inspection of existing rail bridges
- Based on full inspection, develop updated cost estimate for Class 2 track safety standard upgrades
- Complete evaluation of existing at-grade crossings
    - Determine if the number of at-grade crossings can be reduced
    - Determine if crossing protection equipment upgrades are required
    - Complete Quiet Zone designation recalculations
- Discuss Durham Spur maintenance cost responsibilities with CSX
- Research potential grant programs for funding of future study phases as well as construction phases

9. APPENDICES

9.1 Track Chart

9.2 Alignment Maps

9.3 Photographs

CORRIDOR: SDS line

CSX Roadmaster Track Chart - Internal Use Only

South

Div: Sub		CAROLINAS: AB - ABERDEEN
Prefix MP		4757 SDS 3 > 5093 SDS 4 > 5282 SDS 5 > 5248 SDS 6 > 5317 SDS
Alignment		7 / 0 / -7 — 1.0" 2°00' R; 1.0" 4°00' R; .0" 0°01' L; 1.0" 1°00' L
Plan		845861M PETTIGREW STREET; 2.85 - DURHAM FREEWAY WES; 2.9 - Durham Freeway East; 845863B LUCKY STRIKE None; 845864H RIDDLE ROAD Gates; 845865P ALSTON AVENUE Gate; 845866W CORNWALLIS ROAD C; NECTION; GIANT CEMENT (150 FT/136 FT); N & S (150 FT); SG; 84 LUMBER; FEW; READY MIX (174 FT/175 FT); Butt Chord; Butt Chord
Crossties	SG	2003 W; 2020 W
Rail Left	SG	85 J 1948 (N); 85 J 1901 (); 100 J 1926 (N); 100; 75 J 1917 (N); 85 J 1926 (N); 85 J (); 100 J 1956 (N); 100
Rail Right	SG	85 J 1948 (N); 85 J 1901 (); 100 J 1926 (N); 100; 75 J 1917 (N); 85 J 1926 (N); 85 J (); 100 J 1956 (N); 100

