# Appendix A: Alternatives Analysis

Prepared for:

SCDOT

Prepared by:

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526 EXIT 28
LONG POINT ROAD INTERCHANGE
LOWCOUNTRY CORRIDOR

# TECHNICAL MEMORANDUM:
# ALTERNATIVES ANALYSIS

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# TABLE OF CONTENTS

# LIST OF TABLES



# LIST OF FIGURES

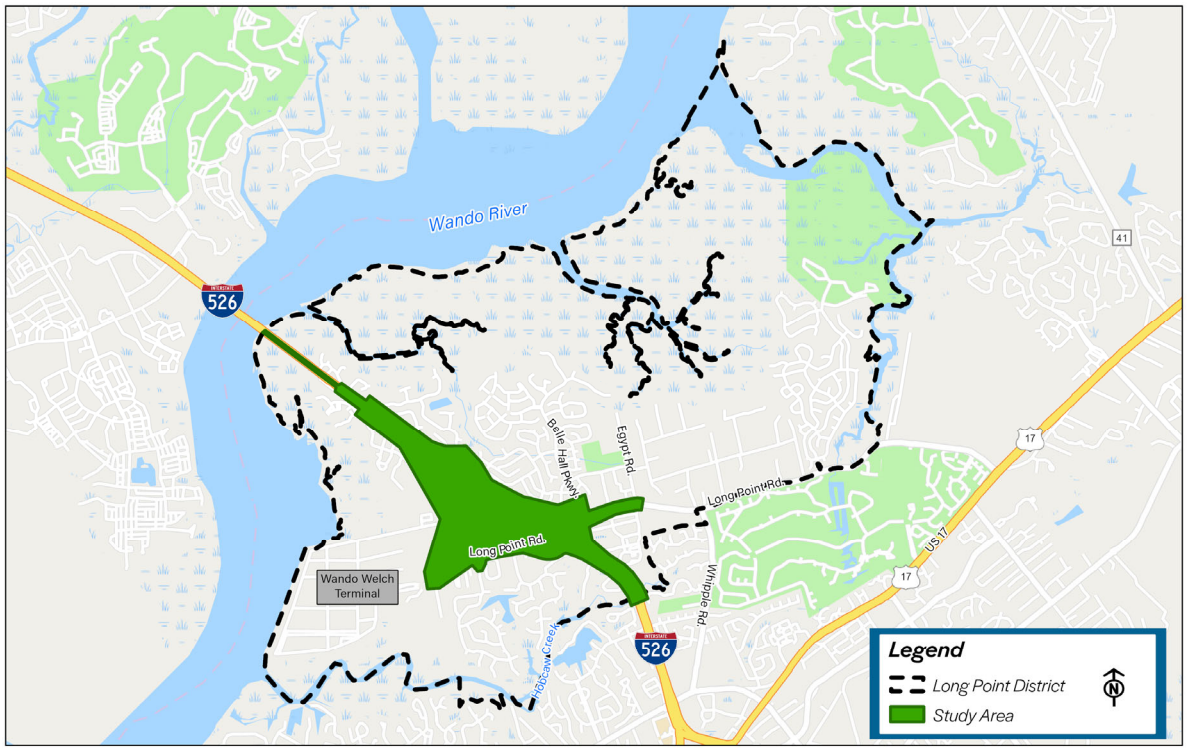


# LIST OF APPENDICES

# 1.0 INTRODUCTION

The South Carolina Department of Transportation (SCDOT) and Federal Highway Administration (FHWA) are proposing improvements to the I-526/Long Point Road interchange in the Town of Mount Pleasant, South Carolina. The study area extends along I-526 from the Wando River to Hobcaw Creek and along Long Point Road from the Wando Welch Terminal to Egypt Road (Figure ).

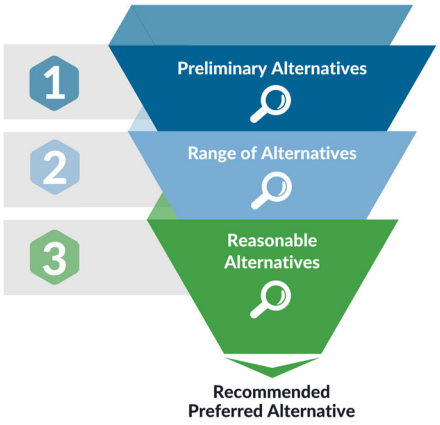
Figure 1 - Study Area




In 2022, SCDOT completed a Planning and Environment Linkages (PEL) Study for I-526 Lowcountry Corridor (LCC) EAST, from Virginia Avenue in North Charleston to US 17 in Mount Pleasant. The PEL study identified existing and projected transportation issues within the corridor through analysis and public and stakeholder engagement. The study established a vision to guide future transportation decision-making in the corridor. After the needs were better understood, potential improvements were identified and evaluated. It was determined that the I-526 LCC EAST corridor requires additional travel lanes in each direction to accommodate the forecasted traffic demand for the corridor. The I-526/Long Point Road interchange was identified as a necessary project for supporting the widening of I-526 and one that could be completed independently from the planned I-526 widening.

This technical memorandum documents the methodology and steps used to identify and analyze alternatives during the project's development. The preliminary alternatives include four alternative options brought forward from the PEL, three additional alternatives developed by the project team, transportation system management/transportation demand management (TSM/TDM), mass transit, and the No-Build Alternative. The No-Build Alternative consists of the existing plus committed roadway network for the year 2050 and does not include improvements to the Long Point Road interchange. The No-Build Alternative establishes the baseline for comparison of the proposed build alternatives.

The alternative analysis consisted of a multi-step process used to identify a Reasonable Alternative to be evaluated in the environmental assessment (EA). The project team, which included planners, scientists, and engineers, identified preliminary concepts for improvements to the interchange. The preliminary concepts were evaluated and synthesized to generate the range of alternatives for the project. The range of alternatives were assessed on their ability to meet the purpose and need for the project. Alternatives determined to meet the purpose and need are considered to be a Reasonable Alternative to be further evaluated in the EA.




The Reasonable Alternative are further evaluated for potential effects on the social, economic, and natural environments and compared to the No-Build Alternative in the EA. For detailed analysis and impacts of the Reasonable Alternative, please see the EA, Chapter 4.

