TECHNICAL REPORT COVERSHEET

DRAFT NOISE STUDY REPORT

Florida Department of Transportation

District One

SR 70 from CR 29 to Lonesome Island Road

Project Development and Environment Study

Highlands County, Florida

Financial Management Number: 414506-5-22-01

ETDM Number: 14364

Date: 7/17/2023

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022 and executed by the Federal Highway Administration and FDOT.

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July 17, 2023

Executive Summary

The Florida Department of Transportation (FDOT), District One, is conducting a Project Development and Environment (PD&E) study to evaluate widening State Road 70 (SR 70) from County Road 29 (CR 29) to Lonesome Island Road in Lake Placid, Highlands County. The project is approximately 4.3 miles in length. The PD&E study is evaluating widening the existing two-lane undivided roadway to a four-lane divided roadway.

The purpose of this Noise Study Report (NSR) is to identify noise sensitive land uses, which are properties adjacent to the project corridor for which there are Noise Abatement Criteria (NAC); to evaluate future traffic noise levels at the properties with and without the proposed improvements, and to evaluate the need for, and effectiveness of, noise abatement measures. Additional objectives include the consideration of potential construction noise impacts and the identification of noise impact contours adjacent to the corridor.

The analysis was performed following FDOT procedures that comply with Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772) - Procedures for Abatement of Highway Traffic Noise and Construction Noise. The evaluation uses methodologies established by the FDOT's Noise Policy (FDOT PD&E Manual – Highway Traffic Noise), and the FDOT's Traffic Noise Modeling and Analysis Practitioners Handbook.

Four receptors (discrete/representative locations of a noise sensitive area) were evaluated. The receptors represented four residences. The residences were evaluated as an Activity Category B land use (an exterior NAC of 66 decibels on the "A"-weighted scale (dB(A)).

The results of the noise analysis indicate that the existing (year 2018) exterior traffic noise levels are predicted to range from 51.5 to 64.0 dB(A). In the future (year 2045) without the proposed project improvements (the No-Build Alternative), exterior traffic noise levels are predicted to range from 54.0 to 66.5 dB(A). In the future with the proposed project improvements (the Recommended Build Alternative), exterior traffic noise levels are predicted to range from 56.1 to 66.8 dB(A).

Based on these results, highway traffic noise levels approach, meet, or exceed the NAC in the future with the proposed project improvements at two of the evaluated receptors. The results of the analysis also indicate that when compared to existing conditions, traffic noise levels with the proposed improvements would not increase more than 6.3 dB(A) at any receptor. As such, the project would not substantially increase highway traffic noise (i.e., an increase of 15 dB(A) or more).

For the two impacted residences, although feasible, traffic management measures, alignment modifications, and buffer zones were determined to be unreasonable abatement measures. A noise barrier was also evaluated. The results of the evaluation indicate that a barrier, although feasible, was not cost reasonable. Based on the results of the evaluation, there appear to be no reasonable solutions to abate the predicted traffic noise impacts at the residences.

Should the proposed improvements change during the project's final design phase such that a re-analysis of highway traffic noise is warranted, and additional impacts are identified in the analysis, another evaluation of noise abatement measures would be performed at that time. The FDOT is committed to the construction of feasible and reasonable noise abatement measures at noise-impacted locations contingent on the following:

1. Detailed noise analyses during the final design process support the need, feasibility, and reasonableness of providing abatement;
2. Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion;
3. Community input supporting types, heights, and locations of the noise barrier(s) is provided to the District Office; and
4. Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved.

The residences are considered to be construction noise and vibration sensitive sites. Implementing the proposed roadway improvements is not expected to have a significant noise or vibration impact on these sites because it is anticipated that application of the FDOT Standard Specifications for Road and Bridge Construction will minimize or eliminate the potential for such impacts. Should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in coordination with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

Land uses such as residences, motels, medical facilities, schools, churches, recreation areas, and parks are considered incompatible with highway traffic noise levels that approach, meet, or exceed the NAC. In order to reduce the possibility of noise-related impacts on land uses that may be approved for construction in the future, noise level contours were developed for the future improved roadway facility. Local officials will be provided a copy of the NSR that delineates/illustrates the contours to promote compatibility between land development and the proposed improvements.

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1.0 Project Overview

1.1 Project Description

The Florida Department of Transportation (FDOT), District One, is conducting a Project Development and Environment (PD&E) study to evaluate widening State Road 70 (SR 70) from County Road 29 (CR 29) to Lonesome Island Road in Lake Placid, Highlands County. The project is approximately 4.3 miles in length. The project study area is shown in **Figure 1-1**. The PD&E study is evaluating widening the existing two-lane undivided roadway to a four-lane divided roadway.

The study is evaluating the need for capacity improvements within the project limits and provides engineering and environmental analysis and documentation along with public involvement. The results of the study will aid FDOT and the FDOT Office of Environmental Management (OEM) for selection of the no build (no action) alternative or the recommended alternative for approval of the Type 2 Categorical Exclusion to grant Location Design Concept Acceptance.

The project was evaluated through FDOT's Efficient Transportation Decision Making (ETDM) process as project #14364. An ETDM *Programming Screen Summary Report* containing comments from the Environmental Technical Advisory Team (ETAT) was published on September 24, 2019. The ETAT evaluated the project's effects on various natural, physical and social resources.

Upon completion, the study will meet all requirements of the National Environmental Policy Act of 1969 (NEPA) as administered by the Federal Highway Administration (FHWA) and the requirements of other federal and state laws so as to qualify the proposed project for federal-aid funding.

1.2 Purpose and Need

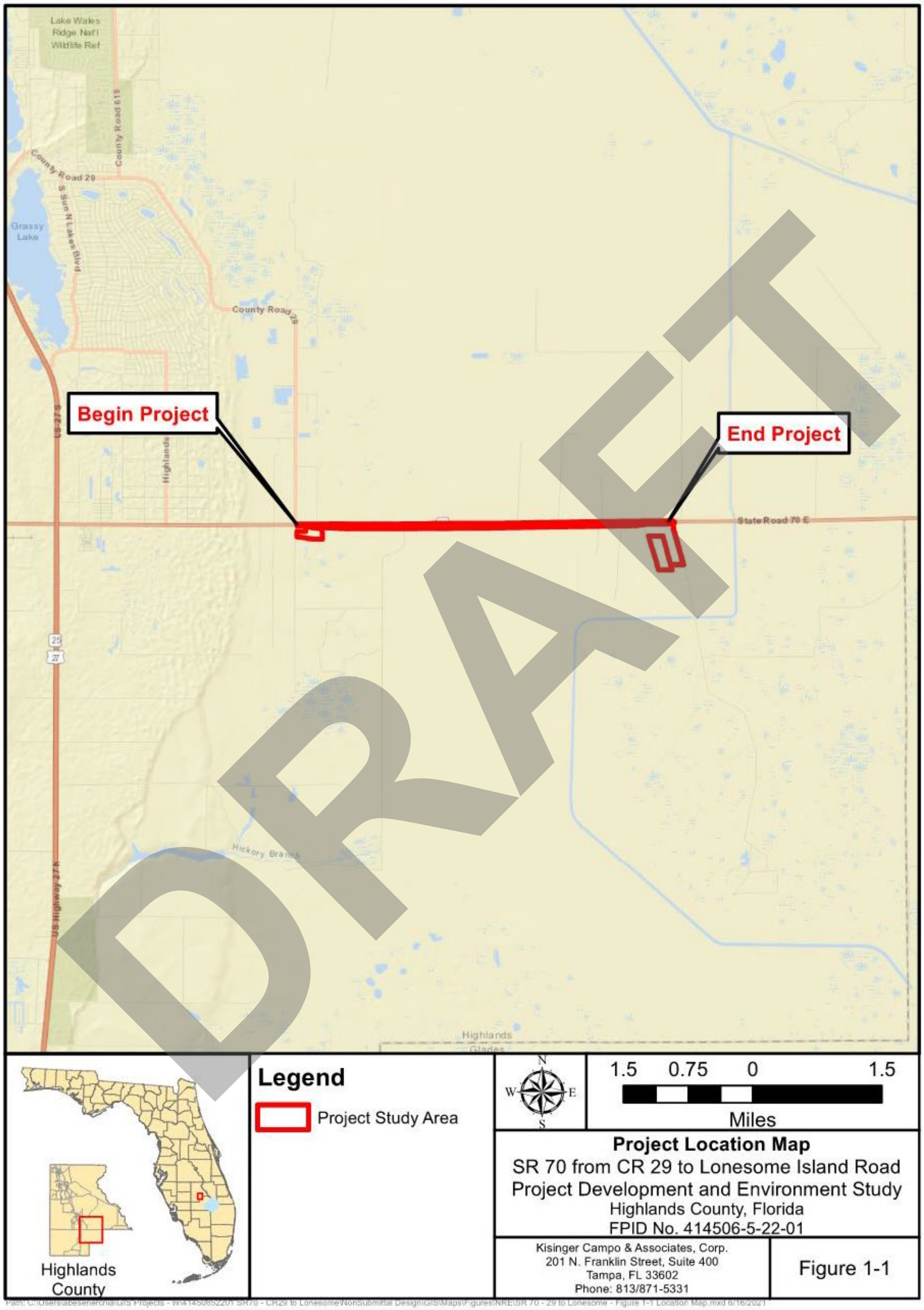
The purpose of this project is to improve roadway deficiencies along SR 70 from CR 29 to Lonesome Island Road. Additionally, the project will enhance operational capacity of the corridor, thereby improving vehicle safety and emergency evacuation/response times as well as access for standard roadway maintenance.

The need for the project is based on existing roadway deficiencies, operational conditions, vehicle safety conditions, and to support economic development, discussed below.

Roadway Deficiencies

Existing sections of the project segment contain pavement distresses (such as severe cracking, rutting, and potholes) as well as failing roadway slopes. The project is additionally located within the 100-year floodplain and prone to flooding. Furthermore, SR 70 is part of Florida's Strategic Intermodal System (SIS). Facilities on the SIS are subject to special standards and criteria for number of lanes, design speed, access, level of service and other requirements. The existing

Figure 1-1. Project Location Map



SR 70 cross-section and geometrics do not meet SIS facility criteria. The potential future widening of the project segment will be built to meet the SIS facility standards and criteria.

Operational Conditions

SR 70 is part of the emergency evacuation route network designated by the Florida Division of Emergency Management (FDEM), as well as the network established by Highlands County. This roadway is critical in facilitating east-west traffic movement and evacuating residents of southern Highlands County. The project segment of SR 70 was deemed critical through the FDEM's Statewide Regional Evacuation Study Program due to vehicle queues lasting among the longest in the Central Florida region under various evacuation scenarios for different storm events.

Clearance time is also critical in emergency response situations. The narrow shoulders along the project corridor, in conjunction with the substandard setback of the guardrails from the roadway and adjacent canals, provide limited space for an emergency service vehicle to pass in response to a situation during periods of congestion. Likewise, inadequate space is provided to accommodate a disabled vehicle to prevent it from obstructing traffic flow.

Accessing the roadway to perform standard maintenance is additionally challenging due to the narrow width of the project corridor. During a maintenance event, a portion of one of the roadway's travel lanes must be closed to accommodate the maintenance vehicle, leading to vehicle queues and increased delays and clearance times.

Safety

The crash rates reported for the project corridor for years 2011 (0.61), 2014 (1.02), & 2015 (1.69) were above the statewide average crash rates reported for similar facilities (a rural undivided facility with 2 – 3 lanes) for the same three years (0.56, 0.73, and 0.78).

Economic

The proposed reconstruction and widening of SR 70 from CR 29 to Lonesome Island Road will enhance the corridor's ability to function as a SIS highway and accomplish SIS objectives for interregional transportation linked to economic development.

1.3 Proposed Action

The proposed action will increase the capacity of the existing two-lane undivided roadway by widening it to a four-lane divided roadway to accomplish the purpose and need described in the previous section.

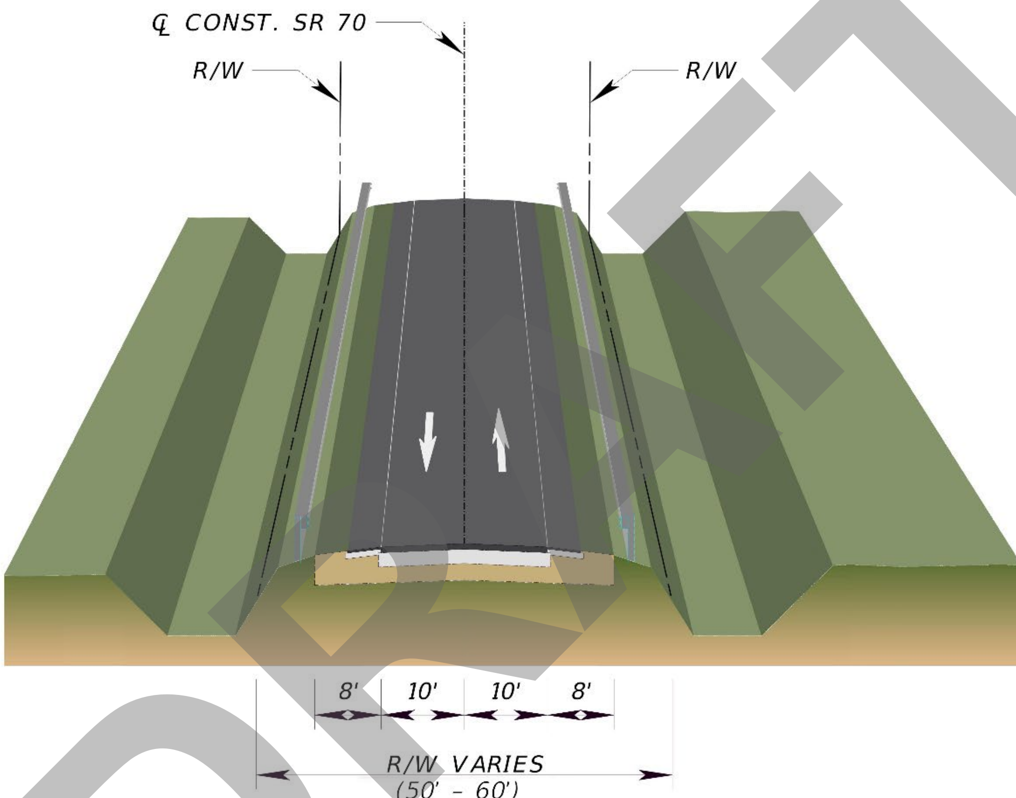
The designation of SR 70 as a SIS facility throughout the project limits presents a key constraint to the design speeds for the project. The FDOT Design Manual, Table 201.5.1, provides design speed controls for SIS facilities. For arterial facilities in rural areas a minimum design speed of 65 miles per hour (mph) is required. Based on these constraints, the following alternatives were developed.

