NORTH CAROLINA
Turnpike Authority

Maintenance Rating Program

Triangle Expressway

May 2022

2022 First Quarter Report

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1.0 Executive Summary

The North Carolina Turnpike Authority (NCTA) Maintenance Rating Program (MRP) is a maintenance evaluation program for roadway features and toll facilities on the NCTA system. This report presents results from the 2022 First Quarter Assessment of the Triangle Expressway.

The overall 2022 First quarter maintenance rating of the Triangle Expressway was **94.2,** above the NCTA target rating of 90. As shown in ***Table 1,*** all five elements assessed achieved a rating greater than the target rating of 85.

Table 1: MRP Element Results for the 2022 First Quarter Assessment

Element	MRP Rating	Target Rating
Road Surface	95.7	85.0
Unpaved Shoulders and Ditches	98.7	85.0
Drainage	92.0	85.0
Roadside	94.0	85.0
Traffic Control Devices	92.1	85.0
Overall MRP Performance Rating	**94.2**	**90.0**

This report also provides a rolling rating of the latest four quarterly inspections of the Triangle Expressway. As presented in ***Table 2,*** the rolling maintenance rating of the Triangle Expressway was **93.9**.

Table 2: MRP Rolling Element Results

Element	Q2 2021 Rating	Q3 2021 Rating	Q4 2021 Rating	Q1 2022 Rating	Rolling Rating
Road Surface	96.8[1]	100.0[1]	98.4	95.7	97.7[3]
Unpaved Shoulders and Ditches	99.3	96.8	98.9	98.7	98.4
Drainage	94.0	92.5	91.7	92.0	92.6
Roadside	95.5	91.6	92.4	94.0	93.4
Traffic Control Devices	92.5[1]	86.5[1]	87.8	92.1[2]	89.6[3]
Overall MRP Performance Rating	**95.2[1]**	**93.0[1]**	**93.3**	**94.2[2]**	**93.9[3]**

[1]Excludes asphalt surface pavement condition as well as markers, striping, and symbols on mainline NC-147 and all ramps/loops.
[2]Excludes concrete surface pavement markers, striping, and symbols on mainline NC-540 and asphalt surface markers on mainline NC-147.
[3]Excludes quarter ratings for elements listed above.

In addition, the report provides findings of the Green Level Historic District signs inspection. This quarter, two signs were inspected. Both signs were found to be in good physical condition, and the landscaped areas around the signs were maintained in accordance with NCTA MRP standards.

2.0 Introduction

The NCTA MRP is a comprehensive planning, measuring, and managing process that provides a means for communicating to managers, stakeholders and customers the impacts of policy and budget decisions on program service delivery.

Using outcome-based performance measures and the service level scale (0 through 100), the inspection results are rated against established thresholds criteria. The program analysis is accomplished using sampling procedures that capture the level of service being provided for individual assets. The evaluation procedure is based on the establishment of threshold conditions that quantify the maximum defect allowed on assets. Over time, the results can be charted to identify work needs and subsequent necessary actions.

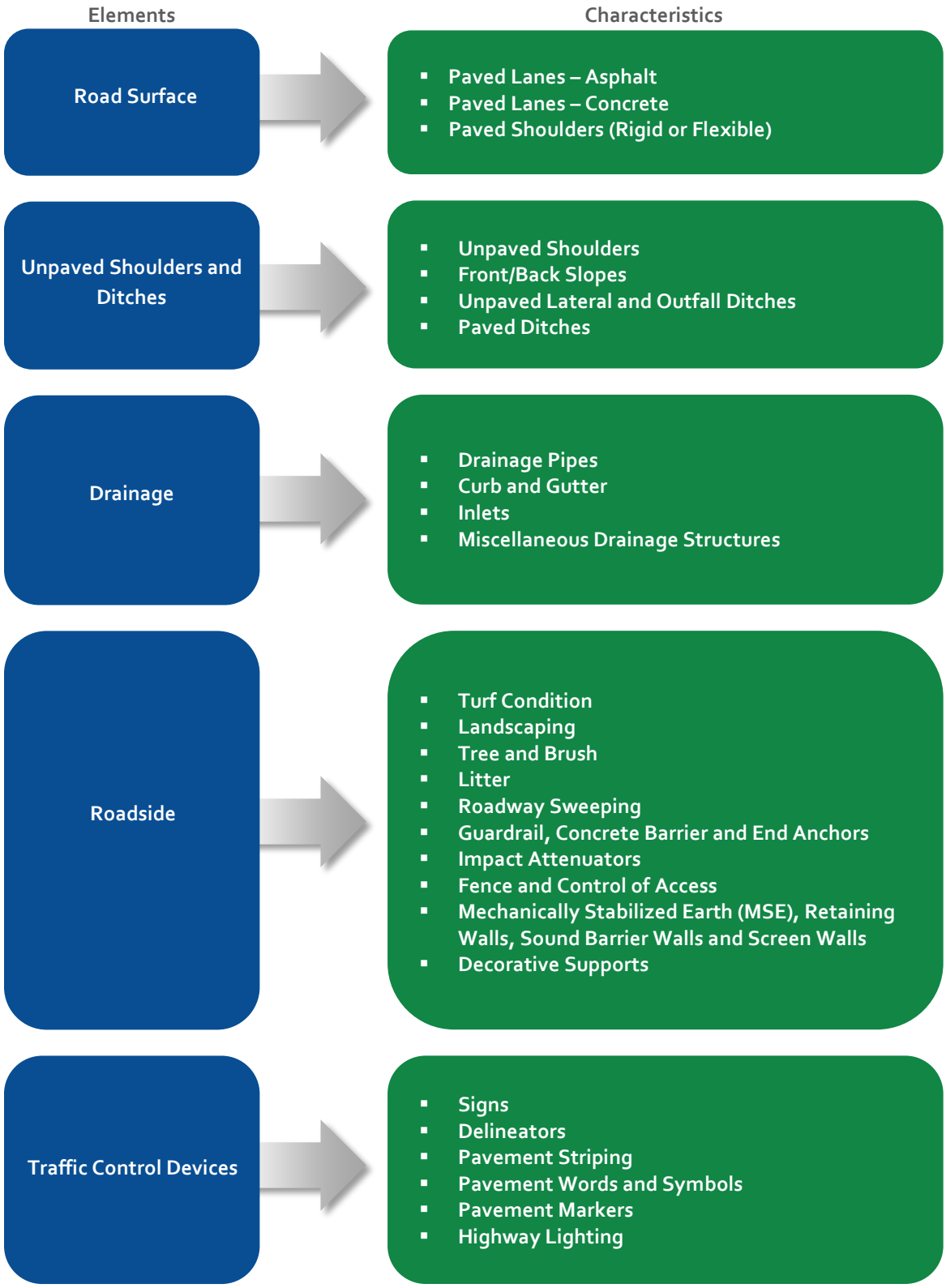
The NCTA performance standards, threshold criteria, and maintenance rating program were developed through a collaborative effort by NCTA managers, NCDOT maintenance staff, and consultants.

Using field survey information, a maintenance matrix can be developed to show the ties between maintenance activities and the characteristics of various roadway features. The purpose of this evaluation is to provide information that can be used to schedule and prioritize routine maintenance activities and provide uniform maintenance conditions that meet established objectives.

3.0 MRP Procedure

Per the *NCTA Roadway and Facility Maintenance Performance Standards V7*, roadway assets or characteristics on NCTA facilities have been grouped into elements. These elements and corresponding characteristics are shown in ***Figure 1:***

Figure 1: Maintenance Elements and Characteristics



A weighting system has been established to identify the importance of each element and characteristic. This system consists of two weighting factors: one that accounts for the importance of individual characteristics within a given maintenance element (1-9), and one that accounts for the importance of the maintenance elements to the total rating (by % of score). This two-factor system reveals deficiencies among characteristics and elements.

The program analysis is accomplished using statistically valid, random sampling procedures that capture the level of service for individual characteristics, with a 95% confidence level in sampling. The sample characteristics selected are evaluated during quarterly inspections, which are performed during the months of February, May, August, and November to account for dynamic changes in assets during the various seasons. The evaluation process is completed using electronic data collection tablets and is based on established threshold conditions described in the NCTA Roadway and Facility Maintenance Standards V7. Those characteristics that meet or exceed the threshold are coded as PASSING; those that do not meet the threshold are coded as NOT PASSING.

When the evaluation process is completed, the number of PASSING samples and total sample are multiplied by the weighted values (1-9) to determine the actual and possible rating points for characteristics and elements. MRP ratings for elements and characteristics are then calculated as the ratio of the actual rating points to possible rating points. The MRP ratings represent the maintenance level of service currently being provided, as they define the percent of characteristics and elements that meet the maintenance condition standard. For instance, an MRP rating of 83 signifies that 83 percent of the inspected elements/characteristics met the standard.

The overall MRP rating is determined by calculating the sum of the elements' ratings multiplied by the following weighted factors:

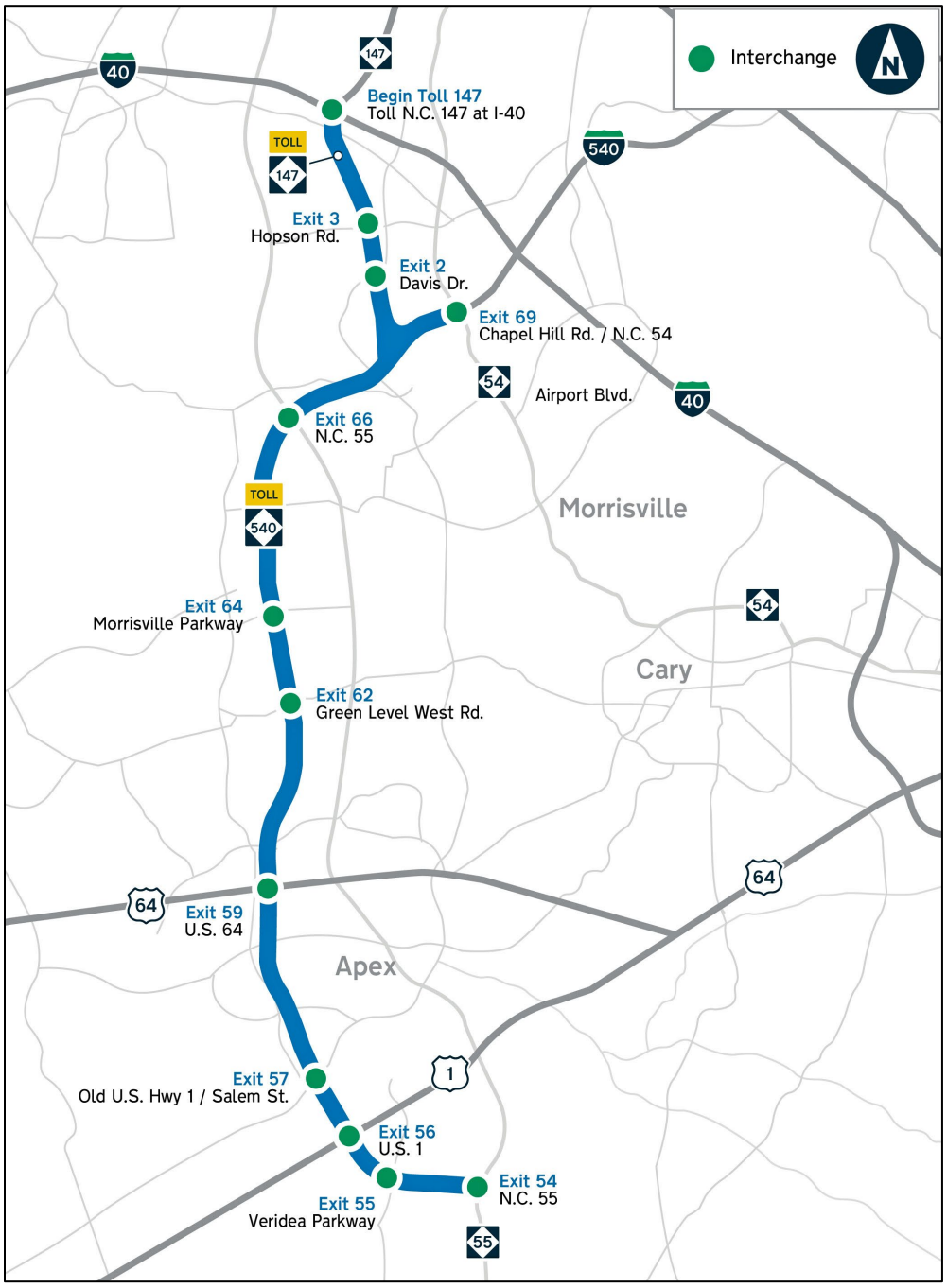
Road Surface =	**25%**
Unpaved Shoulders =	**13%**
Drainage =	**15%**
Roadside =	**17%**
Traffic Control Devices =	**30%**
Total	**100%**

The NCTA's overall target rating is 90, with elements scoring 85 or higher, and characteristics 80 or higher. In addition to quarterly ratings, the cumulative rolling annual rating is calculated each quarter. This rating is obtained by adding the ratings of the latest four quarterly inspections to compensate for the likelihood of uneven sample sizes.

4.0 Triangle Expressway Description

The Triangle Expressway extends for approximately 18.8 miles from the interchange of I-40 and Toll NC-147 in Durham to the NC-55 Bypass near Holly Springs (***Figure 2***). It includes a one-mile segment on Toll NC-540 extending north from the Toll NC-540 / Toll NC-147 interchange to the NC-54 interchange. The Triangle Expressway consists of twelve interchanges and twenty-two all-electronic toll collection zones.

Figure 2: Triangle Expressway Map



5.0 Triangle Expressway Asset Inventory Update

Through normal day-to-day maintenance activities and the construction of special projects, roadside assets are continuously being added or modified on the roadway. NCTA coordinates closely with NCDOT Division 5 Maintenance and conducts routine field visits to maintain an accurate asset inventory and ensure the validity of the MRP survey.

During this quarter assets on Toll NC 540 exit ramps to and from NC-55 Bypass were removed from the inventory due to the Complete 540 construction project. ***Table 3*** presents the updated number of assets that are currently available for inspections.

Table 3: Asset Inventory

Assets	Total Inventory	2022 Eligible Inventory
Barriers	799	627
Curb and Gutter	428	397
Decorative Supports	305	298
Drainage	1179	1131
Misc. Drainage	211	200
Fences	508	484
Highway Lighting	435	431
Impact Attenuators	47	45
Inlets	1126	1080
Linear Segments	795	737
Plant Beds	266	261
Paved Ditches	2	2
Pavement Symbols	652	593
Signs	1221	1169
Tree and Brush	603	569
Turf	1074	978
Walls	88	84

6.0 MRP First Quarter Assessment

6.1 Quarterly Results

The overall 2022 first quarter maintenance rating of the Triangle Expressway was 94.2, above NCTA's target overall rating of 90. All elements assessed achieved quarter ratings above the target rating of 85 established for element groups. All characteristics, except one, achieved a quarter score above the target rating of 80.