# 2.0 PURPOSE AND NEED

The purpose of the proposed project is to improve the operations of the I-526/Long Point Road interchange and I-526 mainline and reduce operational conflicts between port-related and local traffic. The need for the project is demonstrated by the traffic-related congestion on I-526 and Long Point Road and Long Point Road interchange deficiencies, along with multiple public interest concerns identified during the I-526 LCC EAST PEL study.

The purpose and need for the project were developed by SCDOT in coordination with FHWA, along with consideration of input received during the public involvement process; stakeholder engagement; and federal, state, and local agency coordination. The comments, recommendations, and information received during this process were incorporated throughout the development of alternatives.

# 3.0 DEVELOPMENT OF ALTERNATIVES

Heavy volumes of commuter traffic and large trucks use this interchange to access residential and commercial developments and the South Carolina Ports Authority Wando Welch Terminal (WWT). The preliminary alternatives include improvements to the existing Long Point Road interchange configuration, new interchange configurations, and/or a new interchange alternative.

The project team first reviewed previous planning studies completed by SCDOT, the Berkeley Charleston Dorchester Council of Governments (BCDCOG), the Charleston Area Transportation Study (CHATS) Metropolitan Planning Organization, and the Town of Mount Pleasant to develop preliminary concepts for improvements to the interchange.

The I-526 LCC EAST PEL study completed by SCDOT in July 2022, explored and evaluated various alternatives for the proposed I-526 corridor improvements from Virginia Avenue in North Charleston to US 17 in Mount Pleasant; including conceptual build alternatives, transportation system management/transportation demand management (TSM/TDM), mass transit, and interchange options at Virginia Avenue, Clements Ferry Road, River Landing Drive/Seven Farms Drive, Long Point Road and US 17 in Mount Pleasant. The I-526 LCC EAST PEL identified four interchange concepts for the Long Point Road interchange that were brought forward for consideration as part of this project.

Based on the review completed by the project team, no previous studies completed by BCDCOG, CHATS, or the Town of Mount Pleasant included a reconfiguration of the existing interchange. Recommendations for additional turn lanes and adjustments to signal timings at the existing ramp terminals, as well as additional turning and storage lanes on Long Point Road within the existing interchange were proposed. These concepts were incorporated into proposed alternatives by the project team throughout the development of the range of alternatives.

# 4.0 Alternatives Considered But Eliminated

The project team considered preliminary alternatives that included concepts developed during the I-526 LCC EAST PEL, improvements proposed by regional and local planning studies, and new concepts developed by the project team. Table 1 outlines the alternatives and whether the concepts were carried forward for further evaluation or eliminated from further consideration.

It was determined through the I-526 LCC EAST PEL that, on their own, TSM/TDM and mass transit were not viable alternative types for the I-526 corridor. This finding also holds true for the Long Point Road Interchange project and as a result, TSM/TDM and mass transit were not further evaluated as part of this study.

The project team evaluated the four interchange concepts identified in the I-526 LCC EAST PEL and three additional alternatives developed by the team, including a single point urban interchange (SPUI), flyover from Long Point Road, new truck ramps to the Port and DDI.

The PEL Option 3 (Shipping Lane Option) did not move forward as a stand-alone alternative because of its similarities to other alternatives and because it did not provide the basic traffic movements required to improve the interchange. Additionally, this option would require a new traffic signal along Long Point Road, creating an additional conflict between port-related and local traffic. Therefore, this option was eliminated and not considered as a stand-alone alternative.

The No-Build Alternative and six conceptual build alternatives moved forward as stand-alone alternatives for detailed analysis as part of this project and are discussed in Section 5.

Table 1: Alternatives Considered for Further Evaluation

| Universe of Alternatives | Description | Origin | Evaluation |
|---|---|---|---|
| No-Build | Includes improvements include in 2050 E+C Network | 2050 E+C Network | Carried Forward |
| PEL Option 1 (Alternative 1) | Improved Partial Cloverleaf Interchange | I-526 LCC EAST PEL | Carried forward |
| PEL Option 2 (Alternative 2) | New Truck Ramps to the Port and Improved Partial Cloverleaf Interchange | I-526 LCC EAST PEL | Carried forward |
| PEL Option 3 | Shipping Lane Option | I-526 LCC EAST PEL | Removed from further evaluation |
| PEL Option 4 (Alternative 3) | Diverging Diamond Interchange (DDI) | I-526 LCC EAST PEL | Carried forward |
| Alternative 4 | Single Point Urban Interchange (SPUI) | Developed by Project Team | Carried forward |
| Alternative 5 | Flyover from Long Point Road | Developed by Project Team | Carried forward |
| Alternative 6 | New Truck Ramps to the Port and DDI | Developed by Project Team | Carried forward |
| Mass Transit | - | I-526 LCC EAST PEL | Removed from further evaluation |
| TSM/TDM | - | I-526 LCC EAST PEL | Removed from further evaluation |

# 5.0 RANGE OF ALTERNATIVES

The No-Build Alternative and six conceptual build alternatives are described below.

## 5.1 NO-BUILD ALTERNATIVE

The No-Build Alternative provides a baseline for comparing potential benefits of the improvements while also examining the impacts between alternatives. Analysis of the No-Build Alternative considered the existing conditions as well as what would be reasonably expected to occur in the foreseeable future if the proposed project is not constructed. The future conditions include the existing and committed (E+C) transportation projects expected to be in place for the design year 2050. The Traffic Analysis Report/Interchange Access Request in EA Appendix A provides more information on the future No-Build Alternative.

## 5.2 ALTERNATIVE 1 AND ALTERNATIVE 1A - PARTIAL CLOVERLEAF INTERCHANGE

**Alternative 1 and 1A** are each an improved partial cloverleaf interchange. This larger version of the existing interchange would address concerns by constructing larger loop ramps to allow for increased speeds to improve merging onto I-526 for all vehicle types and will accommodate the planned widening of I-526. The eastbound (EB) off-ramp would also benefit from improvements including double left turns onto Long Point Road.

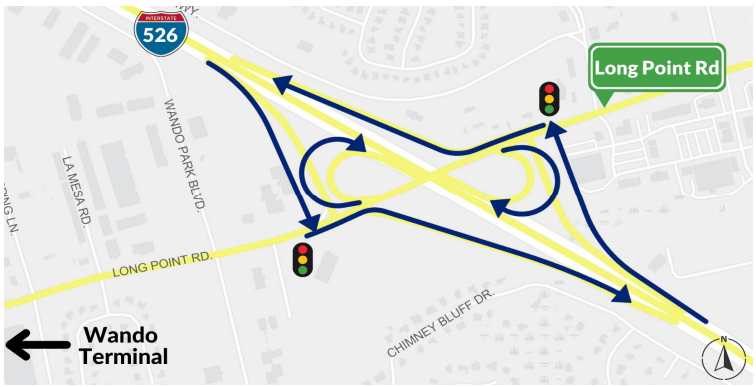



Figure 2 - Alternative 1

Alternative 1A consists of the same improvements but with triple left turns onto Long Point Road on the EB off-ramp. The triple left turns provide signal operations at the ramp end and were incorporated into Alternative 1.