1.3.1 Alternatives

1.3.1.1 No-Build Alternative

The No-Build Alternative remains a viable option throughout the study process. It assumes that both normal and evacuation traffic volumes continue to increase in the future without capacity or operational improvements. The existing typical section with two 10-foot travel lanes and 8-foot shoulders will remain (**Figure 1-2**). Only standard maintenance activities would be conducted along the project. The No-Build Alternative minimizes right-of-way (ROW) and construction costs along with environmental impacts. However, it does not accomplish the purpose and need for this project.

Figure 1-2. Existing Typical Section



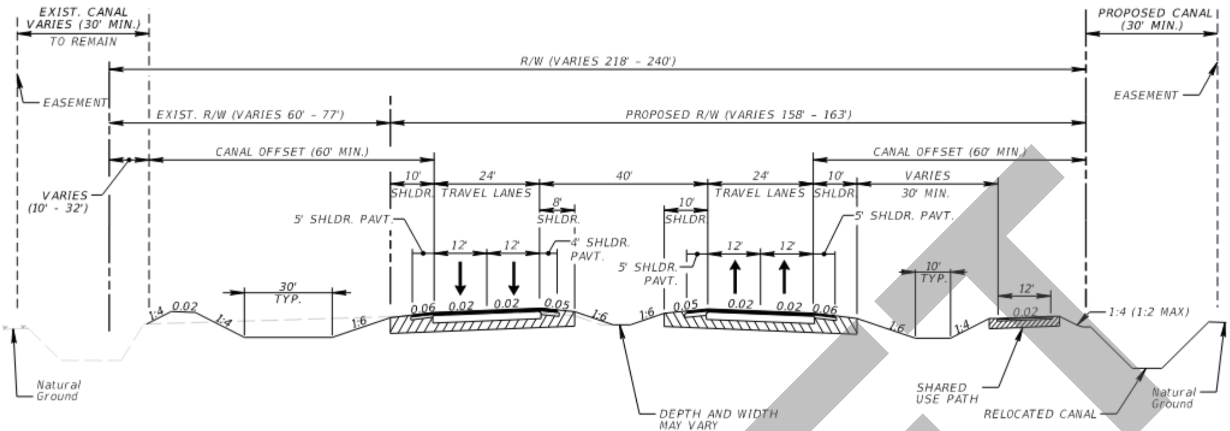
1.3.1.2 Recommended Build Alternative

Based on the ETDM programming screen, several significant natural resources, including conservation easements within the Wetlands Reserve Program (currently the Agricultural Conservation Easement Program), were identified directly north of the existing ROW. To avoid impacting these resources, one (1) build alternative, the southern alignment alternative, was moved forward for further detailed analysis as the Recommended Build Alternative. Due to significant roadway deficiencies, the existing travel lanes will be taken out of service.

The Recommended Build Alternative includes the construction of two (2) new undivided travel lanes to the south of the existing SR 70 travel lanes. SR 70 will operate as a four-lane divided facility under the build condition. The Recommended Build Alternative's typical section includes

12-foot travel lanes, 10-foot (5-foot paved) outside shoulders, 8-foot median shoulders and a 12-foot shared use path (**Figure 1-3**).

Figure 1-3. Build Alternative Typical Section



1.4 Pond Sites

There are three (3) preferred pond sites associated with the Recommended Build Alternative described above. Of those three (3) sites, there are two (2) proposed floodplain compensation (FPC) ponds, one (1) proposed linear treatment stormwater management facility (SMF). The linear treatment ponds will be constructed parallel to SR 70 within the proposed ROW. The pond site footprints were included in the project study area for analysis and field reviews to determine any potential impacts.

1.5 Purpose of Report

The purpose of this Noise Study Report (NSR) is to identify noise sensitive land uses, which are properties adjacent to the project corridor for which there are Noise Abatement Criteria (NAC); to evaluate future traffic noise levels at the properties with and without the proposed improvements, and to evaluate the need for and effectiveness of noise abatement measures. Additional objectives include the consideration of potential construction noise impacts and the identification of noise impact contours adjacent to the corridor.

2.0 Methodology

The highway traffic noise analysis discussed in this NSR was prepared in accordance with Part 772 of Title 23 of the Code of Federal Regulations (23 CFR 772) - Procedures for Abatement of Highway Traffic Noise and Construction Noise, the policies/procedures documented in the FDOT's Noise Policy (FDOT PD&E Manual - Highway Traffic Noise), and guidance from the FDOT's Traffic Noise Modeling and Analysis Practitioners Handbook.

This NSR section describes the sound level metrics and motor vehicle traffic data that were used to prepare the analysis and the criteria used to determine if a future design year (year 2045) traffic noise level with the new roadway would be considered an impact. Potential noise abatement measures and noise contours are also described.

2.1 Noise Metrics

The predicted highway traffic noise levels presented in this report are expressed in decibels on the "A"-weighted scale (dB(A)). This scale most closely approximates the response characteristics of the human ear to traffic noise. The noise levels in this NSR are reported as equivalent levels (Leq), which are equivalent steady-state sound levels that contain the same acoustic energy as time-varying sound levels over a period of one hour (Leq(h)).

The prediction of existing and future highway traffic noise levels with and without the roadway improvements was performed using the FHWA's computer model for highway traffic noise prediction and analysis – the Traffic Noise Model (TNM, Version 2.5). The TNM propagates sound energy, in one-third octave bands, between highways and nearby receptors taking the intervening ground's acoustical characteristics/topography and rows of buildings into account.

2.2 Traffic Data

Traffic noise levels are low when traffic volumes are low (LOS A or B) and when traffic is so congested that movement is slow (LOS D, E, or F). For the purpose of a highway traffic noise assessment, it is assumed that the maximum hourly traffic noise level occurs between these two conditions—when operating conditions are considered to be LOS C. As such, the traffic volume characteristics used in the analysis reflect either the forecast demand volumes, if the level met the LOS A or B criteria, or the LOS C volume, whichever is less. The operating conditions used in TNM to predict existing (year 2018) highway traffic noise and future (year 2045) levels with and without the Recommended Build Alternative are summarized in **Table 2-1**. Detailed project-related traffic data are provided in **Appendix A**.

Table 2-1. Hourly Traffic Volumes/Speeds Used in TNM

Scenario	Peak Direction Volume	Off-Peak Direction Volume	Demand or LOS C	Posted Speed (mph)
Existing (2018)	268	188	Demand	60
No-Build (2045)	486	340	Demand	60
Build (2045)	486	340	Demand	60

Note: Detailed traffic data are provided in Appendix A.

2.3 Noise Abatement Criteria

Noise-sensitive land uses occur where frequent human use occurs. To evaluate traffic noise at these properties, the FHWA established Noise Abatement Criteria (NAC). As shown in **Table 2-2**, the criteria vary according to the activity category for the land use of a property. For comparative purposes, typical noise levels for common indoor and outdoor activities are shown in **Table 2-3**.

Table 2-2. FHWA/FDOT Noise Abatement Criteria [Leq(h) Expressed in dB(A)]

Activity Category	Description of Activity Category	Activity Leq(h)[1]	
		FHWA	FDOT
A	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.	57 (Exterior)	56 (Exterior)
B[2]	Residential.	67 (Exterior)	66 (Exterior)
C[2]	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.	67 (Exterior)	66 (Exterior)
D	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.	52 (Interior)	51 (Interior)
E[2]	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.	72 (Exterior)	71 (Exterior)
F	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.	--	--
G	Undeveloped lands that are not permitted.	--	--

1 The Leq(h) Activity Criteria values are for impact determination only and are not design standards for noise abatement measures.
2 Includes undeveloped lands permitted for this activity category.
Source: CFR, Title 23, Part 772.

When predicted traffic noise levels approach, meet, or exceed the NAC, or when predicted future noise levels increase substantially from existing levels, the FHWA requires that noise abatement measures be considered. FDOT has determined that the NAC is approached when it is within 1 dB(A) of the NAC. The FDOT's NAC are also shown in Table 2-2. Additionally, the FDOT criteria states that a substantial increase would occur if traffic noise levels are predicted to increase 15 dB(A) or more above existing conditions as a direct result of a transportation improvement project.

Table 2-3. Typical Noise Levels

COMMON OUTDOOR ACTIVITIES	NOISE LEVEL dB(A)	COMMON INDOOR ACTIVITIES
	---110---	Rock Band
Jet Fly-over at 1000 ft		
	---100---	
Gas Lawn Mower at 3 ft		
	---90---	
Diesel Truck at 50 ft, at 50 mph		Food Blender at 1 m (3 ft)
	---80---	Garbage Disposal at 1 m (3 ft)
Noise Urban Area (Daytime)		
Gas Lawn Mower at 100 ft	---70---	Vacuum Cleaner at 10 ft
Commercial Area		Normal Speech at 3 ft
Heavy Traffic at 300 ft	---60---	
		Large Business Office
Quiet Urban Daytime	---50---	Dishwasher Next Room
Quiet Urban Nighttime	---40---	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime		
	---30---	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (Background)
	---20---	
	---10---	
	---0---	
Lowest Threshold of Human Hearing		Lowest Threshold of Human Hearing
Source: California Dept. of Transportation Technical Noise Supplement, Oct. 1998, Page 18.		

2.4 Noise Abatement Measures

When traffic noise impacts are predicted, noise abatement measures are considered for the impacted properties. The following subsections of this NSR present and discuss four methods of abating traffic noise impacts.

2.4.1 Traffic Management

Some traffic management measures can reduce motor vehicle-related noise. For example, trucks can be prohibited from certain streets and roads, or be permitted to only use certain streets and roads during daylight hours. The timing of traffic lights can also be changed to smooth out the flow of traffic and eliminate the need for frequent stops and starts. Reducing speed limits and increasing enforcement of speed limits is also an effective method of reducing motor vehicle noise.

2.4.2 Alignment Modifications

Modifying the alignment of a roadway can also be an effective traffic noise mitigation measure. When the horizontal alignment is shifted away from a noise sensitive land use, the sound level is reduced for the land uses that are farther from the roadway than before the shift. In certain circumstances, when a change is made to the vertical alignment (i.e., shifting the alignment so that it is below or above the elevation of a land use), highway traffic noise may be reduced due to shielding.

2.4.3 Buffer Zones

Providing a buffer between a roadway and future noise sensitive land uses is an abatement measure that can minimize/eliminate noise impacts in areas of future development. To encourage use of this abatement measure through local land use planning, noise contours have been developed and are further discussed in Section 2.4.3.1. To abate traffic noise for an existing land use using this abatement measure, the property would have to be acquired.

2.4.3.1 Noise Contours

Land uses such as residences, motels, medical facilities, schools, churches, recreation areas, and parks are considered incompatible with highway noise levels that approach, meet, or exceed the NAC. In order to reduce the possibility of additional traffic noise-related impacts, noise level contours were developed for the future improved roadway facility to estimate where an approach of the NAC is predicted to occur. Specifically, these noise contours delineate the distance from the improved roadway's edge-of-pavement to where 56, 66, and 71 dB(A) (FDOT and FHWA Activity Categories A, B/C, and E, respectively) are expected to occur in the future (year 2045) with the proposed project improvements.

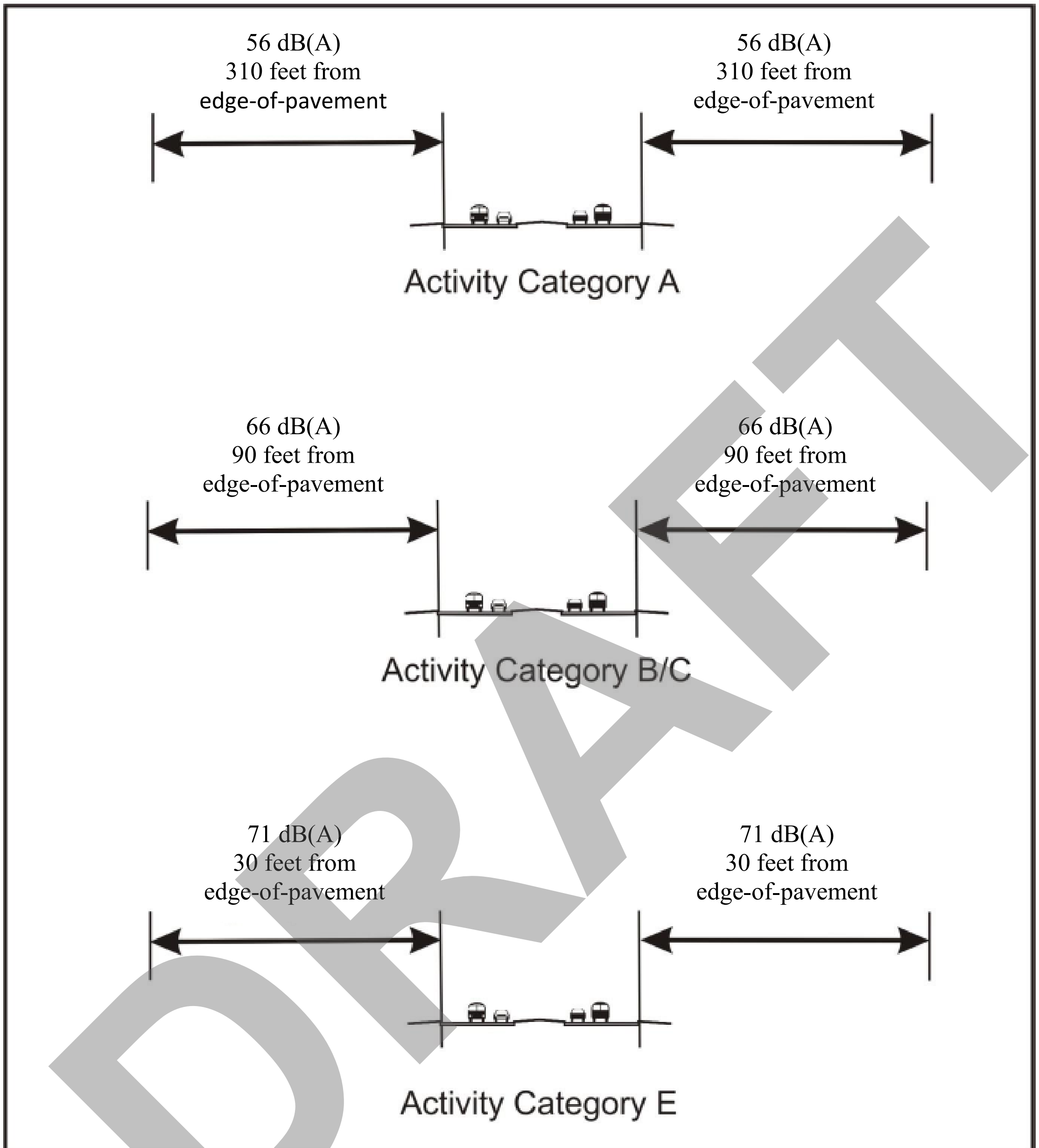
The contours are shown in **Table 2-4** and in **Figure 2-1**. Within the project limits, the contours extend from 30 to 310 feet from the improved roadway's edge-of-pavement. Local officials will be provided with a copy of the NSR to promote compatibility between land development and the proposed improvements.