It is important to note that these results are only representative of the first quarter sample, one of the four surveys to provide an intermediate snapshot of seasonal conditions. Therefore, they are not a statistically valid representation of the assets; only the total of all four quarterly inspections, reported as the rolling rating, provide a 95% confidence level in statistical sampling. The first quarter MRP performance ratings for elements and characteristics are presented in ***Table 4*** and ***Table 5***, respectively.

Table 4: MRP Element Results for Q1 2022

Element	MRP Rating
Road Surface	95.7
Unpaved Shoulders and Ditches	98.7
Drainage	92.0
Roadside	94.0
Traffic Control Devices	92.1
Overall MRP Performance Rating	**94.2**

Table 5: MRP Characteristics Results for Q1 2022

Road Surface	Sample Passed	Sample Total	Weighted Values	Actual Pts	Available Pts	Q1 Rating
Paved Lanes Asphalt	16	17	9	144	153	94
Paved Lanes Concrete	11	12	9	99	108	92
Paved Shoulder	32	32	5	160	160	100
Element Total				**403**	**421**	**95.7**
Unpaved Shoulders and Ditches	**Sample Passed**	**Sample Total**	**Weighted Values**	**Actual Pts**	**Available Pts**	**Q1 Rating**
Unpaved Shoulder	31	32	9	279	288	97
Front/Back Slopes	32	32	6	192	192	100
Lateral and Outfall Ditches, Unpaved	32	32	6	192	192	100
Ditches, Paved	2	2	5	10	10	100
Element Total				**673**	**682**	**98.7**
Drainage	**Sample Passed**	**Sample Total**	**Weighted Values**	**Actual Pts**	**Available Pts**	**Q1 Rating**
Drainage Pipes	29	33	7	203	231	88
Curb and Gutter	23	25	6	138	150	92
Inlets	33	34	7	231	238	97
Misc. Drainage Structure	27	30	4	108	120	90
Element Total				**680**	**739**	**92.0**
Roadside	**Sample Passed**	**Sample Total**	**Weighted Values**	**Actual Pts**	**Available Pts**	**Q1 Rating**
Turf Condition	46	49	7	322	343	94
Landscaping	25	25	4	100	100	100
Trees and Brush	31	31	4	124	124	100
Litter	31	32	4	124	128	97
Roadway Sweeping	31	32	5	155	160	97
Guardrail, Concrete Barrier, and End Anchors	28	32	9	252	288	88
Impact Attenuators	9	9	9	81	81	100
Fence, Control Access	32	35	7	224	245	91
Retaining Walls and Sound Barrier Walls	12	16	5	60	80	75
Decorative Supports	26	26	5	130	130	100
Graffiti and Stain Removal	43	44	4	172	176	98
Element Total				**1744**	**1855**	**94.0**
Traffic Control Devices	**Sample Passed**	**Sample Total**	**Weighted Values**	**Actual Pts**	**Available Pts**	**Q1 Rating**
Signs	32	35	7	224	245	91
Delineators	26	32	3	78	96	81
Pavement Striping/Marking	19	20	8	152	160	95
Words and Symbols	34	35	7	238	245	97
Pavement Markers	14	17	9	126	153	82
Highway Lighting	33	34	6	198	204	97
Element Total				**1016**	**1103**	**92.1**

Additionally, ***Appendix A*** includes maps that present the location of all assets assessed during the first quarter. ***Appendix B*** includes a list of the individual assets that did not achieve their target ratings.

6.2 Quarterly Analysis and Recommendations

Elements

During the first quarter, all elements exceeded NCTA's quarter score threshold criteria of 85. Furthermore, all elements received a quarter score above 90.

Road Surface (95.7) experienced an increase in rolling rating 0.9 points higher than the previous quarter's rolling rating. Asphalt resurfacing was completed in September of 2021.

Unpaved Shoulders and Ditches (98.4) experienced a slight decrease in rolling rating. The rating for this element was 0.2 points lower than the previous quarter rolling rating. All characteristics within this element continued scoring above 95.

Drainage (92.0) experienced an increase in rolling rating of 0.9 points. Misc. Drainage Pipes (90) rolling rating increased from last quarter by 3.6 points, continuing to score above the target rating.

Roadside (93.4) also increased 0.9 points from the previous quarter's rolling rating. Turf Condition (94) experienced an increase in rolling ratings from last quarter by 3.4 points. Retaining Walls and Sound Barrier Walls (75) experienced a decrease in rolling rating of 4.3 points.

Traffic Control Devices (92.1) experienced an increase in rolling rating of 2.1 points from the previous quarter. Highway Lighting (97) had the largest increase in rolling rating of 4.8 points. Pavement Markers (82) experienced a decrease in rolling rating of 1.3 points. Repaving and subsequent striping of all asphalt lanes was completed in September 2021. Replacement of striping and markers for the remaining concrete sections is scheduled to start in Spring 2022.

Recommendations to improve specific critical characteristic ratings are provided in the following sections.

Characteristics

This quarter, all but one characteristic, Retaining Walls and Sound Barrier Walls (75), met the NCTA target threshold criteria of 80. A description of the characteristic's conditions and future work planning recommendations are provided below. Pictures of all characteristic failures are included in ***Appendix B***.

Retaining Walls and Sound Barrier Walls (75 rating –12 of the 16 assets passed): Three of the four wall sections that did not pass inspection had unsealed joints and scaling. Two of the sections that did not pass inspection are presented in ***Figure 3***.

Figure 3: Retaining Walls and Sound Barrier Walls Inspection Results Sample

Maintenance Program:

1) Walls shall be inspected during daily patrols.

2) Unwanted vegetation and graffiti (see graffiti standard) shall be scheduled for removal.

3) Minor wall or column damage shall be scheduled for repair within the annual work program.

4) Staining damage shall be scheduled for repair within the annual work program.

5) Any structural damage that poses a safety risk shall be scheduled immediately upon observation. Mitigate any safety hazard upon observation.

Maintenance and Evaluation Standards: MSE/retaining walls, sound barrier walls, and screen walls do not meet the maintenance standards when any of the following criteria is observed:

1) More than 10% of exposed surface is covered with unwanted vegetation.

2) Any single spall 1 inch deep or greater or cumulative spalls covering an area over 5 SF on any single facing.

3) More than 25% of weep holes within the sample section are not functioning properly.

4) Unsealed cracks or joints greater than 0.25 inches in width.

5) Stained areas exhibit cumulative scaling in excess of 1 SF.

7.0 Current Rolling MRP Rating

The rolling maintenance rating of the Triangle Expressway was **93.9**, exceeding NCTA's target overall rating of 90. All elements exceeded NCTA's rolling rating threshold criteria of 85. All characteristic ratings met or exceeded the target rating of 80.

The 2021/2022 results are presented in ***Exhibit 1*** and ***Table 6***. These results are a collection of the four quarterly inspections conducted in the last year.

Exhibit 1: MRP Element Results for 2021/2022

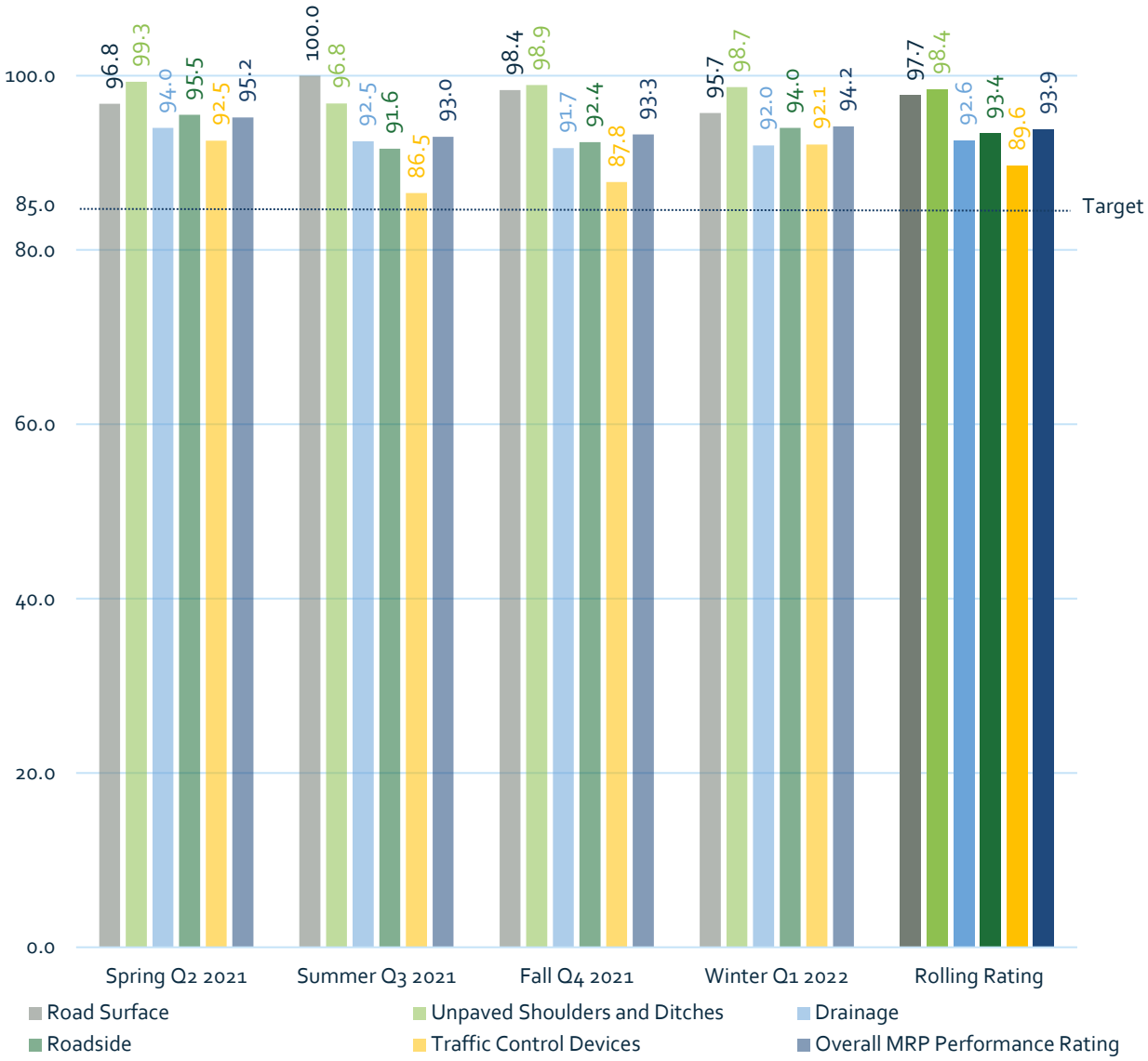


Table 6: MRP Rolling Element Results

Road Surface	Q2 2021 Rating	Q3 2021 Rating	Q4 2021 Rating	Q1 2022 Rating	Rolling Rating
Paved Lanes Asphalt	95[1]	100[1]	93	94	95[2]
Paved Lanes Concrete	95	100	100	92	98
Paved Shoulder	100[1]	100[1]	100	100	100[2]
Element Total	**96.8[1]**	**100.0[1]**	**98.4**	**95.7**	**97.7[2]**
Unpaved Shoulders and Ditches	**Q2 2021 Rating**	**Q3 2021 Rating**	**Q4 2021 Rating**	**Q1 2022 Rating**	**Rolling Rating**
Unpaved Shoulder	100	93	97	97	97
Front/Back Slopes	100	100	100	100	100
Lateral and Outfall Ditches, Unpaved	98	100	100	100	99
Ditches, Paved	100	100	100	100	100
Element Total	**99.3**	**96.8**	**98.9**	**98.7**	**98.4**
Drainage	**Q2 2021 Rating**	**Q3 2021 Rating**	**Q4 2021 Rating**	**Q1 2022 Rating**	**Rolling Rating**
Drainage Pipes	97	91	91	88	92
Curb and Gutter	100	100	100	92	98
Inlets	93	95	89	97	93
Misc. Drainage Structure	83	80	86	90	85
Element Total	**94.0**	**92.5**	**91.7**	**92.0**	**92.6**
Roadside	**Q2 2021 Rating**	**Q3 2021 Rating**	**Q4 2021 Rating**	**Q1 2022 Rating**	**Rolling Rating**
Turf Condition	91	75	88	94	86
Landscaping	96	100	100	100	99
Trees and Brush	100	100	97	100	99
Litter	98	95	92	97	95
Roadway Sweeping	100	100	97	97	99
Guardrail, Concrete Barrier, and End Anchors	93	97	94	88	93
Impact Attenuators	100	100	89	100	97
Fence, Control Access	91	93	84	91	90
Retaining Walls and Sound Barrier Walls	94	69	81	75	80
Decorative Supports	100	100	100	100	100
Graffiti and Stain Removal	100	98	100	98	99
Element Total	**95.5**	**91.6**	**92.4**	**94.0**	**93.4**
Traffic Control Devices	**Q2 2021 Rating**	**Q3 2021 Rating**	**Q4 2021 Rating**	**Q1 2022 Rating**	**Rolling Rating**
Signs	91	88	97	91	92
Delineators	93	80	77	81	83
Pavement Striping/Marking	90[1]	70[1]	69	95[2]	80[3]
Words and Symbols	86[1]	87[1]	90	97[2]	90[3]
Pavement Markers	100[1]	100[1]	100	82[2]	98[3]
Highway Lighting	93	90	88	97	92
Element Total	**92.5[1]**	**86.5[1]**	**87.8**	**92.1[2]**	**89.6[3]**

[1] Excludes asphalt surface pavement condition as well as markers, striping, and symbols on mainline NC-147 and all ramps/loops.

[2] Excludes concrete surface pavement markers, striping, and symbols on mainline NC-540 and asphalt surface markers on mainline NC-147.

[3] Excludes the indicated quarter ratings for characteristics listed above.

8.0 Green Level Historic District Signs

Green Level Historic District signs and surrounding landscaped areas were installed as part of the Triangle Expressway construction project. Currently, NCDOT is maintaining the Green Level Historic District Signs and the Town of Cary is providing maintenance to the landscaped areas surrounding these signs.

8.1 Analysis and Recommendations

As part of each quarterly inspection, an assessment team visits the two remaining Green Level Historic District signs to conduct a visual inspection of each sign and ensure they are in good standing. The two signs included in the inspection inventory were found to be in good condition. One of the two landscaped areas were well maintained while the other appeared overgrown, partially obscuring the sign text. ***Figure 5*** shows the two signs assessed.

Figure 5: Green Level West Historic District Signs, Landscape Areas

9.0 Conclusion

This report presents the 2022 first quarter assessment of the Triangle Expressway. The NCTA's target ratings are 90 for the rolling rating, 90 for the overall quarter rating, 85 for elements, and 80 for characteristics. The first quarter 2022 overall rating was **94.2** and the rolling rating was **93.9** , both ratings met the target rating of 90.