## 5.3 ALTERNATIVE 2 – NEW TRUCK RAMPS TO THE PORT AND IMPROVED PARTIAL CLOVERLEAF INTERCHANGE

**Alternative 2** would provide new access to Long Point Road for port-related traffic along with an improved partial cloverleaf interchange.

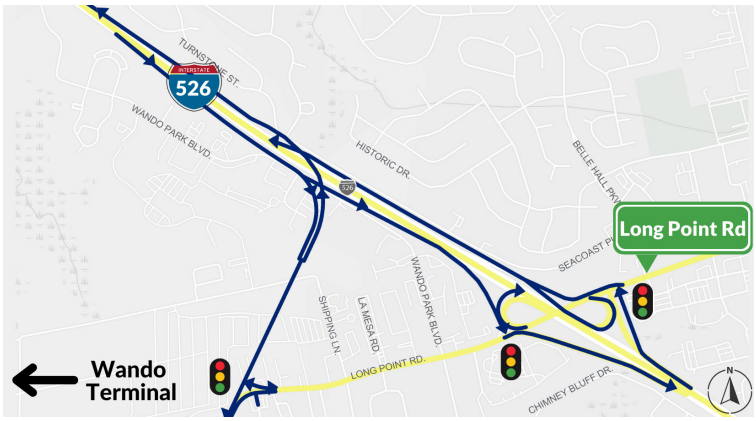



Figure 3 - Alternative 2

Collector-distributor (CD) roads would be used to help separate port-related and local traffic. This alternative also requires a realignment of a segment of Wando Park Boulevard to accommodate the proposed truck ramps and CD roads. This alternative is compatible with the planned widening of I-526.

## 5.4 Alternative 3 – Diverging Diamond Interchange

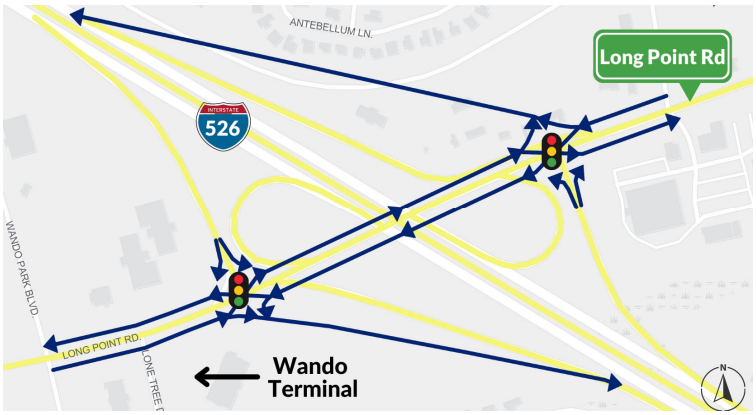



Figure 4 - Alternative 3

**Alternative 3** would replace the existing interchange with a diverging diamond interchange (DDI). A DDI would remove left turns across oncoming lanes of traffic at each of the intersections within the interchange by shifting vehicles passing through the interchange on Long Point Road onto the left-hand side of the road. This alternative is compatible with the planned widening of I-526.

## 5.5 Alternative 4 – Single-point Urban Interchange

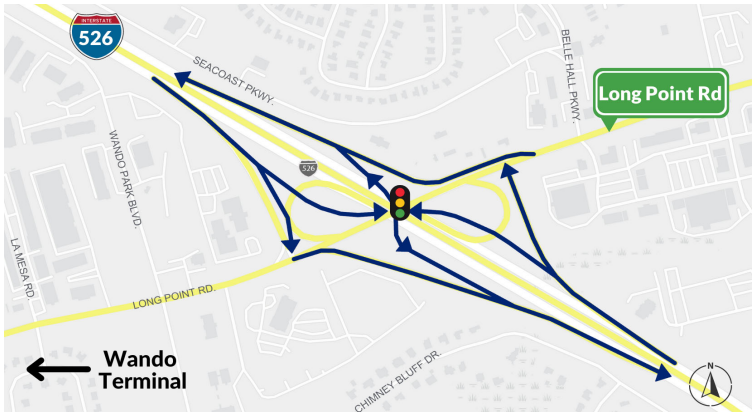



Figure 5 - Alternative 4

**Alternative 4** would replace the existing interchange with a single-point urban interchange (SPUI). The SPUI would create a single signalized intersection underneath I-526. This allows the elimination of the two existing signals. This alternative is compatible with the planned widening of I-526.

## 5.6 Alternative 5 – Flyover from Long Point Road

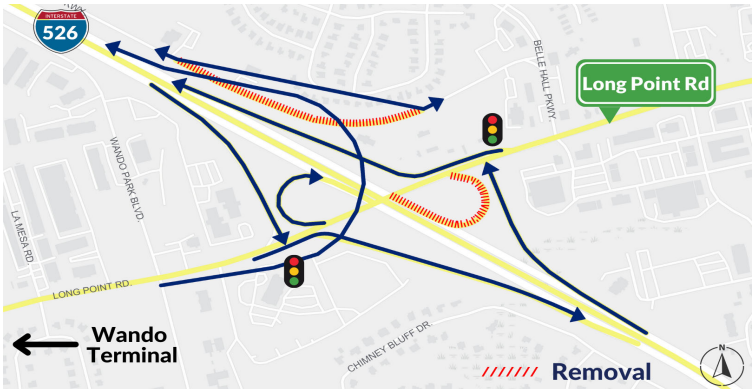



Figure 6 - Alternative 5

**Alternative 5** would replace the existing loop ramp to westbound I-526 with a flyover ramp. The flyover allows removal of one loop, and it requires some realignment of ramps and changes to the local road connections, including a segment of Seacoast Parkway. This alternative would require additional work to be compatible with the planned widening of I-526.