Table 2-4. Noise Contours

Distance From Improved Roadway's Edge-of-Pavement (feet)*		
Activity Category A 56 dB(A)	**Activity Category B/C 66 dB(A)**	**Activity Category E 71 dB(A)**
310	90	30

*See Table 2-2 for a description of the activities that occur within each category. Distances do not reflect any reduction in noise levels that would occur from existing structures (shielding) and should be used for planning purposes only.

Figure 2-1. Noise Contours



2.4.4 Noise Barriers

Noise barriers have the potential to reduce traffic noise by interrupting the sound path between the motor vehicles on a roadway and a noise sensitive land use next to the roadway. To effectively reduce traffic noise, a barrier must be relatively long, continuous, and sufficiently tall. Use of noise barriers is the most common traffic noise abatement measure. Generally, noise barriers are most effective when placed as close to the noise source or as close to the noise receptor as possible.

2.4.5 Feasible and Reasonable Abatement Measures

For PD&E studies, to be considered a potential noise abatement measure, the following criteria must be met:

- Minimum Noise Reduction – To meet the minimum noise reduction criteria, an abatement measure must provide at least a 5 dB(A) reduction in traffic noise for two or more impacted noise sensitive receptors and provide a 7 dB(A) reduction, the FDOT's Noise Reduction Design Goal (NRDG), for one or more benefited receptors. Failure of a measure to provide at least a 5 dB(A) reduction for two or more impacted receptors results in a measure being deemed not feasible. Failure to achieve the NRDG results in a measure being deemed not reasonable.

- Cost Effectiveness Criteria – Based on FDOT's Noise Policy, to be considered a reasonable abatement measure, the measure should cost no more than $42,000 per benefited noise sensitive receptor (a benefited receptor is one that receives at least a 5 dB(A) reduction in nose from a mitigation measure). The FDOT currently uses an estimated cost of $30 per square foot for noise barrier-related materials and labor.

If the results of an abatement measure evaluation indicate that a measure would provide at least the minimum required reduction in traffic noise at a cost that is less than the cost effectiveness criteria, additional factors are considered. Depending on the measure, feasibility factors relate to design and construction (i.e., given site-specific details, can an abatement measure be implemented), safety, accessibility, Right-of-Way requirements, maintenance, and impacts on utilities and/or drainage. Because the analysis is performed on conceptual designs for roadway improvements, noise abatement measures are only identified as being potentially feasible and reasonable at the conclusion of a project's PD&E phase. For such measures, the FDOT makes a commitment to perform detailed analysis in the project's design phase (including obtaining the viewpoints of the property owners and/or residents of the benefited properties) when the final construction plans for an improvement are prepared.

3.0 Noise Analysis

3.1 Model Validation

As previously stated, existing and future noise levels with and without the Recommended Build Alternative were modeled using the TNM. To validate the TNM and verify that the model accurately predicts the existing traffic noise levels, field sound levels measurements were obtained within the project corridor. Traffic data recorded during each measurement period included motor vehicle volumes, vehicle mix, vehicle speeds. Meteorological conditions were also recorded.

The field measurements were conducted in accordance with the FHWA's *Noise Measurement Handbook*. The measurements were obtained using a Larson Davis 831 (Type 1) and an LxT (Type 2) integrating sound level meters (SLMs). The SLMs were calibrated before and after the measurement periods with a Larson Davis CAL200 calibrator.

The recorded traffic data were used as input for the TNM to determine if, given the topography and actual site conditions of the area, the computer model could "re-create" the measured levels with the existing roadway. Following FDOT policy, a noise prediction model is considered within an acceptable level of accuracy if the measured and predicted noise levels are within a tolerance standard of 3 dB(A). The validation results are shown in **Table 3-1.**

As shown, the ability of the model to predict noise levels within an acceptable level of accuracy (plus or minus 3 dB(A)) for the project was confirmed. The measured levels were lower than the modeled levels due to intermittent traffic flow (i.e., periods during the measurements when there were no vehicles driving past the SLMs). The TNM only predicts steady flow traffic noise. Documentation in support of the validation is provided in **Appendix B**.

Table 3-1. Validation Data

Location	Measurement Period	Measured Noise Level (dB(A))	Modeled Noise Level (dB(A))	Difference (Measured – Modeled)
Site 1 – East end of the project, 100 feet south of edge-of-pavement.	1	62.4	65.0	-2.6
	2	63.4	65.8	-2.4
	3	62.5	65.4	-2.9
Site 2 – East end of project, same distance from edge-of-pavement as front façade of Receptor #3 (92 feet)	1	63.2	65.5	-2.3
	2	64.1	66.2	-2.1
	3	63.4	65.9	-2.5

Note: The field measurement locations are identified on the project aerials (Sheet No. 16) in Appendix C of this report.

3.2 Noise Sensitive Land Uses

Within the project limits, four properties with noise sensitive land uses have the potential to be impacted by highway traffic noise as a result of the proposed project improvements. The land use review that identified these properties was performed on May 4, 2023. Note that another land use review will be conducted during the project's design phase to identify any noise sensitive land uses issued a building permit between May 4, 2023, and the project's Date of Public Knowledge, which is yet to be determined, and if any are identified, traffic noise impacts would be evaluated at those locations.

Following FHWA/FDOT guidance, the four noise sensitive land uses, all residences, were evaluated as Activity Category B and abatement was considered if the predicted future traffic noise level with the improvements was 66 dB(A) or greater. The four properties were evaluated using four receptors (i.e., discrete or representative locations of a noise sensitive land use). The locations of the four receptors are shown on the project aerials (Sheet Nos. 2, 4, and 16) in **Appendix C**.

3.3 Predicted Traffic Noise Levels

The predicted noise levels are shown in **Table 3-2**. The results of the analysis indicate that the existing (year 2018) exterior traffic noise levels range from 51.5 to 64.0 dB(A). In the future (year 2045) without the proposed project improvements (the No-Build Alternative), exterior traffic noise levels are predicted to range from 54.0 to 66.5 dB(A). In the future with the proposed project improvements (the Recommend Build Alternative), exterior traffic noise levels are predicted to range from 56.1 to 66.8 dB(A). Based on the results of the analysis, highway traffic noise levels in the future with the proposed improvements are predicted to approach, meet, or exceed the NAC at two of the residences (Receptors #3 and #4).

The results of the analysis also indicate that when compared to existing conditions, traffic noise levels with the proposed improvements would not increase more than 6.3 dB(A) at any of the receptors. As such, the project would not substantially increase highway traffic noise (i.e., an increase of 15 dB(A) or more) at any of the evaluated receptors.

Table 3-2. Summary of the Traffic Noise Levels

Receptor #	Land Use	Activity Category/ NAC (dB(A))	Predicted Traffic Noise Levels (dB(A))			Increase from Existing (dB(A))	Approaches, Meets, or Exceeds the NAC?
			Existing (2018)	No-Build (2045)	Build (2045)		
1	Residence	B / 66	54.1	56.7	56.1	2.0	No
2	Residence	B / 66	51.5	54.0	57.8	6.3	No
3	Residence	B / 66	63.6	66.2	66.4	2.8	Yes
4	Residence	B / 66	64.0	66.5	66.8	2.8	Yes

Note: Receptor locations are shown on the project aerials in Appendix C.

3.4 Noise Abatement Considerations

As previously stated, when traffic noise impacts are predicted, noise abatement measures are considered for the impacted properties. The following discusses the FDOT's consideration of each of the measures for the two receptors that are predicted to be impacted by traffic noise with the improvements to SR 70.

3.4.1 Traffic Management

Reducing traffic speeds and/or the traffic volume or changing the motor vehicle fleet is inconsistent with the goal of increasing operational capacity of the roadway. Therefore, traffic management measures are not considered to be a reasonable measure to abate the predicted traffic noise impacts.

3.4.2 Alignment Modification

As discussed previously, the Recommended Build Alternative includes the construction of two new travels lanes to the south of the existing SR 70 to avoid impacting natural resources located north of the existing ROW. Additionally, suppressing the roadway's vertical alignment to create a natural berm between the highway and receptors would not be possible since the project area is prone to flooding and raising the vertical alignment of the new roadway would be too costly. Therefore, a modification of the alignment of the roadway is not considered to be a reasonable noise abatement measure.

3.4.3 Buffer Zones

As previously stated, to abate predicted traffic noise at an existing noise sensitive land use, the impacted property would have to be acquired. As also previously stated, to be considered a cost-effective measure, the cost of abatement should cost no more than \$42,000 per benefited receptor. A review of data from the Highlands County Property Appraiser indicates that the cost to acquire the impacted properties adjacent to the SR 70 Project would exceed the cost-effective limit. Therefore, creating a buffer zone by acquiring the properties is not considered to be a reasonable noise abatement measure.

3.4.4 Noise Barriers

As previously stated, to be considered reasonable and feasible, an abatement measure must provide at least a 5 dB(A) reduction in predicted traffic noise for at least two impacted receptors, cost no more than \$42,000 per benefited receptor, and achieve the NRDG of 7 dB(A) for one or more benefited receptors. The TNM was used to evaluate the potential for a noise barrier to be a reasonable and feasible noise abatement measure for the two traffic noise impacted residences at the east end of the project.

The noise barrier was evaluated 12 feet inside the FDOT ROW. This places the barrier on the shoulder of SR 70. The shoulder barrier was evaluated at a minimum height of 8 feet to the maximum allowable height of 14 feet in two-foot increments. The results of the noise barrier evaluation are shown in **Table 3-3**. As shown, the barrier could reduce traffic noise by at least 5 dB(A) at both impacted receptors and achieve the NRDG of 7 dB(A) to at least one benefited receptor at heights of 12 and 14 feet. However, the cost exceeds $42,000 per benefited receptor at these heights. As such, a noise barrier is not considered a reasonable abatement measure for the two impacted residences.

Table 3-3. Noise Barrier Evaluation Results

Noise Barrier		Noise Reduction at Impacted Receptors (dB(A))[1]			Number of Benefited Receptors[2]			Total Estimated Cost[3]	Cost per Benefited Receptor[4]	Cost Reasonable Yes/No
Height (feet)	Length (feet)	5 - 5.9	6 – 6.9	≥7	Impacted	Not Impacted	Total			
Number of Impacted Residences = 2										
8	NA[5]	2	0	0	2	0	2	NA[5]	NA[5]	NA[5]
10	NA[5]	2	0	0	2	0	2	NA[5]	NA[5]	NA[5]
12	619	0	1	1	2	0	2	$222,840	$111,420	No
14	479	0	1	1	2	0	2	$201,180	$100,590	No

[1] Receptors with a predicted noise level of 66 dB(A) or greater.
[2] Receptors with a predicted reduction of 5 dB(A) or more are considered benefited.
[3] Based on a unit cost of $30 per square foot.
[4] FDOT cost reasonable criterion is $42,000 per benefited receptor.
[5] The NRDG could not be achieved at any length at this height.

4.0 Conclusions

The results of the highway traffic noise analysis indicate that two residences (Activity Category B) located at the east end of the project would be impacted by traffic noise in the design year (2045) with the proposed improvements (the Recommended Build Alternative). As such, noise abatement measures were evaluated for the impacted residences.

Although feasible, traffic management measures, alignment modifications, and buffer zones were determined to be unreasonable abatement measures. A noise barrier was also evaluated. The results of the evaluation indicate that a barrier, although feasible, was not cost reasonable. Based on the results of the evaluation, there appear to be no reasonable solutions to abate the predicted traffic noise impacts at the residences.

Should the proposed improvements change during the project's design phase such that a re-analysis of highway traffic noise is warranted and additional impacts are identified in the analysis, another evaluation of noise abatement measures would be performed at that time. The FDOT is committed to the construction of feasible and reasonable noise abatement measures at noise-impacted locations contingent on the following:

1. Detailed noise analyses during the final design process support the need, feasibility, and reasonableness of providing abatement;
2. Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion;
3. Community input supporting types, heights, and locations of the noise barrier(s) is provided to the District Office; and
4. Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved.

5.0 Construction Noise and Vibration

The residences within the project limits are considered to be construction noise and vibration sensitive sites. Construction of the proposed roadway improvements is not expected to have any significant noise or vibration impacts on these properties. If sensitive land uses develop adjacent to the roadway prior to construction, increased potential for noise or vibration impacts could result. It is anticipated that the application of the FDOT Standard Specifications for Road and Bridge Construction will minimize or eliminate potential construction noise and vibration impacts. However, should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in coordination with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

6.0 Community Coordination

The FDOT has scheduled a Public Hearing for July 25, 2023, at the Lake Placid Camp and Conference Center. The hearing will inform the public of the results of the PD&E Study and provide the opportunity for the public to express their views regarding specific location, design, socio-economic effects, and environmental impacts associated with the No-Build and the Recommended Build Alternative.

Upon approval of the project's environmental document, a copy of the final NSR will be provided to the Highlands County Community Development office for their use associated with planning for development after the Date of Public Knowledge. Noise contours are discussed in Section 2.4.3.1 and shown in Table 2-4 and in Figure 2-1 to assist planning and zoning with a best estimate on distances from the proposed edge-of-pavement at which traffic noise levels would meet or exceed the FDOT's NAC for Activity Categories A through E.