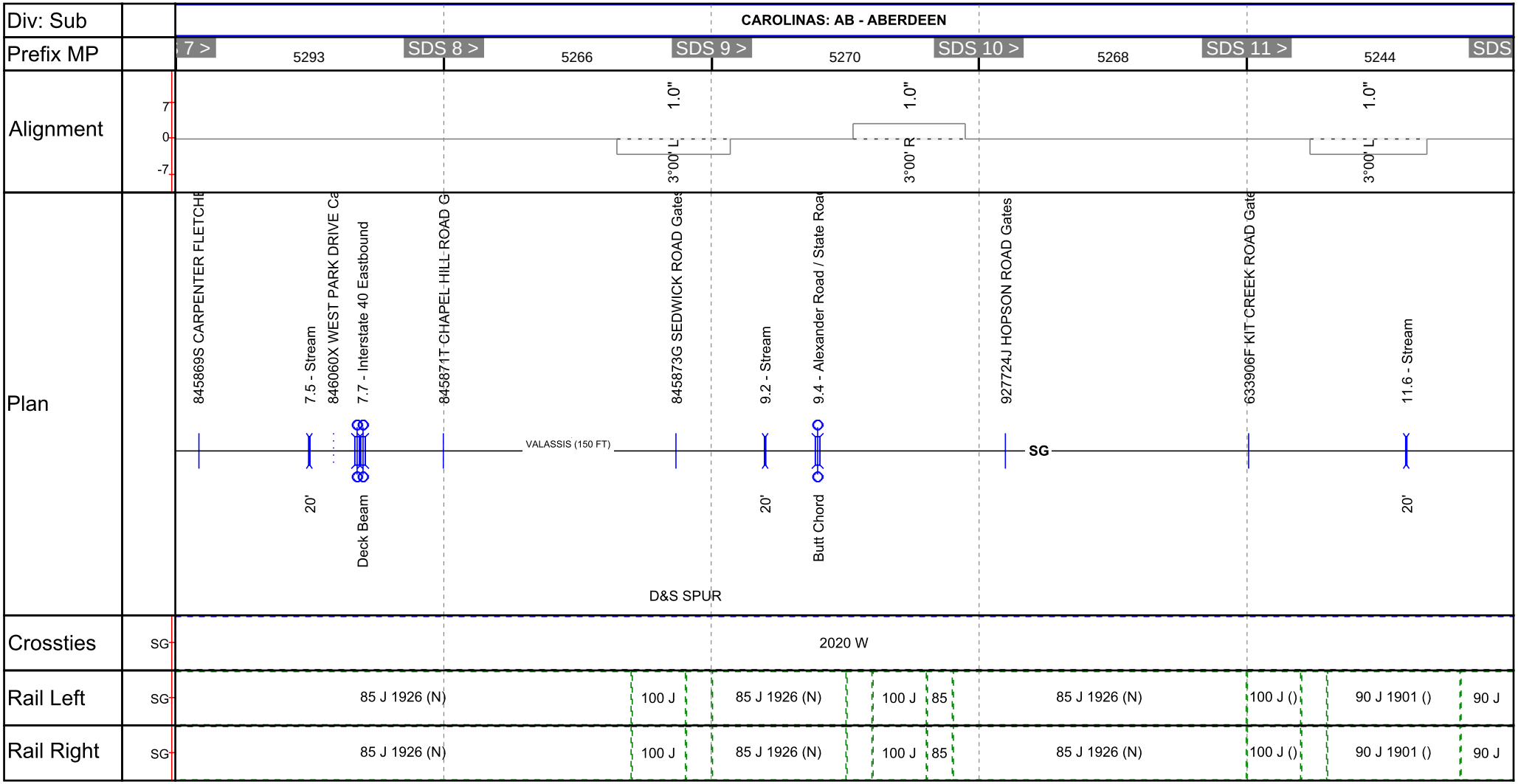
SCALE: 1 INCH = 2570 FEET

PRINTED: 1/15/26

CORRIDOR: SDS line

CSX Roadmaster Track Chart - Internal Use Only

South



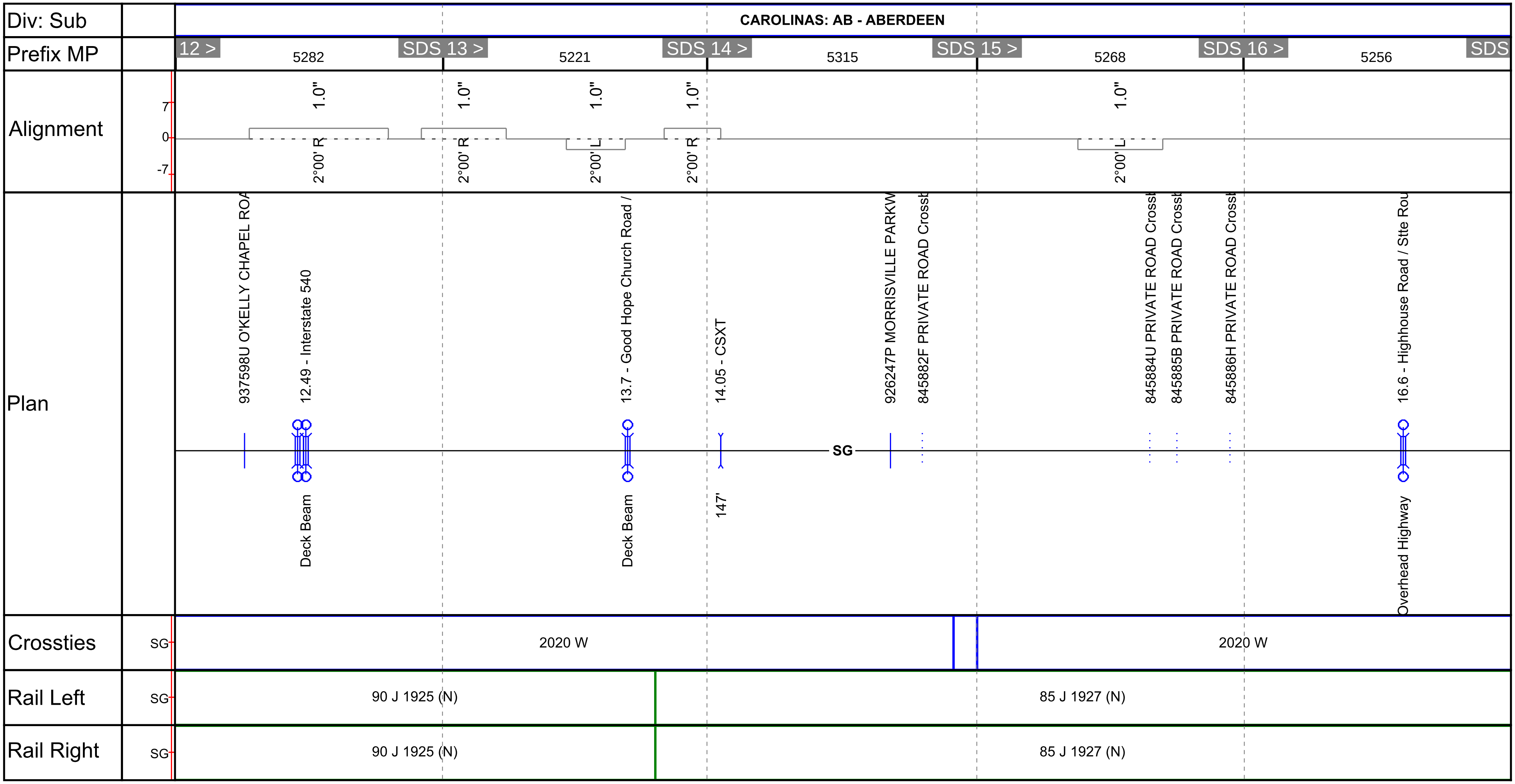
SCALE: 1 INCH = 2789 FEET

PRINTED: 1/15/26

CORRIDOR: SDS line

CSX Roadmaster Track Chart - Internal Use Only

South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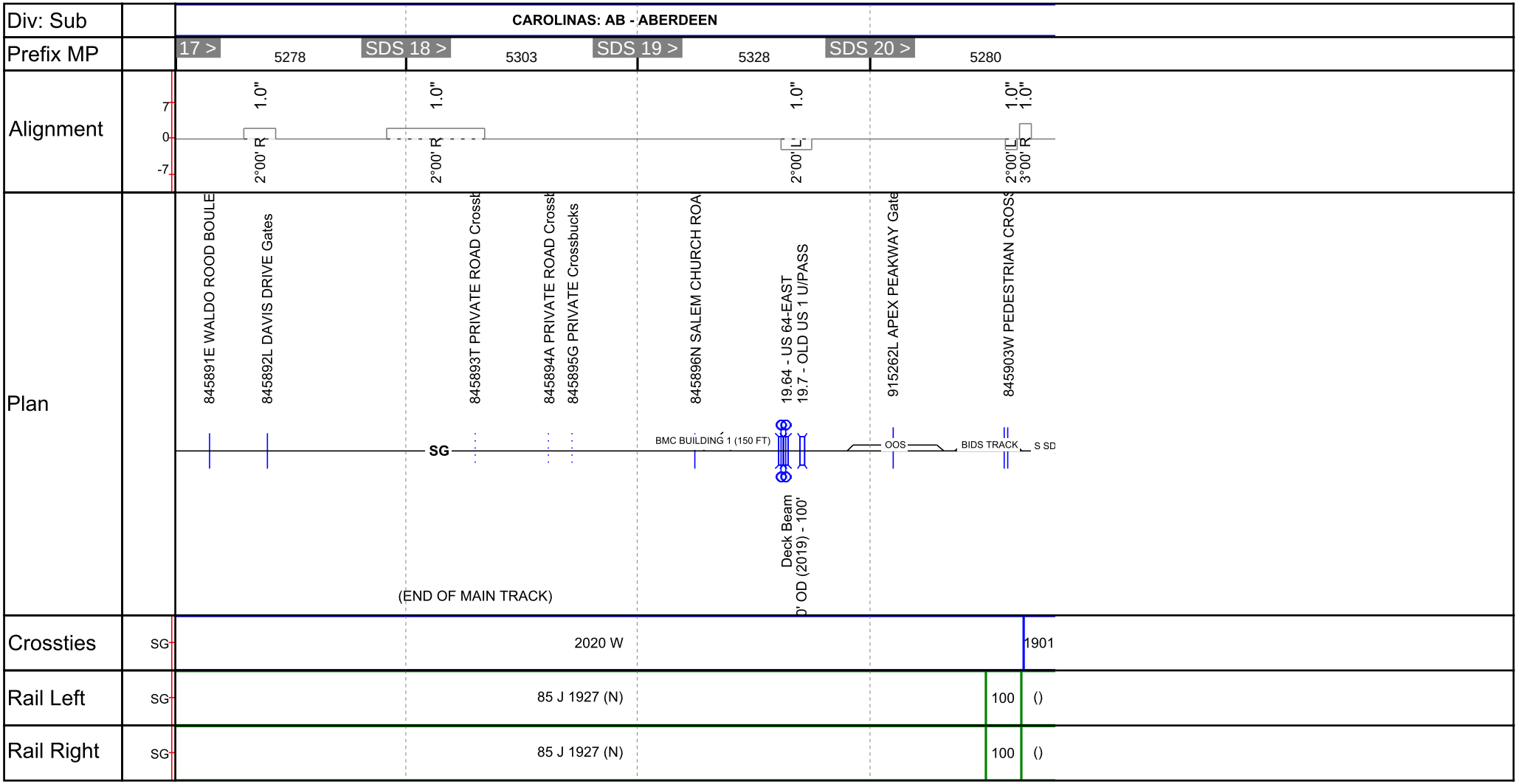
CAROLINAS: AB - ABERDEEN
Prefix MP
12 >
5282
SDS 13 >
5221
SDS 14 >
5315
SDS 15 >
5268
SDS 16 >
5256
SDS
Alignment
7
0
-7
1.0"
2°00' R
1.0"
2°00' R
1.0"
2°00' L
1.0"
2°00' R
1.0"
2°00' L