## 5.7 ALTERNATIVE 6 – NEW TRUCK RAMPS TO THE PORT AND DIVERGING DIAMOND INTERCHANGE

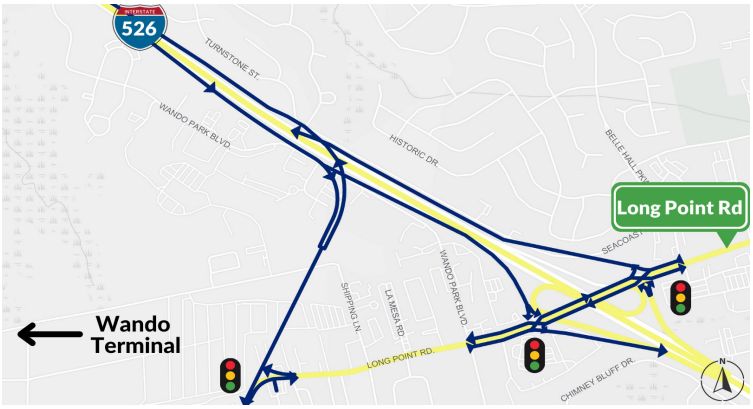



Figure 7 - Alternative 6

**Alternative 6** would provide new access to Long Point Road for port-related traffic and change the interchange type to a DDI. An eastbound CD road was assumed to be used to help separate port-related and local traffic. This alternative also requires a realignment of a segment of Wando Park Boulevard to accommodate the proposed truck ramps and CD roads. This alternative is compatible with the planned widening of I-526.

# 6.0 EVALUATION OF THE RANGE OF ALTERNATIVES

The evaluation of the conceptual build alternatives screened the range of alternatives to determine whether or not they meet the purpose and need of the project. The alternatives that meet the purpose and need of the project will be carried forward for further evaluation in the EA as Reasonable Alternatives.

The purpose of the project can be broken down into two parts:

1. to improve the operations of the I-526/Long Point Road interchange and I-526 mainline and
2. to reduce operational conflicts between port-related and local traffic.

To determine if the alternatives met the purpose and need, each of the six build alternatives were evaluated using the following two questions:

***Analysis for operational improvements included evaluation of traffic on the I-526 mainline, the intersections within the I-526/Long Point Road interchange, and on Long Point Road between the WWT and Egypt Road.***

Operations – Does the alternative improve traffic operations compared with the No-Build Alternative?

Conflicts – Compared with the No-Build Alternative, does the alternative reduce operational conflicts between port-related and local traffic?

Only alternatives that could answer "yes" to both questions were considered to meet the purpose and need and were carried forward as a Reasonable Alternative.

Traffic models including Highway Capacity Software (HCS), Synchro (macrosimulation model), SimTraffic (microsimulation), and VISSIM (robust visualization and microsimulation) provided operational analysis to determine how each of the six build alternatives performed when compared to the No-Build Alternative. Detailed information on the data sets and traffic analysis models can be found in the Traffic Analysis Report/Interchange Access Request (EA Appendix A).

## 6.1 Metrics used for Determining Improved Traffic Operations

The determination of whether an alternative acceptably meets the purpose and need involved comparing a series of calculations and measures of existing traffic data, projected population and traffic growth, and traffic model simulations. Using this approach, the operational effectiveness of an alternative was evaluated using multiple criteria which is outlined in detail in the Traffic Analysis Report/Interchange Access Request (EA Appendix A). The analysis used a combination of Synchro, SimTraffic, and VISSIM to evaluate traffic operations. The results of this analysis are summarized in Table .

To meet the operational improvements part of the project purpose, an alternative had to meet both of the following criteria:

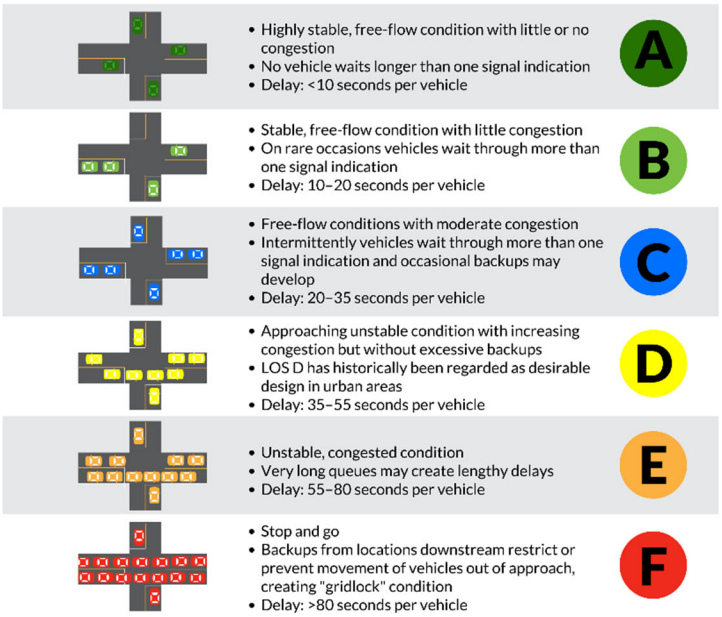
- Reduce ramp queuing (as measured by Synchro, SimTraffic, and VISSIM)
- Result in better level of service (LOS) at the signalized ramp terminals compared with the No-Build Alternative

Ramp queuing is a critical measure affecting traffic operations of the interchange and the I-526 mainline. If the queue extends beyond the current or proposed ramp length, serious operational issues will occur with stopped vehicles interacting with through traffic on the I-526 mainline. The operational issues are worsened if the queued vehicles bound for Long Point Road include a high volume of port-related trucks. Queuing was considered unacceptable if it extended onto the I-526 mainline.

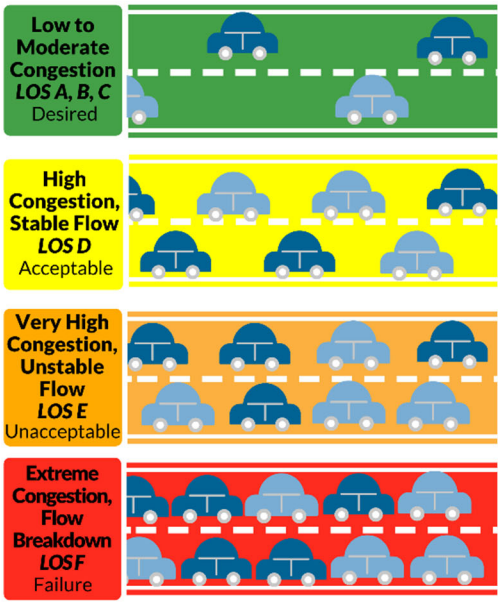
Traffic signal operations is a critical measure affecting traffic operations of the interchange and Long Point Road. The LOS for signalized intersections at the interchange ramp termini and intersections north and south of I-526 on Long Point Road reflects the average delay for all vehicles. The increase in delay caused by poor traffic signal operations associated with the interchange contributes to ramp queuing and congested traffic conditions on Long Point Road. The operational issues are worsened if the vehicles bound for Long Point Road include a high volume of port-related trucks.