7.0 References

FDOT. Project Development and Environment Manual, Part 2, Chapter 18 – Highway Traffic Noise, July 2020.
https://www.fdot.gov/environment/pubs/pdeman/pdeman-current

FDOT. Traffic Noise Modeling and Analysis Practitioners Handbook, December 2018.
https://www.fdot.gov/environment/publications.shtm

FHWA. Report FHWA-HEP-18-065, Noise Measurement Handbook: Final Report, June 2018.
https://www.fhwa.dot.gov/environment/noise/measurement/fhwahep18065.pdf

Title 23 CFR § 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, Tuesday, July 13, 2010.
http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title23/23cfr772_main_02.tpl

California Department of Transportation. Technical Noise Supplement to the Traffic Noise Analysis Protocol, September 2013.
https://dot.ca.gov/programs/environmental-analysis/noise-vibration

FHWA. Report Number FHWA-PD-96-009, FHWA Traffic Noise Model User's Guide (Version 2.5 Addendum). April 2004.
http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/tnm_v25/users_manual/index.cfm

FHWA. Report Number FHWA-HEP-10-025, Highway Traffic Noise: Analysis and Abatement Guidance. December 2011.
https://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf

FDOT. Standard Plans for Road and Bridge Construction. July 2022.
https://www.fdot.gov/design/standardplans/default.shtm

Appendix A Traffic Data

TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT
FDOT DISTRICT 1

Federal Aid Number(s):	
FPID Number(s):	414506-5-22-01
State/Federal Route No.:	SR 70
Road Name:	Fritz Street
Project Description:	SR 70 PD&E Study
Segment Description:	SR 70 from CR 29 to Lonesome Island Road
Section Number:	9060000
Mile Post To/From:	17.255 to 19.805

Existing Facility:

Year:	2018	D =	58.83%	%
		T24 =	22.00%	% of 24 Hour Volume
		Tpeak =	11.00%	% of Design Hour Volume
		MT =	3.00%	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	670	HT =	8.00%	% of Design Hour Volume
Demand Peak Hour Volume:	268	B =	0.11%	% of Design Hour Volume
Posted Speed:	60	MC =	0.10%	% of Design Hour Volume

No Build Alternative (Design Year):

Year:	2045	D =	58.83%	%
		T24 =	22.00%	% of 24 Hour Volume
		Tpeak =	11.00%	% of Design Hour Volume
		MT =	3.00%	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	670	HT =	8.00%	% of Design Hour Volume
Demand Peak Hour Volume:	486	B =	0.11%	% of Design Hour Volume
Posted Speed:	60	MC =	0.10%	% of Design Hour Volume

Build Alternative (Design Year):

Year:	2045	D =	58.83%	%
		T24 =	22.00%	% of 24 Hour Volume
		Tpeak =	11.00%	% of Design Hour Volume
		MT =	3.00%	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	1530	HT =	8.00%	% of Design Hour Volume
Demand Peak Hour Volume:	486	B =	0.11%	% of Design Hour Volume
Posted Speed:	60	MC =	0.10%	% of Design Hour Volume

I certify that the above information is accurate and appropriate for use with the traffic noise analysis

Prepared By: Elizabeth Fernandez (Print Name) Elizabeth Fernandez (Signature) Date: 1/7/2019

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis

FDOT Reviewer: Christopher Simpson (Print Name) (Signature) Date: 1/15/2019

FDOT TRAFFIC DATA FOR NOISE STUDIES - DETAILED OUTPUT

Prepared By: Elizabeth Fernandez **Date:** 1/7/2019 **Approved for Use By:** ______ **Date:** ______

Federal Aid Number(s): ______ **Section Number:** 9060000

FPID Number(s): 414506-5-22-01 **Mile Post To/From:** 17.255 to 19.805

State/Federal Route No.: SR 70

Road Name: Fritz Street

Project Description: SR 70 PD&E Study

Segment Description: SR 70 from CR 29 to Lonesome Island Road

Note: Data sheets are to be completed for each segment having a change in traffic parameters (i.e., volume posted speed, typical section)

Demand Peak Hour/LOS C	Peak or Off-Peak Direction	Vehicle Type	Existing	No Build (Design Year)	Build (Design Year)
			Year: 2018	Year: 2045	Year: 2045
			Posted Speed: 60	Posted Speed: 60	Posted Speed: 60
			Number of Travel Lanes: 2	Number of Travel Lanes: 2	Number of Travel Lanes: 4
			Number of Vehicles	Number of Vehicles	Number of Vehicles
See Columns to Right > for Which Volumes To Use (Demand or LOS C)			Use Demand Volumes	Use Demand Volumes	Use Demand Volumes
Demand Peak Hour	Peak Direction	Autos	237	430	430
		Med Trucks	8	15	15
		Heavy Trucks	21	39	39
		Buses	1	1	1
		Motorcycles	1	1	1
		Total	268	486	486
	Off-Peak Direction	Autos	165	301	301
		Med Trucks	6	10	10
		Heavy Trucks	15	27	27
		Buses	1	1	1
		Motorcycles	1	1	1
		Total	188	340	340
LOS C	Peak Direction	Autos	594	594	1358
		Med Trucks	20	20	46
		Heavy Trucks	54	54	122
		Buses	1	1	2
		Motorcycles	1	1	2
		Total	670	670	1530
	Off-Peak Direction	Autos	594	594	1358
		Med Trucks	20	20	46
		Heavy Trucks	54	54	122
		Buses	1	1	2
		Motorcycles	1	1	2
		Total	670	670	1530

Appendix B Validation Documentation

NOISE MEASUREMENT DATA SHEET

Measurements Taken By: Wayne Arner, CMT Date: 5-4-23

Time Run 1 Started: 13:25 pm Time Run 1 Ended: 13:35 pm
Time Run 2 Started: 13:46 pm Time Run 2 Ended: 13:56 pm
Time Run 3 Started: 14:08 pm Time Run 3 Ended: 14:18 pm

Project Identification:

Financial Project ID: 414506-5-22-01
Project Location: SR 70 from CR 29 to Lonesome Island Rd
Site Identification: East end of project, south side of SR 70

Weather Conditions:

Sky: Clear X Partly Cloudy Cloudy Other
Temperature 85F Wind Speed 3 mph Wind Direction E Humidity 44%

Equipment:

Sound Level Meter:

Type: Larson Davis 831/LxT
Did you check the battery? Yes X
Calibration Readings: Start 114.0/114.0 End 114.1/114.1
Response Settings: Slow
Weighting: A

Calibrator:

Type: LD CAL200
Did you check the battery? Yes

TRAFFIC DATA (Run 1/Run 2/Run 3)

Roadway Identification	SR 70 WB		SR 70 EB	
Vehicle Type	Volume	Speed (mph)	Volume	Speed (mph)
Autos	25/28/27	61/56/68	31/12/23	62/64/68
Medium Trucks	3/4/2	51/55/59	1/0/0	60/na/na
Heavy Trucks	9/12/8	55/60/57	3/3/3	63/61/65
Buses	0/0/0	na/na/na	0/0/0	na/na/na
Motorcycles	0/0/0	na/na/na	0/0/0	na/na/na
Duration	Three 10-minute sample periods		Three 10-minute sample periods	

RESULTS [dB(A)] (831/LxT)

L_{EQ} 63.2/62.4 (Run 1), 64.1/63.4 (Run 2), 63.4/62.5 (Run 3)

Primary Noise: Traffic on SR 70

Background Noise: Flyovers, birds, and passbys on access road. Intermittent traffic during all three runs with measured levels dropping to the mid-30s dB(A).

Appendix C Project Aerials

LEGEND

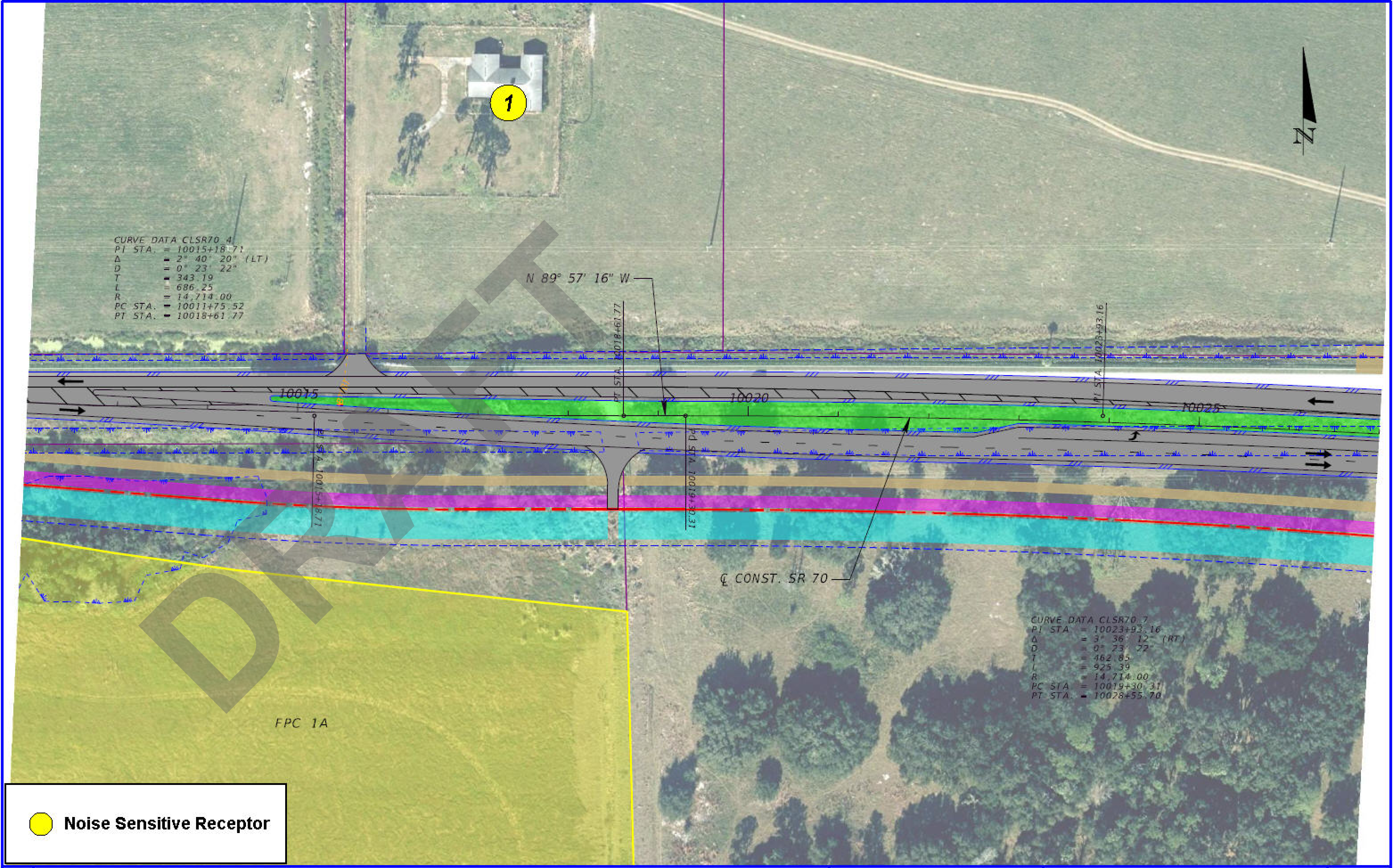
PROPOSED RIGHT-OF-WAY	PROPOSED GRASS MEDIAN	RELOCATED CANAL
EXISTING PROPERTY LINE	PROPOSED PAVEMENT	PROPOSED SWALE
EASEMENT	PROPOSED SHOULDER	PROPOSED POND
WETLAND & OTHER SURFACE WATERS	PROPOSED SHARED USE PATH	POTENTIAL RELOCATION

0 20 100
Feet
DATE OF AERIAL: 2020

Kisinger Campo & Associates Corp.
201 N. Franklin Street, Suite 400
Tampa, Florida 33602
Phone: (813) 871-5331
Florida Certificate of Authorization No. 02317
Alejandro Mendez, P.E. No. 77055

SR 70 PD&E STUDY
From CR 29 to Lonesome Island Rd.
Concept Plans

SHEET NO.



LEGEND

PROPOSED RIGHT-OF-WAY
EXISTING PROPERTY LINE
EASEMENT
WETLAND & OTHER SURFACE WATERS
PROPOSED GRASS MEDIAN
PROPOSED PAVEMENT
PROPOSED SHOULDER
PROPOSED SHARED USE PATH
RELOCATED CANAL
PROPOSED SWALE
PROPOSED POND

0 20 100
Feet
DATE OF AERIAL: 2020
R POTENTIAL RELOCATION

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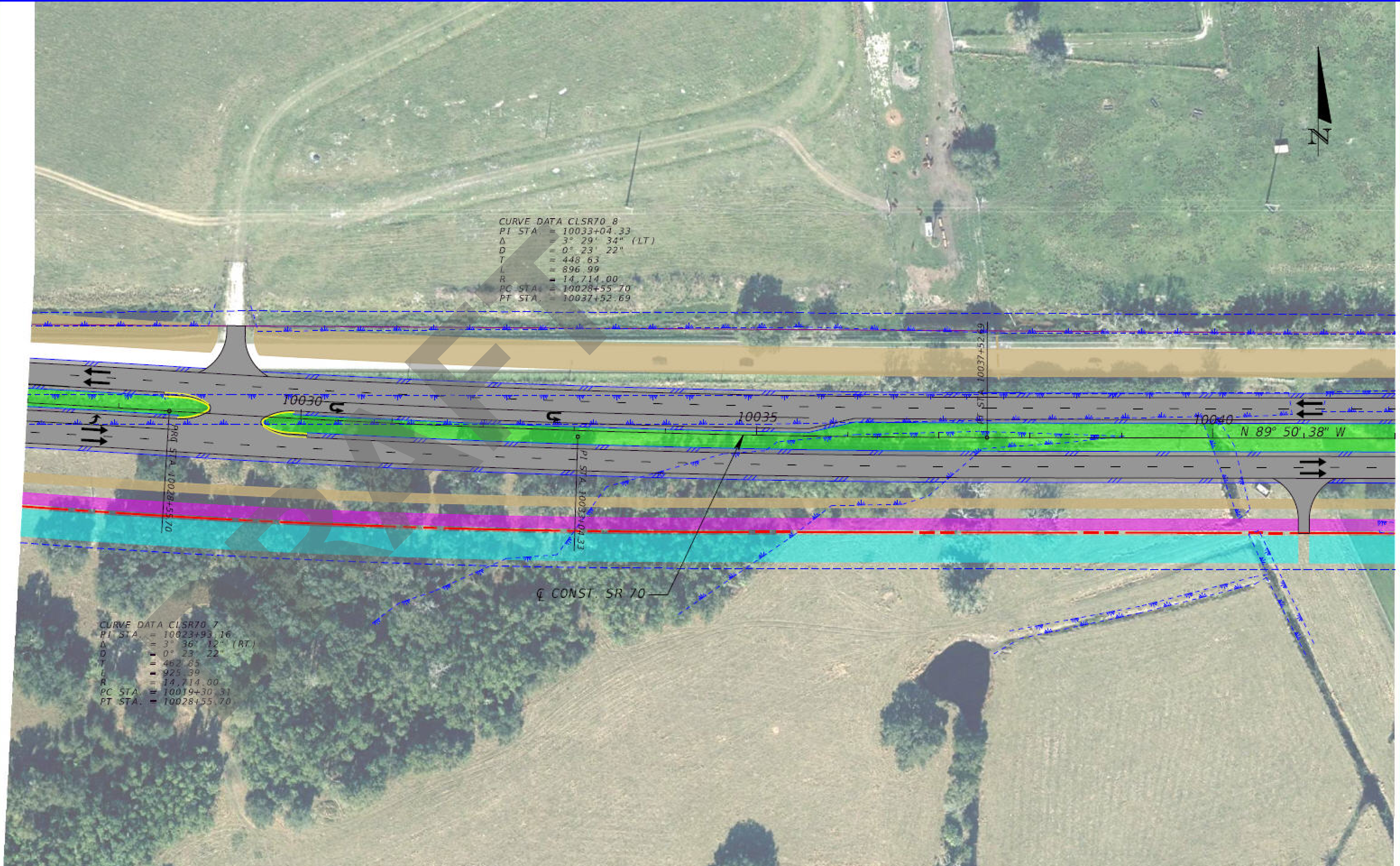
SHEET NO.
2 of 16