Plan
937598U O'KELLY CHAPEL ROA
12.49 - Interstate 540
Deck Beam
13.7 - Good Hope Church Road /
Deck Beam
14.05 - CSXT
147'
SG
926247P MORRISVILLE PARKW
845882F PRIVATE ROAD Crossi
845884U PRIVATE ROAD Crossi
845885B PRIVATE ROAD Crossi
845886H PRIVATE ROAD Crossi
16.6 - Highhouse Road / Stte Rou
Overhead Highway
Crossties
SG
2020 W
2020 W
Rail Left
SG
90 J 1925 (N)
85 J 1927 (N)
Rail Right
SG
90 J 1925 (N)
85 J 1927 (N)

CORRIDOR: SDS line

CSX Roadmaster Track Chart - Internal Use Only

South



SCALE: 1 INCH = 3236 FEET

PRINTED: 1/15/26


GIANT CEMENT
CURVE 1
RADIUS: 2°00' R
Ea: 1.00"
AT-GRADE CROSSING
E PETTIGREW ST
CROSSING GATE: YES
FLASHERS: YES
NUMBER OF TRACKS: 1
CROSSING PANEL MATERIAL: ASPHALT
S BRIGGS AVE
NC 147
CURVE 2
RADIUS: 4°00' R
Ea: 1.00"
N&S
AT-GRADE CROSSING
PRIVATE ROAD (LUCKY STRIKE)
CROSSING GATE: NO
FLASHERS: NO
NUMBER OF TRACKS: 1
CROSSING PANEL MATERIAL: ASPHALT
AT-GRADE CROSSING
RIDDLE RD
CROSSING GATE: YES
FLASHERS: YES
NUMBER OF TRACKS: 1
CROSSING PANEL MATERIAL: ASPHALT
CURVE 3
RADIUS: 4°00' L
Ea: 1.00"
AT-GRADE CROSSING
S ALSTON AVE
CROSSING GATE: YES
FLASHERS: YES
NUMBER OF TRACKS: 1
CROSSING PANEL MATERIAL: ASPHALT
84 LUMBER
MATCHLINE (SEE SHEET 2)