All element ratings were above the target ratings for the quarter and rolling assessment. During the first quarter assessment, all but one characteristic met or exceeded the target rating of 80. The characteristic that received a quarter score less than 80 was Retaining Walls and Sound Barrier Walls (75). Replacement of pavement striping and marking is scheduled to begin in Spring 2022.

To maintain/improve the condition ratings, it is recommended that the pavement striping/marking replacement cycles are completed as planned in the capital budget.

This quarter, the two Green Level Historic District signs inspected were found to be in good condition. The landscaped area surrounding one of the two signs was found to be overgrown and in need of maintenance. The landscape area around the other sign on Green Level Church Road was found to be well maintained.

Appendix A

Triangle Expressway 2022 First Quarter Asset Assessment Locations

Appendix A: Triangle Expressway 2022 First Quarter Asset Assessment Locations

Provided below are a series of maps outlining the assets that were a part of this quarter's sample and their corresponding result. Assets are defined by an Inventory ID, which is a unique identifier given to each individual asset. The components that make up the Inventory ID are an asset specific prefix along with a number, such as LS_1. All assets and their respective prefixes are listed below:

- Guardrail, Concrete Barrier and End Anchors – BR
- Curb and Gutter – CG
- Decorative Supports – DS
- Drainage Pipes – DP
- Misc. Drainage Structures – MDP
- Fence and Control of Access – FN
- Graffiti – GF
- Highway Lighting – HL
- Impact Attenutators – IA
- Inlets – IN
- Landscaping – PB
- Linear Samples – LS
    - Paved Lanes – Asphalt
    - Paved Lanes – Concrete
    - Paved Shoulders
    - Unpaved Shoulders
    - Front/Back Slopes
    - Unpaved Lateral and Outfall Ditches
    - Litter
    - Roadway Sweeping
    - Pavement Striping/Markings
    - Pavement Markers
    - Delineators
- Paved Ditches – PD
- Pavement Words and Symbols – PS
- Signs – SN
- Tree and Brush – TB
- Turf Condition – TF
- MSE/Retaining Walls, Sound Barrier Walls, and Screen Walls – WL

Appendix A: Triangle Expressway 2022 First Quarter Asset Assessment Locations

Legend

Failing Asset

Passing Asset

NORTH CAROLINA Turnpike Authority

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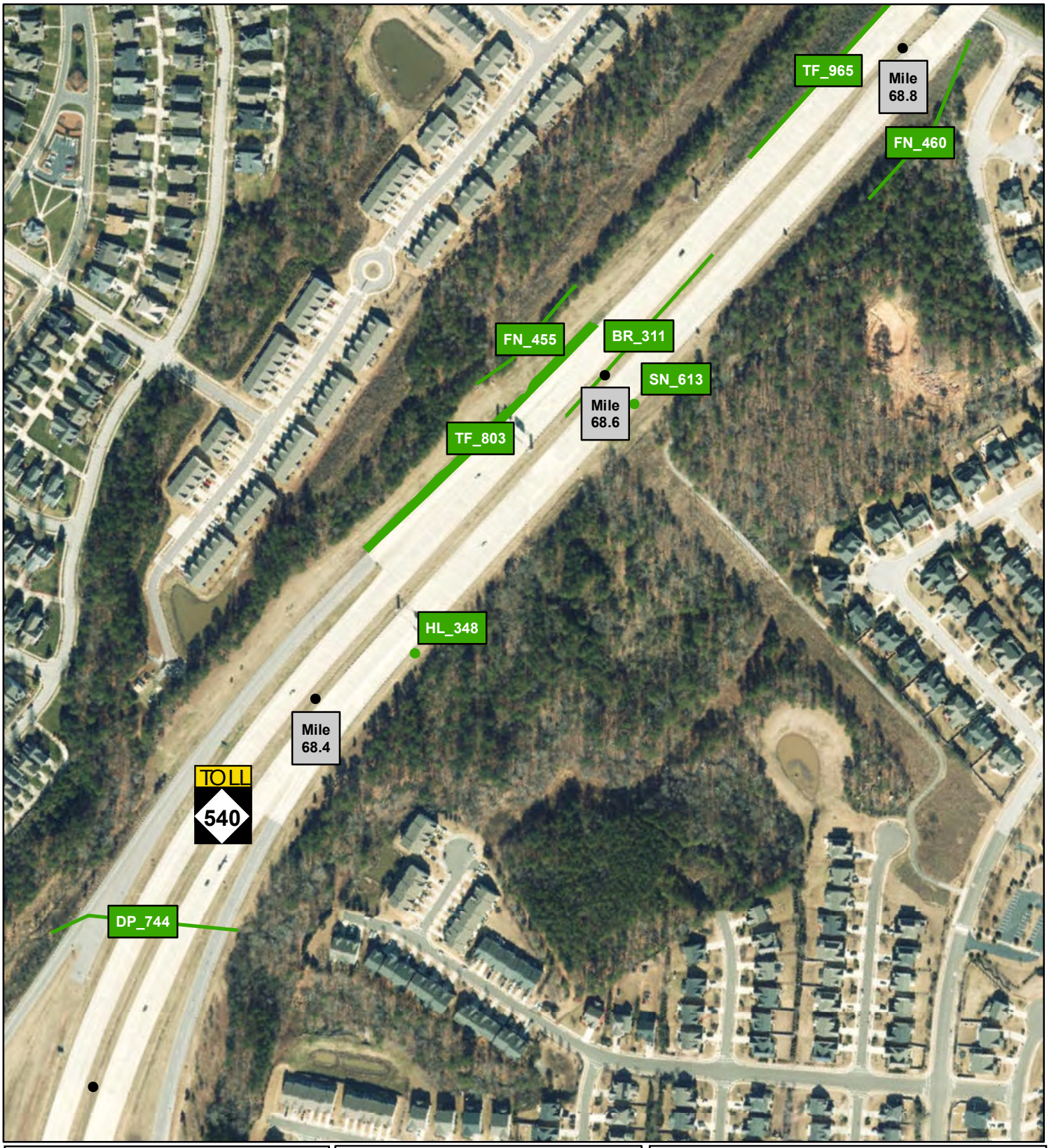

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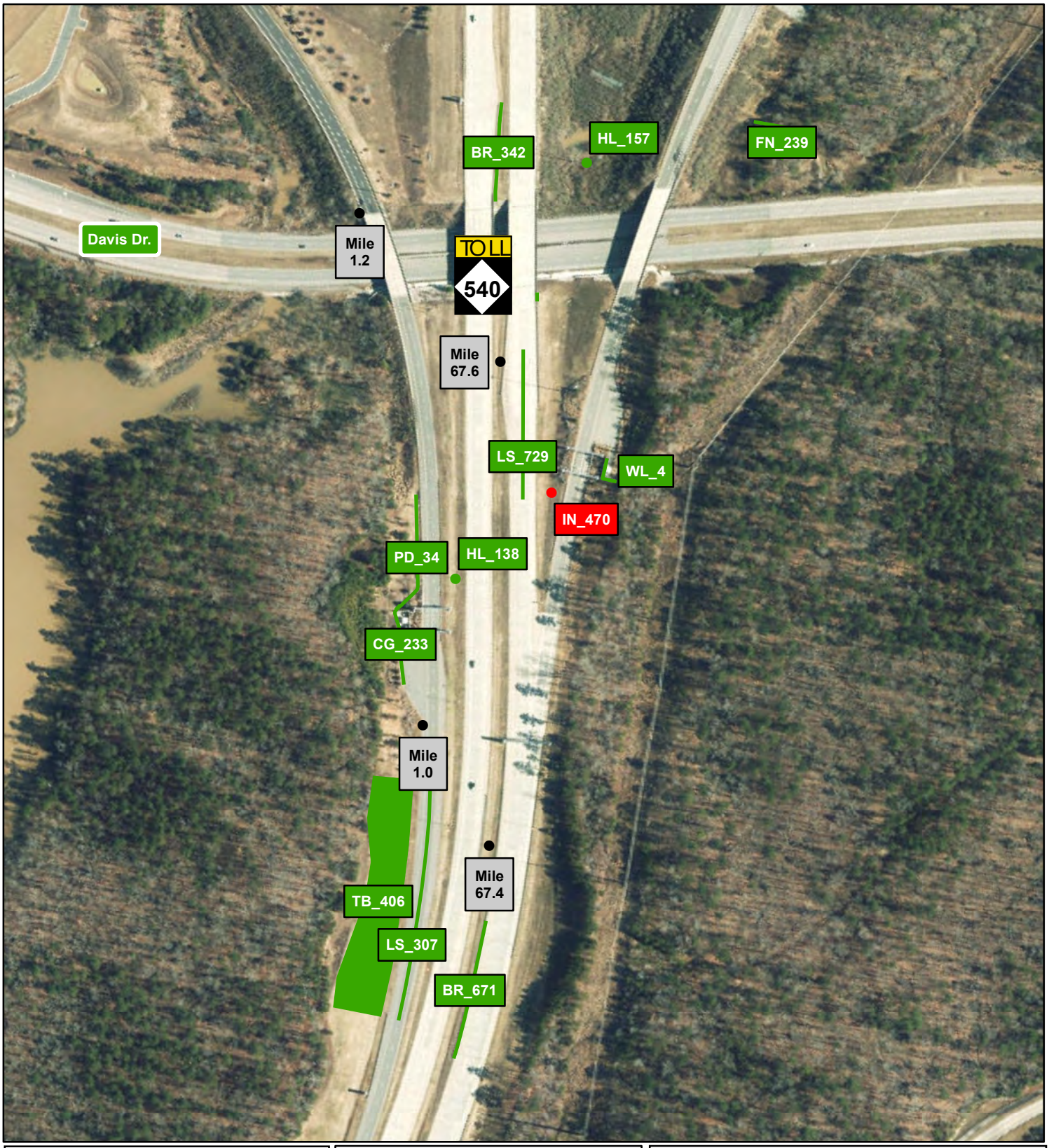

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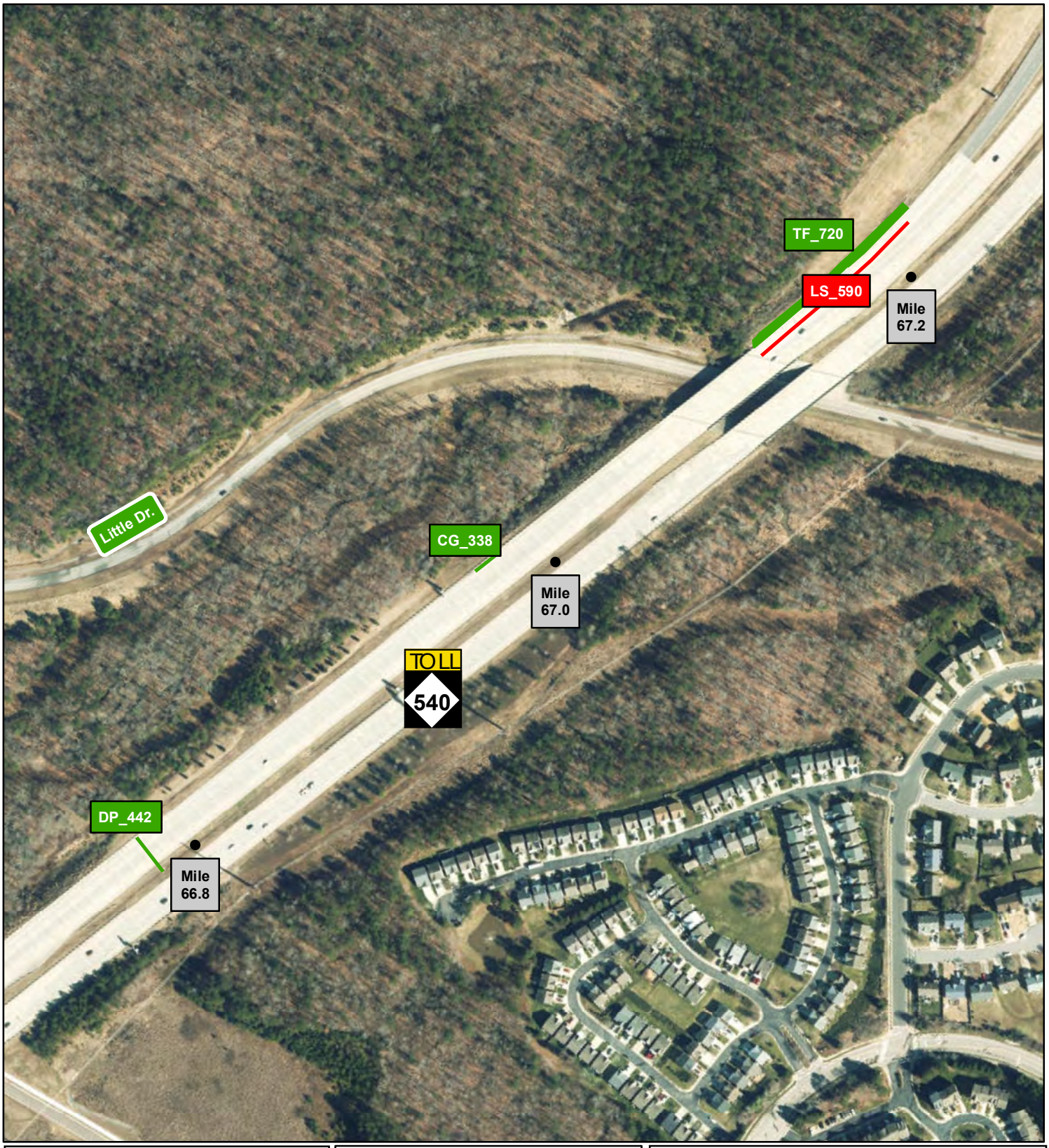