LEGEND

PROPOSED RIGHT-OF-WAY		PROPOSED GRASS MEDIAN		RELOCATED CANAL	
EXISTING PROPERTY LINE		PROPOSED PAVEMENT		PROPOSED SWALE	
EASEMENT		PROPOSED SHOULDER		PROPOSED POND	
WETLAND & OTHER SURFACE WATERS		PROPOSED SHARED USE PATH			

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DATE OF AERIAL: 2020
R POTENTIAL RELOCATION

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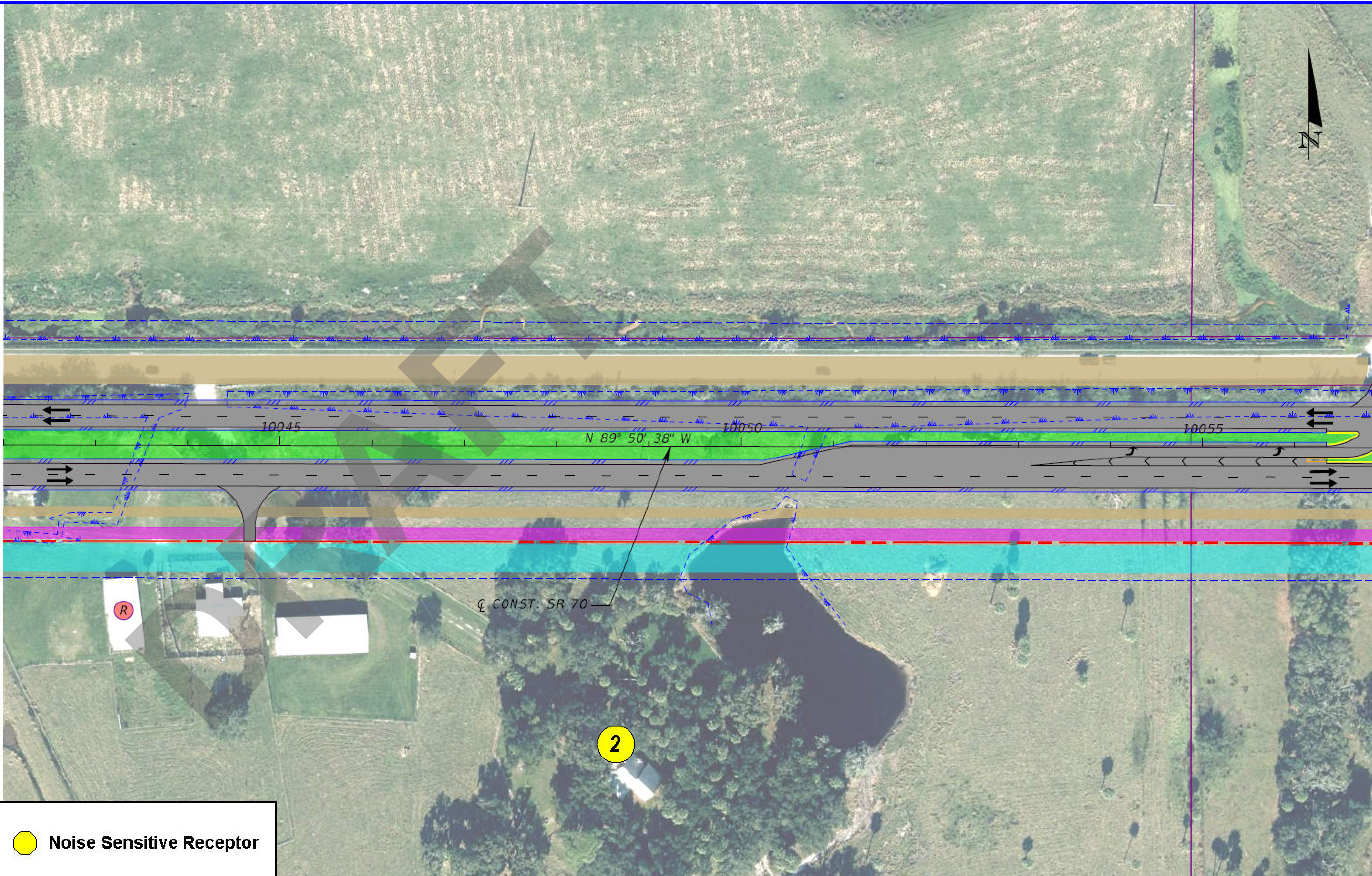

LEGEND

PROPOSED RIGHT-OF-WAY	PROPOSED GRASS MEDIAN	RELOCATED CANAL
EXISTING PROPERTY LINE	PROPOSED PAVEMENT	PROPOSED SWALE
EASEMENT	PROPOSED SHOULDER	PROPOSED POND
WETLAND & OTHER SURFACE WATERS	PROPOSED SHARED USE PATH	POTENTIAL RELOCATION

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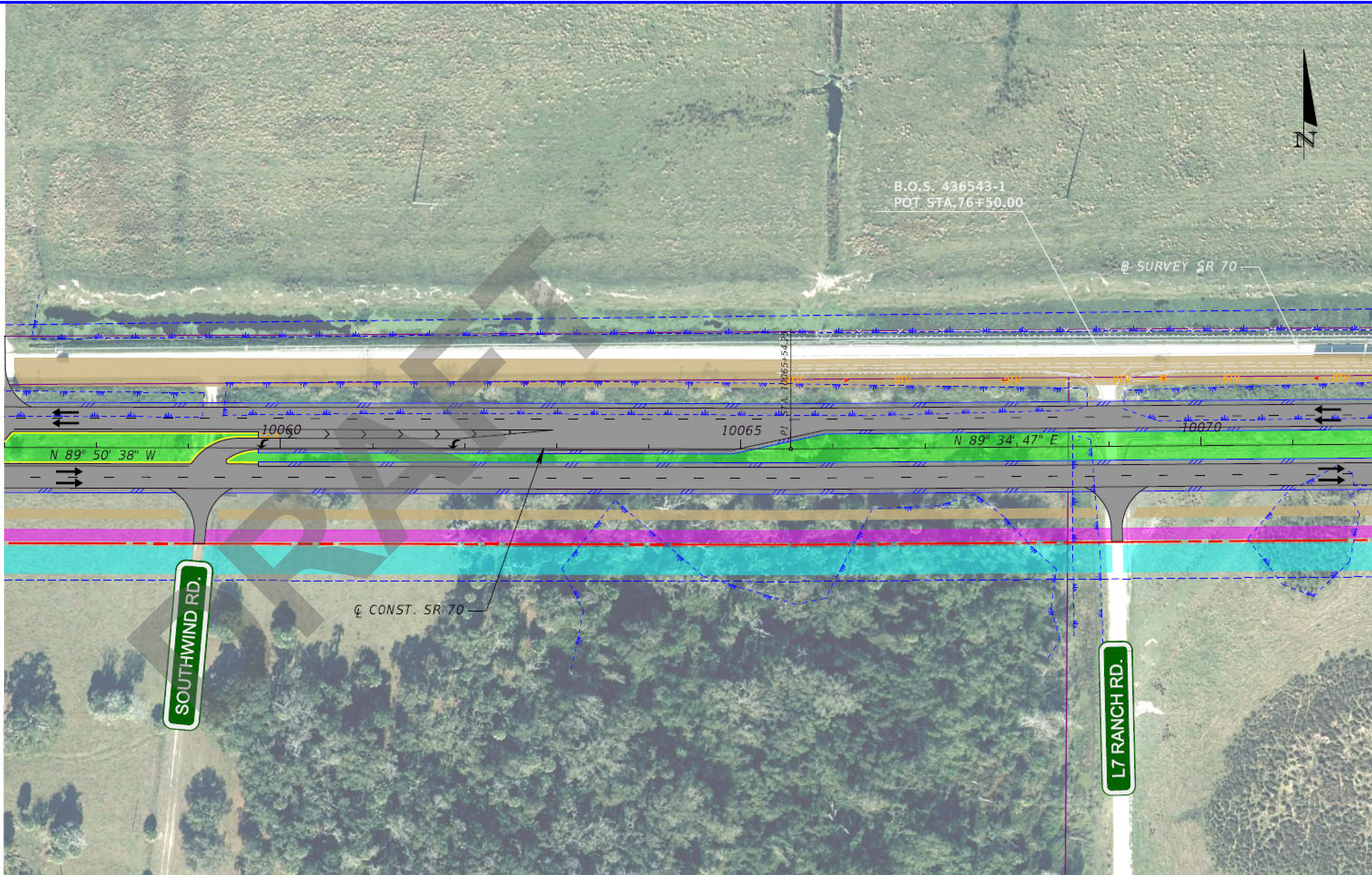

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PROPOSED RIGHT-OF-WAY	PROPOSED GRASS MEDIAN	RELOCATED CANAL
EXISTING PROPERTY LINE	PROPOSED PAVEMENT	PROPOSED SWALE
EASEMENT	PROPOSED SHOULDER	PROPOSED POND
WETLAND & OTHER SURFACE WATERS	PROPOSED SHARED USE PATH	POTENTIAL RELOCATION

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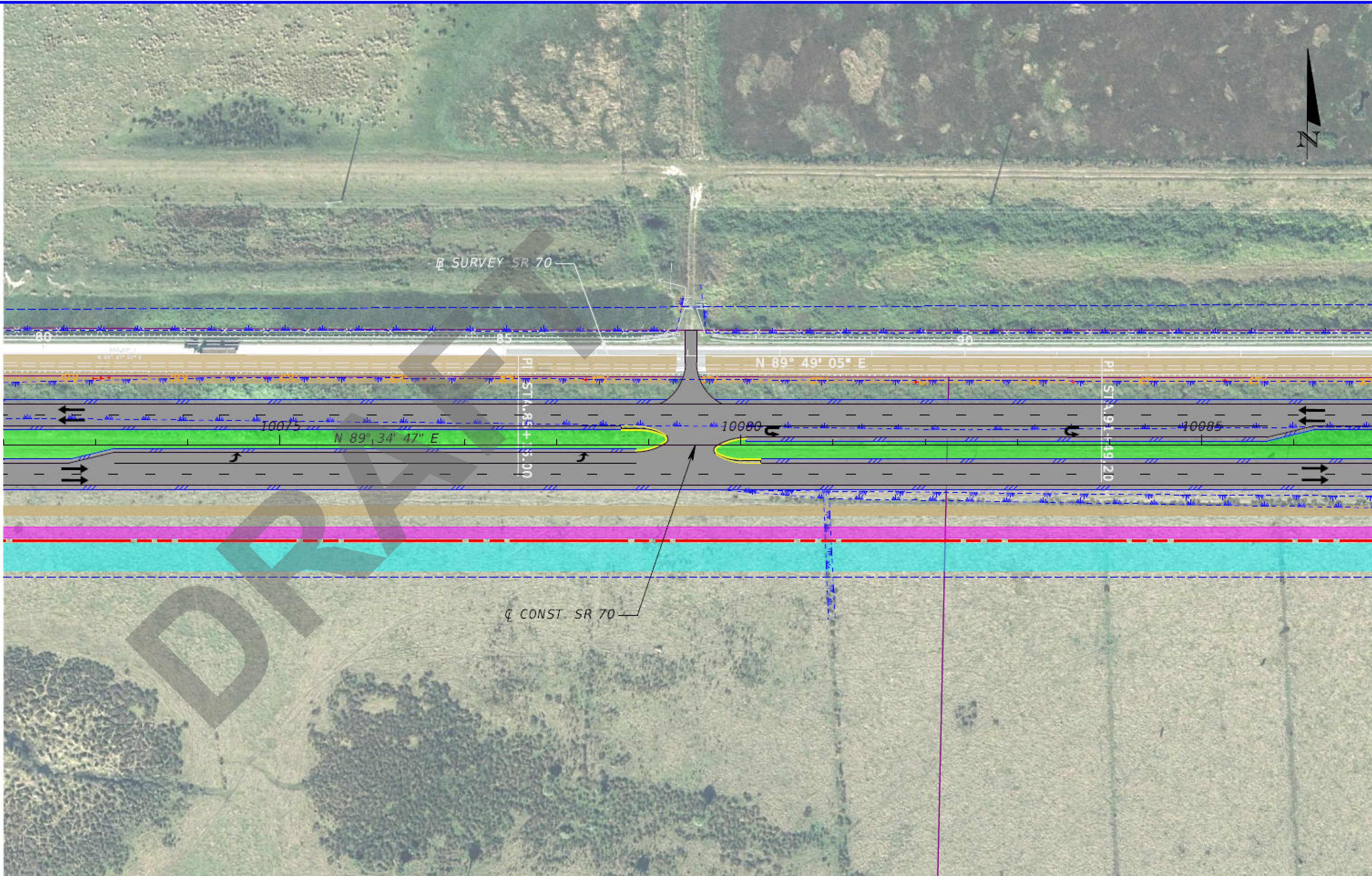

