CR 48 SAFETY STUDY

Sumter County, Florida

Prepared for:

THE FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT 5 TRAFFIC OPERATIONS
719 South Woodland Boulevard
DeLand, Florida 32720

Districtwide Contract for Traffic Operations
Financial Project ID: 237995-1-32-14
Contract No.: C-9086

Task Work Order: 45

Prepared by:

England-Thims & Miller, Inc.
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March 2022

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Executive Summary

At the request of the Florida Department of Transportation (FDOT), England-Thims & Miller, Inc. (ETM) conducted a safety study along almost seven miles of CR 48 from SR 471 (in Sumter County) to the Lake County/Sumter County line. The purpose of the study was to identify any improvements that address existing crash patterns and to potentially reduce the frequency and severity of future crashes.

Between January 1, 2013 and December 31, 2020, there were 49 collisions reported within the study limits. These crashes resulted in two fatalities (in two fatal crashes), 33 injuries (in 21 injury crashes), and $412,850 in estimated property damage. The predominant crash types include 12 (24%) off-road/ rollover and ten (20%) rear-end collisions.

ETM personnel completed field observations during the AM and PM peak periods as well as the off-peak hours to identify existing operational deficiencies and potential safety issues.

After reviewing the study corridor, short-term and long-term conceptual plans were developed.

Short-Term Improvements – The following low-cost, short-term improvements are recommended:

- Install intersection warning signs on both approaches of CR 48 approaching CR 567.

The estimated cost for these short-term improvements is $1,109.

Long-Term Improvements – The following long-term improvement are also recommended:

- Widen the travel lanes from 10' to 12' (east of Center Hill).
- Construct 4' paved shoulders with Safety Edge along CR 48 (where shoulders do not currently exist). Safety Edge is a FHWA Proven Safety Countermeasure.
- Add profiled thermoplastic to the edge line in the 55-mph section (from 1.4 miles west of CR 469 to 1,000 feet east of SR 471); because this segment is slightly more populated, a lower decibel audible pavement treatment is recommended. Add ground-in rumble strips on the edge line in the 55-mph section (from 0.5 miles east of CR 469 to the Lake County/Sumter County line). When the roadway is resurfaced, centerline audible pavement treatments should also be considered for both segments.
- Reconstruct the CR 558 intersection to reduce the existing intersection skew.

The proposed improvements were divided into two phases: Phase A (west of the City of Center Hill) and Phase B (east of the City of Center Hill). A benefit-to-cost analysis was calculated for the proposed long-term improvements and was based on criteria outlined in the Highway Safety Improvement Program Manual.

The estimated cost of the Phase A improvements is $4,719,632 (which reflects an annual cost of $280,542). The resulting annual benefit is expected to be $1,522,346. **The calculated benefit/cost ratio is 5.4 and the Net Present Value is $13,672,973.**

The estimated cost of the Phase B improvements is $7,736,703 (which reflects an annual cost of $451,987). The resulting annual benefit is expected to be $994,484. **The calculated benefit/cost ratio is 2.2 and the Net Present Value is $4,278,404.**

Introduction

England-Thims & Miller, Inc. (ETM) performed a safety study along CR 48 (in Sumter County) from SR 471 to the Lake County/Sumter County line. The purpose of the study was to identify improvements that could reduce the frequency and/or severity of crashes in this area.

The analysis methods used in completing this study are consistent with the Federal Highway Administration's **Manual on Uniform Traffic Control Devices** (MUTCD 2009), the American Association of State Highway and Transportation Officials' (AASHTO) **Highway Safety Manual** (HSM 2010), FDOT's **Traffic Engineering Manual** (TEM 2021), FDOT's **Manual of Uniform Traffic Studies** (MUTS 2016), and FDOT's **Design Manual** (2021). This report contains existing conditions, collision analyses, qualitative assessments, recommended improvements, cost estimates and final recommendations.

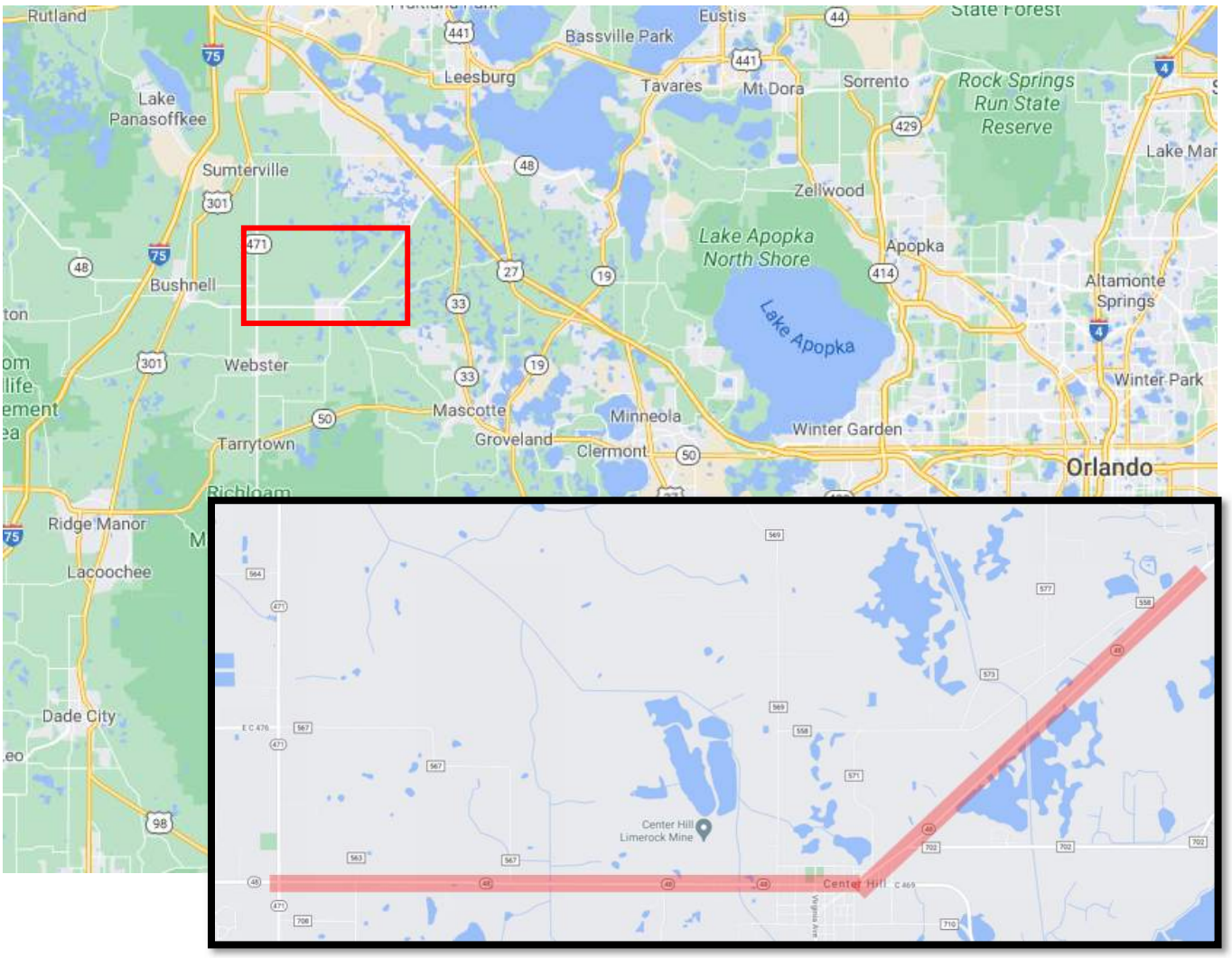

Figure 1 – Project Location/Vicinity Map

Existing Conditions

Table 1 (next page) summarizes the existing conditions for the study corridor. The condition diagrams are provided in **Appendix A**.

Table 1: Existing Conditions

Feature	Description
Roadway	CR 48
Area Location	Sumter County, Florida
Project Length	6.8 miles
Surrounding Development	The corridor area is predominantly rural
CR 48	• Cross Section – two-lane, undivided rural typical section • Posted Speed Limit – varies between 35 mph to 55 mph • AADT – 5,700 vpd from SR 471 to Market St, 2,800 vpd from Market St to north of CR 558, with a daily T-factor of 22.0% • Sidewalks 600' on the north side of CR 48 from Magnolia Avenue to Palm Avenue • Street lighting does not exist • Lane width – varies 10' - 12' • Paved shoulder width – varies 0' – 6' • Overhead utilities – on the north side of CR 48 east of SR 471 and on the west side of CR 48 from Kings Highway to the Lake County/Sumter County line
CR 469/Market Street/ Palm Avenue/Washington Avenue at CR 48	• Intersection – six legs, no turn turn bays • Posted Speed Limit – 35 mph on CR 48; 25 mph on Palm Avenue; 35 mph on CR 469; no posted speed limit signs on Washington Avenue • Traffic Control – Side-street STOP-controlled (Palm Avenue, Market Street, Washington Avenue approaches, and CR 48 southwest approach); No STOP signs for eastbound CR 48 approach nor for westbound CR 469 approach

Traffic Conditions

Sumter County collected traffic data at two locations along CR 48. Additionally, there are two FDOT Traffic Count Stations on CR 48. Historical traffic data and traffic characteristics are shown in Table 2.

Table 2: Historical Local Traffic Data and Characteristics

Characteristics	Sumter County 300' West of Old RR Tracks (1/26/2021)	Sumter County East of SE 26th Drive (1/26/2021)	FDOT Count Station 187001 0.095 miles west of CR 747	FDOT Count Station 188002 950 feet north of CR 702
2014 AADT			5,200	1,550
2015 AADT			5,400	1,650
2016 AADT			5,800	2,800
2017 AADT			5,000	3,300
2018 AADT			5,000	3,300
2019 AADT			5,000	3,600
2020 AADT			5,700	2,800
2021 AADT	6,009	5,748		
2020 K-Factor			9.50	9.50
2020 D-Factor			54.70	54.70
2020 T-Factor			9.50	20.20

Collision Analysis

Within the study area, crash data was obtained from the University of Florida's *Signal Four Analytics* for the period between January 1, 2013 and December 31, 2020. During this time, a total of 49 crashes were reported within the study corridor.

An annual summary of the crash types (Table 3), crash severities (Table 4), and lighting/roadway conditions (Table 5) are shown below:

Table 3: Crash Types by Year

Year / Type	2013	2014	2015	2016	2017	2018	2019	2020	SUM
Angle	0	1	0	1	0	0	0	0	2
Animal	1	1	0	1	0	1	1	1	6
Bicycle	0	1	0	0	0	0	0	0	1
Head On	0	0	0	0	0	1	0	1	2
Left Turn	0	0	0	0	0	0	0	1	1
Off Road	1	1	1	0	0	1	2	3	9
Other	1	2	2	2	1	1	1	3	13
Rear End	1	2	0	1	0	3	0	3	10
Rollover	0	0	2	1	0	0	0	0	3
Sideswipe	0	0	0	0	0	0	0	1	1
Unknown	0	1	0	0	0	0	0	0	1
TOTAL	4	9	5	6	1	7	4	13	**49**

Table 4: Crash Severity by Year

Year / Type	2013	2014	2015	2016	2017	2018	2019	2020	SUM
Fatal	0	0	0	0	0	0	0	2	2
Incapacitating	1	0	0	1	0	1	0	1	4
Non-Incapacitating	0	2	0	0	0	1	1	3	7
Possible	0	3	1	2	0	3	0	1	10
Property Damange Only	3	4	4	3	1	2	3	6	26
TOTAL	4	9	5	6	1	7	4	13	**49**

Table 5: Lighting and Roadway Condition by Year

Year / Type	2013	2014	2015	2016	2017	2018	2019	2020	SUM
Lighting Condition									**49**
Daylight	2	6	3	5	0	4	2	7	**29**
Dark - Not Lighted	1	2	2	1	0	3	1	4	**14**
Dusk/Dawn	1	0	0	0	0	0	0	2	**3**
Unknown	0	1	0	0	0	0	0	0	**1**
Roadway Condition									**49**
Dry Pavement	3	7	4	6	1	7	3	10	**41**
Wet Pavement	1	1	0	0	0	0	1	3	**6**
Unknown	0	1	1	0	0	0	0	0	**2**

Additional collision information:

- There were two (4%) fatalities (in two fatal crashes) and 21 crashes (43%) resulted in 33 injuries
- There were six (12%) wet-pavement crashes and 17 (35%) night-time crashes (which included dawn and dusk collisions)
- The total property damage amount for all 49 crashes was estimated to be $412,850

Detailed crash summaries for each intersection and the associated collision diagrams are located in **Appendix B** and **Appendix C**, respectively. The two fatal crashes are summarized below:

Wednesday, October 14, 2020 at 1:20 PM: A westbound vehicle on CR 48 (approximately 0.3 miles west of SE 41st Terrace) crossed over the center line and into the eastbound lane. The front left of the westbound vehicle collided with the front left of the eastbound vehicle. The driver of the eastbound vehicle received fatal injuries from the collision. The collision occurred on dry pavement (Crash Report No. 88390447).

Monday, October 26, 2020 at 6:55 AM: A southbound vehicle on CR 48 (approximately 0.50 miles south of CR 558) crossed over the center line and struck a northbound vehicle. The front left of the westbound vehicle collided with the front left of the eastbound vehicle. The driver of the southbound vehicle received fatal injuries from the collision. The collision occurred on dry pavement around dawn (Crash Report No. 88391848).

Qualitative Assessment

General Observations

- CR 48 had visible shoulder patching throughout study limits.
- The existing signs appear to be in good condition.
- The existing pavement markings (i.e., centerline stripes) appear to be in good condition.
- There is no street lighting within the corridor.
- Numerous box culverts were identified adjacent to the roadway within the clear zone without appropriate protection.

- Two typical sections are present throughout the study corridor. Through the middle of the City of Center Hill, the roadway has curb and gutter with 6' paved shoulders. To the east and west of this section, no paved shoulders exist (as shown in the photos below).

- The skew of the CR 558 approach to CR 48 is so acute that motorists have made their own intersection to the south of the paved intersection.

Intersection Analysis

The intersection of CR 48/Market Street/CR 469/Palm Avenue/Washington Avenue is shown below.

Between January 1, 2013 and December 31, 2020, there were three collisions reported within this intersection: one southbound rear-end on CR 42, one angle from Market Street/Washington Avenue, and one off-road collision on CR 42. During field visits, no operational issues were identified. Based on this, no improvements are recommended at this intersection.

The intersection of CR 567 and CR 48 was also reviewed. As shown in the collision diagram, three intersection crashes occurred at this location (one in 2014, one in 2017, one in 2020). For this reason, intersection warning signs are recommended. No turning movement counts were collected at this intersection; however, based on the crash types/frequency at this intersection, it does not appear turn lanes are needed at this time.

Corridor-Wide Improvements

Within the rural sections, the existing shoulders are unpaved and drop-offs have been created by settling, erosion and tire wear. Exposed vertical pavement edges can cause vehicles to be unstable and prevent their safe return to the roadway. Sumter County reported the approximate pavement condition index scores east of the City of Center Hill between 65-70 and west of Center Hill as 75-80. The Pavement Condition Index scale rates roadways from 1-100, with 100 being newly constructed or resurfaced roads in perfect condition and 1 being roads with extensive loss of surface integrity. There are no adopted/ approved plans by the Board of County Commissioners (BOCC) to resurface this roadway.

To reduce future collisions, it is recommended that 4’ paved shoulders and safety edge treatments be constructed. It is recommended that east of Center Hill, CR 48 be widened to provide 12’-wide travel lanes.

East of Center Hill, most of the roadway consists of 20’-wide pavement and slopes at 1:4. West of Center Hill, the slopes are much gentler and will require less distance to tie the proposed shoulders into the natural ground. The right-of-way was reviewed using GIS parcel lines. The sod distances used were based on worst-case scenarios (1:4 slope for 30’ or more) and although they approach the right-of-way limits in some areas, the need to acquire additional right-of-way is not expected.

The proposed improvements for CR 48 were divided into two phases: Phase A (west of the City of Center Hill) and Phase B (east of the City of Center Hill), at the request of Sumter County.

Seven culvert crossings with headwalls were identified within Phase B. All of these headwalls were within the clear zone and motorist protection for these potential hazards does not currently exist. However, none of the crash reports noted a collision with any drainage structure. Due to the financial cost associated with relocating the headwalls and the lack of collision history, only four culverts were recommended to be extended to allow for these headwalls to be relocated outside of the clear zone. Tto maintain an acceptable benefit-to-cost (B/C) ratio and Net Present Value (NPV), additional headwalls were not selected. Protecting the remaining headwalls (currently within the clear zone) with guardrail was recommended.