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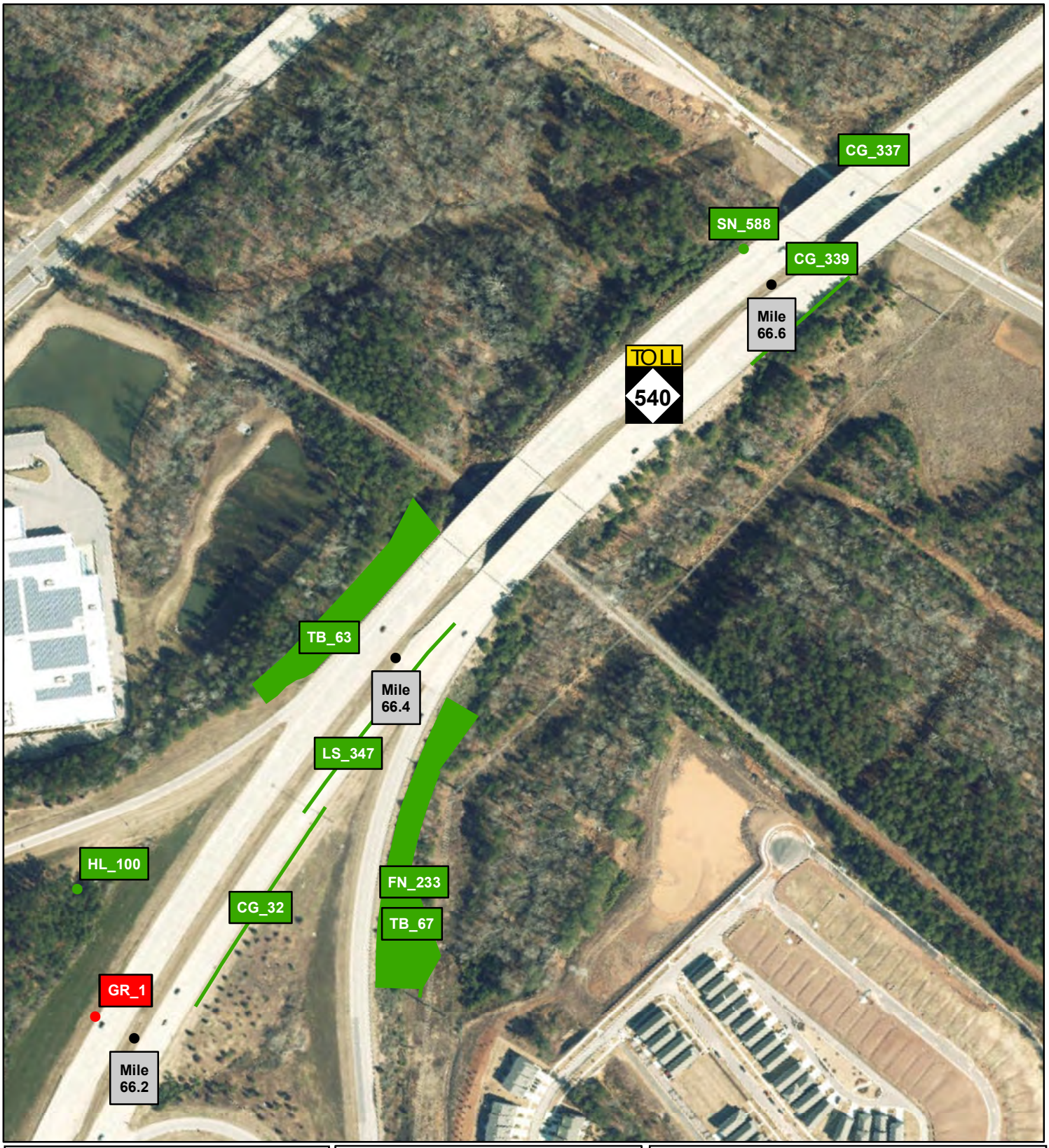

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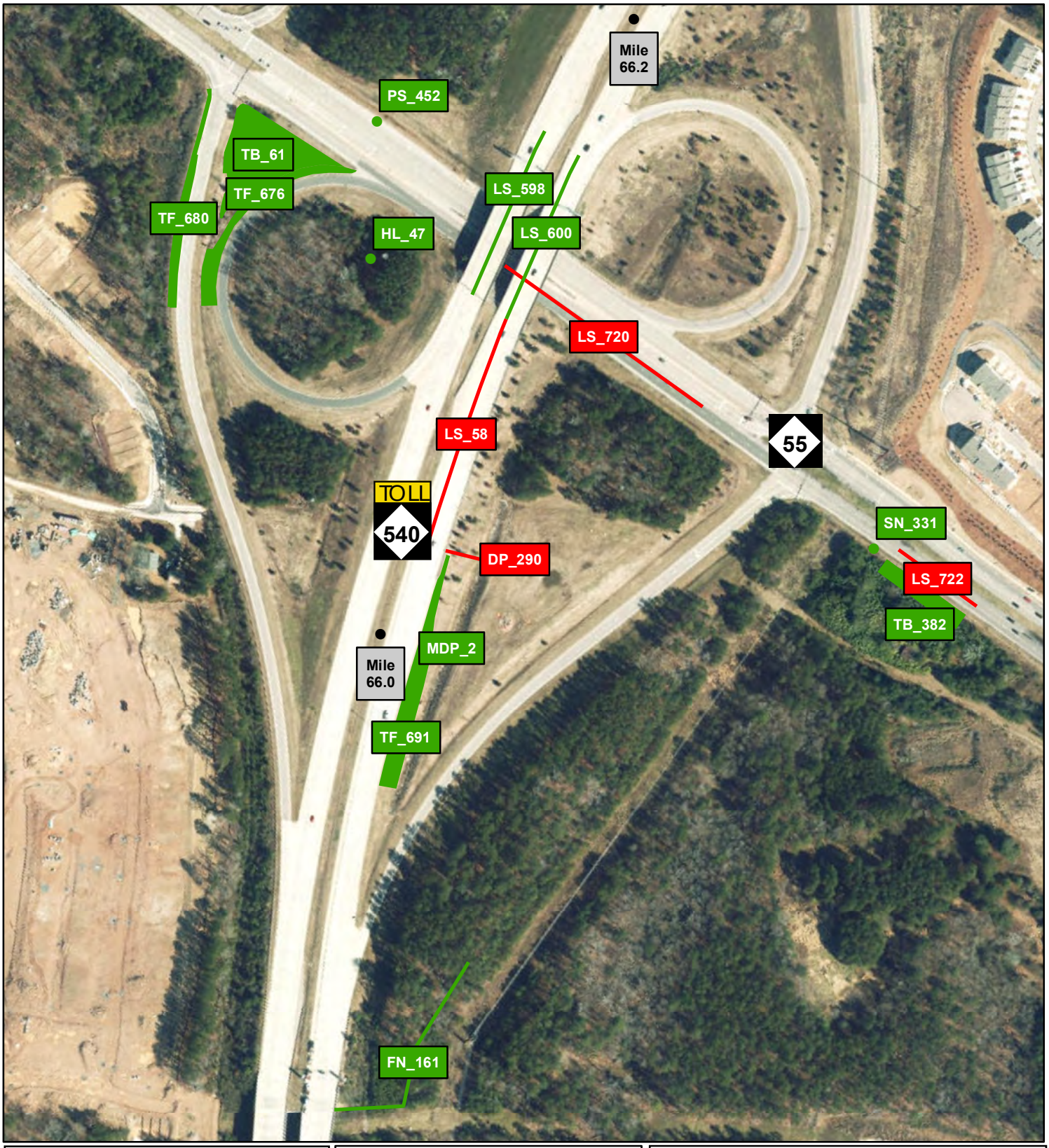

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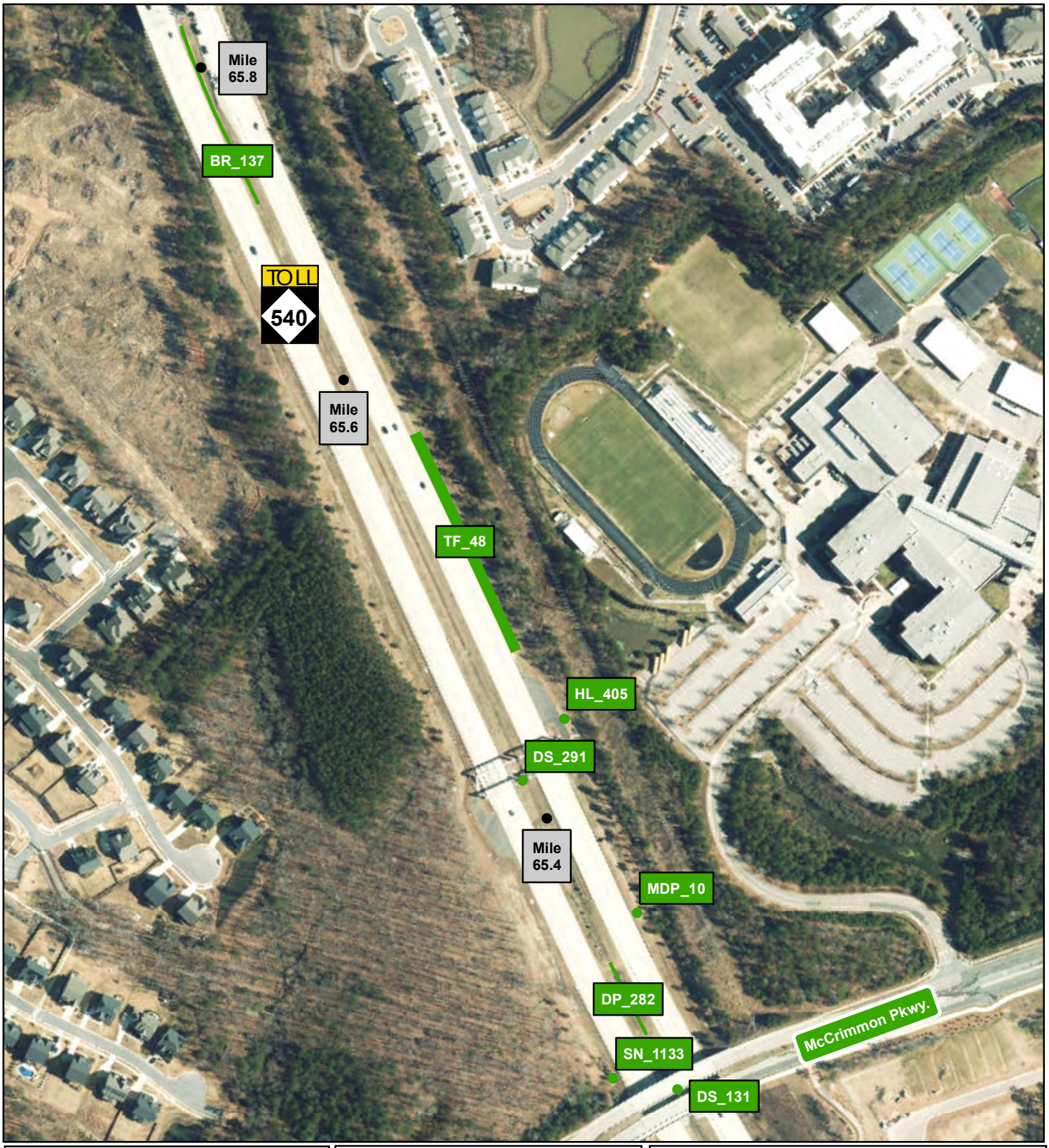

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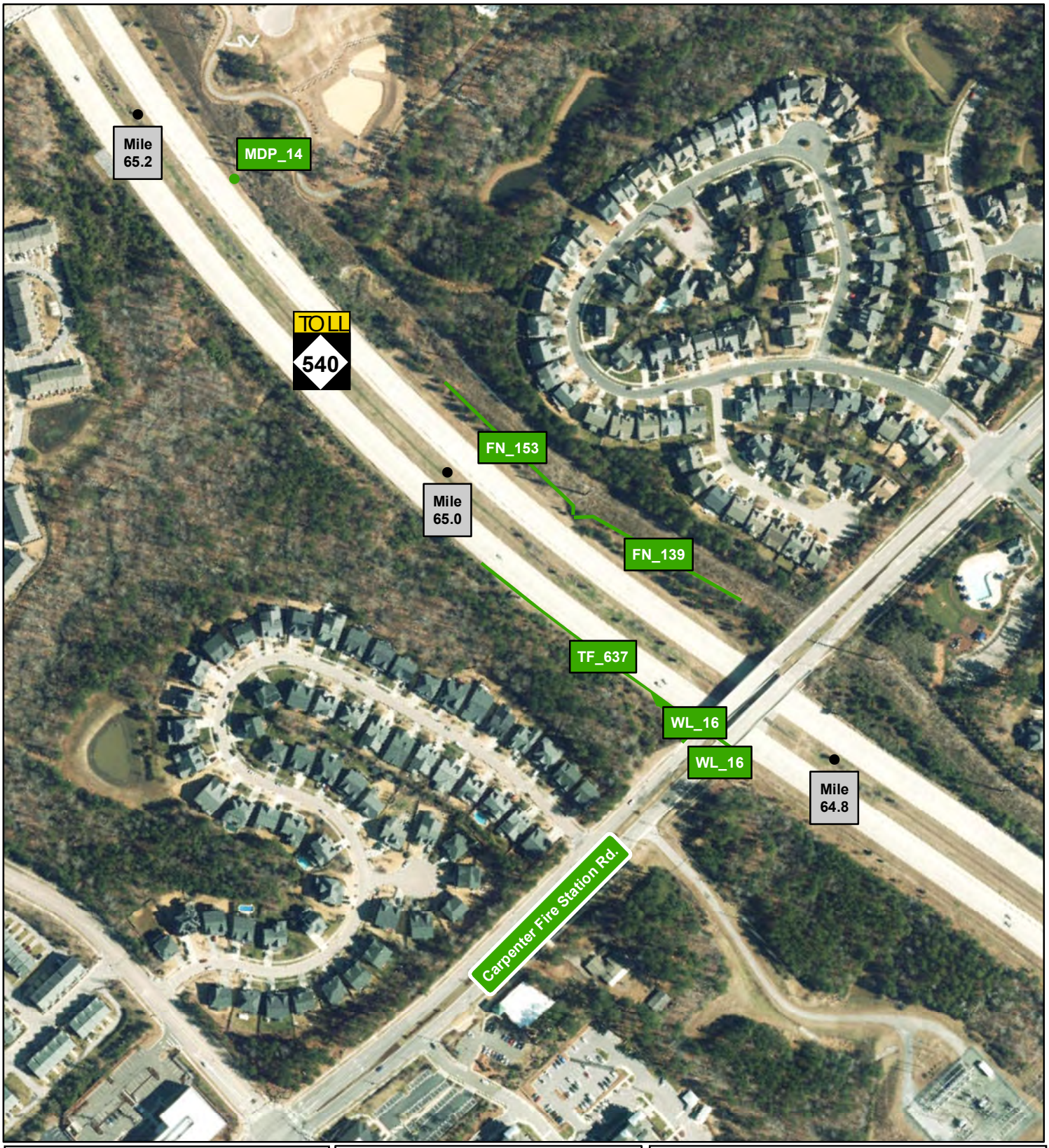