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PROPOSED RIGHT-OF-WAY	PROPOSED GRASS MEDIAN	RELOCATED CANAL	0 20 100 Feet
EXISTING PROPERTY LINE	PROPOSED PAVEMENT	PROPOSED SWALE	DATE OF AERIAL: 2020
EASEMENT	PROPOSED SHOULDER	PROPOSED POND	R POTENTIAL RELOCATION
WETLAND & OTHER SURFACE WATERS	PROPOSED SHARED USE PATH		

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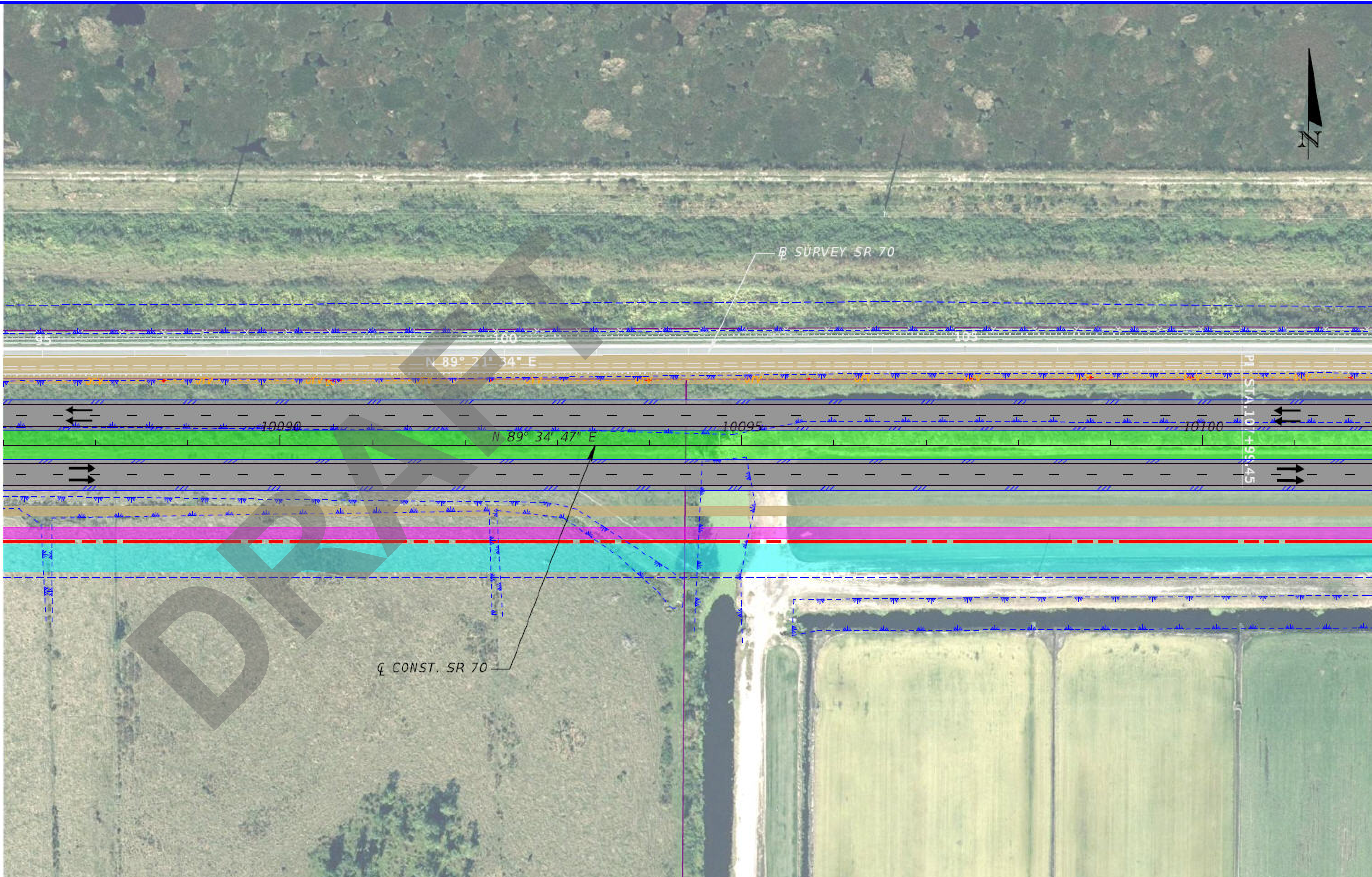

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	PROPOSED RIGHT-OF-WAY		PROPOSED GRASS MEDIAN		RELOCATED CANAL
	EXISTING PROPERTY LINE		PROPOSED PAVEMENT		PROPOSED SWALE
	EASEMENT		PROPOSED SHOULDER		PROPOSED POND
	WETLAND & OTHER SURFACE WATERS		PROPOSED SHARED USE PATH		

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R POTENTIAL RELOCATION

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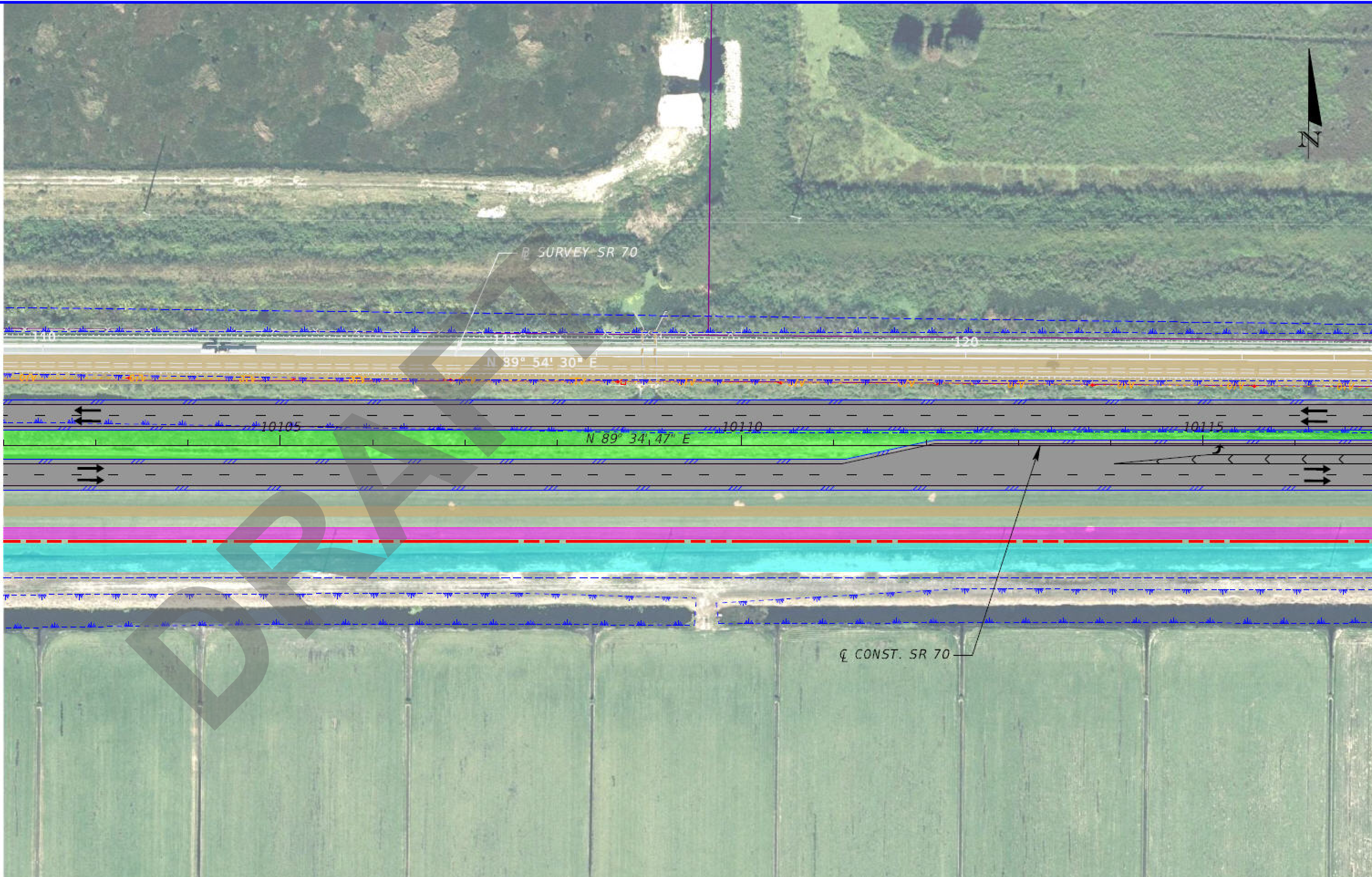

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PROPOSED RIGHT-OF-WAY	PROPOSED GRASS MEDIAN	RELOCATED CANAL	0 20 100
EXISTING PROPERTY LINE	PROPOSED PAVEMENT	PROPOSED SWALE	Feet
EASEMENT	PROPOSED SHOULDER	PROPOSED POND	DATE OF AERIAL: 2020
WETLAND & OTHER SURFACE WATERS	PROPOSED SHARED USE PATH		(R) POTENTIAL RELOCATION

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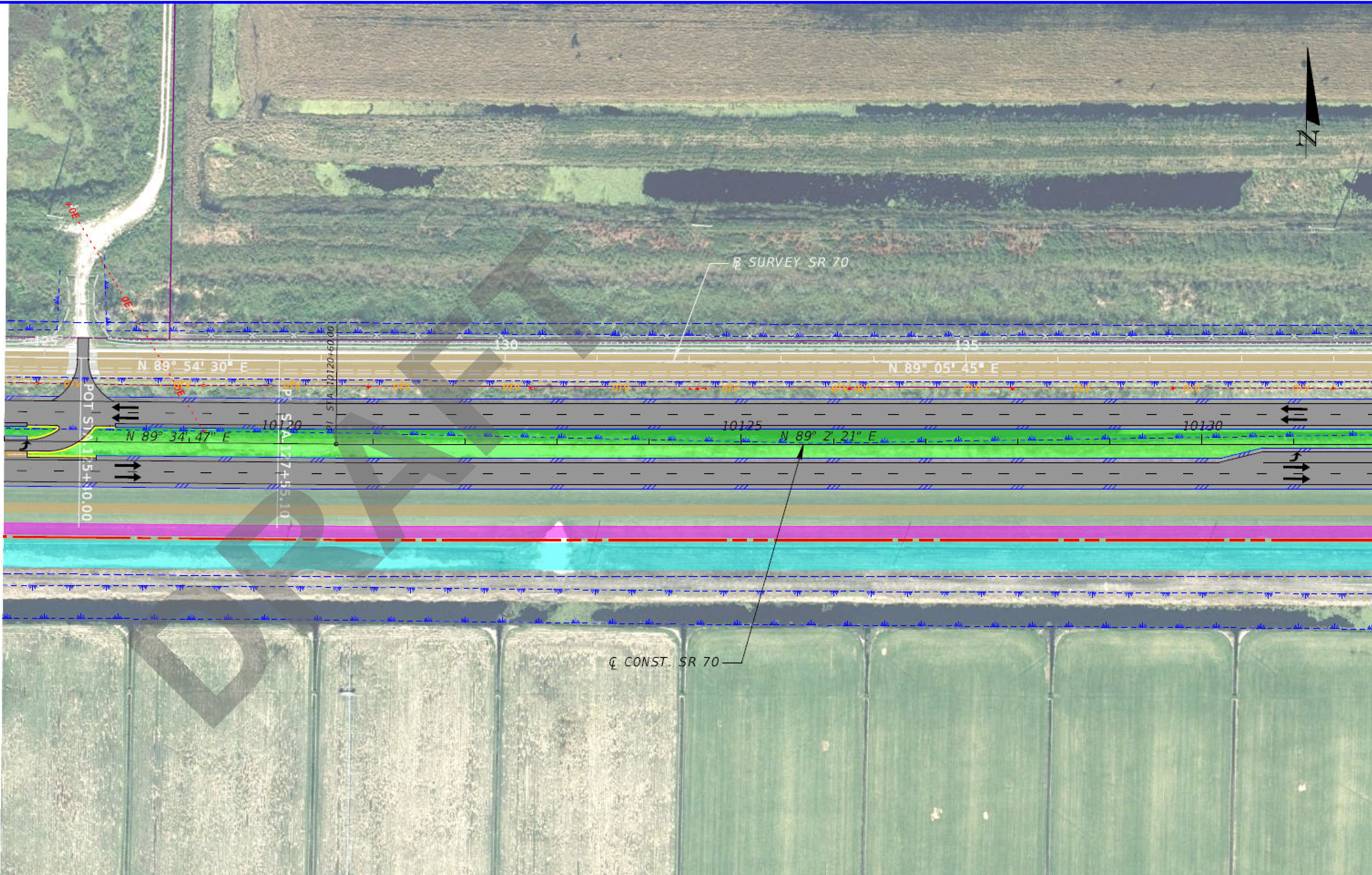

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EXISTING PROPERTY LINE		PROPOSED PAVEMENT		PROPOSED SWALE	
EASEMENT		PROPOSED SHOULDER		PROPOSED POND	
WETLAND & OTHER SURFACE WATERS		PROPOSED SHARED USE PATH		(R) POTENTIAL RELOCATION	