CAMPO APEX RAIL SWITCHING OPERATIONS RELOCATION STUDY
CSX DURHAM SPUR EVALUATION

REVISIONS

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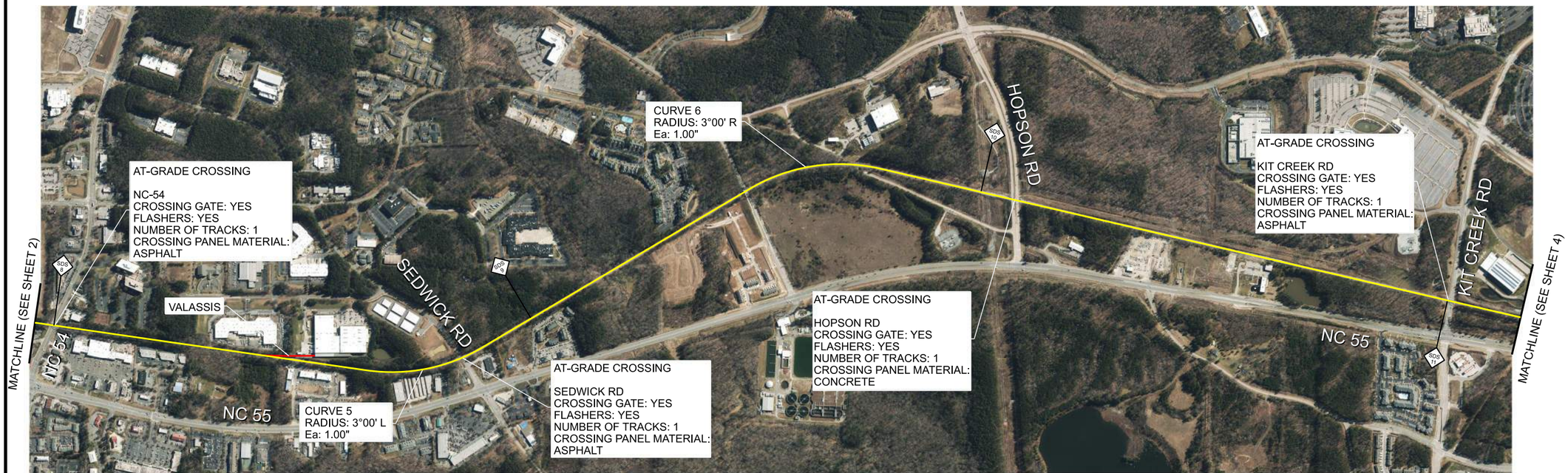

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SYSTIME
SUBSCRIBE

MATCHLINE (SEE SHEET 6)
DAVIS DR
CURVE 13
RADIUS: 2°00' R
Ea: 1.00"
AT-GRADE CROSSING
DAVIS DR
CROSSING GATE: YES
FLASHERS: YES
NUMBER OF TRACKS: 1
CROSSING PANEL MATERIAL:
CONCRETE
AT-GRADE CROSSING
WALDO ROOD BLVD
CROSSING GATE: YES
FLASHERS: YES
NUMBER OF TRACKS: 1
CROSSING PANEL MATERIAL:
ASPHALT
HIGH HOUSE RD
AT-GRADE CROSSING
PRIVATE DRIVEWAY
CROSSING GATE: NO
FLASHERS: NO
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CROSSING PANEL MATERIAL:
ASPHALT
AT-GRADE CROSSING
PRIVATE DRIVEWAY
CROSSING GATE: NO
FLASHERS: NO
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CROSSING PANEL MATERIAL:
ASPHALT
AT-GRADE CROSSING
MORRISVILLE PKWY
CROSSING GATE: YES
FLASHERS: YES
NUMBER OF TRACKS: 1
CROSSING PANEL MATERIAL:
CONCRETE
AT-GRADE CROSSING
PRIVATE DRIVEWAY
CROSSING GATE: NO
FLASHERS: NO
NUMBER OF TRACKS: 1
CROSSING PANEL MATERIAL:
ASPHALT
AT-GRADE CROSSING
PRIVATE DRIVEWAY
CROSSING GATE: NO
FLASHERS: NO
NUMBER OF TRACKS: 1
CROSSING PANEL MATERIAL:
ASPHALT
CURVE 12
RADIUS: 2°00' L
Ea: 1.00"
MATCHLINE (SEE SHEET 4)
NC 55
N