Traffic congestion occurs when travel demand exceeds the traffic-carrying capacity of a roadway. Congestion is most commonly expressed with a LOS ranking. In general, LOS is ranked on an A to F scale with LOS A representing free-flow conditions and LOS F representing poor operations, high levels of congestion, and excessive delays. LOS is measured differently for freeways, traffic signals, and arterials, but the A through F meaning of LOS remains consistent.

**Intersection Level of Service (LOS)**




**Roadway Level of Service**




## 6.2 Metrics used for Determining a Reduction in Operational Conflicts

The second part of the purpose and need is to reduce operation conflicts between port-related and local traffic. To satisfy and meet this part of the project purpose, an alternative was required to demonstrate a reduction in the amount of truck traffic or conflicts compared with the No-Build Alternative. The measures for determining improvements over the No-Build Alternative include:

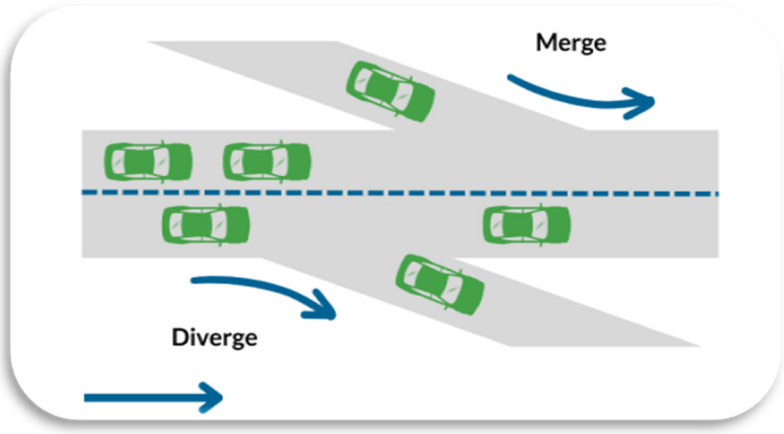
- Reduced truck traffic on Long Point Road
- Reduced truck traffic on ramps to I-526 westbound (WB) at Long Point Road
- Reduced number of key conflict points between port-related and local traffic

High truck volumes on local roads like Long Point Road result in high levels of truck and automobile conflicts. Recognizing that trucks also have a higher level of impact related to both operations and safety, particularly related to crash severity, by lowering the percentage of trucks traveling on Long Point Road, the number of conflicts between cars and trucks would also be expected to decline.

The existing I-526 WB loop ramp is a major conflict point for port-related traffic and local traffic. Analysis of the current traffic conditions shows that 70 percent of trucks using the Long Point Road interchange use the I-526 WB loop ramps. By reducing the percentage of trucks using the I-526 WB ramps, conflicts between cars and trucks would be expected to decline.

For both the incoming and outgoing port-related traffic key decision points with operational challenges such as traffic signals, required lane changes or shifts, merges and diverges, queuing, and other operational factors were counted along the primary ingress and egress routes. These conflict points were identified using engineering judgment and represent key conflict points between port-related and

local traffic. Reducing the number of conflict points for port-related traffic would be expected to reduce the overall conflict between port-related traffic and local traffic.




***Merging traffic is where two separate roadways join (an on-ramp) into one roadway facility.***

***Diverging traffic is where a roadway separates (an off-ramp), allowing for two separate traffic streams.***

## 6.3 Screening For Reasonable Alternatives

Table  details the performance of each of the six conceptual build alternatives, the No-Build Alternative and the existing 2022 traffic conditions for operations and conflicts. This includes analysis results of ramp queuing, ramp terminal signal operations, truck percentages and number of conflict points.

## 6.4 No-Build Alternative (Carried Forward)

Traffic analysis showed the No-Build Alternative results in queuing that backs up onto the I-526 mainline. The LOS at the ramp terminus signals showed a poor LOS F which would create substantial queuing extending beyond the ramps and onto the I-526 mainline. Because of the queuing on the mainline, travel speeds and delays for I-526 traffic would be extremely slow and congested with the key diverge operating at LOS F. Even with the anticipated widening of I-526 (as part of a separate project), operations at the Long Point Interchange Road would have extensive queues onto I-526, restricting flow for both through traffic and traffic using the Long Point Road interchange.

The No-Build Alternative would not reduce the conflicts between port-related traffic and local traffic. Having no improvements to the interchange would not address the projected increase in trucks or the growth of local automobile traffic.

The No-Build Alternative does not meet the purpose and need of the project because it would not improve traffic operations, nor would it reduce conflicts between port-related traffic and local traffic. However, the No-Build Alternative will be carried forward in the evaluation of alternatives as a baseline comparison for environmental impacts.