Recommended Improvements

Based on the data collected, field observations, crash history within the corridor and engineering judgment, the following improvements are recommended and discussed below. The proposed improvements are expected to improve safety for motorists and non-motorists within the study area.

Short-Term Improvements – The following low-cost, short-term improvements are recommended:

- Install intersection warning signs on both approaches of CR 48 approaching CR 567.

The estimated cost for these short-term improvements is $1,109.

Long-Term Improvements – The following long-term improvement are also recommended:

- Widen the travel lanes from 10' to 12' (east of Center Hill).
- Construct 4' paved shoulders with Safety Edge along CR 48 (where shoulders do not currently exist). Safety Edge is a FHWA Proven Safety Countermeasure.
- Add profiled thermoplastic to the edge line in the 55-mph section (from 1.4 miles west of CR 469 to 1,000 feet east of SR 471); because this segment is slightly more populated, a lower decibel audible pavement treatment is recommended. Add ground-in rumble strips on the edge line in the 55-mph section (from 0.5 miles east of CR 469 to the Lake County/Sumter County line). When the roadway is resurfaced, centerline audible pavement treatments should also be considered for both segments.
- Reconstruct the CR 558 intersection to reduce the existing intersection skew.

As mentioned previously, these improvements were divided into two phases. The estimated cost of the Phase A long-term improvements is $4,719,632. The estimated cost of the Phase B long-term improvements is $7,736,703.

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Benefit-To-Cost Analysis

Proposed Short-Term and Long-Term Concept Diagrams are included in **Appendix D** and **Appendix F**, respectively. Cost estimates were based on FDOT's Historical Costs from 05/01/20 to 04/30/21 (Area 7 cost data was used). The appropriate pay items and estimated quantities were used to generate an opinion of probable costs. The cost estimates are located in **Appendix G**.

Part C of the Highway Safety Manual (HSM) provides a predictive method for estimating average crash frequency of a network, facility, or location. The predictive method is applied to a given time period, traffic volume, and constant geometric design characteristics of the roadway. The study limits were divided into segment and the intersection of CR 48/CR 469/Market Street/Palm Avenue/Washington Avenue. Table 6 (next page) shows the results of the predictive method for the segments and intersections. **Appendix H** includes additional details and results.

Table 6: Predictive Method Results

Worksheet 3A -- Predicted and Observed Crashes by Severity and Site Type Using the Site-Specific EB Method

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Site type	**Predicted average crash frequency (crashes/year)**			**Observed crashes, $N_{observed}$** (crashes/year)	**Overdispersion Parameter, k**	**Weighted adjustment, w**	**Expected average crash frequency,**
	$N_{predicted}$ (TOTAL)	$N_{predicted}$ (FI)	$N_{predicted}$ (PDO)			Equation A-5 from Part C Appendix	Equation A-4 from Part C Appendix
ROADWAY SEGMENTS							
Segment_1	7.556	2.425	5.130	3.125	0.076	0.636	5.944
Segment_2	1.797	0.577	1.220	0.375	0.373	0.599	1.226
Segment_3	4.387	1.408	2.979	2.375	0.076	0.750	3.883
Segment Totals:	13.739	4.410	9.329	5.875			11.054
INTERSECTIONS							
Intersection_1	5.286	2.278	3.008	0.125	0.240	0.441	2.400
Intersection Totals:	5.286	2.278	3.008	0.125			2.400
COMBINED (sum of column)	19.026	6.689	12.337	6.000	--	--	13.454

Worksheet 3B -- Site-Specific EB Method Summary Results

(1)	(2)	(3)
Crash severity level	$N_{predicted}$	$N_{expected}$
Total	$(2)_{COMB}$ from Worksheet 3A	$(8)_{COMB}$ from Worksheet 3A
	19.026	13.454
Fatal and Injury (FI)	$(3)_{COMB}$ from Worksheet 3A	$(3)_{TOTAL} * (2)_{FI} / (2)_{TOTAL}$
	6.689	4.730
Property Damage Only (PDO)	$(4)_{COMB}$ from Worksheet 3A	$(3)_{TOTAL} * (2)_{PDO} / (2)_{TOTAL}$
	12.337	8.724

A benefit/cost analysis was completed for the proposed long-term improvements and was based on criteria outlined in the Highway Safety Improvement Program Manual. Based on the Federal Highway Administration's (FHWA's) Crash Modification Factors Clearinghouse, one crash modification factor (CMF) was identified. Details of the selected Crash Reduction Factors used can be found in Table 7 below.

Table 7: Crash Reduction Factor Information

CMF ID	Description	Crash Type	Crash Severity	CMF Value	CRF (%)	Quality Rating
9198	Install safety edge treatment	All	All	0.511	48.9	5 Stars

CMF 9198 was applied to the segment's expected average crash frequencies.

A benefit-to-cost analysis was calculated for the proposed long-term improvements and was based on criteria outlined in the Highway Safety Improvement Program Manual.

The estimated cost of the Phase A improvements is $4,719,632 (which reflects an annual cost of $280,542). The resulting annual benefit is expected to be $1,522,346. **The calculated benefit/cost ratio is 5.4 and the Net Present Value is $13,672,973.**

The estimated cost of the Phase B improvements is $7,736,703 (which reflects an annual cost of $451,987). The resulting annual benefit is expected to be $994,484. **The calculated benefit/cost ratio is 2.2 and the Net Present Value is $4,278,404.**

The associated B/C analysis forms, NPV, and CMF information (for the long-term improvements) are located in **Appendix I**. The recommended improvements satisfy the minimum requirements of B/C > 2 and NPV > 0, and indicate the proposed improvements are justified and should be pursued as Highway Safety Improvement Program (HSIP) funding becomes available.

Project Documentation, Variations and Exceptions

A variation will be required for the shoulder width due to the offset of the guardrail from the edge of the roadway. There is not enough room between the travel lane and the existing box culvert headwalls to install the guardrail at the back of the full shoulder. This distance varies based on the location of the existing headwalls which were measured between 8’ to 14’ from the edge of the travel lane. The travel lanes are recommended to be widened from 10’ to 12’, which will result in the offset to the headwalls varying between 6’ to 12’ from the edge of travel lane. The FDOT Florida Greenbook requires 8’-wide shoulders. However, it should be noted that no crashes were reported that involved motorists colliding with the existing headwalls.

APPENDIX

Appendix A: Existing Condition Diagrams

Appendix B: Crash Summaries

Appendix C: Collision Diagrams

Appendix D: Short-Term Concept Diagrams

Appendix E: Typical Sections

Appendix F: Long-Term Concept Diagrams

Appendix G: Improvements Cost Estimates

Appendix H: HSM Predictive Method Results

Appendix I: B/C Analysis, Net Present Value, and Crash Modification Factors

Appendix A:

Existing Condition Diagrams

SR 471

CR-48 E

SPEED LIMIT 45

REDUCE SPEED AHEAD

YIELD

SPEED LIMIT 55

10 15 20 25 30

N

0 50 200

Feet

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COUNTY ROAD 48 STUDY

CONDITION DIAGRAM

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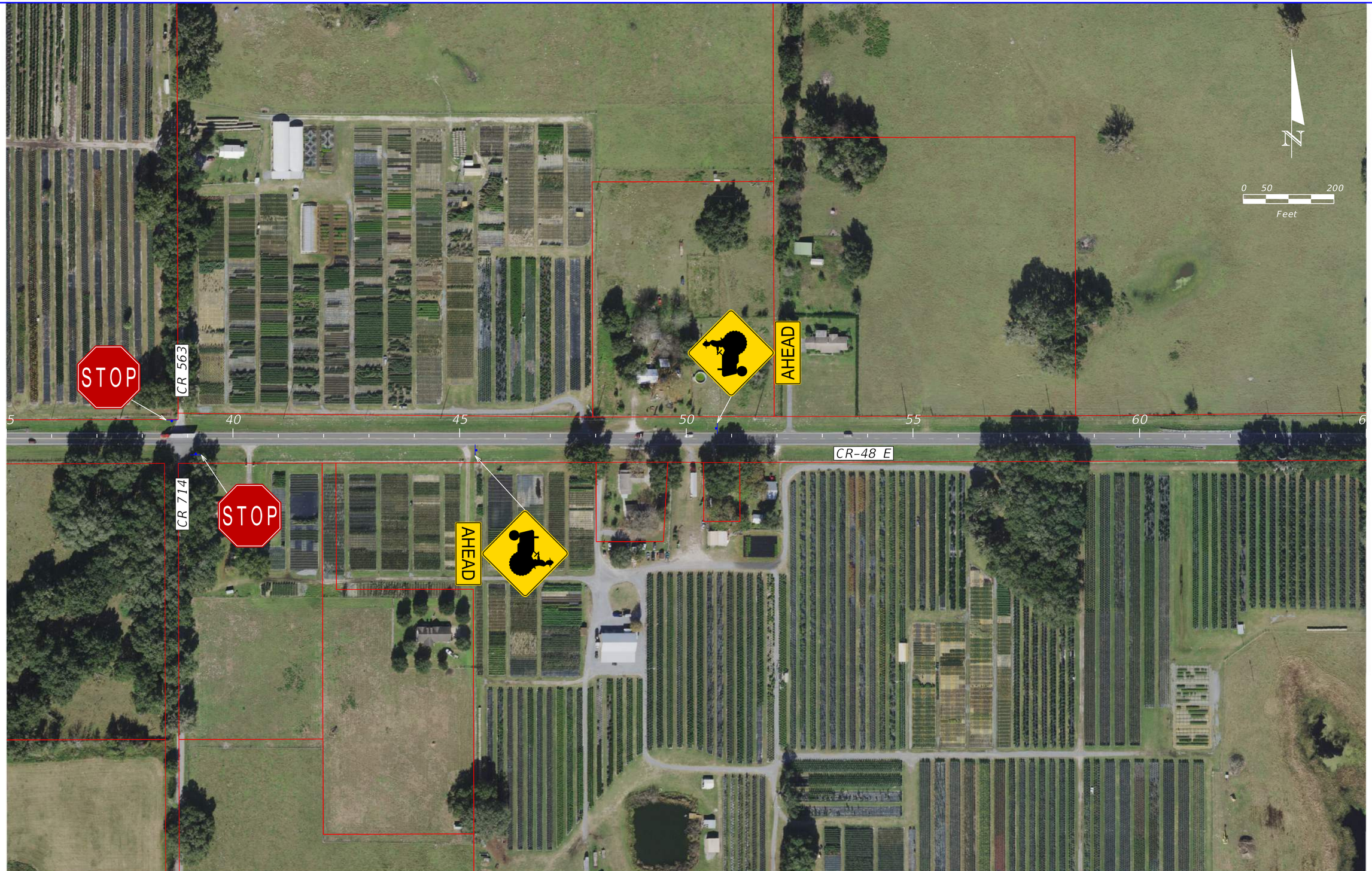
PLAN 1



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COUNTY ROAD 48 STUDY
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FAX: (904) 646-9485
Registry - 2584 LC - 0000316
ADRIANN C. LEBLANC P.E. License No. 87860

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

COUNTY ROAD 48 STUDY
CONDITION DIAGRAM

SHEET NO.
PLAN 10

England-Thims & Miller, Inc.
1525 International Pkwy, Ste 1011
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COUNTY ROAD 48 STUDY
CONDITION DIAGRAM

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COUNTY ROAD 48 STUDY
CONDITION DIAGRAM

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STATE OF FLORIDA
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COUNTY ROAD 48 STUDY

CONDITION DIAGRAM

SHEET NO. PLAN 13

Appendix B:

Crash Summaries

State of Florida Department of Transportation

COLLISION SUMMARY

General Information

Road: CR 48
Section:
County: Sumter
Study Period: 2/1/13 To: 12/31/20
Data by: ETM
Date: 3/11/2022

No.	Date	Day	Time	Severity		Property Damage	Crash Type	Day / Night	Wet / Dry	Contributing Cause
				Fatal	Injury					
1	2/4/2013	Mon	6:50 AM	0	0	$1,200	Off Road	Night	Dry	Careless Driving
2	4/22/2013	Mon	2:20 AM	0	0	$7,000	Animal	Night	Wet	Animal(s) in roadway
3	9/2/2013	Mon	5:30 PM	0	2	$10,000	Rear End	Day	Dry	Careless Driving
4	9/12/2013	Thu	9:40 AM	0	0	$2,000	Other	Day	Dry	Improper Backing
5	1/29/2014	Wed	7:50 AM	0	0	$7,000	Unknown			Failed to Yield ROW
6	3/15/2014	Sat	12:00 PM	0	1	$100	Bicycle	Day	Dry	Unknown
7	4/26/2014	Sat	2:17 PM	0	1	$11,000	Rear End	Day	Dry	Followed Too Closely
8	6/26/2014	Thu	6:00 AM	0	0	$50	Other	Day	Dry	Careless Driving
9	8/30/2014	Sat	2:30 AM	0	0	$8,500	Off Road	Night	Dry	Careless Driving
10	9/26/2014	Fri	7:50 PM	0	0	$5,000	Animal	Unknown	Wet	Animal(s) in roadway
11	10/18/2014	Sat	9:45 AM	0	2	$6,000	Angle	Day	Dry	Careless Driving
12	12/7/2014	Sun	1:15 PM	0	1	$4,500	Other	Day	Dry	Improper Turn
13	12/10/2014	Wed	10:40 AM	0	2	$12,000	Rear End	Day	Dry	Followed Too Closely
14	4/19/2015	Sun	8:22 AM	0	0	$5,200	Other	Day	Dry	Unknown
15	6/21/2015	Sun	4:45 PM	0	0	$5,500	Rollover	Day	Dry	DUI
16	8/10/2015	Mon	1:12 PM	0	0	$20,000	Rollover	Day	Dry	Careless Driving
17	8/26/2015	Wed	6:30 AM	0	0	$8,500	Other	Night	Unknown	Unknown
18	12/12/2015	Sat	3:28 AM	0	1	$12,500	Off Road	Night	Dry	Careless Driving
19	4/6/2016	Wed	3:08 PM	0	1	$15,000	Other	Day	Dry	Careless Driving
20	4/6/2016	Wed	4:15 PM	0	1	$8,000	Angle	Day	Dry	Failed to Yield ROW
21	4/19/2016	Tue	6:00 PM	0	0	$15,000	Other	Day	Dry	Unsecured Load
22	4/21/2016	Thu	12:25 AM	0	0	$10,000	Animal	Night	Dry	Animal(s) in roadway
23	6/28/2016	Tue	11:10 AM	0	0	$5,000	Rollover	Day	Dry	Failed to Yield ROW
24	7/20/2016	Wed	8:17 AM	0	2	$6,000	Rear End	Day	Dry	Followed Too Closely
TOTAL				**0**	**14**	**$185,050**				

Total No.	Fatal	Injury	PDO	Rear End	Head-on	Angle	Left Turn	Right Turn	Sideswipe	Off Road	Bicycle / Pedestrian	Other
24	0	10	14	4	0	2	0	0	0	3	1	14
PERCENT	0%	42%	58%	17%	0%	8%	0%	0%	0%	13%	4%	58%

Contrib. Cause	Day	Night	PAVEMENT CONDITIONS			Followed Too Closely	DUI	Careless Driving	Improper Lane Change	Failed to Yield ROW	Disregarded Control Devices	Other
			WET	DRY	Unknown							
TOTAL	16	6	2	20	2	3	1	8	0	3	0	9
PERCENT	67%	25%	8%	83%	8%	13%	4%	33%	0%	13%	0%	38%

Total Vehicles Entering/ADT:
Collision Rate: PER M.E.V.