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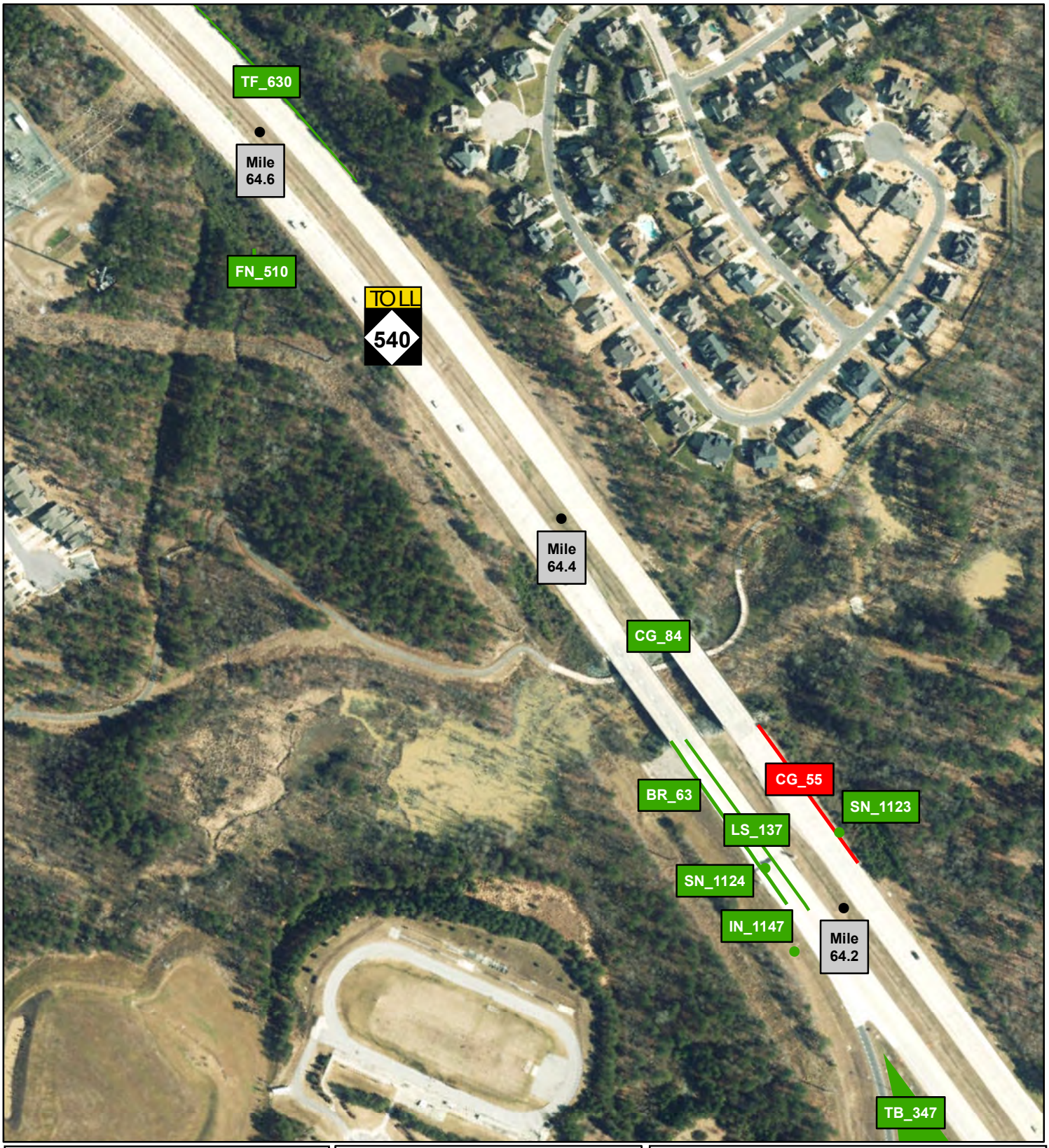

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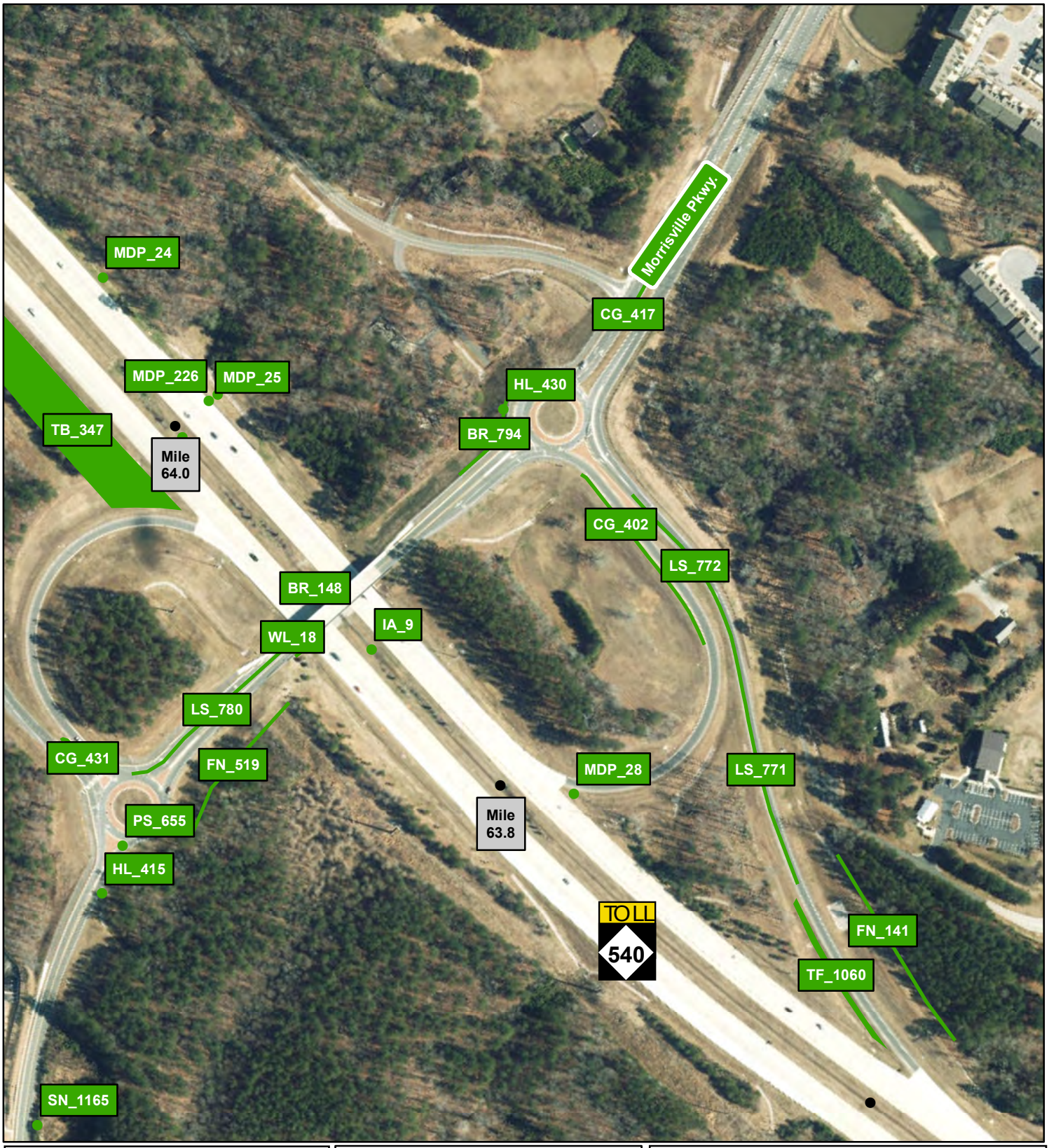
Passing Asset

NORTH CAROLINA Turnpike Authority

Appendix A: Triangle Expressway 2022 First Quarter Asset Assessment Locations



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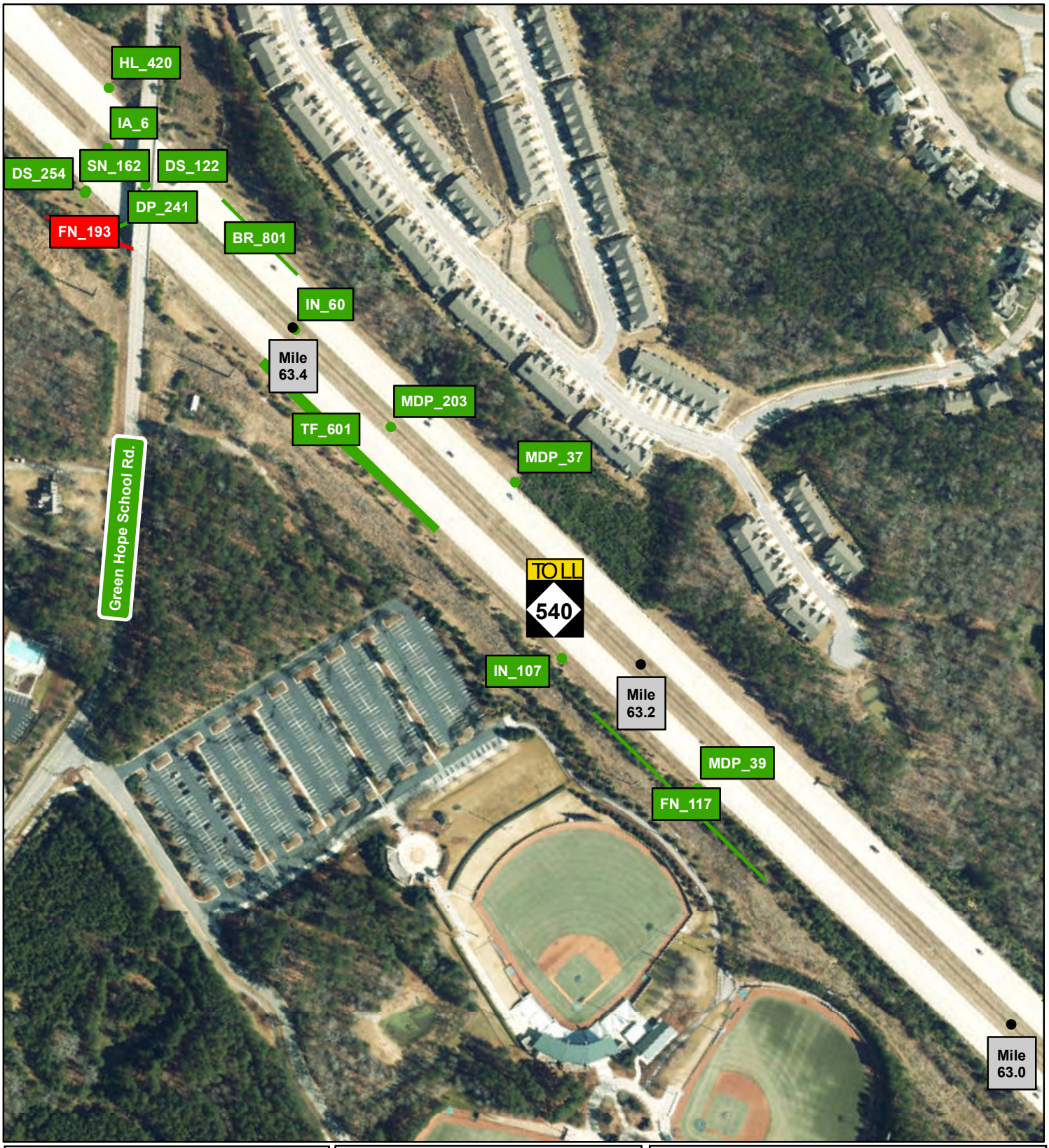

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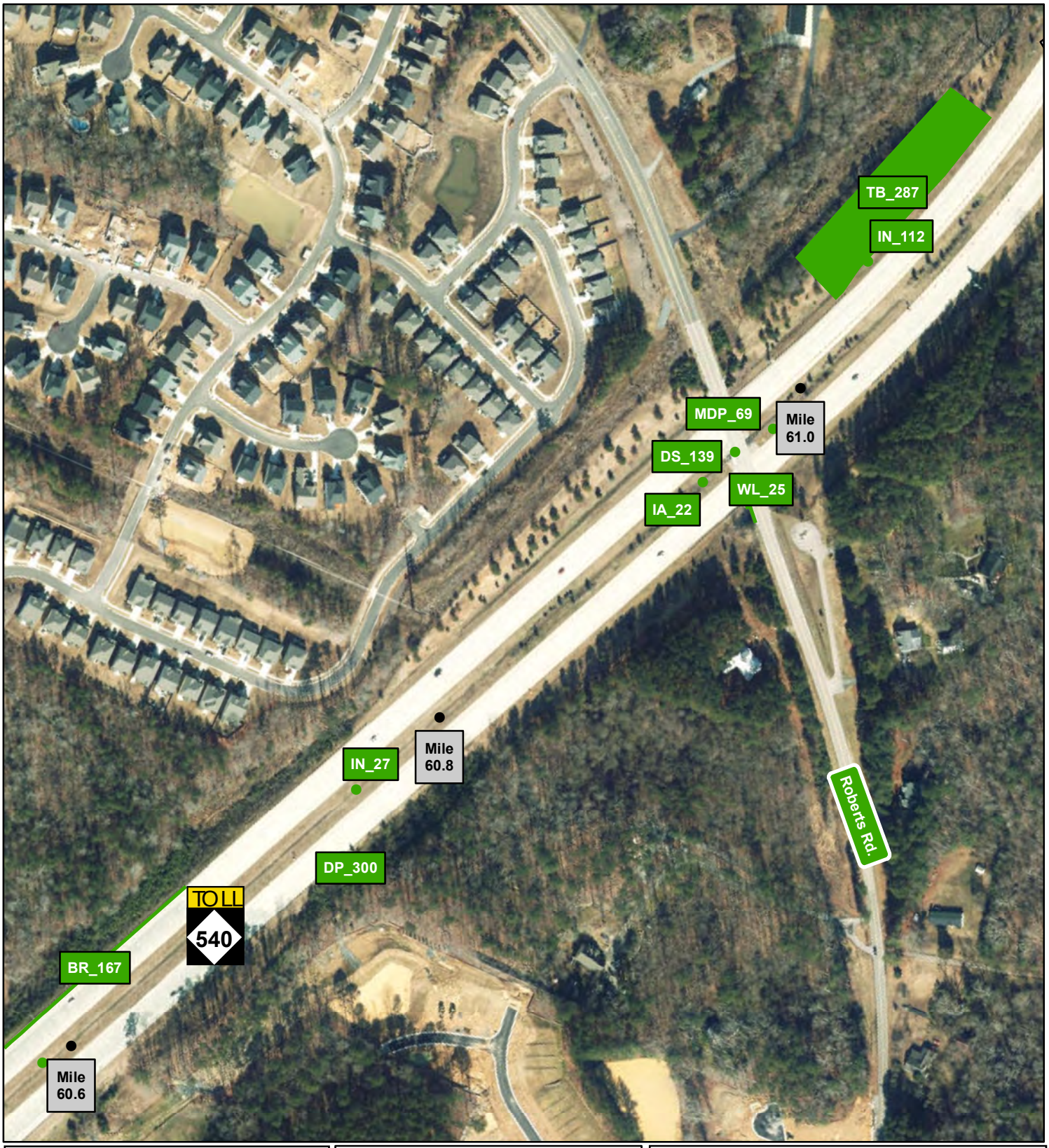