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Feet
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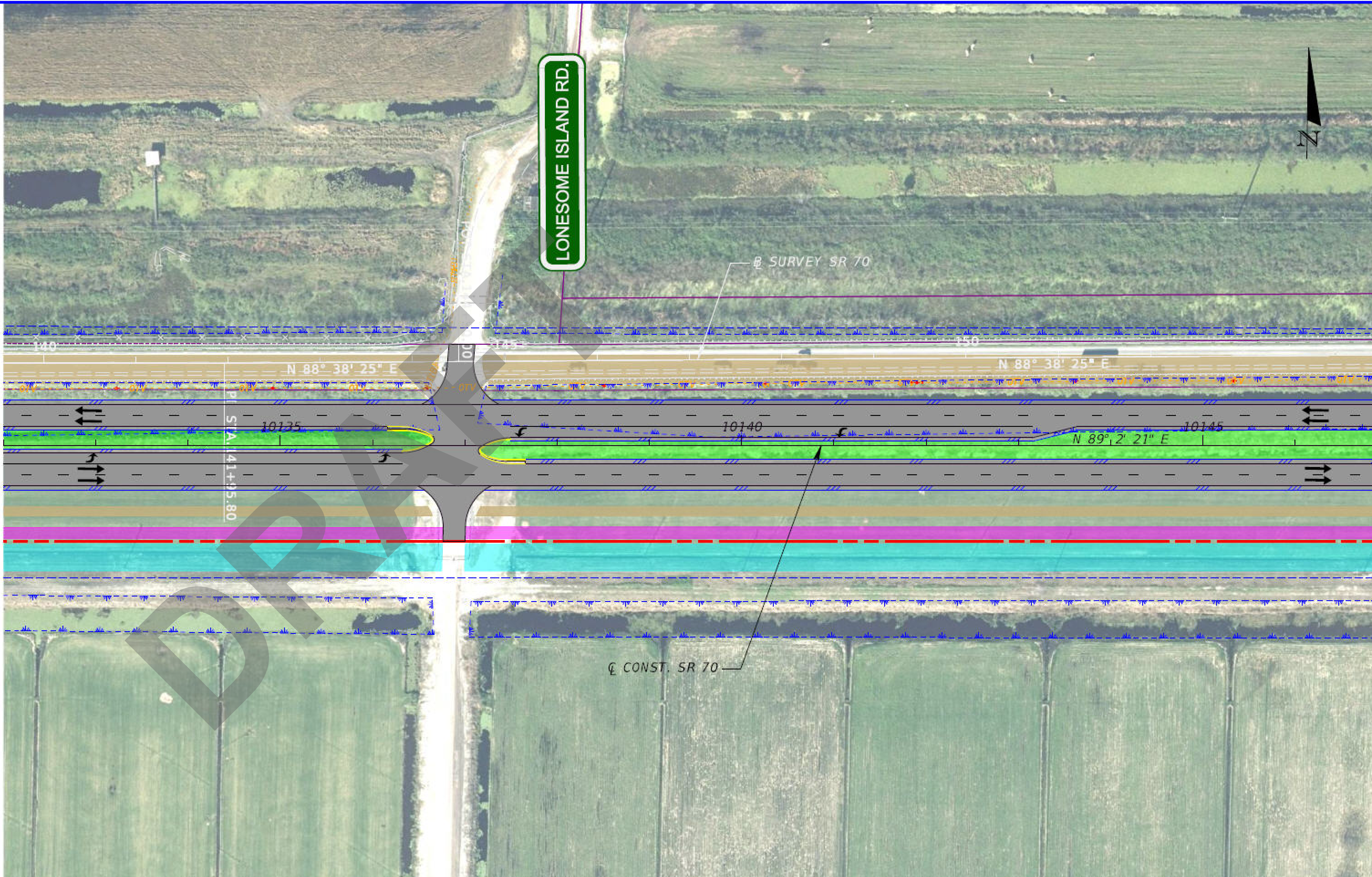

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EXISTING PROPERTY LINE	PROPOSED PAVEMENT	PROPOSED SWALE
EASEMENT	PROPOSED SHOULDER	PROPOSED POND
WETLAND & OTHER SURFACE WATERS	PROPOSED SHARED USE PATH	POTENTIAL RELOCATION

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Feet
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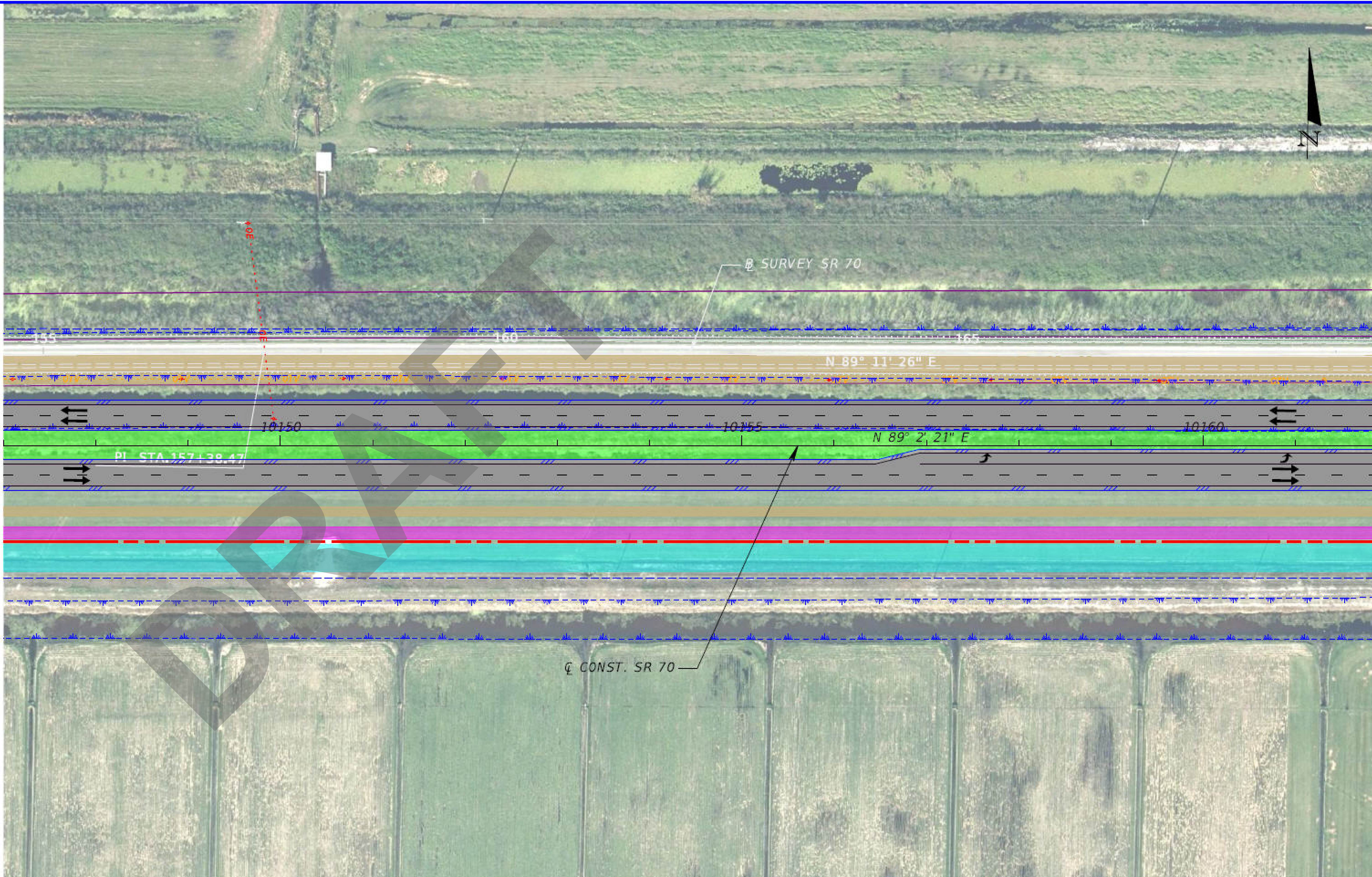

LEGEND

PROPOSED RIGHT-OF-WAY	PROPOSED GRASS MEDIAN
EXISTING PROPERTY LINE	PROPOSED PAVEMENT
EASEMENT	PROPOSED SHOULDER
WETLAND & OTHER SURFACE WATERS	PROPOSED SHARED USE PATH
RELOCATED CANAL	PROPOSED SWALE
PROPOSED POND	POTENTIAL RELOCATION

0 20 100
Feet
DATE OF AERIAL: 2020

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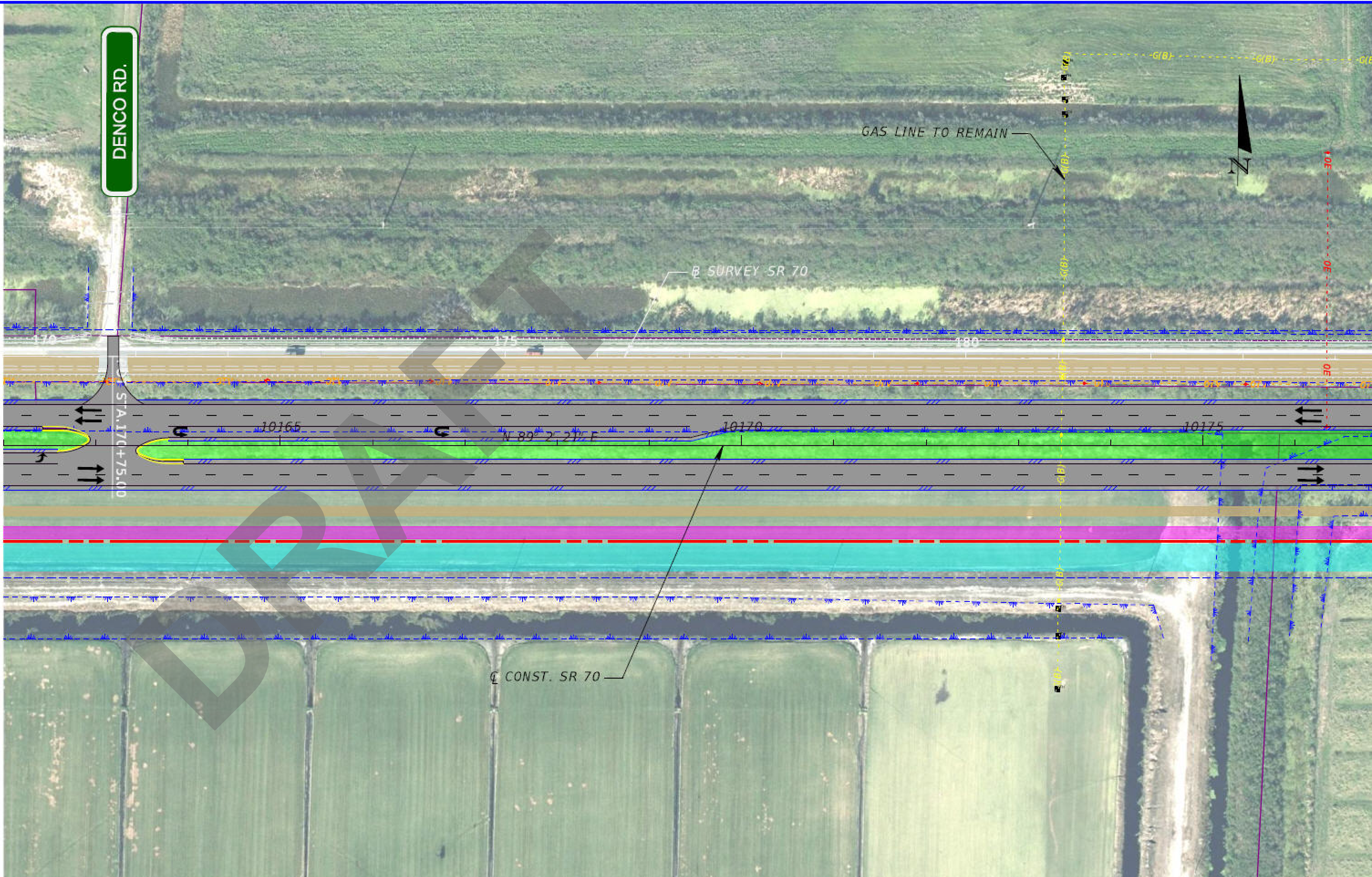

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EXISTING PROPERTY LINE	PROPOSED PAVEMENT	PROPOSED SWALE
EASEMENT	PROPOSED SHOULDER	PROPOSED POND
WETLAND & OTHER SURFACE WATERS	PROPOSED SHARED USE PATH	

0 20 100
Feet
DATE OF AERIAL: 2020
R POTENTIAL RELOCATION

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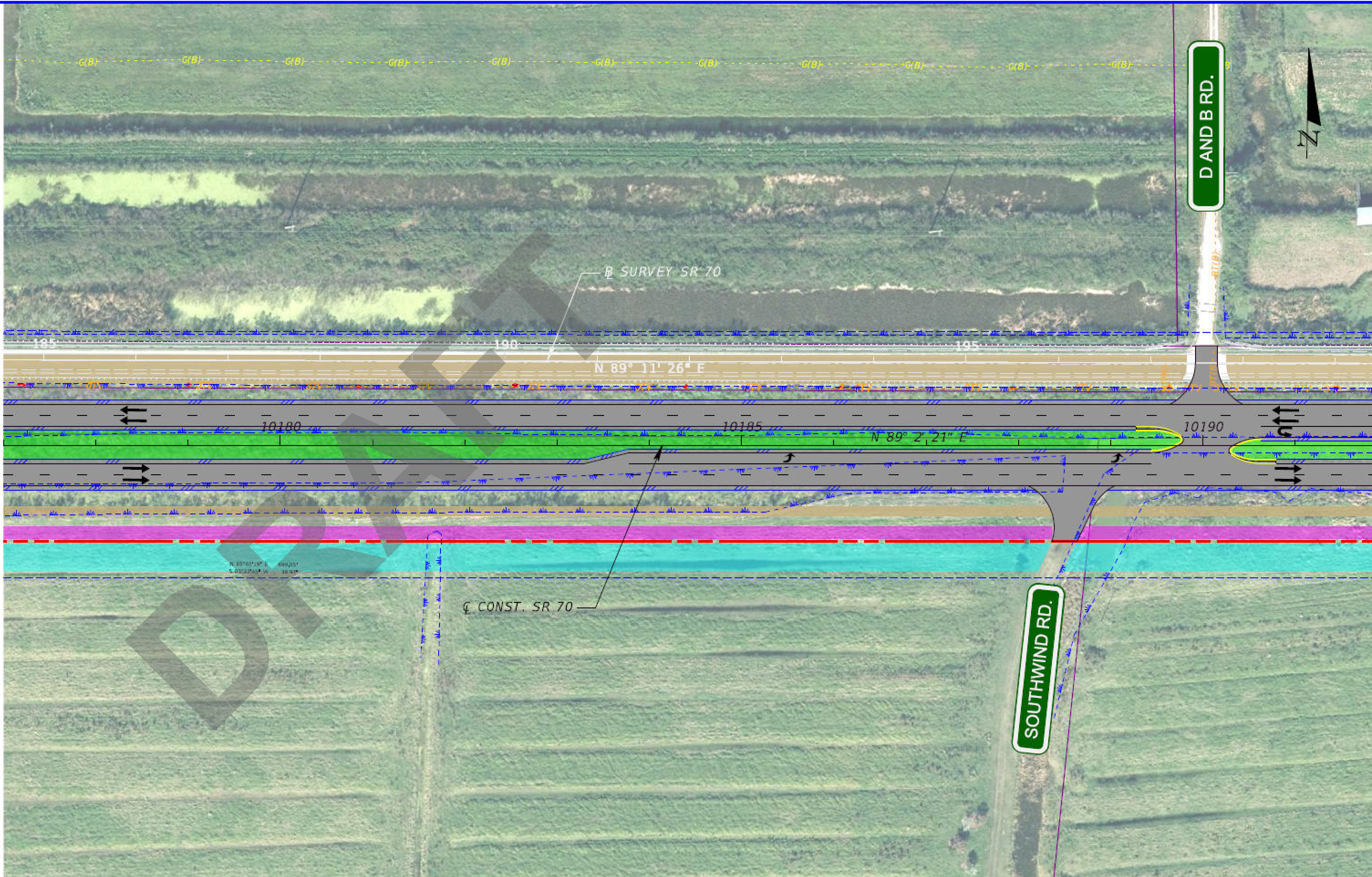