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TRAFFIC ENGINEERING
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State of Florida Department of Transportation

COLLISION SUMMARY

General Information

Road:	CR 48	Study Period:	2/1/13 To: 12/31/20
Section:		Data by:	ETM
County:	Sumter	Date:	3/11/2022

No.	Date	Day	Time	Severity		Property Damage	Crash Type	Day / Night	Wet / Dry	Contributing Cause
				Fatal	Injury					
25	6/20/2017	Tue	7:15 AM	0	0	$2,100	Other	Night	Dry	Failed to Yield ROW
26	3/22/2018	Thu	7:57 AM	0	0	$2,000	Rear End	Day	Dry	Followed Too Closely
27	4/4/2018	Wed	3:06 PM	0	1	$10,000	Rear End	Day	Dry	Followed Too Closely
28	4/9/2018	Mon	1:50 PM	0	1	$10,000	Head On	Day	Dry	Failed to Drive in Single Lane
29	8/28/2018	Tue	10:17 AM	0	5	$57,000	Rear End	Day	Dry	Careless Driving
30	9/7/2018	Fri	2:03 AM	0	0	$2,000	Animal	Night	Dry	Animal(s) in roadway
31	10/31/2018	Wed	11:40 PM	0	1	$2,000	Off Road	Night	Dry	Careless Driving
32	11/1/2018	Thu	7:04 AM	0	1	$500	Other	Night	Dry	Improper Backing
33	3/31/2019	Sun	1:39 AM	0	0	$11,000	Off Road	Night	Dry	DUI
34	6/7/2019	Fri	3:43 PM	0	0	$1,500	Off Road	Day	Wet	Vehicle Malfunction
35	8/26/2019	Mon	6:38 AM	0	0	$2,100	Animal	Day	Dry	Animal(s) in roadway
36	11/6/2019	Wed	6:00 PM	0	1	$1,000	Other	Night	Dry	Obstruction in Roadway
37	1/22/2020	Wed	4:38 AM	0	1	$10,000	Other	Night	Dry	Careless Driving
38	3/3/2020	Tue	1:25 PM	0	1	$10,500	Other	Day	Dry	Obstruction in Roadway
39	3/29/2020	Sun	12:17 AM	0	0	$2,500	Off Road	Night	Dry	DUI
40	7/22/2020	Wed	10:50 PM	0	0	$600	Off Road	Night	Wet	Hit and Run
41	7/23/2020	Thu	4:05 PM	0	2	$15,000	Rear End	Day	Wet	Careless Driving
42	8/31/2020	Mon	7:18 AM	0	0	$11,000	Rear End	Night	Dry	Careless Driving
43	9/28/2020	Mon	4:36 AM	0	0	$2,000	Animal	Night	Dry	Animal(s) in roadway
44	9/28/2020	Mon	4:45 PM	0	0	$7,000	Off Road	Day	Wet	Too Fast for Conditions
45	10/14/2020	Wed	1:20 PM	1	1	$20,000	Head On	Day	Dry	Failed to Drive in Single Lane
46	10/26/2020	Mon	6:55 AM	1	1	$25,000	Sideswipe	Night	Dry	Failed to Drive in Single Lane
47	11/28/2020	Sat	10:47 AM	0	2	$1,000	Other	Day	Dry	Road Surface Condition (wet)
48	12/11/2020	Fri	8:00 AM	0	1	$20,000	Left Turn	Day	Dry	Disregarded Control Devices
49	12/29/2020	Tue	3:20 PM	0	0	$2,000	Rear End	Day	Dry	Unknown
TOTAL				**2**	**19**	**$225,800**				

Total No.	Fatal	Injury	PDO	Rear End	Head-on	Angle	Left Turn	Right Turn	Sideswipe	Off Road	Bicycle / Pedestrian	Other
24	2	13	9	5	2	0	1	0	1	6	0	9
PERCENT	8%	54%	38%	21%	8%	0%	4%	0%	4%	25%	0%	38%

Contrib. Cause	Day	Night	PAVEMENT CONDITIONS			Followed Too Closely	DUI	Careless Driving	Improper Lane Change	Failed to Yield ROW	Disregarded Control Devices	Other
			WET	DRY	Unknown							
TOTAL	12	12	4	20	0	2	2	5	0	1	1	13
PERCENT	50%	50%	17%	83%	0%	8%	8%	21%	0%	4%	4%	54%

Total Vehicles Entering/ADT:

Collision Rate: PER M.E.V.

State of Florida Department of Transportation

COLLISION SUMMARY

General Information

Road:	CR 48	Study Period:	2/1/13	To:	12/31/20
Section:		Data by:	ETM		
County:	Sumter	Date:	3/11/2022		

No.	Date	Day	Time	Severity		Property Damage	Crash Type	Day / Night	Wet / Dry	Contributing Cause
				Fatal	Injury					
TOTAL				**2**	**33**	**$412,850**				

Total No.	Fatal	Injury	PDO	Rear End	Head-on	Angle	Left Turn	Right Turn	Sideswipe	Off Road	Bicycle / Pedestrian	Other
49	2	21	26	10	2	2	1	0	1	9	1	23
PERCENT	4%	43%	53%	20%	4%	4%	2%	0%	2%	18%	2%	47%

Contrib. Cause	Day	Night	PAVEMENT CONDITIONS			Followed Too Closely	DUI	Careless Driving	Improper Lane Change	Failed to Yield ROW	Disregarded Control Devices	Other
			WET	DRY	Unknown							
TOTAL	29	18	6	41	2	5	3	13	0	4	1	23
PERCENT	59%	37%	12%	84%	4%	10%	6%	27%	0%	8%	2%	47%

Total Vehicles Entering/ADT:

Collision Rate: PER M.E.V.

Form 750-020-06
TRAFFIC ENGINEERING
10/15

Appendix C:

Collision Diagrams

CRASH NUMBER
INJURY SEVERITY
1 = NO INJURY
2 = POSSIBLE INJURY
3 = NON-INCAPACITATING
4 = INCAPACITATING
5 = FATALITY
YEAR

LEGEND
WET
FATALITY
VEHICLE DIRECTION
OUT OF CONTROL
TURNING VEHICLE
BICYCLE
PEDESTRIAN
SIDESWIPE

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

COUNTY ROAD 48 STUDY
COLLISION DIAGRAM

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PLAN 1

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COUNTY ROAD 48 STUDY
COLLISION DIAGRAM

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PLAN 2

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COUNTY ROAD 48 STUDY

COLLISION DIAGRAM

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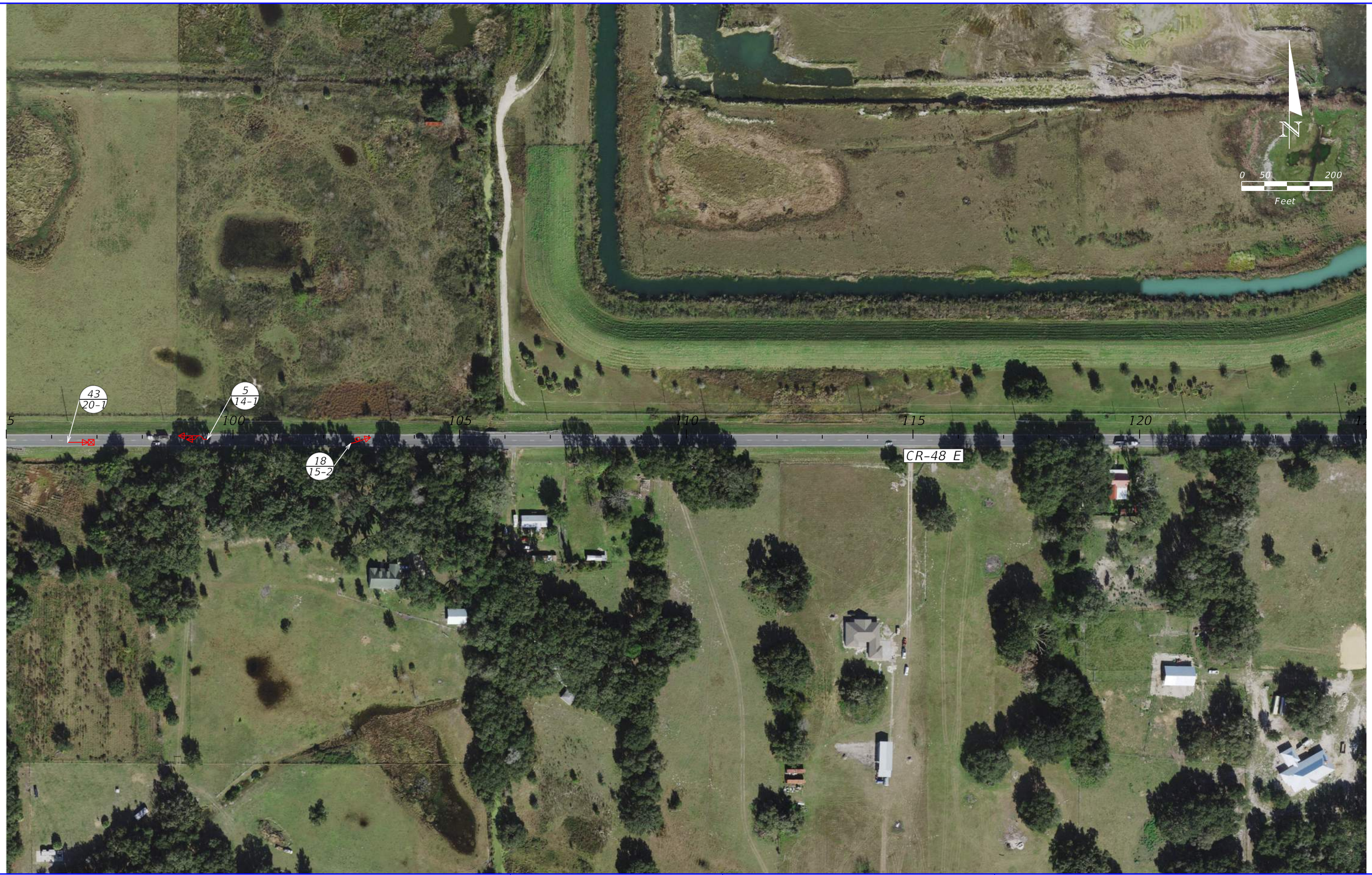

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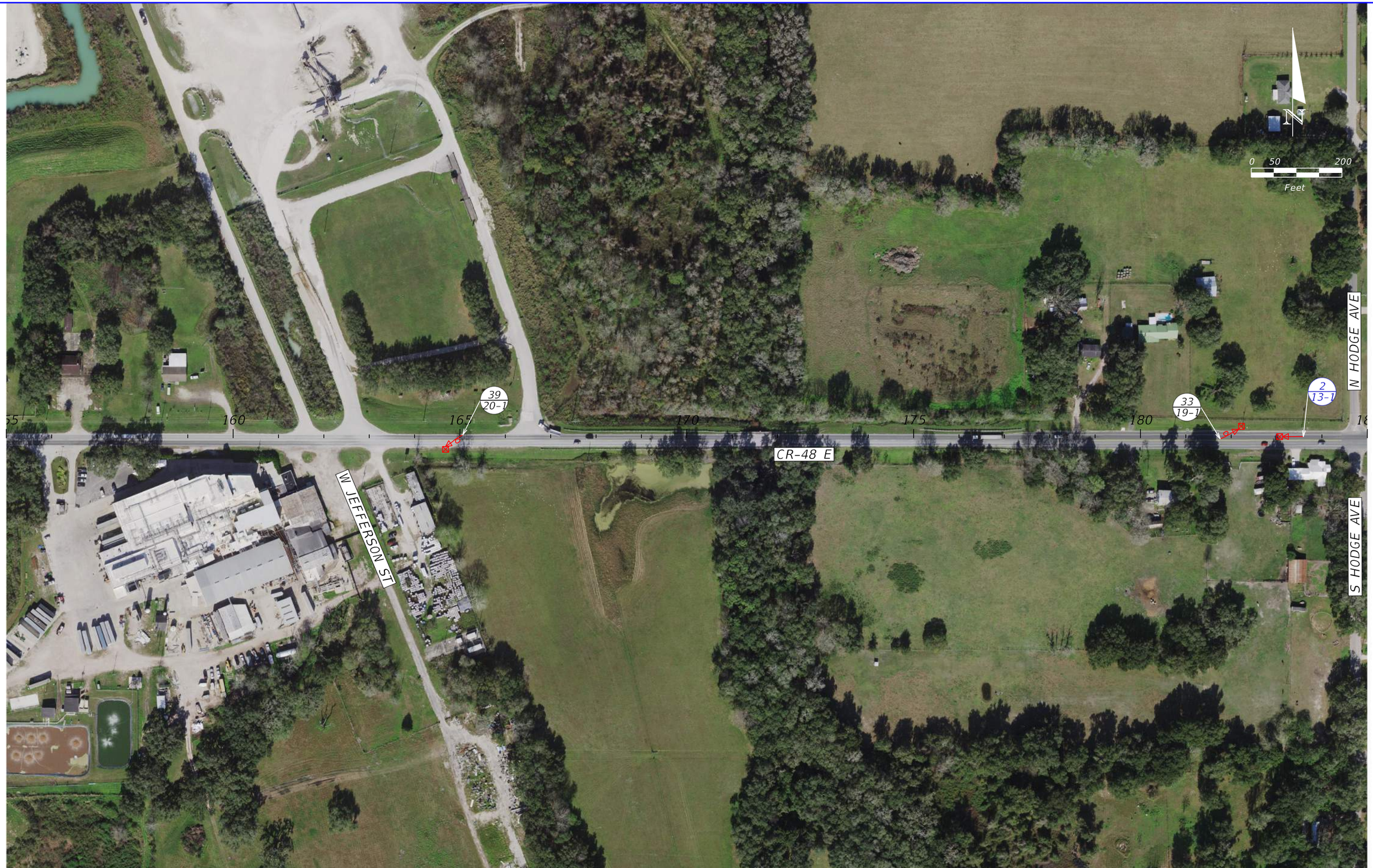

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COUNTY ROAD 48 STUDY
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COUNTY ROAD 48 STUDY
COLLISION DIAGRAM

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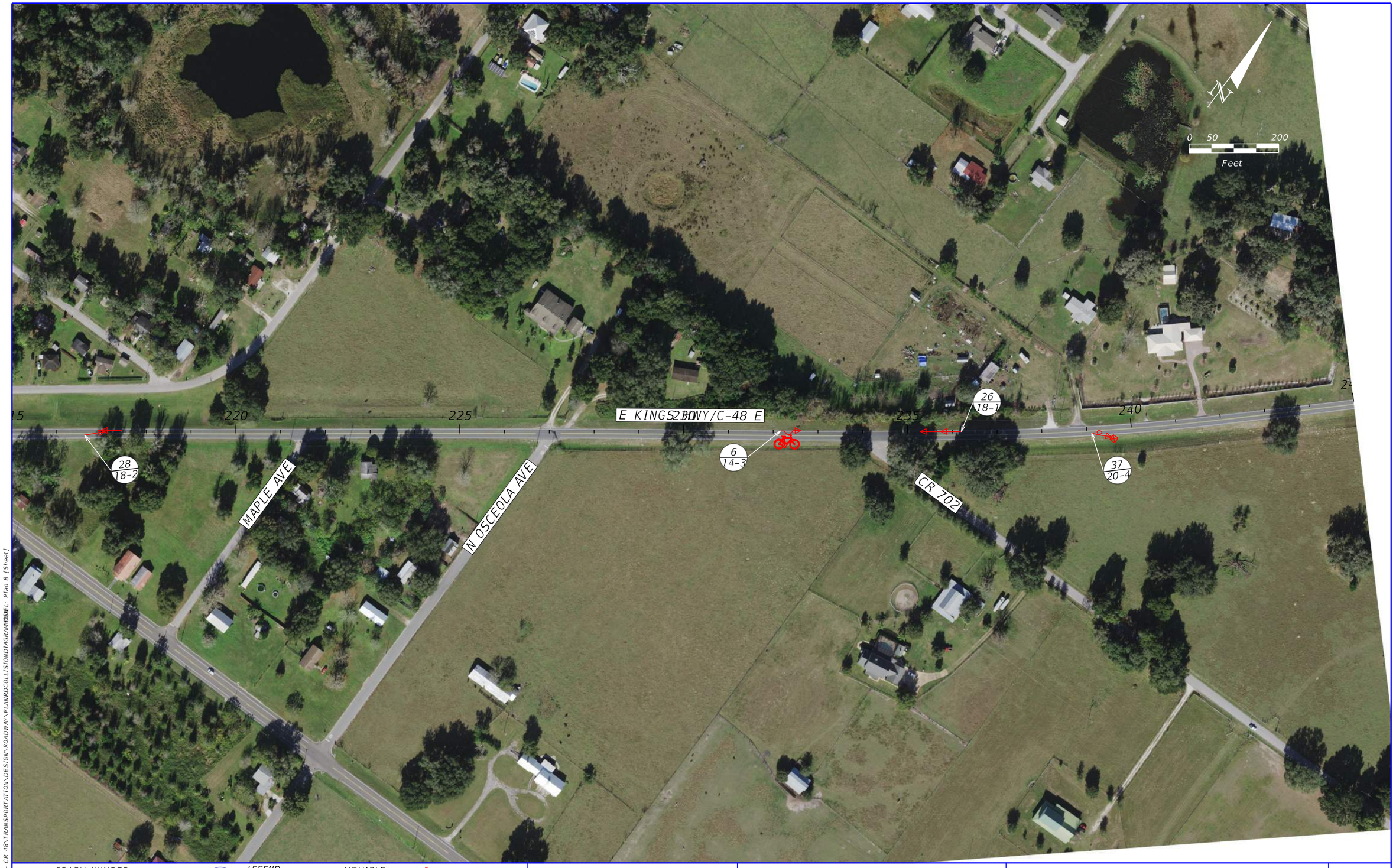

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COUNTY ROAD 48 STUDY
COLLISION DIAGRAM

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COLLISION DIAGRAM

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COUNTY ROAD 48 STUDY
COLLISION DIAGRAM

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5 = FATALITY
YEAR

LEGEND
WET
FATALITY
VEHICLE DIRECTION
OUT OF CONTROL
TURNING VEHICLE
BICYCLE
PEDESTRIAN
SIDESWIPE

ETM
VISION • EXPERIENCE • RESULTS
England-Thims & Miller, Inc.
1525 International Pkwy, Ste 1011
Lake Mary, FL 32746
TEL: (407) 536-8990
FAX: (904) 646-8485
Registry - 2584 LC - 0000316
ADRIANN C. LEBLANC P.E. License No. 87860

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

COUNTY ROAD 48 STUDY
COLLISION DIAGRAM

SHEET NO.
PLAN 12

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LEGEND

CRASH NUMBER
INJURY SEVERITY
1 = NO INJURY
2 = POSSIBLE INJURY
3 = NON-INCAPACITATING
4 = INCAPACITATING
5 = FATALITY
YEAR

WET

FATALITY

VEHICLE DIRECTION

OUT OF CONTROL

TURNING VEHICLE

BICYCLE

PEDESTRIAN

SIDESWIPE

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

COUNTY ROAD 48 STUDY

COLLISION DIAGRAM

SHEET NO.