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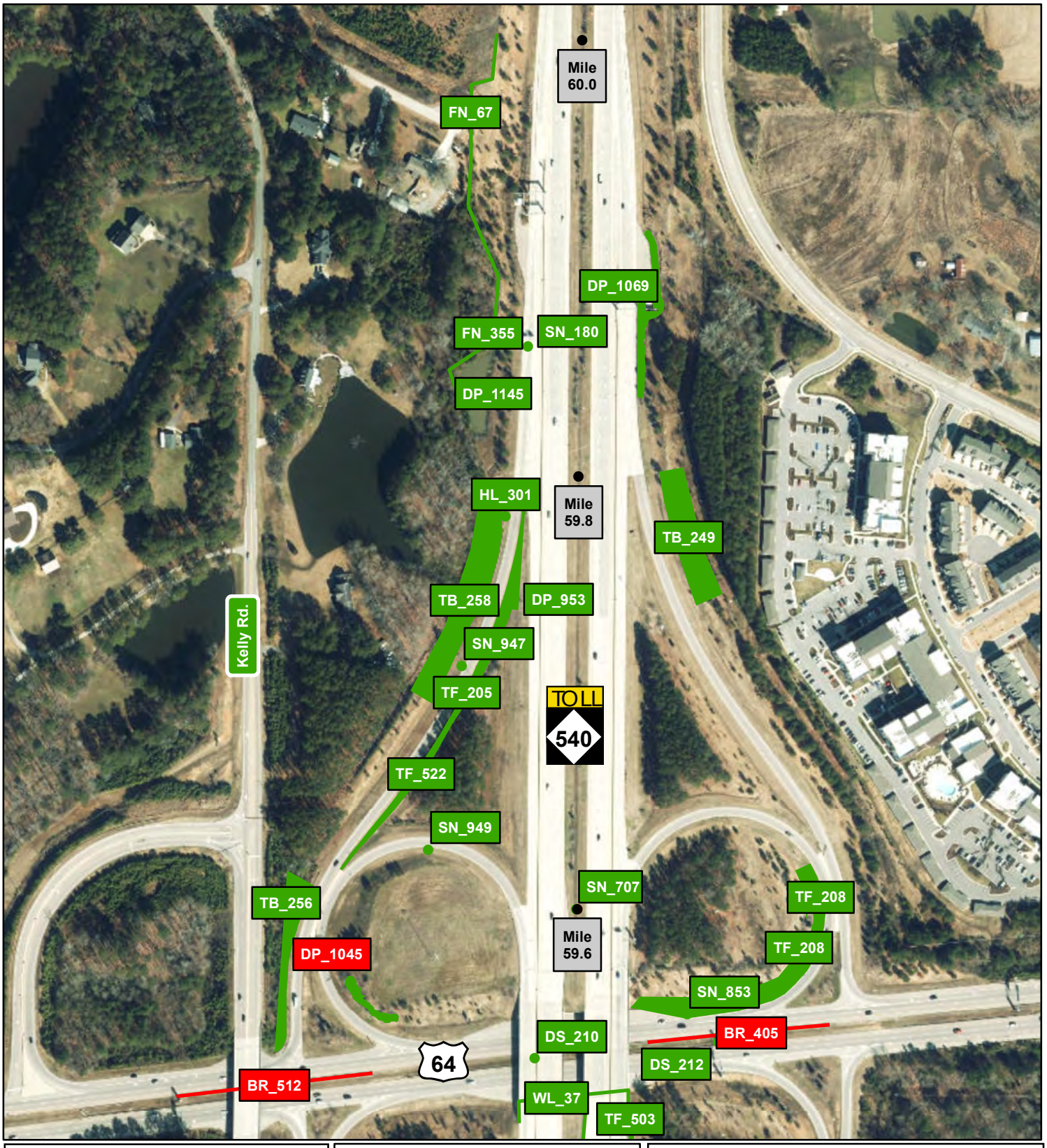

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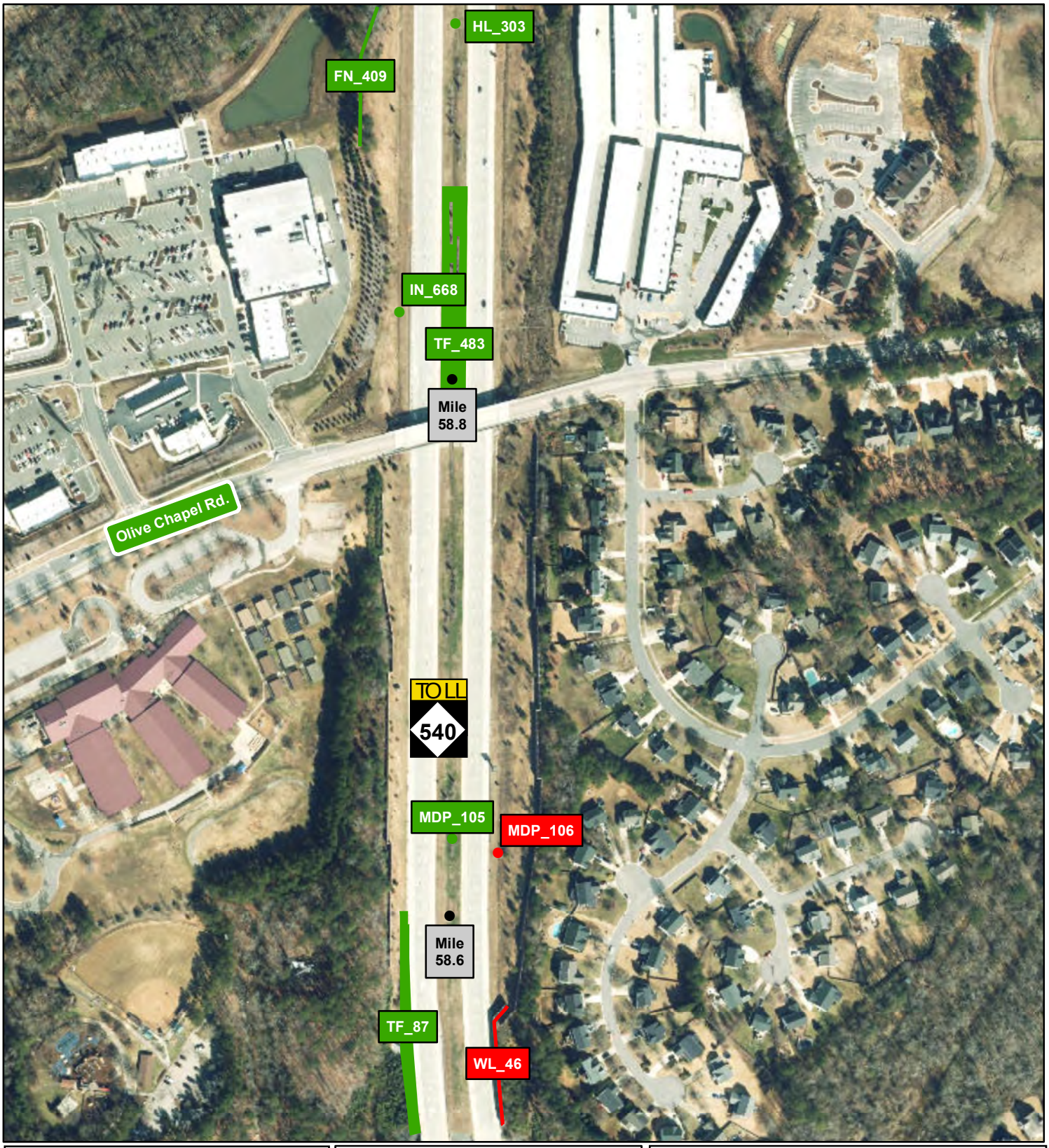

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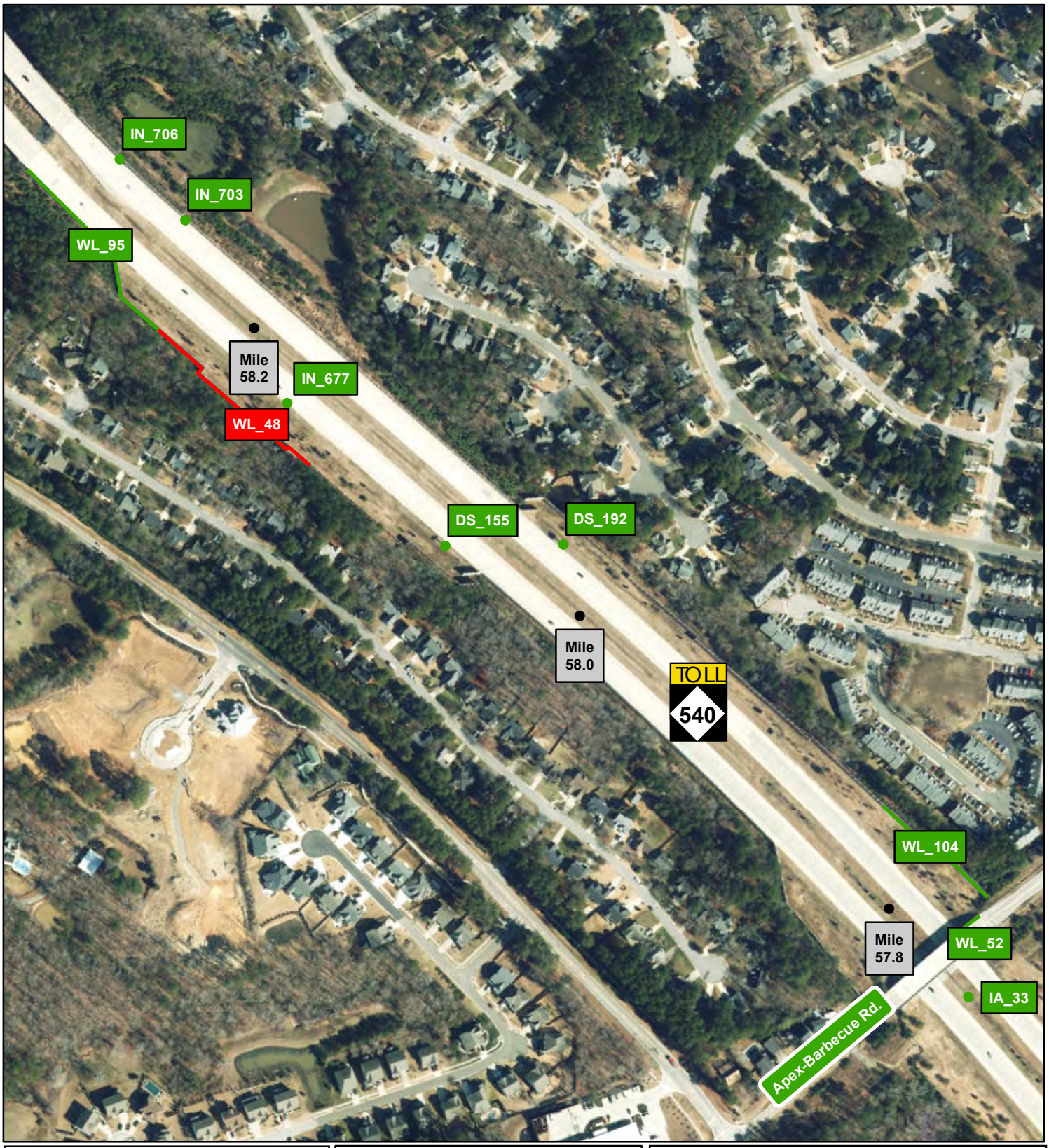

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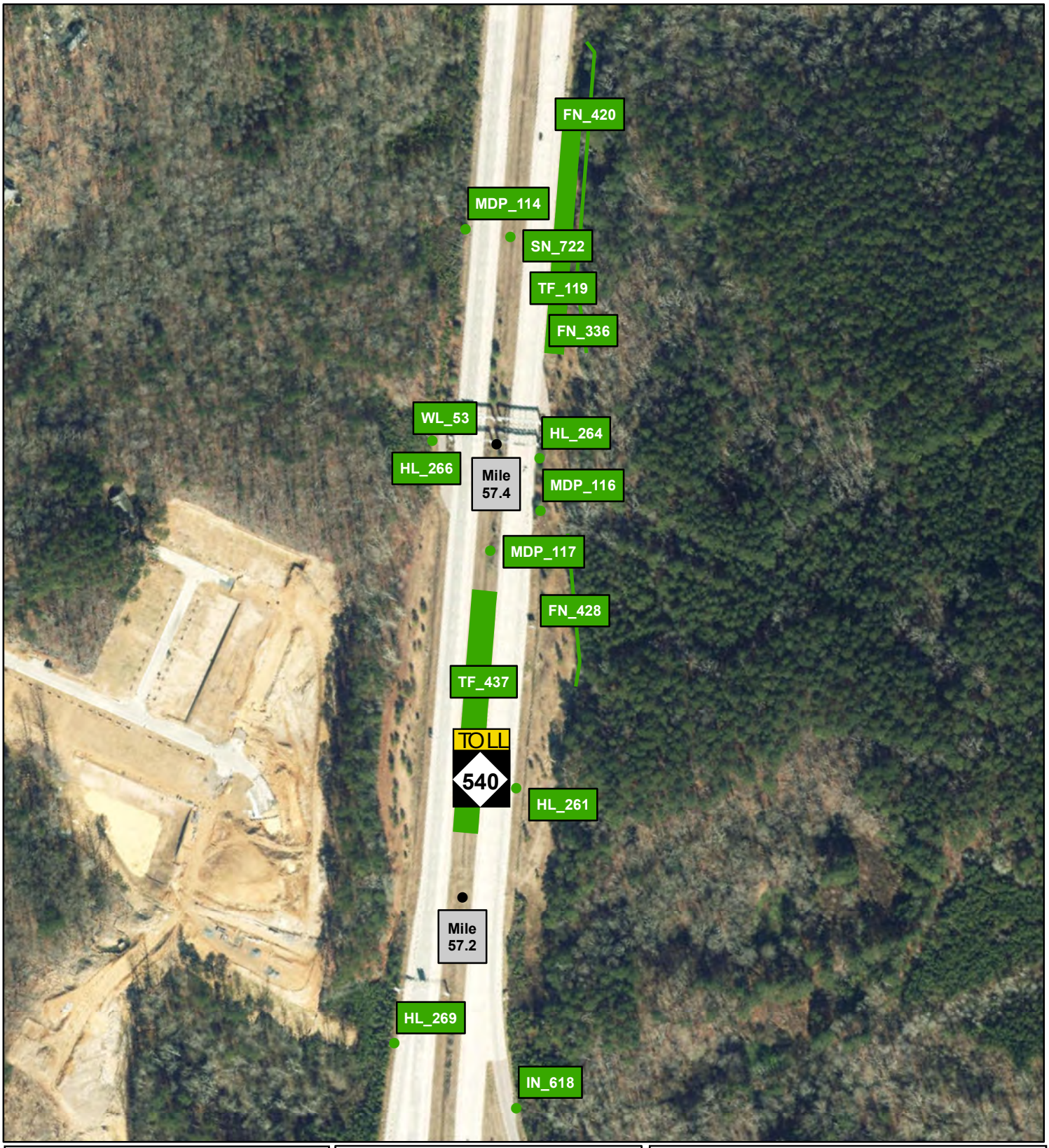