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EASEMENT	PROPOSED SHOULDER
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RELOCATED CANAL	PROPOSED SWALE
PROPOSED POND	

0 20 100
Feet
DATE OF AERIAL: 2020
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Tampa, Florida 33602
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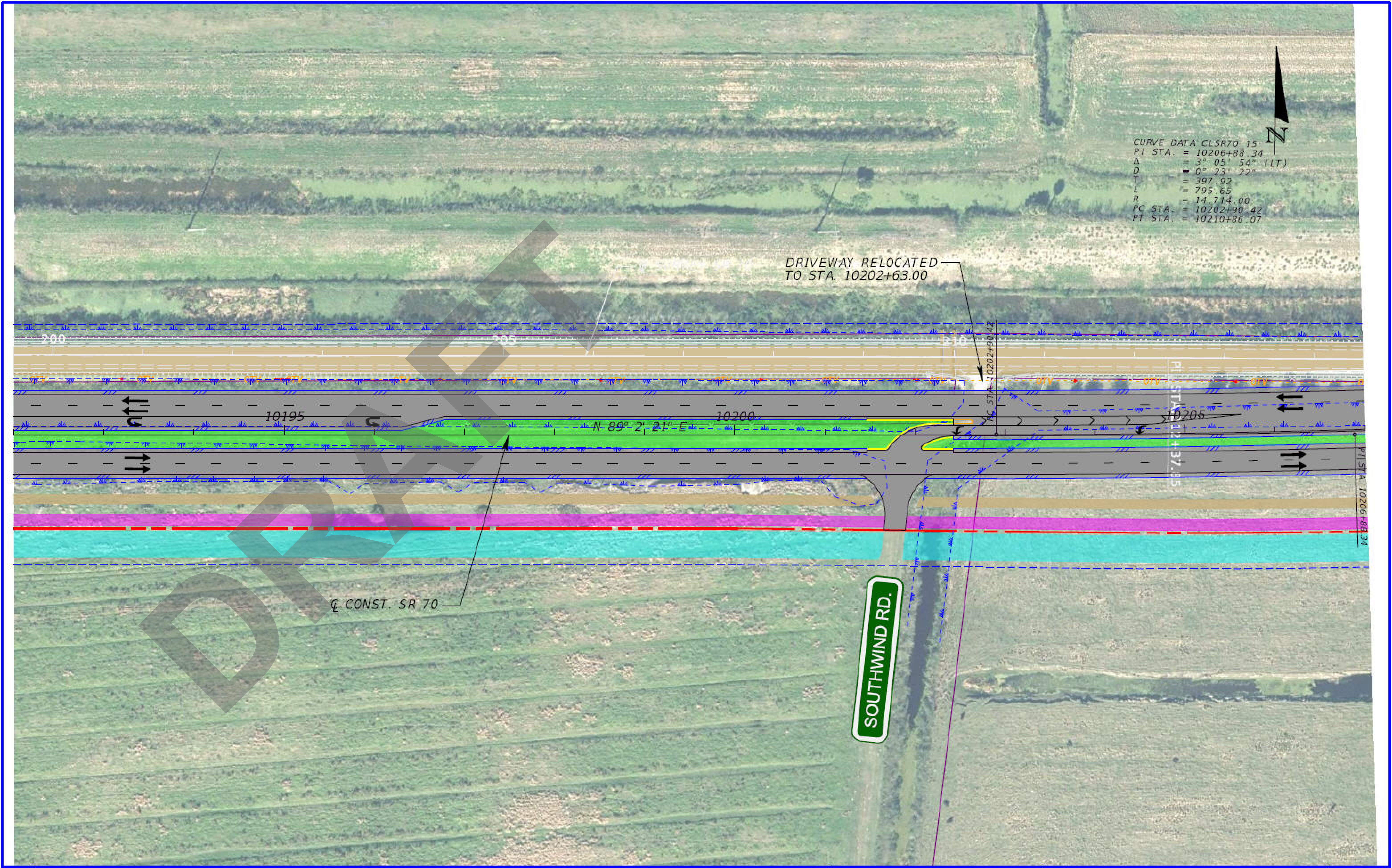
Florida Certificate of Authorization No. 02317
Alejandro Mendez, P.E. No. 77055

SR 70 PD&E STUDY
From CR 29 to Lonesome Island Rd.
Concept Plans

SHEET NO.



LEGEND

PROPOSED RIGHT-OF-WAY
EXISTING PROPERTY LINE
EASEMENT
WETLAND & OTHER SURFACE WATERS
PROPOSED GRASS MEDIAN
PROPOSED PAVEMENT
PROPOSED SHOULDER
PROPOSED SHARED USE PATH
RELOCATED CANAL
PROPOSED SWALE
PROPOSED POND

0 20 100
Feet
DATE OF AERIAL: 2020
R POTENTIAL RELOCATION

Kisinger Campo & Associates Corp.
201 N. Franklin Street, Suite 400
Tampa, Florida 33602
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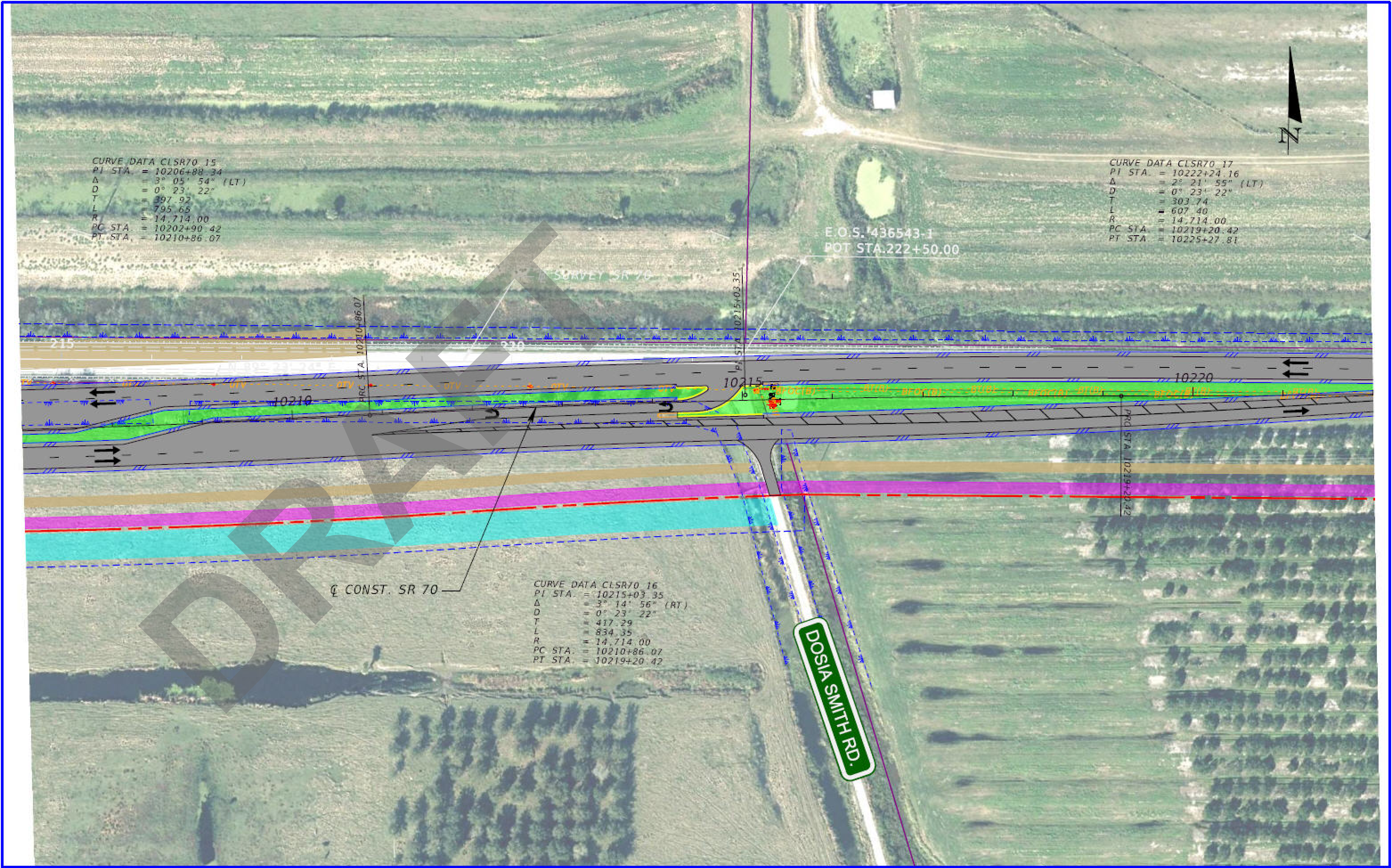

LEGEND

	PROPOSED RIGHT-OF-WAY		PROPOSED GRASS MEDIAN		RELOCATED CANAL
	EXISTING PROPERTY LINE		PROPOSED PAVEMENT		PROPOSED SWALE
	EASEMENT		PROPOSED SHOULDER		PROPOSED POND
	WETLAND & OTHER SURFACE WATERS		PROPOSED SHARED USE PATH		

0 20 100
Feet
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Ⓡ POTENTIAL RELOCATION

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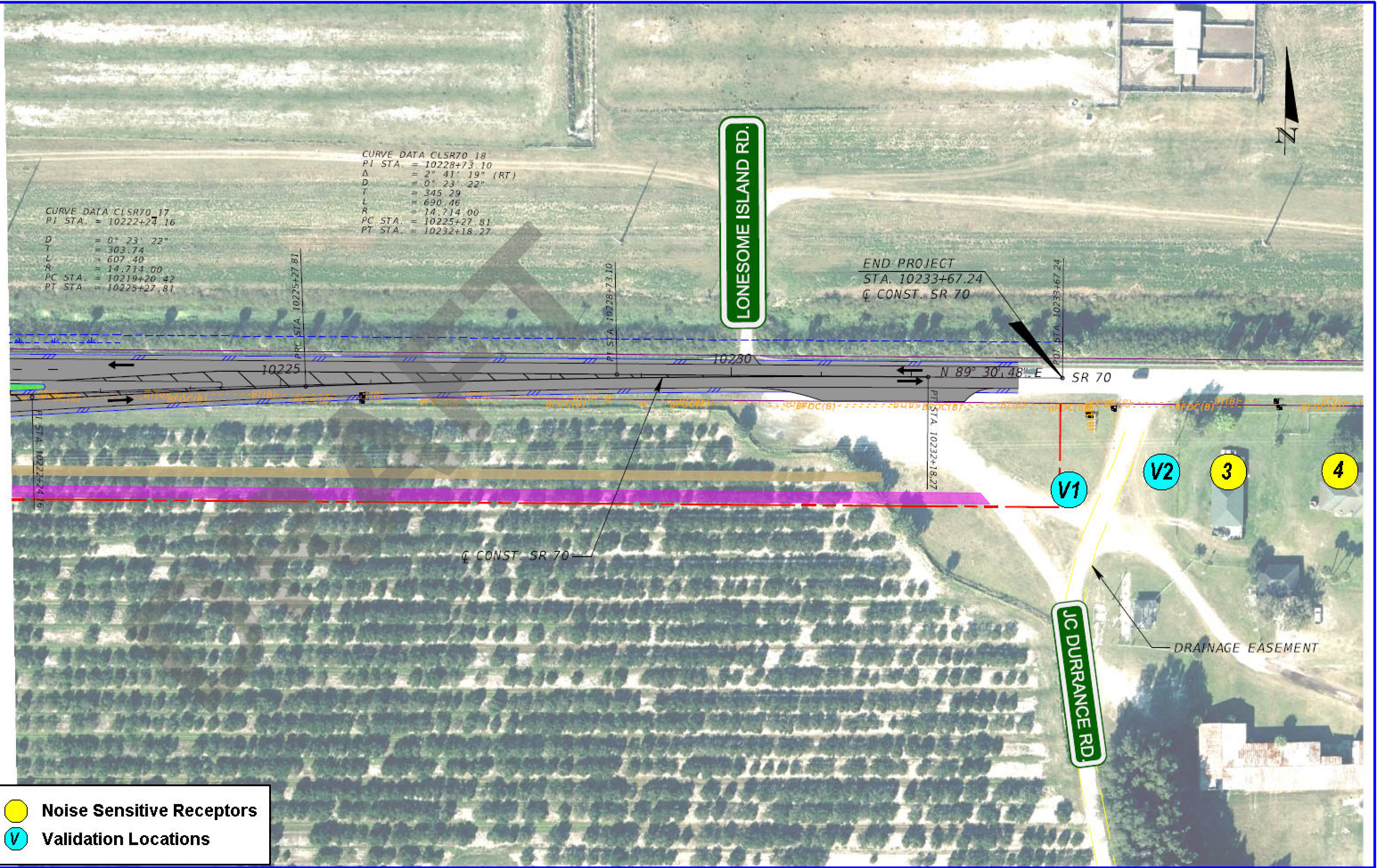

LEGEND

PROPOSED RIGHT-OF-WAY	PROPOSED GRASS MEDIAN	RELOCATED CANAL
EXISTING PROPERTY LINE	PROPOSED PAVEMENT	PROPOSED SWALE
EASEMENT	PROPOSED SHOULDER	PROPOSED POND
WETLAND & OTHER SURFACE WATERS	PROPOSED SHARED USE PATH	R POTENTIAL RELOCATION

0 20 100
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Appendix D TNM Modeling Files and PDF of the NSR (provided electronically)