PLAN 13

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Appendix D:

Short-Term Concept Diagram

ETM VISION • EXPERIENCE • RESULTS England-Thims & Miller, Inc. 1525 International Pkwy, Ste 1011 Lake Mary, FL 32746 TEL: (407) 536-8990 FAX: (904) 646-9485 Registry - 2584 LC - 0000316 ADRIANN C. LEBLANC P.E. License No. 87860	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	COUNTY ROAD 48 STUDY SHORT-TERM CONCEPT	SHEET NO. 1

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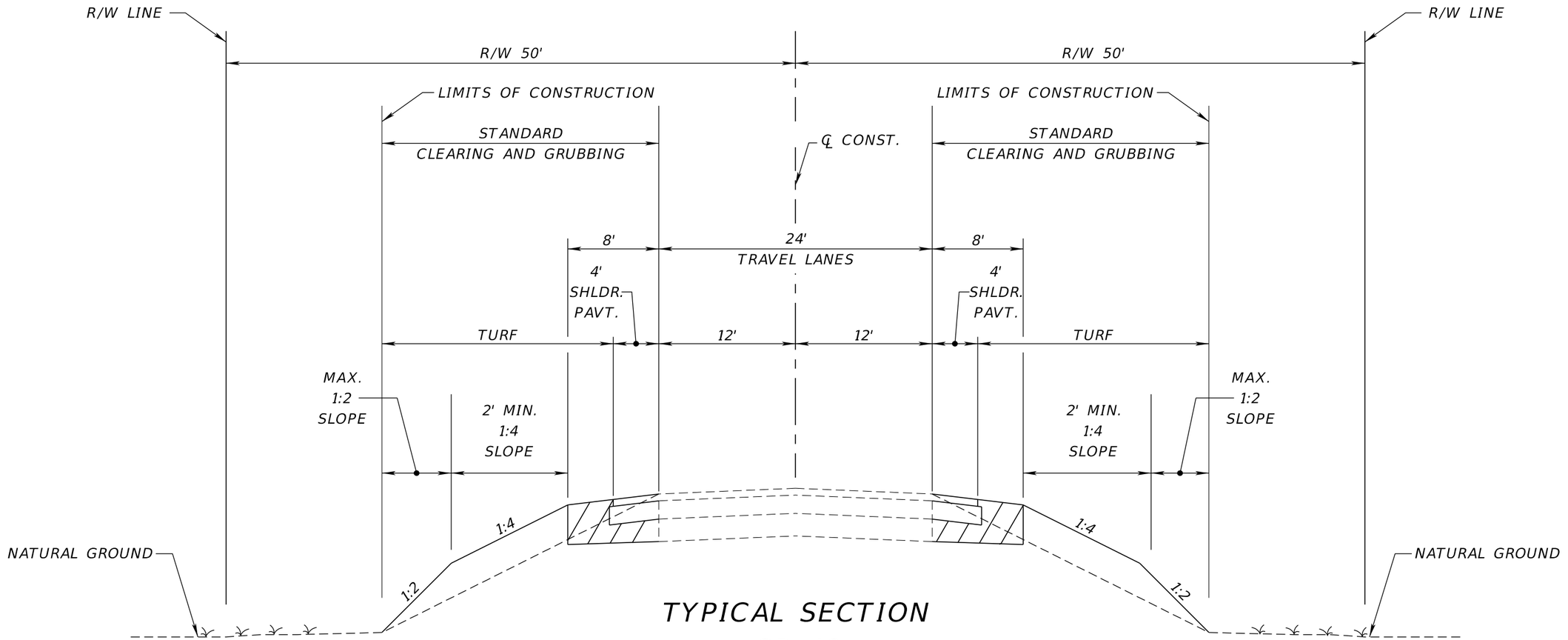
Appendix E:

Typical Sections



TYPICAL SECTION
CR 48
35 mph Segment

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STATE OF FLORIDA
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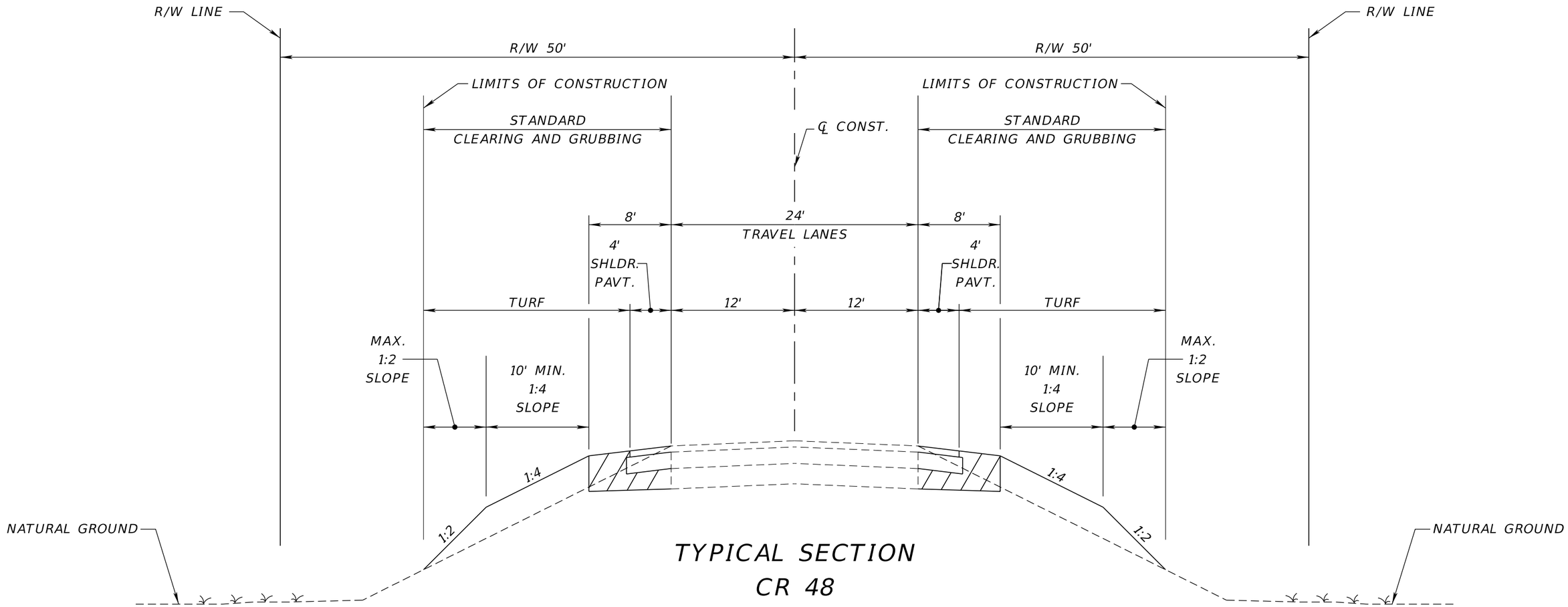
COUNTY ROAD 48 STUDY

TYPICAL SECTION PHASE A

SHEET NO. 1



TYPICAL SECTION
CR 48
45 mph Segment

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COUNTY ROAD 48 STUDY

TYPICAL SECTION PHASE A

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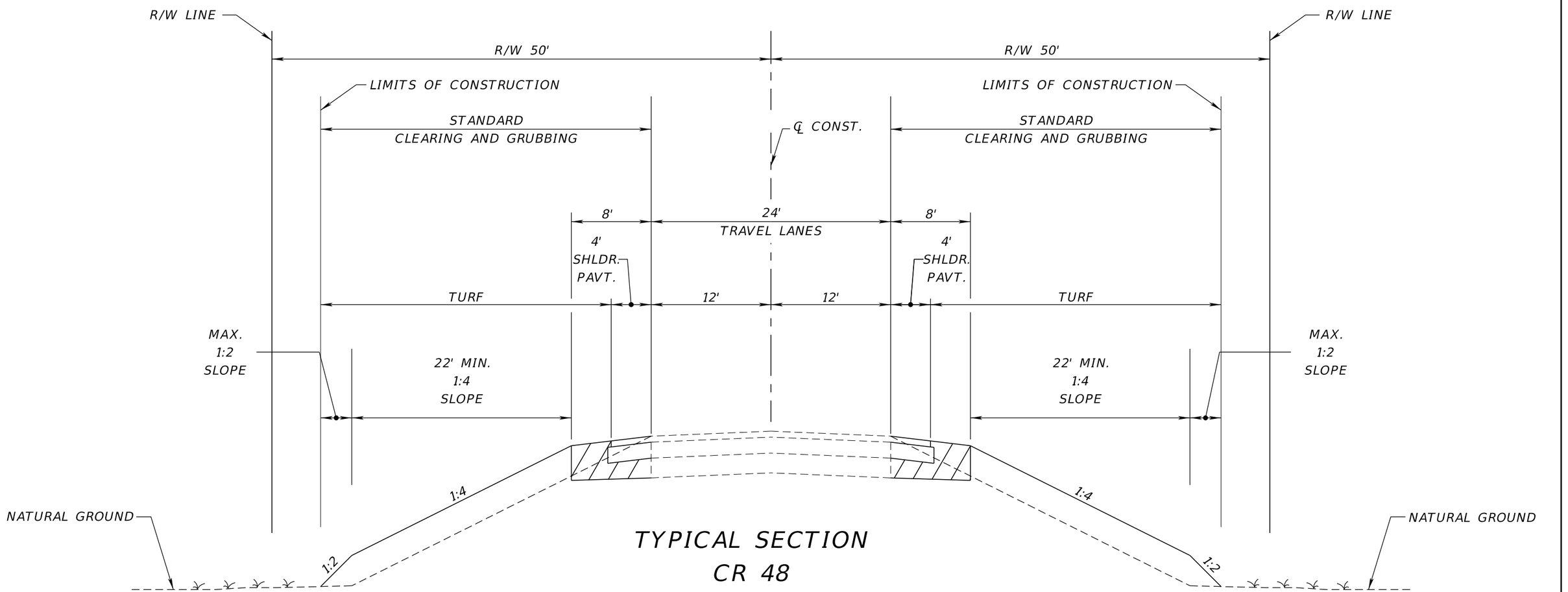

TYPICAL SECTION
CR 48
55 mph Segment

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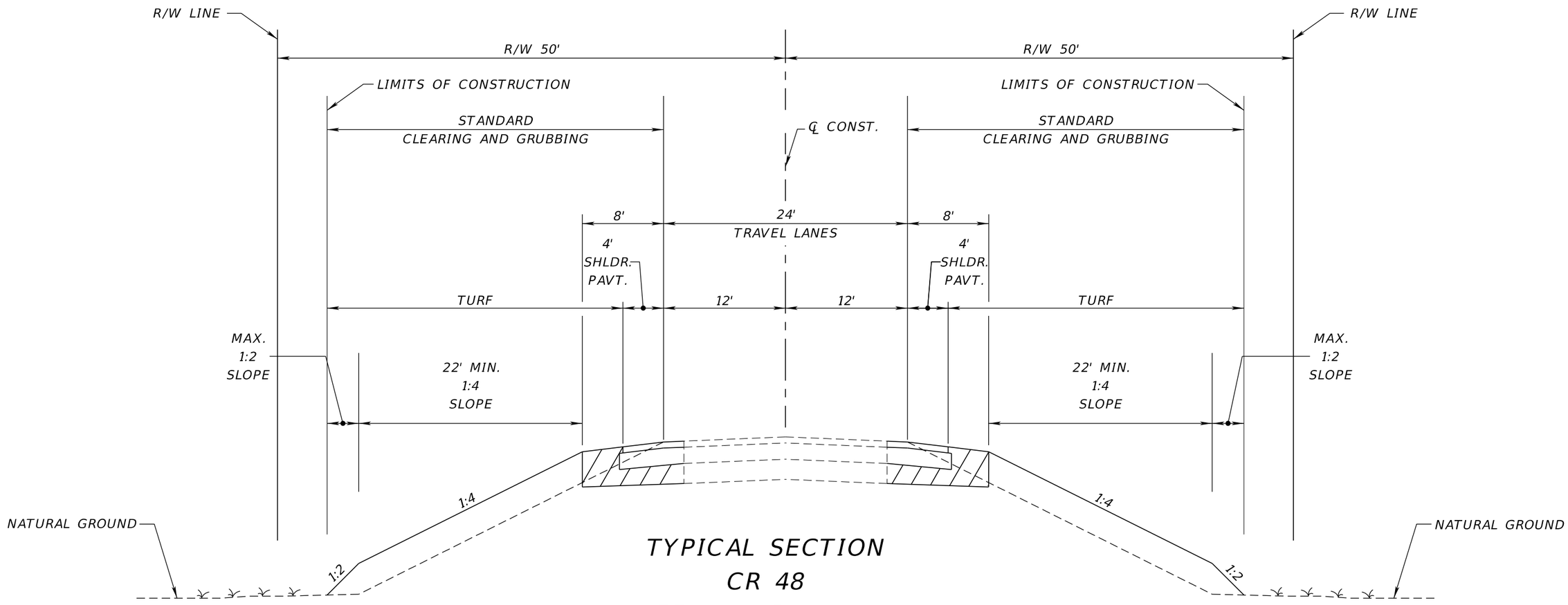
COUNTY ROAD 48 STUDY