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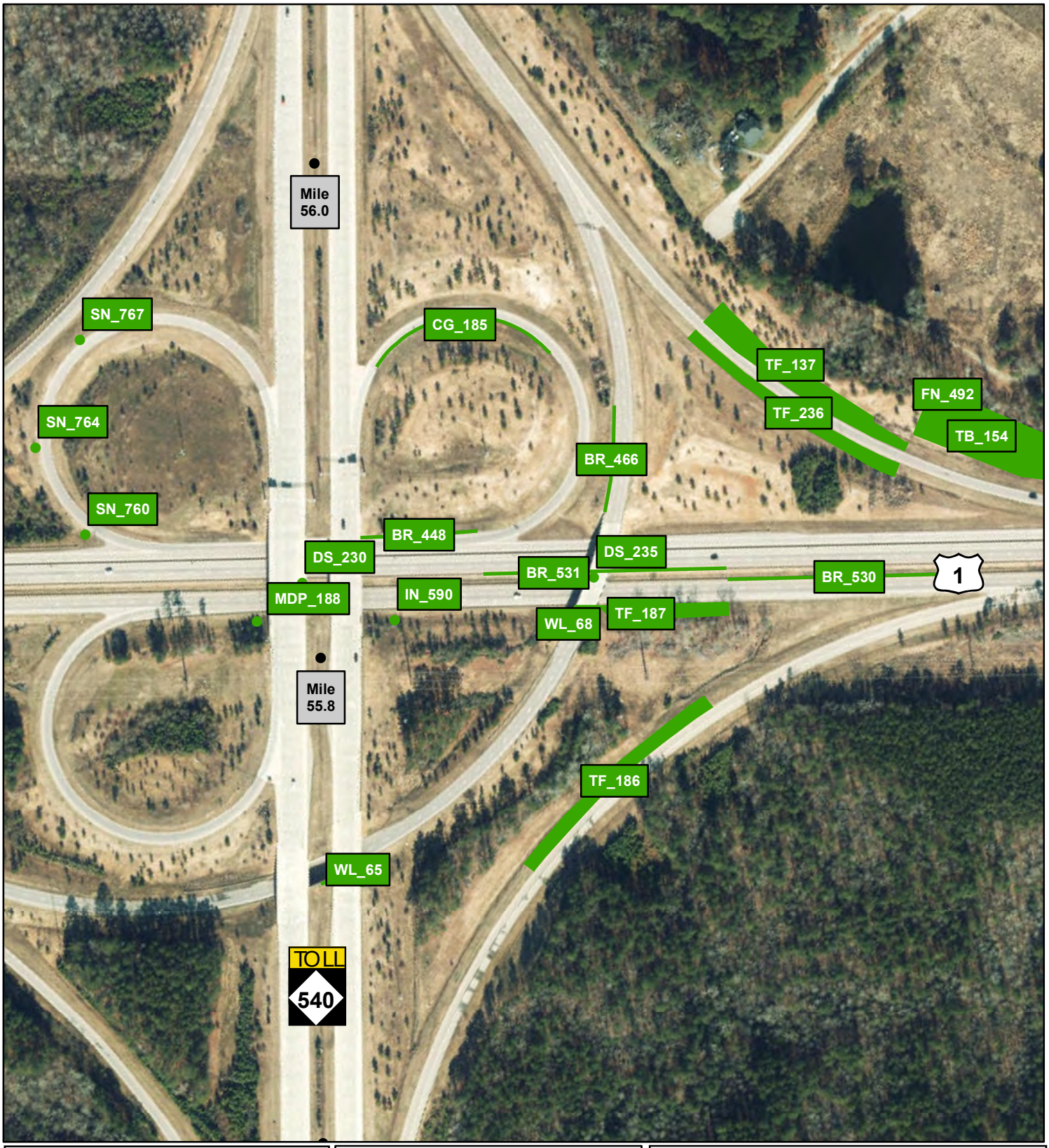

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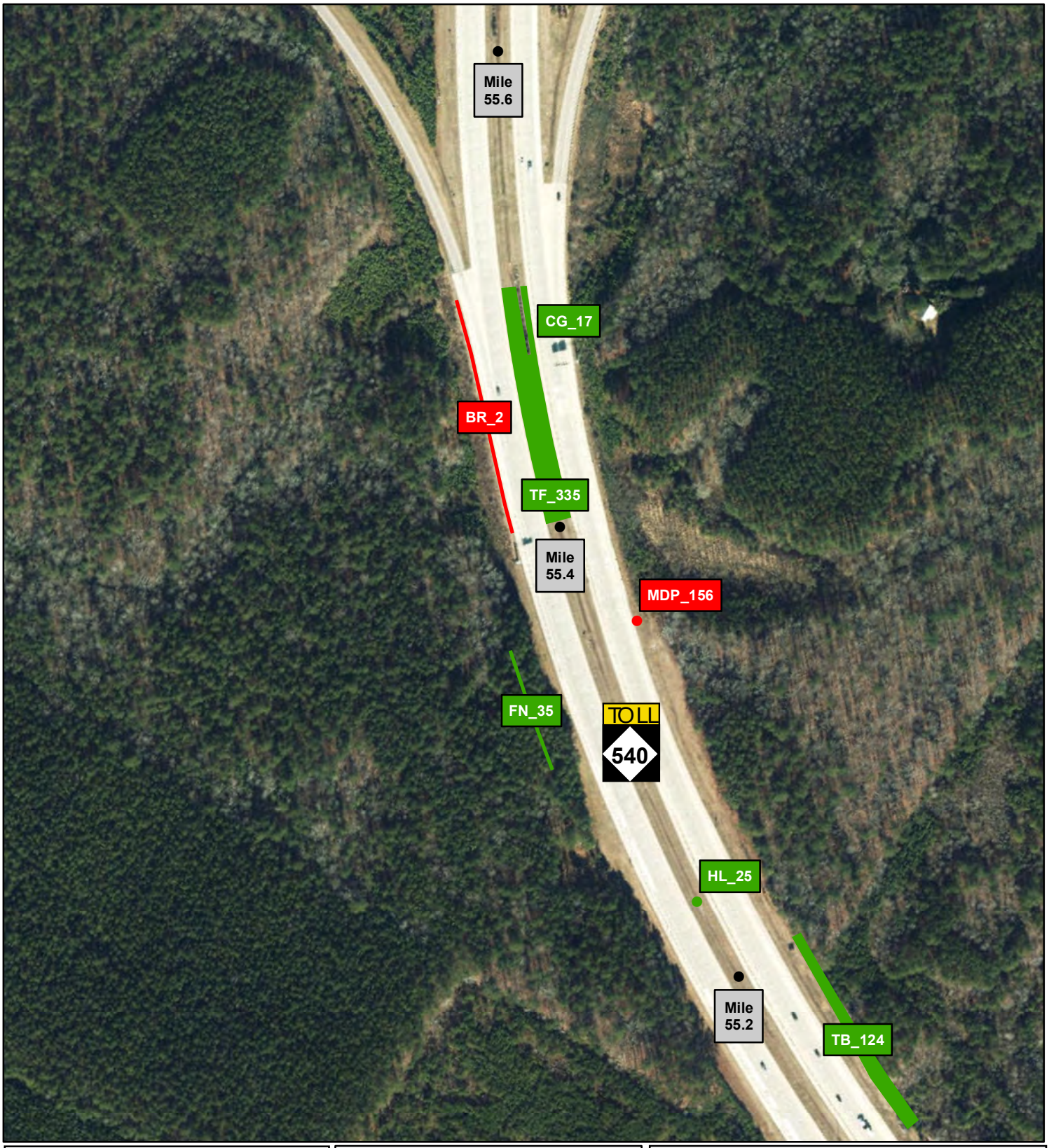

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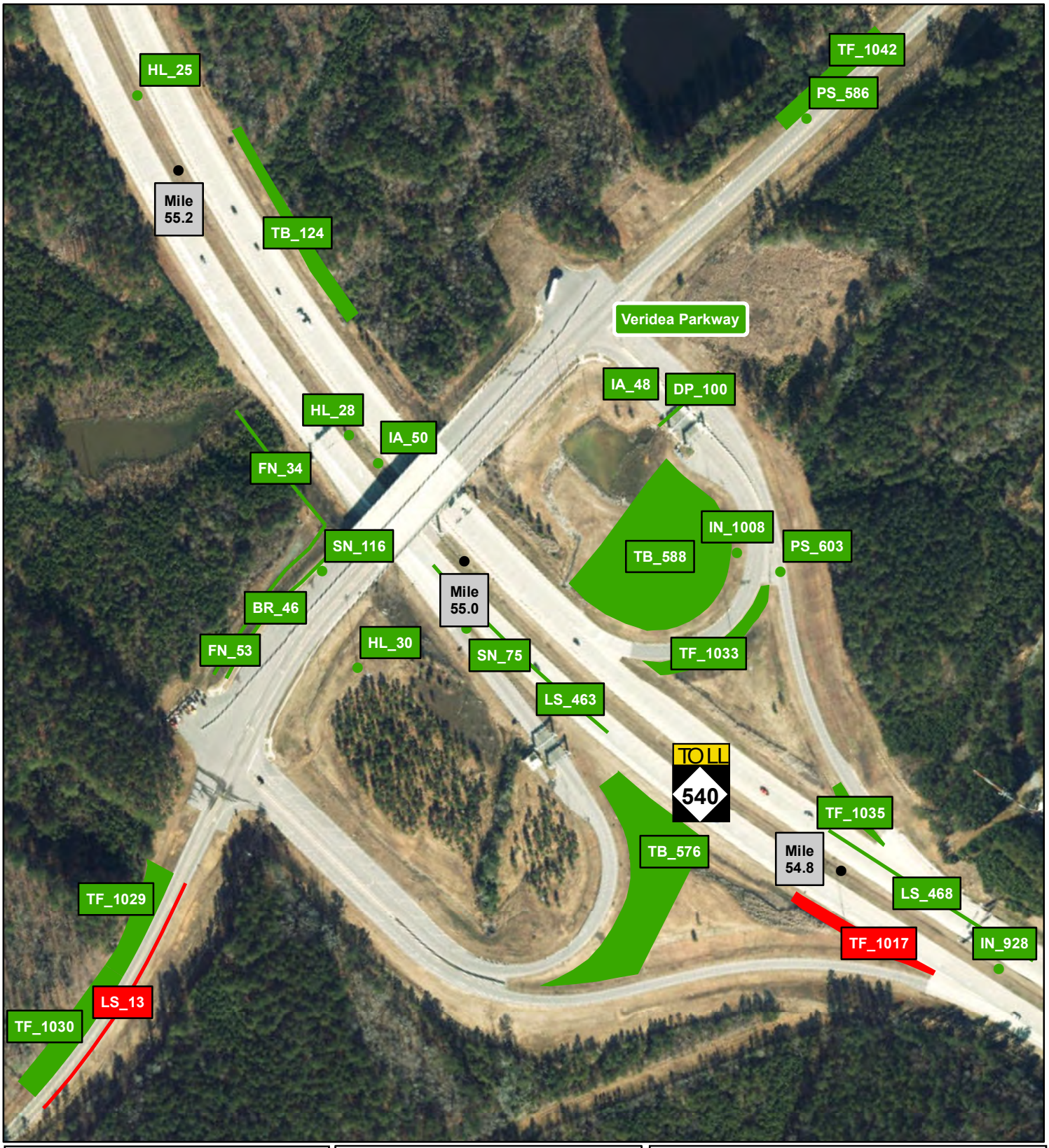

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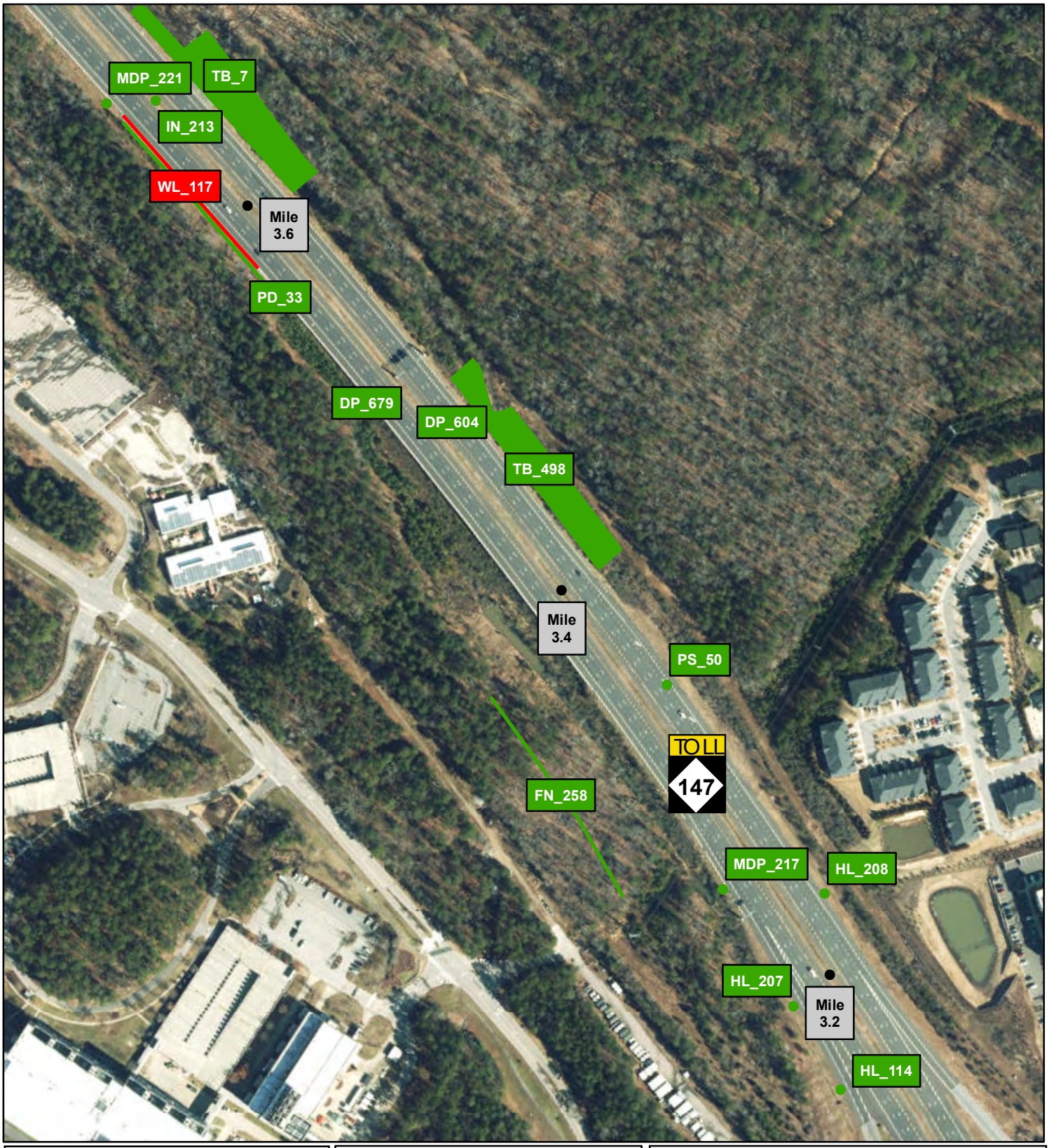