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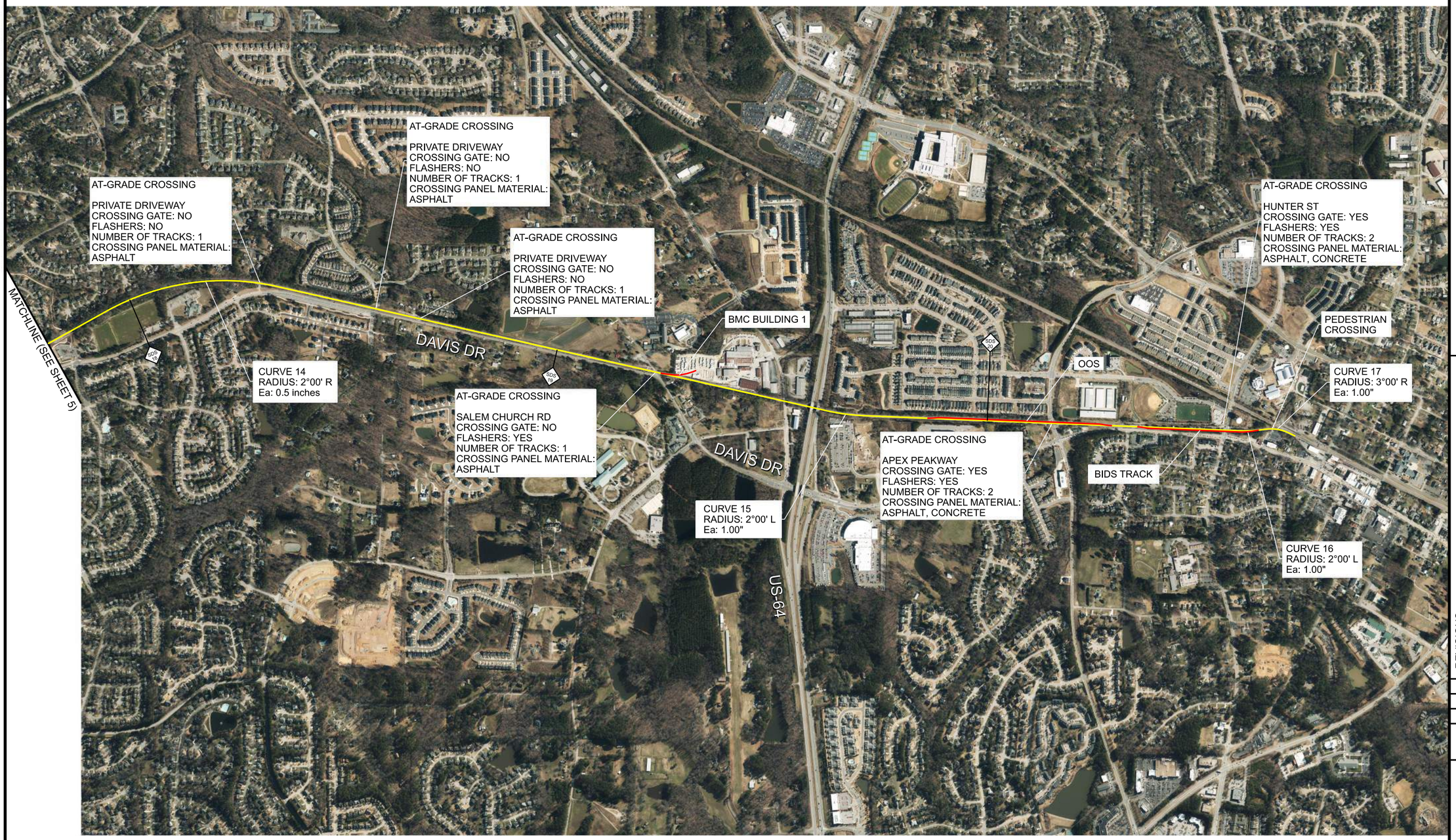

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