TYPICAL SECTION PHASE A

SHEET NO. 3



TYPICAL SECTION
CR 48
55 mph Segment

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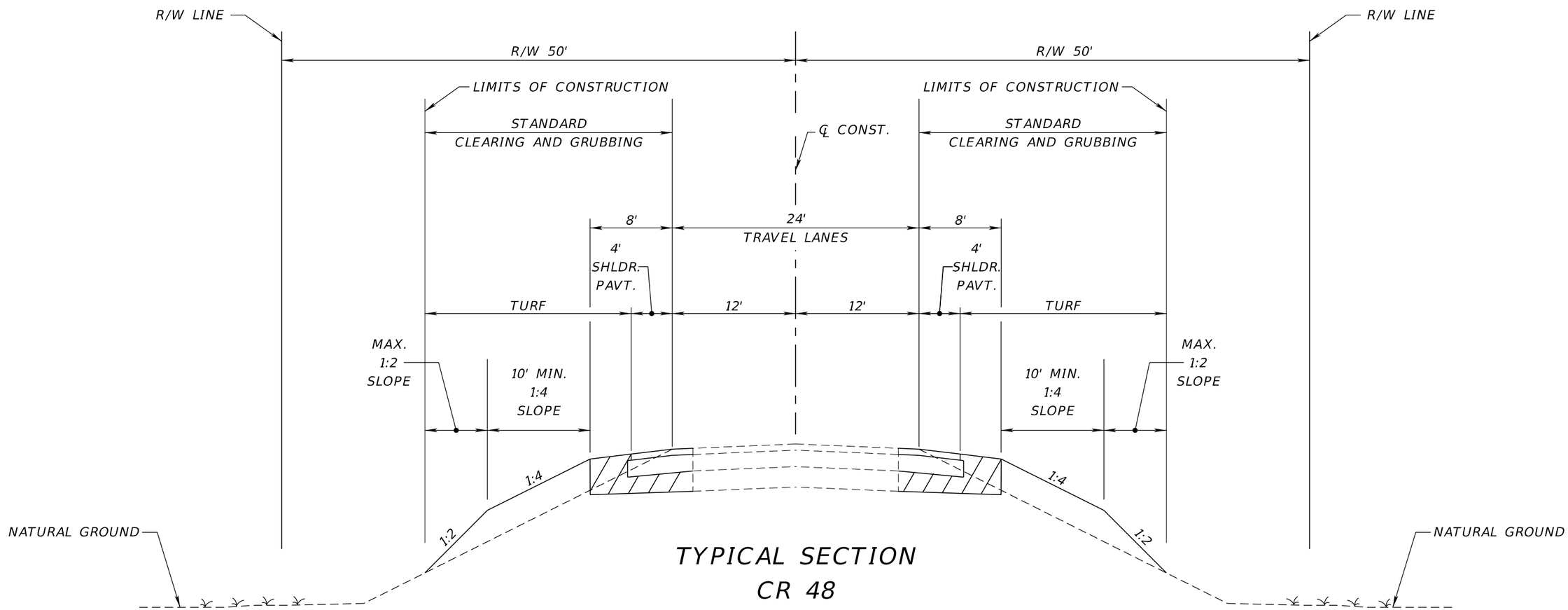
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

COUNTY ROAD 48 STUDY

TYPICAL SECTION PHASE B

SHEET NO. 2



TYPICAL SECTION
CR 48
35 and 45 mph Segment

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

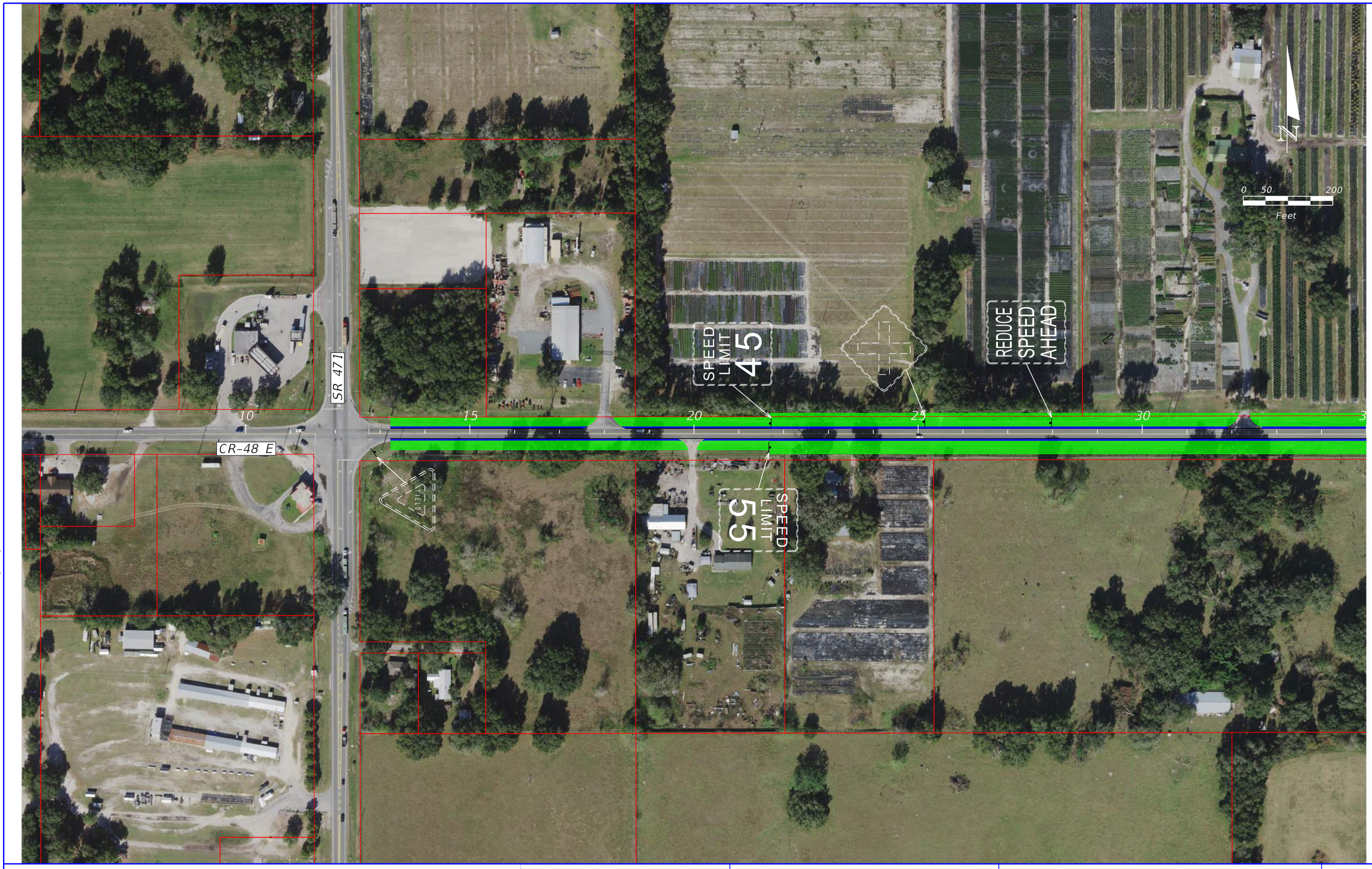
COUNTY ROAD 48 STUDY

TYPICAL SECTION PHASE B

SHEET NO. 1

Appendix F:

Long-Term Concept Diagrams



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COUNTY ROAD 48 STUDY

LONG-TERM CONCEPT

SHEET NO. 1

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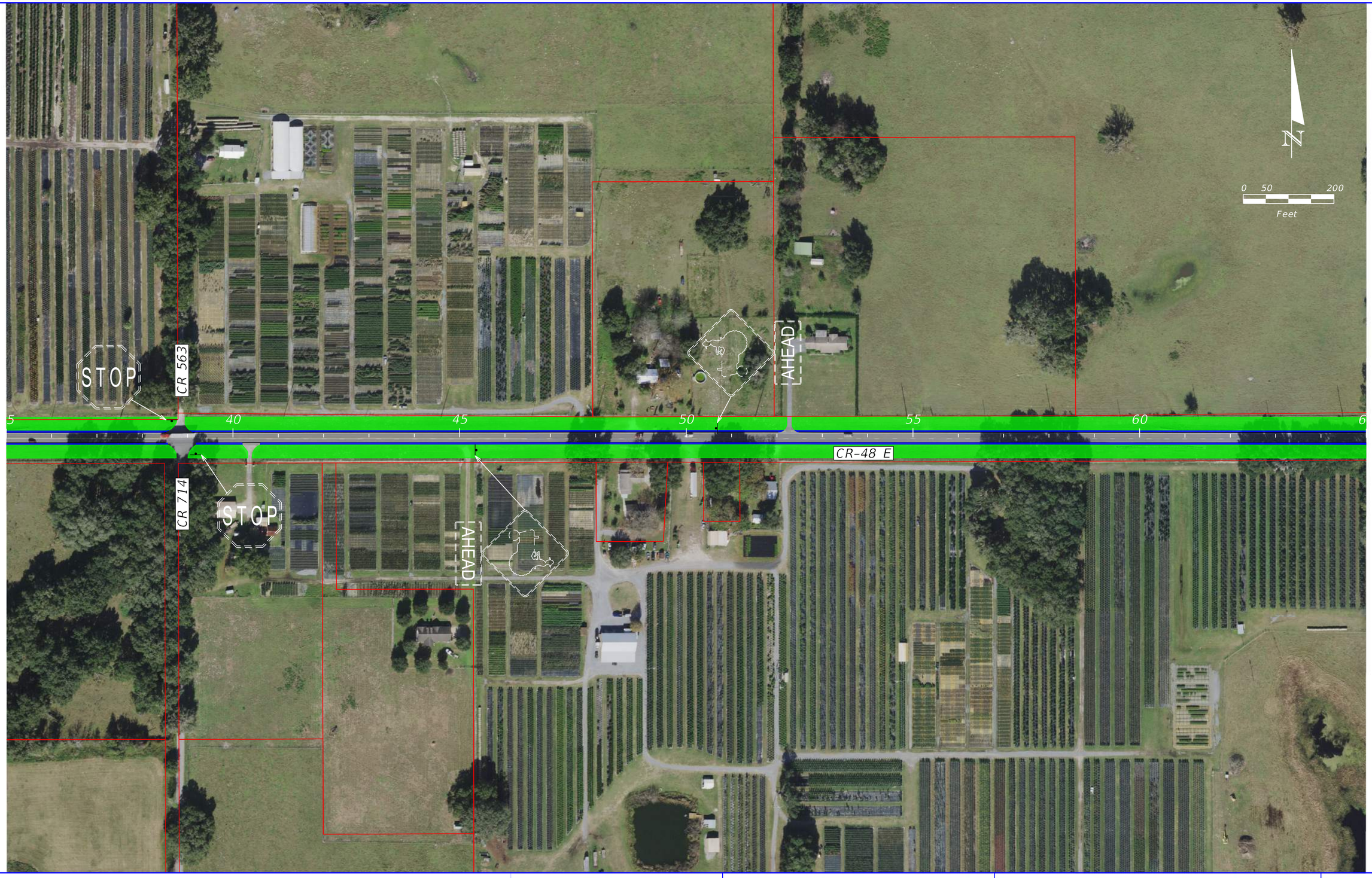

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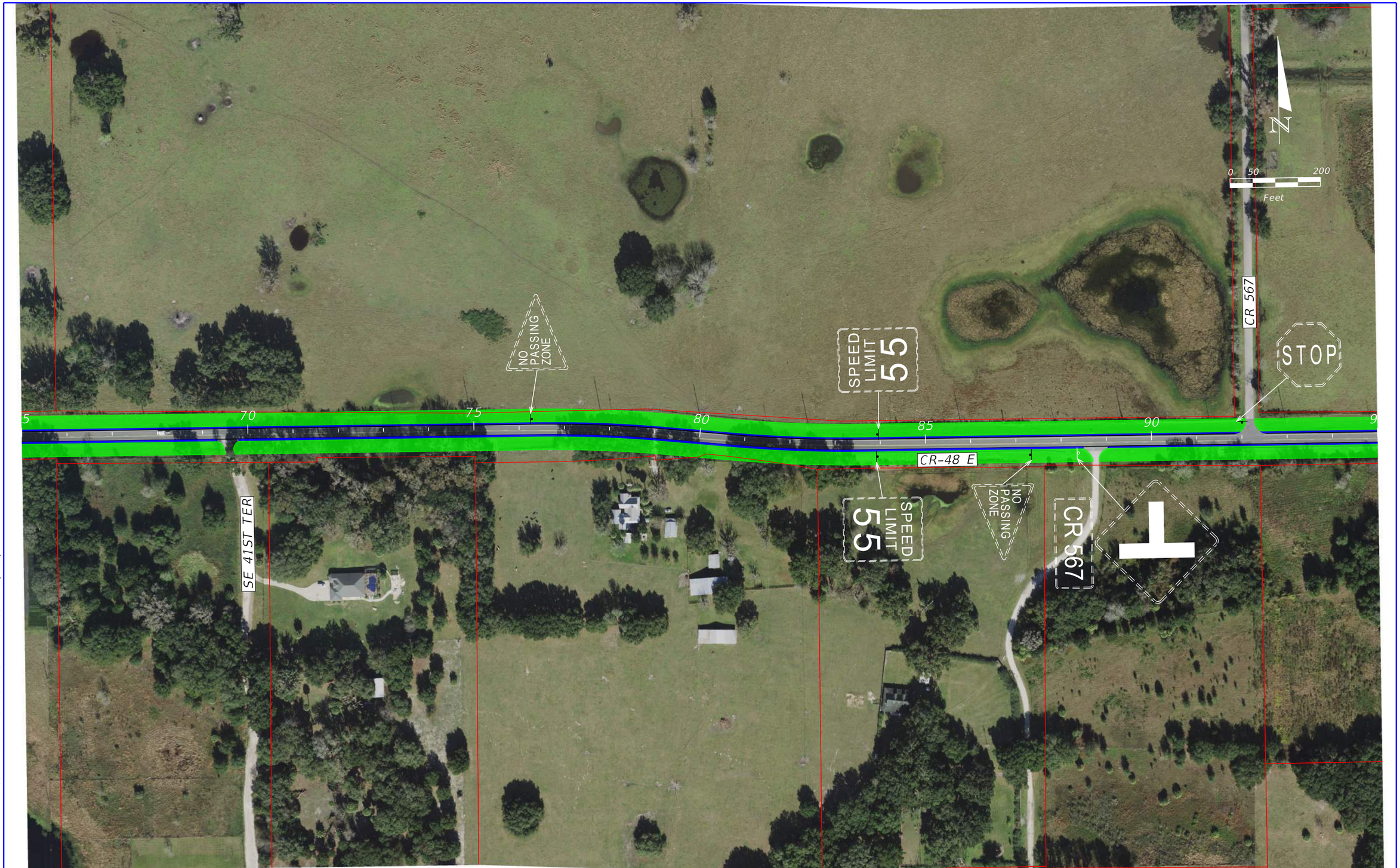
COUNTY ROAD 48 STUDY

LONG-TERM CONCEPT

SHEET NO. 2



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COUNTY ROAD 48 STUDY

LONG-TERM CONCEPT

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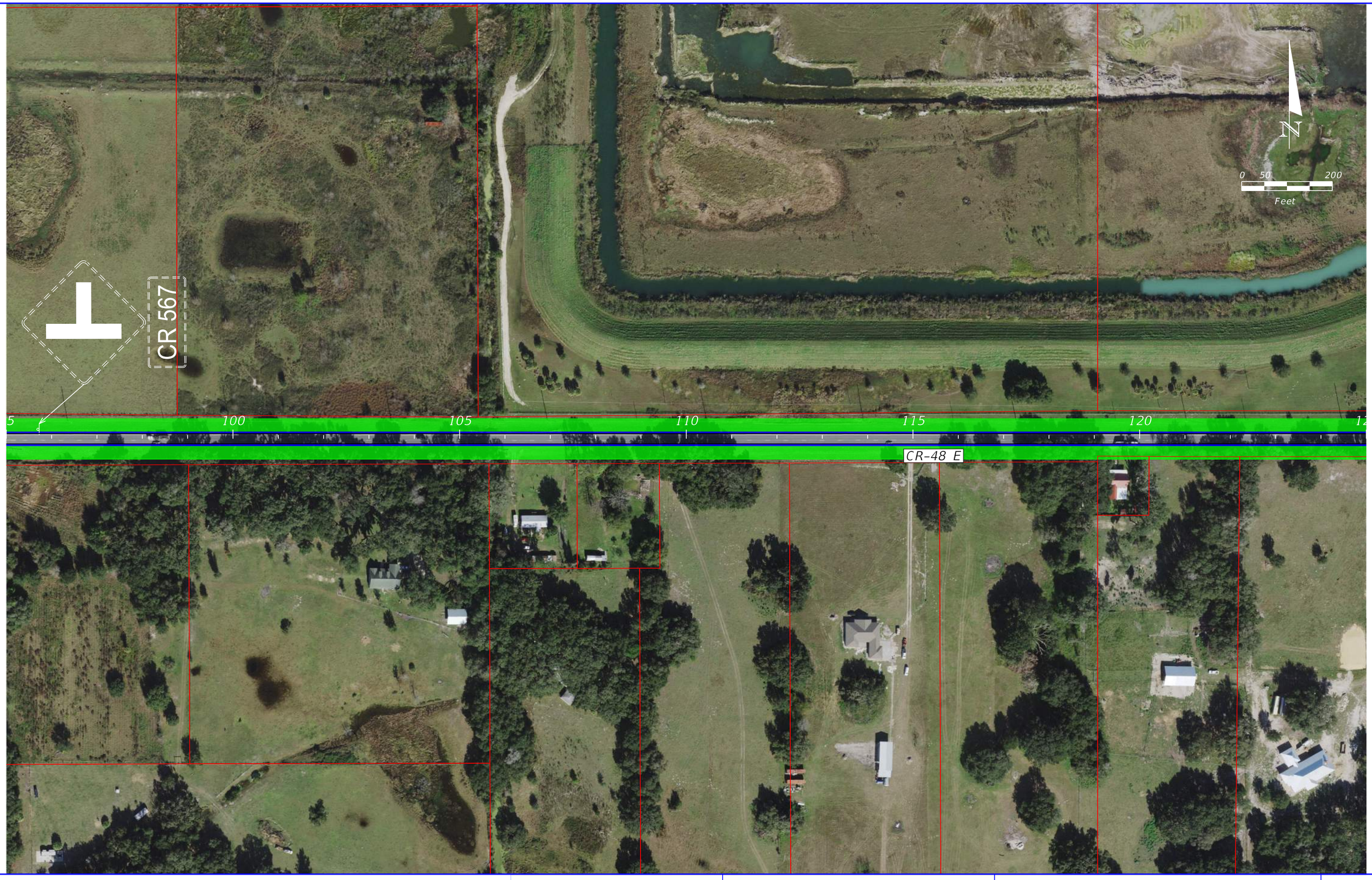