Table 2: Performance of the Range of Alternatives

| Evaluation Criteria (2050 No-Build Alternative as Baseline) | | ANALYSIS TYPE | LEVEL OF ANALYSIS | Existing Conditions | No-Build | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 | Alternative 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2022 | 2050 | Improved Partial Cloverleaf Interchange | New Truck Ramps with the Improved Partial Cloverleaf Interchange | Diverging Diamond Interchange (DDI) | Single-point Urban Interchange (SPUI) | Flyover from Long Point Road | New Truck Ramps with the Diverging Diamond Interchange (DDI) |
| IMPROVES OPERATIONS | Backup on I-526 Ramp (feet) | Synchro | LEVEL OF DETAIL ANALYSIS | Acceptable (385 feet) | Unacceptable Back up on Mainline (1,327 feet) | Undesirable Back up on Mainline (753 feet) | Acceptable (628 feet) | Moderate Back up on Mainline (704 feet) | Unacceptable Back up on Mainline (1,901 feet) | Unacceptable Back up on Mainline (1,058 feet) | Acceptable (437 feet) |
| | Level of Service (LOS) Signal Operation | | | C | F | D | B | D | F | E | D |
| | Backup on I-526 Ramp (feet) | SimTraffic | | Acceptable (974 feet) | Unacceptable Back up on Mainline (<2,640 feet) | Unacceptable Back up on Mainline (<2,640 feet) | Acceptable (728 feet) On CD Road | Unacceptable Back up on Mainline (<2,640 feet) | Unacceptable Back up on Mainline (<2,640 feet) | Unacceptable Back up on Mainline (<5,280 feet) | Undesirable Back up on C-D Road (<2,640 feet) |
| | Level of Service Signal Operation | | | F | F | D | C | F | F | D | F |
| | Backup on I-526 Ramp (feet) | VISSIM | | Not applicable | Unacceptable Back up on Mainline (10,054 feet) | Unacceptable Back up on Mainline (10,054 feet) | Acceptable (972 feet) | Unacceptable Back up on Mainline (7,994 feet) | Removed from further analysis | | Undesirable Back up on C-D (3,836 feet) |
| | Level of Service Signal Operation | | | | F | F | C | F | | | F |
| TRUCK/CAR CONFLICTS | Truck Percentage on Long Point Road | | | Not applicable | Base Line (70% trucks) | No Improvement Over Base Line (70% trucks) | Acceptable Reduction (15% trucks) | No Improvement Over Base Line (70% trucks) | | | Acceptable Reduction (15% trucks) |
| | Maximum Truck Percentage at loop to I-526 WB or Ramp to I-526 WB | | | | Base Line (67% trucks) | No Improvement Over Base Line (65% trucks) | Acceptable Reduction (8% trucks) | Undesirable Reduction (30% trucks) | | | Acceptable Reduction (4% trucks) |
| | Number of Key Conflict Points Between Port-Related Trucks and Automobiles | | | | 17 | 17 | 7 | 18 | | | 7 |
| | Does the alternative improve traffic operations to an acceptable level compared to No-Build? | | | | | No | Yes | No | No | No | No |
| | Compared with the No Build, does the alternative reduce operation conflicts between port-related and local traffic? | | | | | No | Yes | No | No | No | Yes |
| | Moved forward as a Reasonable Alternative? | | | | | No | Yes | No | No | No | No |

| Color | Comparative Levels | Does it Meet Purpose and Need? |
|---|---|---|
| Green | Good | Yes |
| Yellow | Acceptable | |
| Orange | Minimal | |
| Red | Poor | No |
| Gray | Not applicable for comparison | - |

## 6.5 Alternative 1 - Partial Cloverleaf Interchange (Not Reasonable)

Alternative 1 provides some improvements to the interchange allowing for better geometric design and additional capacity. However, it fails to reduce queuing onto the I-526 mainline and would operate with LOS F at the signalized intersections associated with the interchange. Compared to the No-Build condition, there is no improvement for these two key performance measures. In reviewing the effectiveness and operational performance measures, Alternative 1 marginally improves some traffic operations but does not meet the overall purpose and need related to traffic operations.

In evaluating the second part of the purpose and need, Alternative 1 does not reduce the volume of trucks on I-526 or Long Point Road or the percentage of trucks on the I-526 WB ramps compared to the No-Build Alternative. Additionally, there would be no reduction in the number of key conflict points because trucks would follow the same routes as the No-Build Alternative. Alternative 1 does not reduce port-related truck conflicts and does not meet the second part of the purpose and need.

Alternative 1 does not meet the purpose and need for the project and was removed from further consideration.

## 6.6 Alternative 2 – New Truck Ramps to the Port and Improved Partial Cloverleaf Interchange (Reasonable and Carried Forward)

Alternative 2 provides improvements with better geometric design, additional capacity, and the incorporation of truck ramps allowing port-related truck traffic to be connected directly to the WWT. CD roads would be used to further separate port-related and local traffic on both I-526 and Long Point Road. Alternative 2 would reduce queuing on I-526 and showed an improved LOS (C) at the signalized interchange ramps compared with the No-Build. In reviewing the effectiveness and operational performance measures, Alternative 2 improves traffic operations compared with the No-Build.

In evaluating the second part of the purpose and need, Alternative 2 provides an alternate route for the diversion of port-related trucks to the port access road. As a result, this alternative substantially reduces the percentage of trucks on Long Point Road and I-526 WB ramps at Long Point Road. Additionally, this alternative reduces the number of key conflict points for port-related trucks and local traffic. Alternative 2 successfully meets the second element of the purpose and need to reduce truck and car conflicts in the study area.

Alternative 2 meets all elements of the purpose and need. It was determined to be a reasonable alternative and will be further evaluated in the EA.

## 6.7 Alternative 3 – Diverging Diamond Interchange (Not Reasonable)

Alternative 3 provides improvements by allowing traffic from the I-526 ramps to merge without crossing through traffic on Long Point Road. However, this improvement requires the through movement to

cross each other twice. The DDI, however, has poor operations in the northbound direction of Long Point Road. It requires through traffic to cross the southbound lanes and then has to weave across each other followed by another signal. This complex pattern and the high volumes (including trucks coming from the port) resulted in queuing and instability in the VISSIM simulations. As a result, Alternative 3 failed to reduce queuing from spilling onto the I-526 mainline and had a LOS F at the signalized intersections associated with the interchange. Compared to the No-Build Alternative, there is no improvement for these two key performance measures. In reviewing the effectiveness and operational performance measures, Alternative 3 marginally improves some traffic operations, but does not meet the overall purpose and need related to traffic operations.

In evaluating the second part of the purpose and need, Alternative 3 does not reduce the volume of port-related trucks on I-526 or Long Point Road. It does eliminate the existing WB loop ramp in the northeast quadrant of the interchange. The elimination of the loop also results in the peak truck ramp percentage to drop to 30 percent, but this reflects a higher volume of automobiles and not a reduction in trucks. Additionally, the traffic pattern of the DDI increases the number of truck and automobile conflict points. Alternative 3 does not reduce port-related truck conflicts compared to the No-Build Alternative and therefore does not meet the second part of the purpose and need.

Alternative 3 does not meet the purpose and need for the project and was removed from further consideration.

## 6.8 Alternative 4 – Single-point Urban Interchange (Not Reasonable)

Alternative 4 provides no improvement by eliminating two existing signals with a single intersection. The single intersection at the center of the SPUI operates at a poor LOS (F) and would cause an unacceptable backup on the I-526 mainline, failing to provide improvement over the No-Build Alternative. The queuing from ramps onto the I-526 mainline was verified in both the Synchro and SimTraffic analysis. Therefore, Alternative 4 was not advanced into the VISSIM analysis because queuing onto I-526 is not acceptable. In reviewing the effectiveness and operational performance measures, Alternative 4 does not improve traffic operations compared with the No-Build Alternative.