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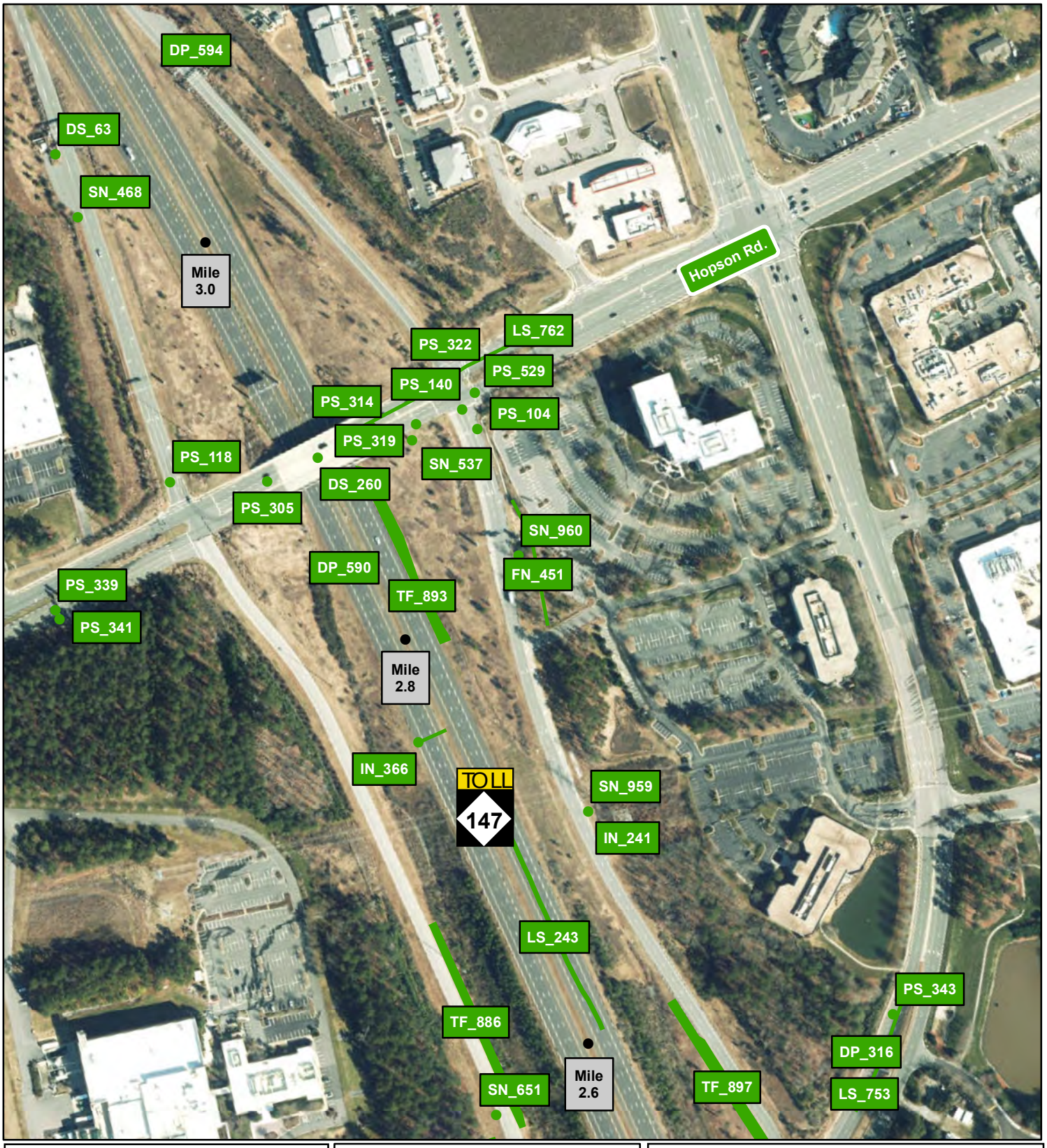

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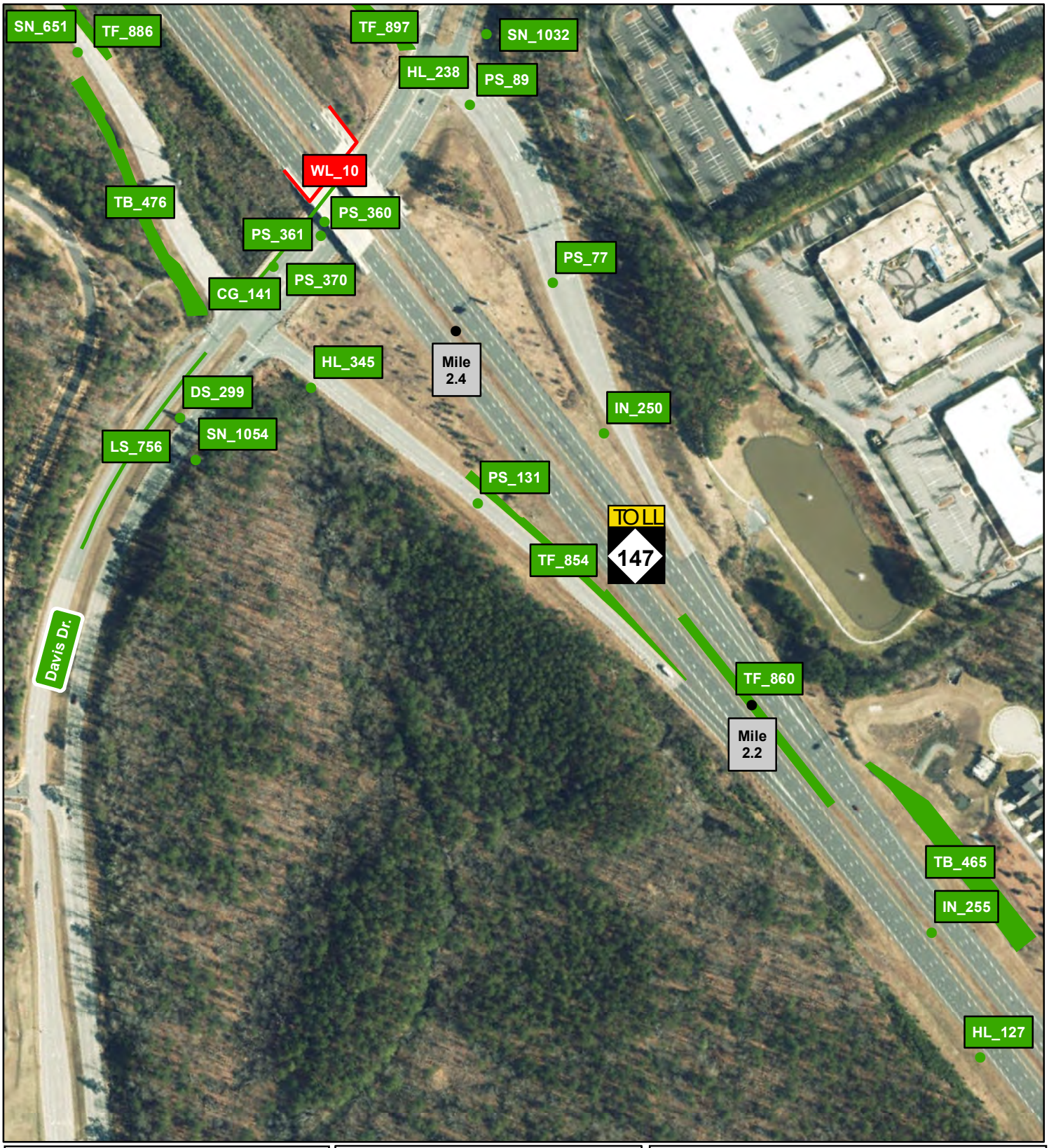

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Appendix A: Triangle Expressway 2022 First Quarter Asset Assessment Locations

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Appendix B

Triangle Expressway 2022 First Quarter Table Results of Assets Failing MRP

Appendix B: Triangle Expressway 2022 First Quarter Table Results of Assets Failing MRP

Provided below are a series of tables outlining the existing failures that occurred throughout the facility. Assets are defined by an Inventory ID, which is a unique identifier given to each individual asset. The components that make up the Inventory ID are an asset specific prefix along with a number, such as LS_1. The Inventory ID and GIS Reference Page number correspond to the provided map packets and allow for quick location of particular asset failures. Photos of failures were provided when applicable.

All assets and their respective prefixes are listed below:

Guardrail, Concrete Barrier and End Anchors (BR) 1
Curb and Gutter (CG) 2
Decorative Supports (DS) 3
Drainage Pipes (DP) 4
Misc. Drainage Structure (MDP) 5
Fence and Control of Access (FN) 6
Graffiti (GR) 7
Highway Lighting (HL) 8
Impact Attenuators (IA) 9
Inlets (IN) 10
Landscaping (PB) 11
Paved Lanes – Asphalt (LS) 12
Paved Lanes – Concrete (LS) 12
Paved Shoulders (LS) 12
Unpaved Shoulders (LS) 13
Front/Back Slopes (LS) 13
Unpaved Lateral and Outfall Ditches (LS) 13
Litter (LS) 14
Roadway Sweeping (LS) 14
Pavement Striping (LS) 15
Pavement Markers (LS) 16
Delineators (LS) 17
Paved Ditches (PD) 19
Pavement Words and Symbols (PS) 20
Signs (SN) 21
Tree and Brush (TB) 22
Turf Condition (TF) 23
MSE/Retaining Walls, Sound Barrier Walls, and Screen Walls (WL) 24

Guardrail, Concrete Barrier and End Anchors (BR)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Guardrail	BR_2	Functional Damage		A28
2	Guardrail	BR_223	Functional Damage		A31
3	Guardrail	BR_405	Functional Damage		A18
4	Guardrail	BR_512	Functional Damage		A18

Curb and Gutter (CG)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Shoulder Berm Gutter	CG_55	Separation		A10
2	Shoulder Berm Gutter	CG_68	Separation		A13

Decorative Supports (DS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page

This asset did not produce any failures.

Drainage Pipes (DP)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Drain	DP_290	End Protection		A7
2	Drain	DP_452	Obstruction		A3
3	Drain	DP_658	Obstruction		A31
4	Drain	DP_1045	Obstruction		A18

Misc. Drainage Structure (MDP)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Shoulder Drain	MDP_106	Obstruction		A20
2	Shoulder Drain	MDP_156	Obstruction		A28
3	Shoulder Drain	MDP_165	Obstruction		A30

Fence and Control of Access (FN)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Woven	FN_193	Fence Hole		A12
2	Woven	FN_310	Hole Height		A1
3	Woven	FN_494	Fence Hole		A27

Graffiti (GR)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Mile Marker Sign	GR_1	Graffiti		A6

Highway Lighting (HL)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Single Roadway	HL_217	Rodent Screen		A3

Impact Attenuators (IA)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page

This asset did not produce any failures.

Inlets (IN)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Inlet	IN_470	Eroded Area & Surface Damage		A4

Landscaping (PB)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page

This asset did not produce any failures.

Paved Lanes – Asphalt (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page

This asset did not produce any failures.

Paved Lanes – Concrete (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Concrete	LS_590	Joint Malfunction		A5
2	Concrete	LS_605	Joint Malfunction		A10

Paved Shoulders (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page

This asset did not produce any failures.

Unpaved Shoulders (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Aaphalt	LS_13	Drop Off		A29

Front/Back Slopes (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page

This asset did not produce any failures.

Unpaved Lateral and Outfall Ditches (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page

This asset did not produce any failures.

Litter (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Asphalt	LS_720	Litter – 3CF		A7

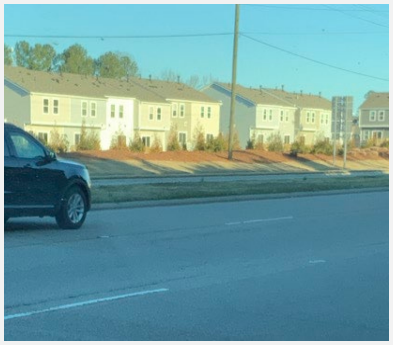
Roadway Sweeping (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Asphalt	LS_537	Material Accumulation		A26

Pavement Striping (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Asphalt	LS_738	Line Missing, Nighttime Visibility		A1

Pavement Markers (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Asphalt	LS_720	Marker Missing, Nighttime Visibility		A7
2	Asphalt	LS_722	Marker Missing, Nighttime Visibility		A7
3	Asphalt	LS_738	Marker Missing		A1

Delineators (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Concrete	LS_58	Missing		A7
2	Asphalt	LS_212	Nighttime Reflectivity	Not Available for Nighttime Failure	A32
3	Asphalt	LS_267	Missing, Nighttime Reflectivity		A31
4	Asphalt	LS_537	Missing, Nighttime Reflectivity		A26
5	Asphalt	LS_539	Missing, Nighttime Reflectivity		A26

Delineators (LS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
6	Concrete	LS_605	Missing, Nighttime Reflectivity		A10

Paved Ditches (PD)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page

This asset did not produce any failures.

Pavement Words and Symbols (PS)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Right Turn	PS_417	Daytime Assessment & Nighttime Reflectivity		A1

Signs (SN)

#	Sign Type	Object ID	Failure Type	Photo	GIS Reference Page
1	NC Route	SN_587	Leaning		A1
2	Chevron	SN_1049	Leaning		A31
3	One Way	SN_1114	Support, Leaning		A1

Tree and Brush (TB)

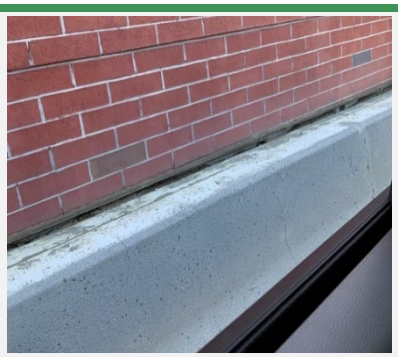
#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page

This asset did not produce any failures.

Turf Condition (TF)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Turf	TF_410	Bare Ground		A23
2	Turf	TF_956	Bare Ground		A31
3	Turf	TF_1017	Bare Ground		A29

MSE/Retaining Walls, Sound Barrier Walls, and Screen Walls (WL)

#	Material Type	Object ID	Failure Type	Photo	GIS Reference Page
1	Bridge Wall	WL_10	Unsealed Cracks/Joints		A35
2	Sound Wall	WL_46	Unsealed Cracks/Joints		A20
3	Sound Wall	WL_48	Spalling		A21
4	Sound Wall	WL_117	Unsealed Cracks/Joints		A33