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STATE OF FLORIDA
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COUNTY ROAD 48 STUDY

LONG-TERM CONCEPT

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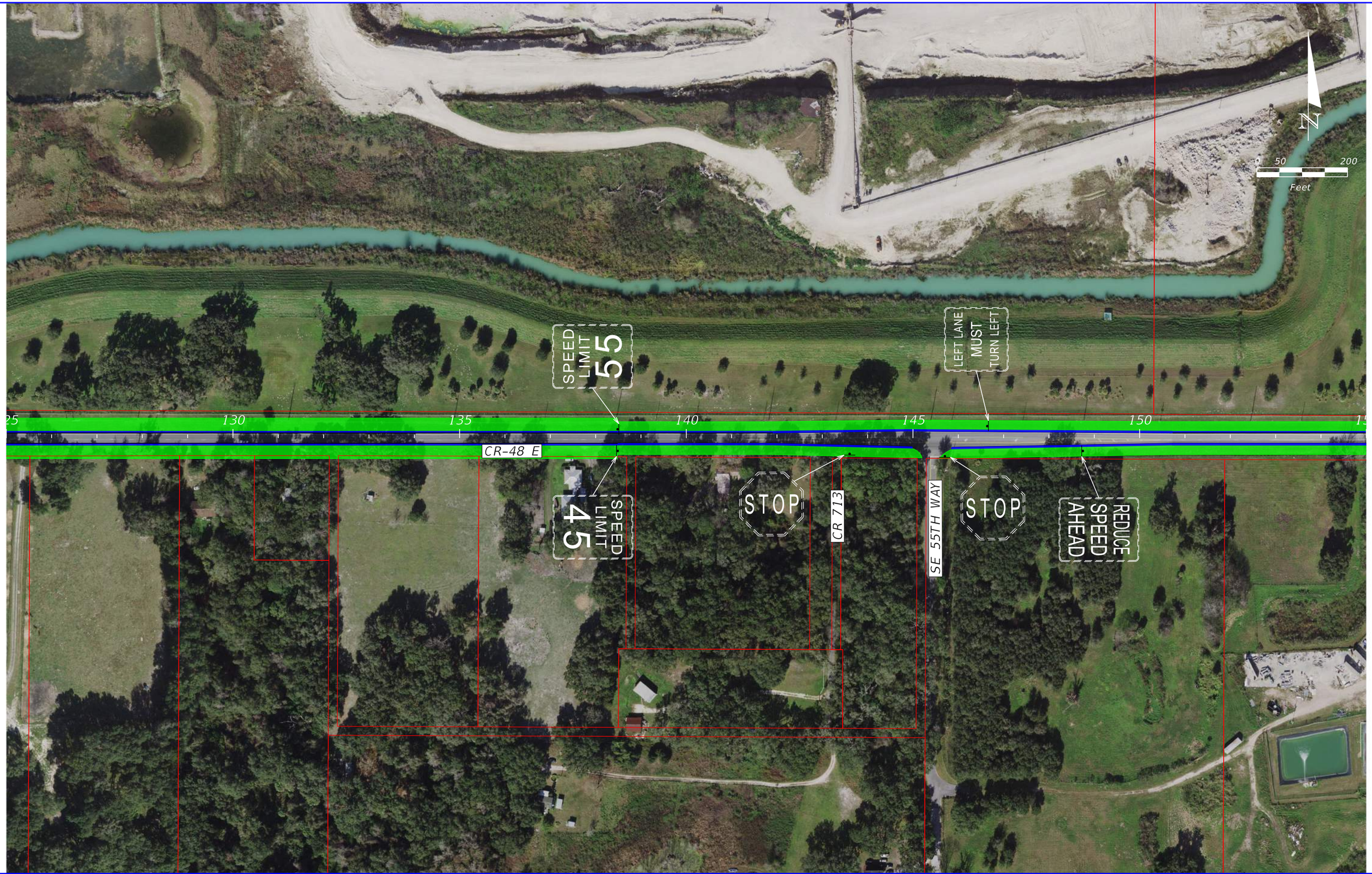

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LONG-TERM CONCEPT

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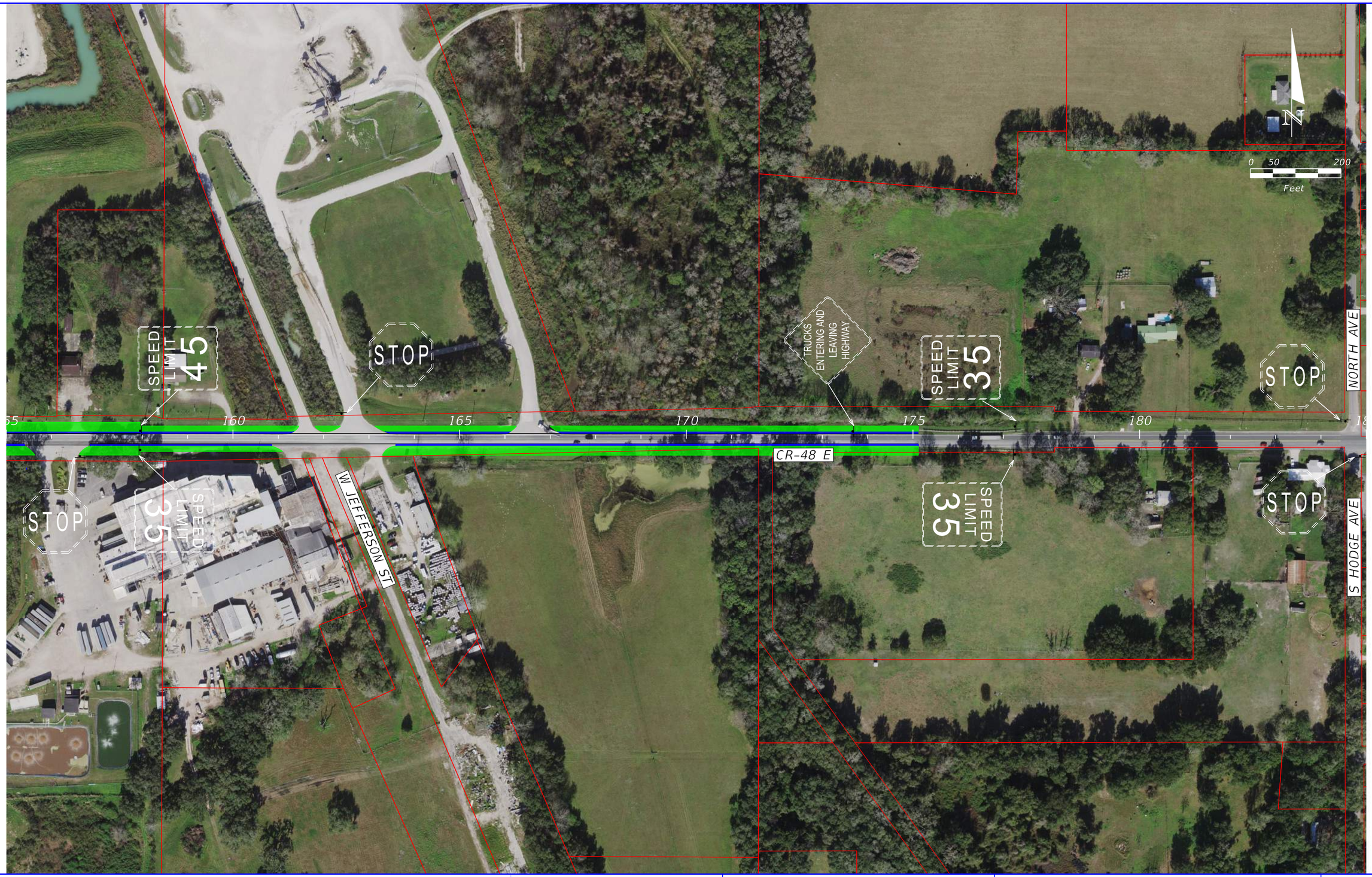

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SHEET NO. 6

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COUNTY ROAD 48 STUDY

LONG-TERM CONCEPT

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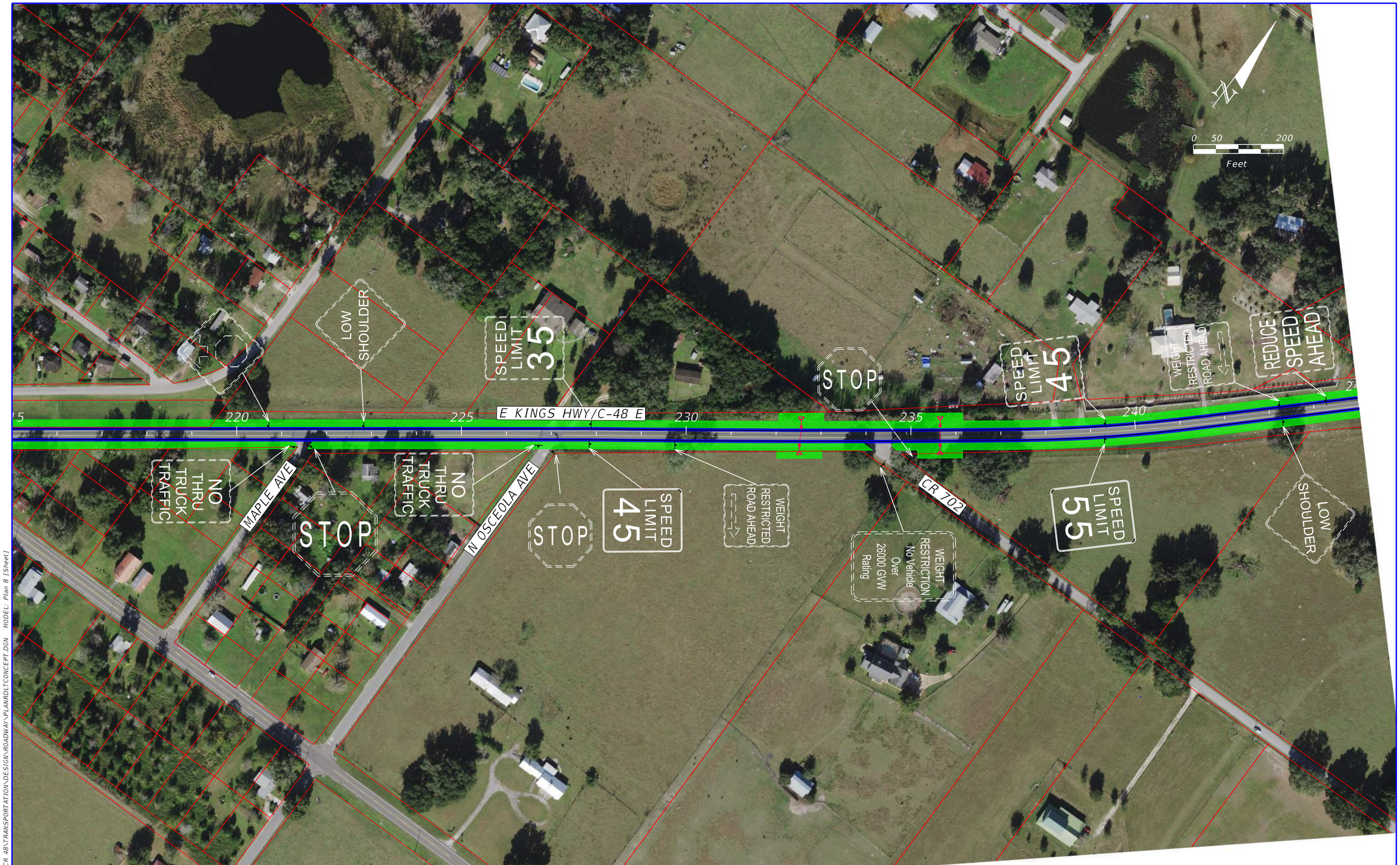

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COUNTY ROAD 48 STUDY

LONG-TERM CONCEPT

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COUNTY ROAD 48 STUDY

LONG-TERM CONCEPT

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COUNTY ROAD 48 STUDY

LONG-TERM CONCEPT

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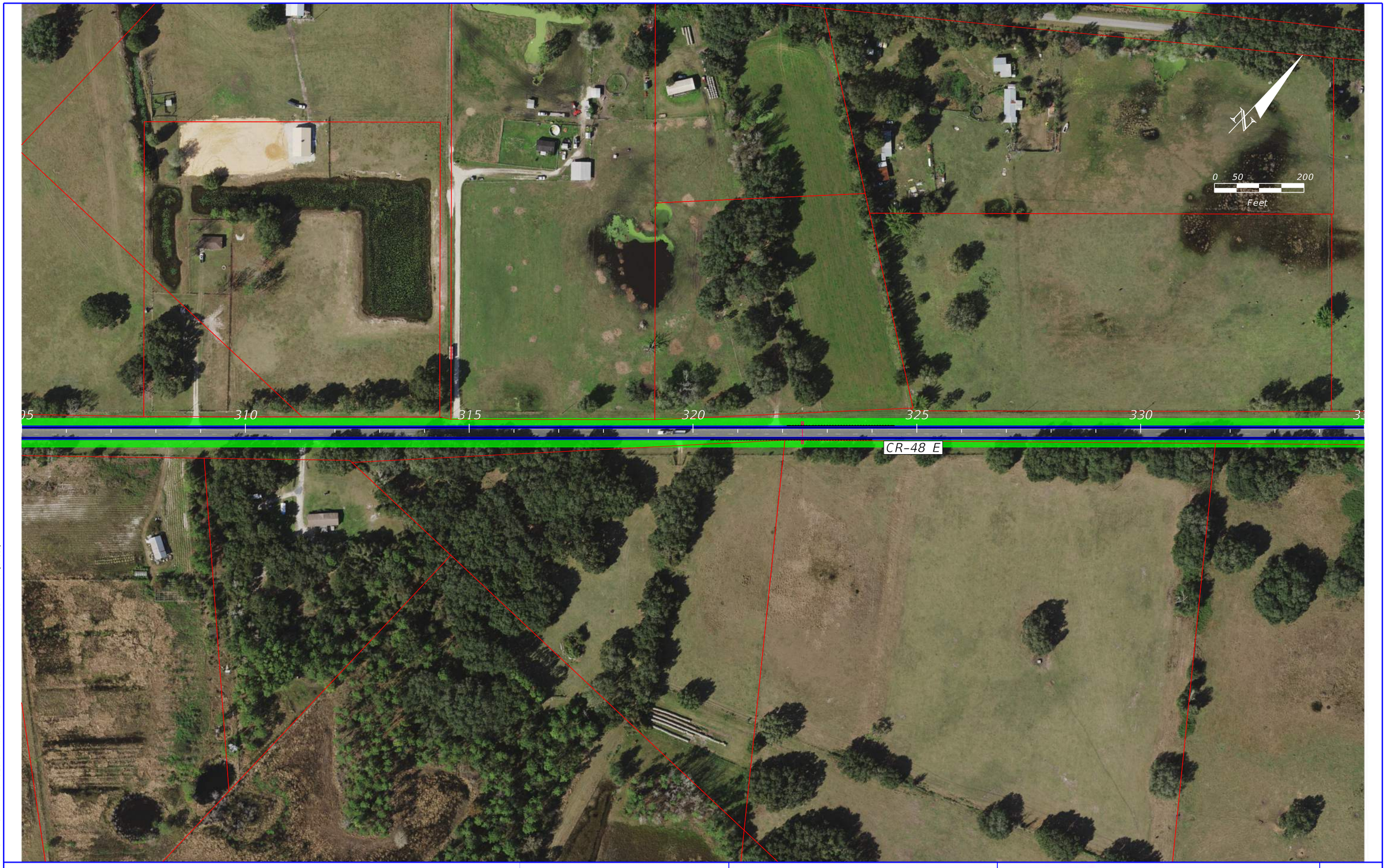