In evaluating the second part of the purpose and need, Alternative 4 does not reduce the volume of port-related trucks on I-526 or Long Point Road. It does eliminate the existing loop in the northeast quadrant, but the additional left-turn and high-volume traffic merge onto I-526 results in a similar number of truck and automobile conflict points. The elimination of the loop also results in the peak truck ramp percentage to drop to 30 percent, but this reflects a higher volume of automobiles and not a reduction in trucks. Alternative 4 does not reduce port-related truck conflicts and does not meet the second part of the purpose and need.

Alternative 4 does not meet the purpose and need for the project and was removed from further consideration.

## 6.9 Alternative 5 – Flyover from Long Point Road (Not Reasonable)

Alternative 5 provides improvements by replacing the existing loop ramp to westbound I-526 with a flyover ramp. While this provides capacity improvements for traffic between the port and I-526 to the west, it does not provide additional capacity for the opposite direction. The traffic analysis showed that queuing onto the I-526 mainline was almost double that of the No-Build Alternative. Because both Synchro and SimTraffic identified the ramp queuing as unacceptable and queuing was doubled, this alternative was not advanced into the VISISM analysis. In reviewing the effectiveness and operational performance measures, Alternative 5 does not improve traffic operations compared with the No-Build Alternative.

In evaluating the second part of the purpose and need, Alternative 5 is more complex than other alternatives. Overall, it does not reduce the volume of port-related trucks on I-526 or Long Point Road. While the inbound trucks to the port still have nine conflict points, the outbound truck are carried over the Long Point Road interchange and do not use the existing WB loop ramp in the northeast quadrant, resulting in a decrease in the outbound conflict points. The elimination of the loop does not drop the peak truck ramp percentage because the flyover carries the same vehicles as the loop ramp. Overall, it is concluded that Alternative 5 does not reduce port-related truck conflicts with local traffic, so it does not meet the second part of the purpose and need.

Alternative 5 does not meet the purpose and need for the project and was removed from further consideration.

## 6.10 Alternative 6 – New Truck Ramps to the Port and DDI (Not Reasonable)

Alternative 6 combines the DDI configuration at Long Point Road with the ramps and port access road similar to Alternative 2. Overall, this alternative effectively met many of the operational needs of the project, particularly on I-526 and Long Point Road. The reduction in traffic volumes through the DDI (due to the shift of port-related traffic to the new ramps) improved operations of the DDI interchange compared to the Alternative 3 DDI. Nevertheless, the VISSIM analysis showed the DDI was unstable, resulting in queues in multiple runs focused on the northbound direction. These queues would subsequently result in LOS F operations at the signal for the EB exit ramp, which then result in queues spilling onto the I-526 mainline. In reviewing the effectiveness and operational performance measures, Alternative 6 improves most traffic operations compared with the No-Build Alternative but does not meet the first part of the purpose and need of the project because it does not improve the ramp termini signal operations.

In evaluating the second part of the purpose and need, Alternative 6 provides an alternate route for the diversion of port-related trucks to the port access road. As a result, the total vehicle hours traveled by trucks reduces 54 percent because of a combination of shorter trips for port-related trucks and reduced delays for all trucks. The alternate route also reduces both the number of conflict points between cars and port-related trucks as well as reduces truck percentages on I-526 and Long Point Road. Alternative 6

successfully meets the second element of the purpose and need to reduce truck and car conflicts in the study area.

Because Alternative 6 does not meet both purpose and need criteria for the project, it was removed from further consideration.

# 7.0 REASONABLE ALTERNATIVE

During the screening of the range of alternatives, only one alternative, Alternative 2, met the purpose and need for the project. Therefore, Alternative 2 will be carried forward as a Reasonable Alternative for further evaluation in the EA. Table 3 summarizes the results of the screening for reasonable alternatives. The Reasonable Alternative will be evaluated in the EA to determine the Recommended Preferred Alternative. See Appendix A for figures of the Reasonable Alternative.

Table 3: Summary of Range of Alternatives Screening

| Conceptual Alternatives | Description | Improves Traffic Operation | Reduces Conflicts Between Port-Related and Local Traffic | Meets Purpose and Need |
|---|---|---|---|---|
| Alternative 1 | Improved Partial Cloverleaf Interchange | No | No | No |
| Alternative 2 | New Truck Ramps to the Port and Improved Partial Cloverleaf Interchange | Yes | Yes | Yes |
| Alternative 3 | DDI | No | No | No |
| Alternative 4 | SPUI | No | No | No |
| Alternative 5 | Flyover from Long Point Road | No | No | No |
| Alternative 6 | New Truck Ramps to the Port and DDI | No | Yes | No |

## 7.1 REFINEMENTS TO THE REASONABLE ALTERNATIVE BASED ON AGENCY AND PUBLIC COMMENTS

The project team further refined Alternative 2 to accommodate input provided through agency coordination and comments received during the public comment period for the public information meeting held on August 8, 2022. The design changes to Alternative 2 include:

- shifting the new truck ramps to the east to avoid and minimize potential impacts to residential properties along Seacoast Parkway,
- optimizing interchange merge and diverge operations,
- minimizing potential impacts to a cultural and historic resource,
- maintaining the left turn from Long Point Road onto Belle Hall Parkway,
- incorporating a 10-foot multiuse path along the east side of Long Point Road from Wando Park Boulevard to Belle Point Drive to enhance bicycle and pedestrian connectivity, and
- adding a cul-de-sac at the end of Shipping Lane near the back gate of the Wando Terminal.

**Shifting the new truck ramps east avoid and minimize potential impacts along Seacoast Parkway**– After reviewing the comments from the public involvement meeting on August 8, 2022, the design team re-evaluated the location of the truck ramps and was able to shift the ramps to the east to avoid and minimize potential impacts to the Tidal Walk and Grassy Creek neighborhoods. Residents from these neighborhoods expressed concerns about the location of the new ramps and potential impacts on residences due to relocations, noise, and visual impacts. This refinement eliminates the potential for residential relocations and would minimize the effects of noise and visual impacts for the Tidal Walk and Grassy Creek neighborhoods.