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COUNTY ROAD 48 STUDY
LONG-TERM CONCEPT

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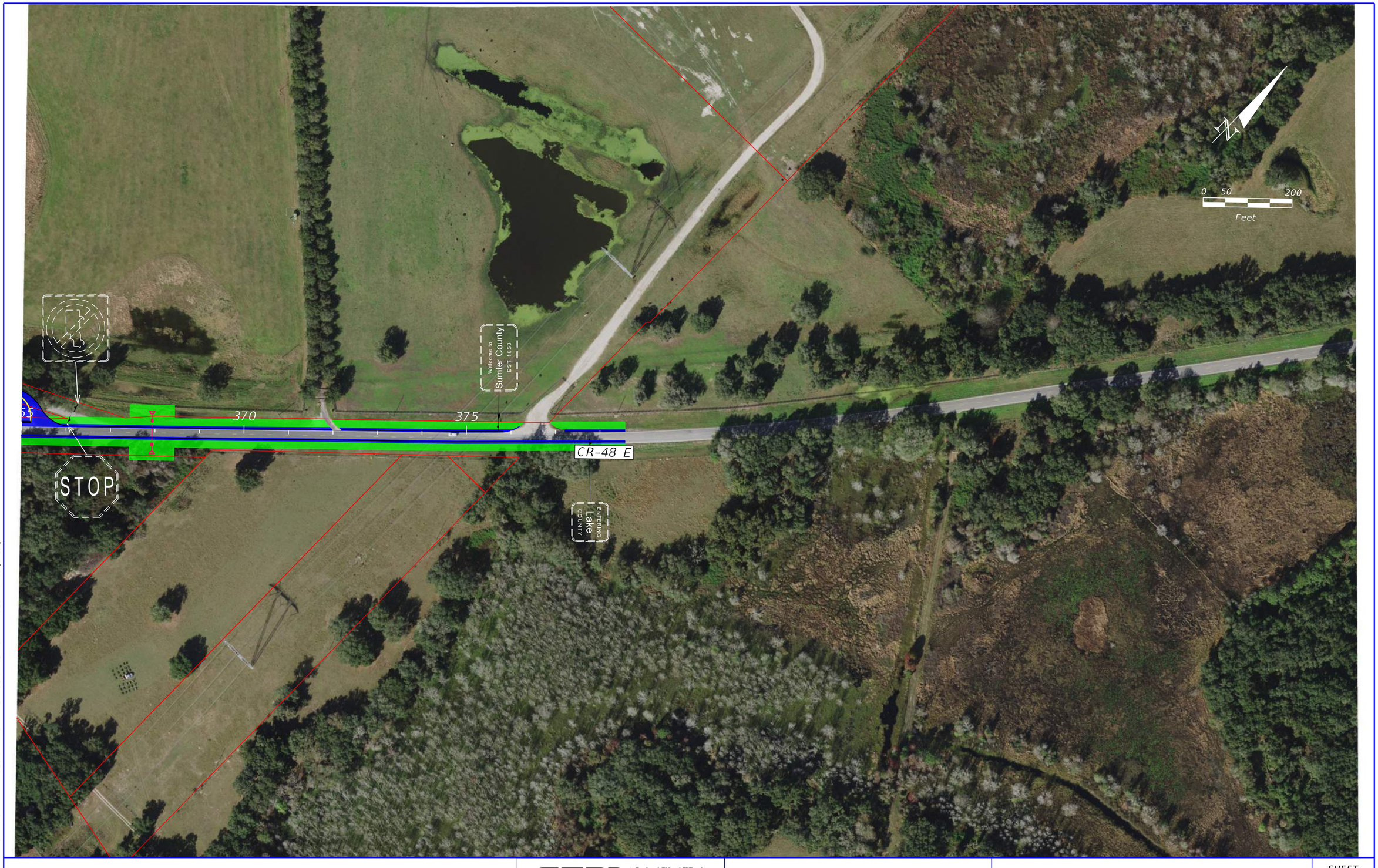

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COUNTY ROAD 48 STUDY

LONG-TERM CONCEPT

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COUNTY ROAD 48 STUDY

LONG TERM CONCEPT DETAIL

SHEET NO.
PLAN 1

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Appendix G:

Improvements Cost Estimates

ENGINEER'S OPINION OF PROBABLE COST

SHORT-TERM IMPROVEMENTS

CR 48 Corridor Improvements

PAY ITEM	PAY ITEM DESCRIPTION	QUANTITY	UNIT	FDOT UNIT COST 05/01/20 - 04/30/21 AREA 07	PROBABLE UNIT COST (10% INCREASE)	TOTAL
I. SIGNING & STRIPING						
0700 1 11	SINGLE POST SIGN, F&I GM, <12 SF	2	AS	$398.59	$438.45	$876.90
II. TOTALS						
					SUBTOTAL I	**$876.90**
					MOBILIZATION (10%)	**$87.69**
					TEMPORARY TRAFFIC CONTROL (15%)	**$144.69**
					CONSTRUCTION TOTAL	**$1,109.28**

ENGINEER'S OPINION OF PROBABLE COST

LONG-TERM IMPROVEMENTS

Phase A CR 48 Corridor Improvements

west of Center Hill

PAY ITEM	PAY ITEM DESCRIPTION	QUANTITY	UNIT	FDOT UNIT COST 05/01/20 - 04/30/21 AREA 07	PROBABLE UNIT COST (10% INCREASE)	TOTAL
I. EARTHWORK						
0104 10 3	SEDIMENT BARRIER	34,200	LF	$1.43	$1.57	$53,796.60
0110 1 1	CLEARING & GRUBBING	22.00	AC	$11,353.05	$12,488.36	$274,743.81
0120 6	EMBANKMENT	72,500	CY	$8.07	$8.88	$643,582.50
0160 4	TYPE B STABILIZATION	27,600	SY	$4.25	$4.68	$129,030.00
					SUBTOTAL I	**$1,101,152.91**
II. ROADWAY						
0285709	OPTIONAL BASE,BASE GROUP 9	13,800	SY	$13.72	$15.09	$208,269.60
0334 1 13	SUPERPAVE ASPH CONC, TRAF C, PG 76-22	1,150	TN	$112.39	$123.63	$142,173.35
0337 7 83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	1,150	TN	$139.25	$153.18	$176,151.25
0536 1 1	GUARDRAIL -ROADWAY, GENERAL TL-3	0	LF	$26.39	$29.03	$0.00
0536 85 24	GUARDRAIL END TREATMENT- PARALLEL APPROACH TI	0	EA	$3,360.00	$3,696.00	$0.00
0570 1 2	PERFORMANCE TURF, SOD	92,000	SY	$2.85	$3.14	$288,420.00
					SUBTOTAL II	**$815,014.20**
III. SIGNING & STRIPING						
0700 1 60	SINGLE POST SIGN, REMOVE	0	AS	$34.36	$37.80	$0.00
0711 11170	THERMOPLASTIC, STD, WHITE, ARROW	0	EA	$66.45	$73.10	$0.00
0711 14125	THERMOPLASTIC, PREFORM, WHITE, SOLID,24"	0	LF	$15.59	$17.15	$0.00
0711 16101	THERMOPLASTIC, STD-OTH, WHITE, SOLID, 6"	1.62	GM	$4,550.09	$5,005.10	$8,099.16
0701 18101	PROFILED THERMOPLASTIC,STANDARD- ASPHALT SUR	4.43	GM	$7,401.38	$8,141.52	$36,081.73
					SUBTOTAL III	**$44,180.89**
IV. TOTALS						
					SUBTOTAL I+II+III	**$1,960,348.00**
					MOBILIZATION (10%)	**$196,034.80**
					TEMPORARY TRAFFIC CONTROL (15%)	**$323,457.42**
					CONSTRUCTION TOTAL	**$2,479,840.22**
					ENGINEERING (40%)	**$991,936.09**
					CEI (10.32%)	**$255,919.51**
					P.E.C.E.I. Total	**$1,247,855.60**
					GRAND TOTAL	**$4,719,631.90**

ENGINEER'S OPINION OF PROBABLE COST

LONG-TERM IMPROVEMENTS

Phase B CR 48 Corridor Improvements

east of Center Hill

PAY ITEM	PAY ITEM DESCRIPTION	QUANTITY	UNIT	FDOT UNIT COST 05/01/20 - 04/30/21 AREA 07	PROBABLE UNIT COST (10% INCREASE)	TOTAL
I. EARTHWORK						
0104 10 3	SEDIMENT BARRIER	33,500	LF	$1.43	$1.57	$52,695.50
0110 1 1	CLEARING & GRUBBING	25.00	AC	$11,353.05	$12,488.36	$312,208.88
0120 6	EMBANKMENT	50,000	CY	$8.07	$8.88	$443,850.00
0160 4	TYPE B STABILIZATION	40,000	SY	$4.25	$4.68	$187,000.00
					SUBTOTAL I	**$995,754.38**
II. ROADWAY						
0285709	OPTIONAL BASE,BASE GROUP 9	31,000	SY	$13.72	$15.09	$467,852.00
0334 1 13	SUPERPAVE ASPH CONC, TRAF C, PG 76-22	1,900	TN	$112.39	$123.63	$234,895.10
0337 7 83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	1,900	TN	$139.25	$153.18	$291,032.50
0400 4 1	CONCRETE CLASS IV, CULVERTS	400	CY	$1,592.71	$1,751.98	$700,792.40
0415 1 3	REINFORCING STEEL- RETAINING WALL	60,000	LB	$0.10	$0.11	$6,600.00
0430175124	PIPE CULVERT,OPTIONAL MATERIAL,ROUND, 24"S/CD	200	LF	$86.04	$94.64	$18,928.80
0536 1 1	GUARDRAIL -ROADWAY, GENERAL TL-3	2,000	LF	$26.39	$29.03	$58,058.00
0536 85 24	GUARDRAIL END TREATMENT- PARALLEL APPROACH TI	22	EA	$3,360.00	$3,696.00	$81,312.00
0546 72 1	GROUND-IN RUMBLE STRIPS, 16"	2.64	GM	$955.00	$1,050.50	$2,775.47
0570 1 2	PERFORMANCE TURF, SOD	100,000	SY	$2.85	$3.14	$313,500.00
					SUBTOTAL II	**$2,175,746.27**
III. SIGNING & STRIPING						
0700 1 50	SINGLE POST SIGN, RELOCATE	30	AS	$261.47	$287.62	$8,628.51
0711 14125	THERMOPLASTIC, PREFORM, WHITE, SOLID,24"	50	LF	$15.59	$17.15	$857.45
0711 16101	THERMOPLASTIC, STD-OTH, WHITE, SOLID, 6"	6.50	GM	$4,550.09	$5,005.10	$32,533.14
					SUBTOTAL III	**$42,019.10**
IV. TOTALS						
					SUBTOTAL I+II+III+IV	**$3,213,519.75**
					MOBILIZATION (10%)	**$321,351.97**
					TEMPORARY TRAFFIC CONTROL (15%)	**$530,230.76**
					CONSTRUCTION TOTAL	**$4,065,102.48**
					ENGINEERING (40%)	**$1,626,040.99**
					CEI (10.32%)	**$419,518.58**
					P.E.C.E.I. Total	**$2,045,559.57**
					GRAND TOTAL	**$7,736,703.04**

Appendix H:

HSM Predictive Method Results

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	LeBlanc	Roadway	CR 48
Agency or Company	ETM	Roadway Section	SR 471 to 770' West of North Avenue
Date Performed	06/08/21	Jurisdiction	Sumter County
		Analysis Year	2021

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	3.120			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	5,700			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	1	Left Shld:	1
Shoulder type		Paved	Right Shld:	Paved	Left Shld:	Paved
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	0			
Driveway density (driveways/mile)		5	11.92			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	5			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	1.23	1.00	1.00	1.00	1.13	1.00	1.00	1.00	1.14	1.00	1.00	1.590

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1) Crash Severity Level	(2) N spf rs	(3) Overdispersion Parameter, k	(4) Crash Severity Distribution	(5) N spf rs by Severity Distribution	(6) Combined CMFs	(7) Calibration Factor, Cr	(8) Predicted average crash frequency, N
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)$_{TOTAL}$ x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	4.751	0.08	1.000	4.751	1.59	1.00	7.556
Fatal and Injury (FI)	--	--	0.321	1.525	1.59	1.00	2.425
Property Damage Only (PDO)	--	--	0.679	3.226	1.59	1.00	5.130

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1) Collision Type	(2) Proportion of Collision Type$_{(TOTAL)}$	(3) N $_{predicted\ rs\ (TOTAL)}$ (crashes/year)	(4) Proportion of Collision Type$_{(FI)}$	(5) N $_{predicted\ rs\ (FI)}$ (crashes/year)	(6) Proportion of Collision Type$_{(PDO)}$	(7) N $_{predicted\ rs\ (PDO)}$ (crashes/year)
	from Table 10-4	(8)$_{TOTAL}$ from Worksheet 1C	from Table 10-4	(8)$_{FI}$ from Worksheet 1C	from Table 10-4	(8)$_{PDO}$ from Worksheet 1C
Total	1.000	7.556	1.000	2.425	1.000	5.130
		(2)x(3)$_{TOTAL}$		(4)x(5)$_{FI}$		(6)x(7)$_{PDO}$
SINGLE-VEHICLE						
Collision with animal	0.121	0.914	0.038	0.092	0.184	0.944
Collision with bicycle	0.002	0.015	0.004	0.010	0.001	0.005
Collision with pedestrian	0.003	0.023	0.007	0.017	0.001	0.005
Overturned	0.025	0.189	0.037	0.090	0.015	0.077
Ran off road	0.521	3.936	0.545	1.322	0.505	2.591
Other single-vehicle collision	0.021	0.159	0.007	0.017	0.029	0.149
Total single-vehicle crashes	0.693	5.236	0.638	1.547	0.735	3.771
MULTIPLE-VEHICLE						
Angle collision	0.085	0.642	0.100	0.243	0.072	0.369
Head-on collision	0.016	0.121	0.034	0.082	0.003	0.015
Rear-end collision	0.142	1.073	0.164	0.398	0.122	0.626
Sideswipe collision	0.037	0.280	0.038	0.092	0.038	0.195
Other multiple-vehicle collision	0.027	0.204	0.026	0.063	0.030	0.154
Total multiple-vehicle crashes	0.307	2.320	0.362	0.878	0.265	1.360

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1) Crash severity level	(2) Crash Severity Distribution (proportion)	(3) Predicted average crash frequency (crashes/year)	(4) Roadway segment length (mi)	(5) Crash rate (crashes/mi/year)
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	7.6	3.12	2.4
Fatal and Injury (FI)	0.321	2.4	3.12	0.8
Property Damage Only (PDO)	0.679	5.1	3.12	1.6

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	LeBlanc	Roadway	CR 48
Agency or Company	ETM	Roadway Section	770' West of North Avenue to CR 469
Date Performed	06/08/21	Jurisdiction	Sumter County
		Analysis Year	2021

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	0.6326			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	5,700			
Lane width (ft)		12	12			
Shoulder width (ft)		6	Right Shld:	7	Left Shld:	7
Shoulder type		Paved	Right Shld:	Paved	Left Shld:	Paved
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	0			
Driveway density (driveways/mile)		5	41.60			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	5			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.00	0.96	1.00	1.00	1.00	1.70	1.00	1.00	1.00	1.14	1.00	1.00	1.865

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	0.963	0.37	1.000	0.963	1.87	1.00	1.797
Fatal and Injury (FI)	--	--	0.321	0.309	1.87	1.00	0.577
Property Damage Only (PDO)	--	--	0.679	0.654	1.87	1.00	1.220

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type(TOTAL)**	**N *predicted rs* (TOTAL) (crashes/year)**	**Proportion of Collision Type(FI)**	**N *predicted rs* (FI) (crashes/year)**	**Proportion of Collision Type(PDO)**	**N *predicted rs* (PDO) (crashes/year)**
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	1.797	1.000	0.577	1.000	1.220
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.217	0.038	0.022	0.184	0.225
Collision with bicycle	0.002	0.004	0.004	0.002	0.001	0.001
Collision with pedestrian	0.003	0.005	0.007	0.004	0.001	0.001
Overturned	0.025	0.045	0.037	0.021	0.015	0.018
Ran off road	0.521	0.936	0.545	0.314	0.505	0.616
Other single-vehicle collision	0.021	0.038	0.007	0.004	0.029	0.035
Total single-vehicle crashes	0.693	1.245	0.638	0.368	0.735	0.897
MULTIPLE-VEHICLE						
Angle collision	0.085	0.153	0.100	0.058	0.072	0.088
Head-on collision	0.016	0.029	0.034	0.020	0.003	0.004
Rear-end collision	0.142	0.255	0.164	0.095	0.122	0.149
Sideswipe collision	0.037	0.066	0.038	0.022	0.038	0.046
Other multiple-vehicle collision	0.027	0.049	0.026	0.015	0.030	0.037
Total multiple-vehicle crashes	0.307	0.552	0.362	0.209	0.265	0.323

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	1.8	0.632575758	2.8
Fatal and Injury (FI)	0.321	0.6	0.632575758	0.9

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	LeBlanc	Roadway	CR 48
Agency or Company	ETM	Roadway Section	CR 469 to Sumter County Line
Date Performed	06/08/21	Jurisdiction	Sumter County
		Analysis Year	2021

Input Data		Base Conditions	Site Conditions			
Length of segment, L (mi)		--	3.100			
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	2,800			
Lane width (ft)		12	10			
Shoulder width (ft)		6	Right Shld:	0	Left Shld:	0
Shoulder type		Paved	Right Shld:	Paved	Left Shld:	Paved
Length of horizontal curve (mi)		0	0.0			
Radius of curvature (ft)		0	0			
Spiral transition curve (present/not present)		Not Present	Not Present			
Superelevation variance (ft/ft)		< 0.01	0			
Grade (%)		0	0			
Driveway density (driveways/mile)		5	8.52			
Centerline rumble strips (present/not present)		Not Present	Not Present			
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present			
Two-way left-turn lane (present/not present)		Not Present	Not Present			
Roadside hazard rating (1-7 scale)		3	5			
Segment lighting (present/not present)		Not Present	Not Present			
Auto speed enforcement (present/not present)		Not Present	Not Present			
Calibration Factor, Cr		1	1.00			

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.17	1.29	1.00	1.00	1.00	1.10	1.00	1.00	1.00	1.14	1.00	1.00	1.892

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1) Crash Severity Level	(2) N spf rs	(3) Overdispersion Parameter, k	(4) Crash Severity Distribution	(5) N spf rs by Severity Distribution	(6) Combined CMFs	(7) Calibration Factor, Cr	(8) Predicted average crash frequency, N
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	2.319	0.08	1.000	2.319	1.89	1.00	4.387
Fatal and Injury (FI)	--	--	0.321	0.744	1.89	1.00	1.408
Property Damage Only (PDO)	--	--	0.679	1.575	1.89	1.00	2.979

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1) Collision Type	(2) Proportion of Collision $Type_{(TOTAL)}$	(3) $N_{predicted\ rs\ (TOTAL)}$ (crashes/year)	(4) Proportion of Collision $Type_{(FI)}$	(5) $N_{predicted\ rs\ (FI)}$ (crashes/year)	(6) Proportion of Collision $Type_{(PDO)}$	(7) $N_{predicted\ rs\ (PDO)}$ (crashes/year)
	from Table 10-4	(8)TOTAL from Worksheet 1C	from Table 10-4	(8)FI from Worksheet 1C	from Table 10-4	(8)PDO from Worksheet 1C
Total	1.000	4.387	1.000	1.408	1.000	2.979
		(2)x(3)TOTAL		(4)x(5)FI		(6)x(7)PDO
SINGLE-VEHICLE						
Collision with animal	0.121	0.531	0.038	0.054	0.184	0.548
Collision with bicycle	0.002	0.009	0.004	0.006	0.001	0.003
Collision with pedestrian	0.003	0.013	0.007	0.010	0.001	0.003
Overturned	0.025	0.110	0.037	0.052	0.015	0.045
Ran off road	0.521	2.286	0.545	0.767	0.505	1.504
Other single-vehicle collision	0.021	0.092	0.007	0.010	0.029	0.086
Total single-vehicle crashes	0.693	3.040	0.638	0.898	0.735	2.189
MULTIPLE-VEHICLE						
Angle collision	0.085	0.373	0.100	0.141	0.072	0.214
Head-on collision	0.016	0.070	0.034	0.048	0.003	0.009
Rear-end collision	0.142	0.623	0.164	0.231	0.122	0.363
Sideswipe collision	0.037	0.162	0.038	0.054	0.038	0.113
Other multiple-vehicle collision	0.027	0.118	0.026	0.037	0.030	0.089
Total multiple-vehicle crashes	0.307	1.347	0.362	0.510	0.265	0.789

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1) Crash severity level	(2) Crash Severity Distribution (proportion)	(3) Predicted average crash frequency (crashes/year)	(4) Roadway segment length (mi)	(5) Crash rate (crashes/mi/year)
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	4.4	3.1	1.4
Fatal and Injury (FI)	0.321	1.4	3.1	0.5
Property Damage Only (PDO)	0.679	3.0	3.1	1.0

Appendix I:

B/C Analysis, Net Present Value, and Crash Modification Factor

FORM 511

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
SAFETY OFFICE ANNUAL BENEFIT COST ANALYSIS

1. SUBMITTED BY: ETM, Inc. | FM #: | 5. X SAFETY PRIORITY
2. DATE SUBMITTED: 3/7/2022 | ENV. STUDY
3. PROJECT NO.: 15-225-45 | SKID (ID)
4. ALTERNATIVE NO.: Long-Term Phase A | SN | SPEED: 35 - 55

6. DISTRICT: 5 | COUNTY: Sumter | SECTION | SR | U.S. ROAD

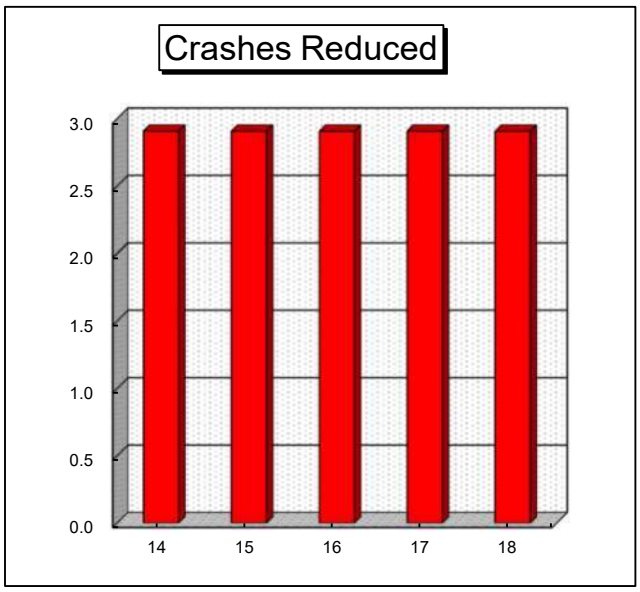
7. BEGIN MILE POST | END MILE POST | LENGTH | NODE

10. PROPOSED IMPROVEMENTS (LIST AND DISCUSS): Widen the unpaved shoulders to 4' paved shoulder, add profiled thermoplastic and Safety Edge.

	YEAR	14	15	16	17	18	AVG
11.	NO.OF CRASHES	5.94	5.94	5.94	5.94	5.94	5.944
12.	NO. CRASHES POTENTIALLY REDUCED BY PROJECT	2.9	2.9	2.9	2.9	2.9	2.9

14. CRASH INFORMATION FOR FACILITY

COST/CRASH $	$523,727
CRASH CLEANUP $	-100
INTEREST RATE	4%



15. ANNUAL COST OF IMPROVEMENTS

	TYPE	COST	LIFE	CRF	AN'L COST
A.	R-O-W	$0	50	0.0725	$0
B.	PECEI	$1,268,429	20	0.0736	$93,356
C.	EARTHWK	$1,112,037	50	0.0725	$80,623
D.	SIGNAL	$0	15	0.0899	$0
E.	SGN/STRIF	$34,612	8	0.1485	$5,140
F.	RDWY	$846,019	20	0.0736	$62,267
G.	MOT/MOBI	$528,057	20	0.0736	$38,865
H.	LIGHTING				$0
I.	CRASH CLEANUP				$291
J.	TOTAL				$280,542

16. BENEFIT: $1,522,346.03

17. BENEFIT / COST: 5.43

PREPARED BY: Adriann LeBlanc, PE | APPROVED BY: | DATE:

COMMENTS/CRASH REDUCTION METHOD: Cost per crash based on the FDOT's Average Cost per Crash 2-3 Lanes, Undivided, Rural Used CMF ID 9198 - Install safety edge treatment. CMF value = 0.511 and CRF value = 48.9%.

HIGH CRASH SEGMENTS:

FORM 511

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
SAFETY OFFICE ANNUAL BENEFIT COST ANALYSIS

1. SUBMITTED BY: ETM, Inc. | FM #: | 5. X SAFETY PRIORITY
2. DATE SUBMITTED: 3/7/2022 | | ENV. STUDY
3. PROJECT NO.: 15-225-45 | | SKID (ID)
4. ALTERNATIVE NO.: Long-Term Phase B | SN: | SPEED: 35 - 55

6. DISTRICT: 5 | COUNTY: Sumter | SECTION: | SR: | U.S. ROAD:

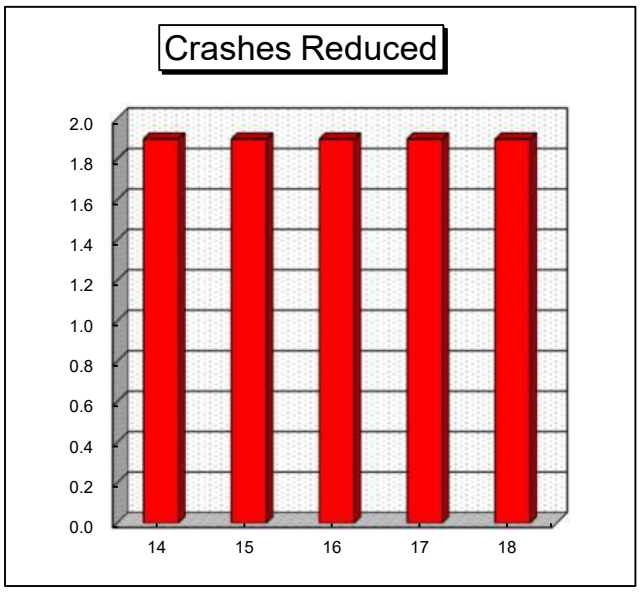
7. BEGIN MILE POST: | END MILE POST: | LENGTH: | NODE:

10. PROPOSED IMPROVEMENTS (LIST AND DISCUSS): Widen the unpaved shoulders to 4' paved shoulder, add ground-in rumble strips on edgeline and Safety Edge.

	YEAR	14	15	16	17	18	AVG
11.	NO.OF CRASHES	3.88	3.88	3.88	3.88	3.88	3.883
12.	NO. CRASHES POTENTIALLY REDUCED BY PROJECT	1.9	1.9	1.9	1.9	1.9	1.9

14. CRASH INFORMATION FOR FACILITY

COST/CRASH $	$523,727
CRASH CLEANUP $	-100
INTEREST RATE	4%



15. ANNUAL COST OF IMPROVEMENTS

	TYPE	COST	LIFE	CRF	AN'L COST
A.	R-O-W	$0	50	0.0725	$0
B.	PECEI	$2,045,560	20	0.0736	$150,553
C.	EARTHWK	$995,754	50	0.0725	$72,192
D.	SIGNAL	$0	15	0.0899	$0
E.	SGN/STRIF	$42,019	8	0.1485	$6,240
F.	RDWY	$2,175,746	20	0.0736	$160,135
G.	MOT/MOBI	$851,583	20	0.0736	$62,676
H.	LIGHTING				$0
I.	CRASH CLEANUP				$190
J.	TOTAL				$451,987

16. BENEFIT: $994,483.94

17. BENEFIT / COST: 2.20

PREPARED BY: Adriann LeBlanc, PE | APPROVED BY: | DATE:

COMMENTS/CRASH REDUCTION METHOD: Cost per crash based on the FDOT's Average Cost per Crash 2-3 Lanes, Undivided, Rural Used CMF ID 9198 - Install safety edge treatment. CMF value = 0.511 and CRF value = 48.9%.

HIGH CRASH SEGMENTS:

Project Name	CR 48 Phase A
Current Year	2022
Project Completion	2025
Project Life	20
Project Category	
Discount Rate	0.04
Project Ends	2044

Widen the unpaved shoulders to 4' paved shoulder, add profiled thermoplastic and add Safety Edge.

Year #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Calendar Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Estimated Cost	4,719,632																											
Estimated Benefits				1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346	1,522,346					
Calculation																												
Discount Factor	1.000	0.962	0.925	0.889	0.855	0.822	0.790	0.760	0.731	0.703	0.676	0.650	0.625	0.601	0.577	0.555	0.534	0.513	0.494	0.475	0.456	0.439	0.422	0.406	0.390	0.375	0.361	0.347
Discounted Cost	-4,719,632	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Discounted Benefits	0	0	0	1,353,360	1,301,308	1,251,257	1,203,132	1,156,858	1,112,363	1,069,580	1,028,442	988,887	950,853	914,282	879,117	845,305	812,793	781,532	751,473	722,570	694,779	668,057	642,362	0	0	0	0	0
NPV	**14,408,677**																											

Project Name	CR 48 Phase B
Current Year	2022
Project Completion	2025
Project Life	20
Project Category	
Discount Rate	0.04
Project Ends	2044

Widen the unpaved shoulders to 4' paved shoulder, add profiled thermoplastic and add Safety Edge.

Year #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Calendar Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Estimated Cost	7,736,703																											
Estimated Benefits				994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484	994,484					
Calculation																												
Discount Factor	1.000	0.962	0.925	0.889	0.855	0.822	0.790	0.760	0.731	0.703	0.676	0.650	0.625	0.601	0.577	0.555	0.534	0.513	0.494	0.475	0.456	0.439	0.422	0.406	0.390	0.375	0.361	0.347
Discounted Cost	-7,736,703	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Discounted Benefits	0	0	0	884,093	850,089	817,393	785,955	755,726	726,660	698,711	671,838	645,998	621,152	597,261	574,290	552,202	530,963	510,541	490,905	472,024	453,869	436,413	419,628	0	0	0	0	0
NPV	**4,759,008**																											

CMF / CRF Details

CMF ID: 9198

Install safety edge treatment

Description: The safety edge is a low-cost treatment that is implemented in conjunction with pavement resurfacing and is intended to help minimize drop-off-related crashes.

Prior Condition: Drop-off pavement edge

Category: Shoulder treatments

Study: *Development Of Crash Modification Factors For The Application Of The Safetyedge Treatment On Two-Lane Rural Roads*, Donnell et al., 2017

Star Quality Rating:	★★★★★ [View score details]

Crash Modification Factor (CMF)	
Value:	0.511
Adjusted Standard Error:	
Unadjusted Standard Error:	0.093

Crash Reduction Factor (CRF)	
Value:	48.9 *(This value indicates a **decrease** in crashes)*

Adjusted Standard Error:	
Unadjusted Standard Error:	9.3

Applicability

Crash Type:	All
Crash Severity:	All
Roadway Types:	Principal Arterial Other
Number of Lanes:	2
Road Division Type:	
Speed Limit:	
Area Type:	Rural
Traffic Volume:	107 to 8368 *Annual Average Daily Traffic (AADT)*
Time of Day:	Not specified

If countermeasure is intersection-based

Intersection Type:	
Intersection Geometry:	
Traffic Control:	
Major Road Traffic Volume:	
Minor Road Traffic Volume:	

Development Details

Date Range of Data Used:	2008 to 2014
Municipality:	

State:	PA
Country:	
Type of Methodology Used:	2
Sample Size Used:	

Other Details

Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	Jun-17-2018
Comments:	Excludes intersection-related crashes and animal-related crashes

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