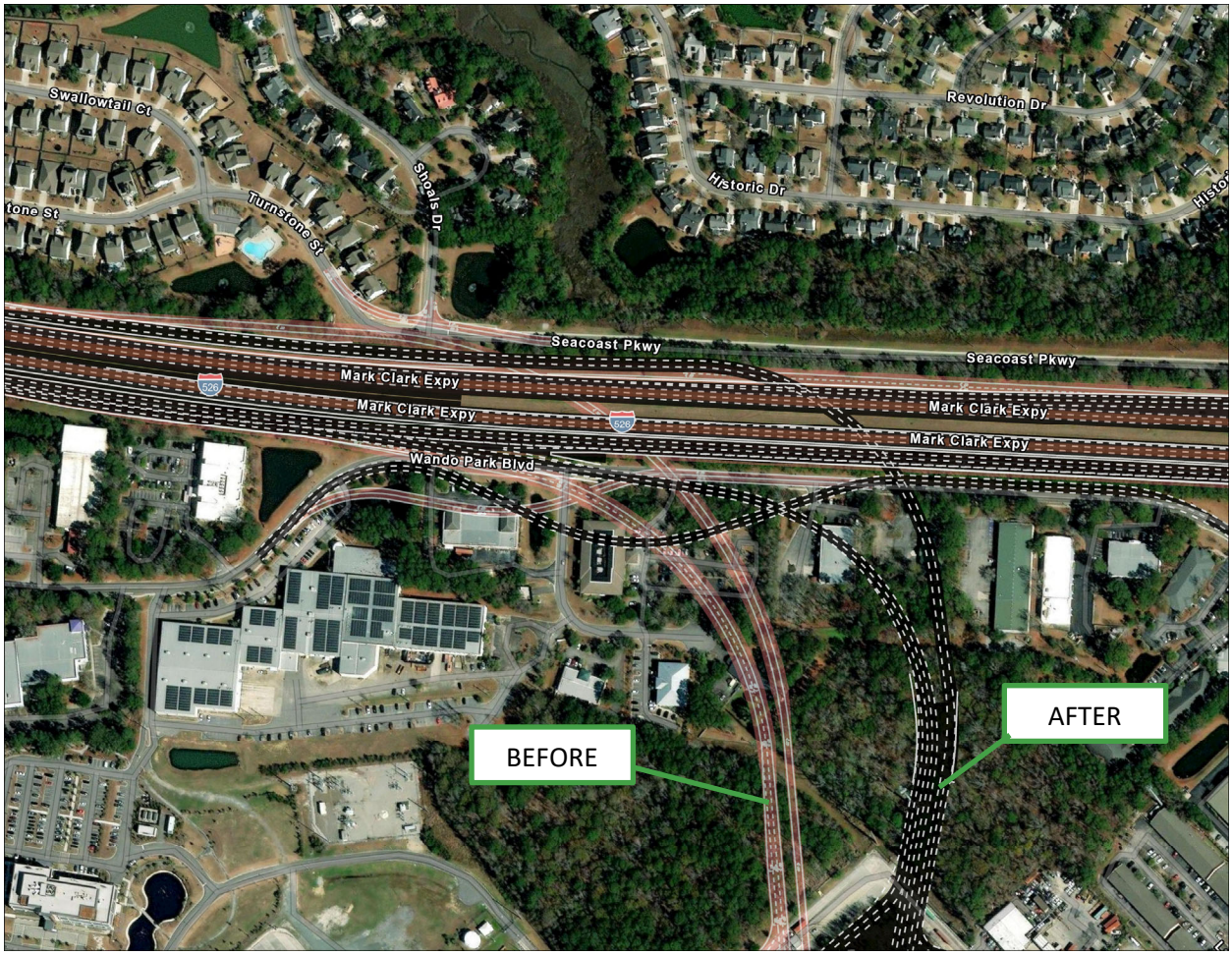



Figure 8 - Alternative 2 before and after refinements along Seacoast Parkway

**Optimizing interchange operations –** Multiple merge and diverge options along I-526 were examined to both improve traffic operations and reduce direct conflicts between trucks and cars. Because of the high volume of trucks, merging traffic into I-526 introduces multiple issues related to truck acceleration, trucks merging into congested lanes, and an increase in car and truck interactions with both operational and safety issues. For this reason, multiple merge options were examined to try to both improve traffic operations and reduce direct conflicts between trucks and automobiles. It was determined that extending the distance between the WB merge point for the proposed truck ramps and existing interchange would best meet the purpose and need of the project. In addition, it was determined there should be only one exit from I-526 EB to a CD road. The CD would split into two separate ramps: the port access ramp and the Long Point Road EB exit ramp. These two refinements optimize interchange operations and would best meet the purpose and need of the project.

**Minimizing potential impacts to cultural and historic resources** – During the environmental field studies and subsequent coordination with the state historic preservation office (SHPO) for cultural and historic resources, it was determined the Snowden School site is eligible for listing on the National Register of Historic Places. The design team revised the design to minimize potential impacts to this school site but could not completely avoid the resource.

**Evaluating operational improvements for the Long Point Road and Belle Hall Parkway intersection** – Currently, traffic traveling from the I-526 and Long Point Road interchange north along Long Point Road can turn left onto Belle Hall Parkway. Belle Hall Parkway provides access to the neighborhoods of Belle Hall, Tidal Walk, Grassy Creek, and multiple businesses. The project team evaluated the traffic operations associated with the left turn options from Long Point Road onto Belle Hall Parkway. It has been noted that through public comments, a desire to maintain the left-turn movement has been expressed. The project team performed additional traffic analysis to determine that the left turn movements from Long Point Road onto Belle Hall Parkway can be maintained.

**Incorporating a 10-foot multiuse path along the east side of Long Point Road from Wando Park Boulevard to Belle Point Drive to enhance bicycle and pedestrian connectivity** – There are existing sidewalks located along Long Point Road on both sides of the roadway within the study area. Sidewalks along Long Point Road connect to sidewalks on Wando Park Boulevard, Belle Hall Parkway, Belle Point Drive, and Egypt Road. An existing bicycle lane is located on the west side of Long Point Road from Belle Hall Parkway and continues outside the project limits along Long Point Road to Whipple Road. The incorporation of a 10-foot multiuse path along the east side of Long Point Road will enhance connectivity within and around the study area. The proposed multiuse path will connect to the existing sidewalks and will also accommodate future connections to bicycle and pedestrian facilities outlined in the BCDCOG Walk-Bike Master Plan[1] and the "Mount Pleasant Way"[2] plan proposed by the Town of Mount Pleasant.

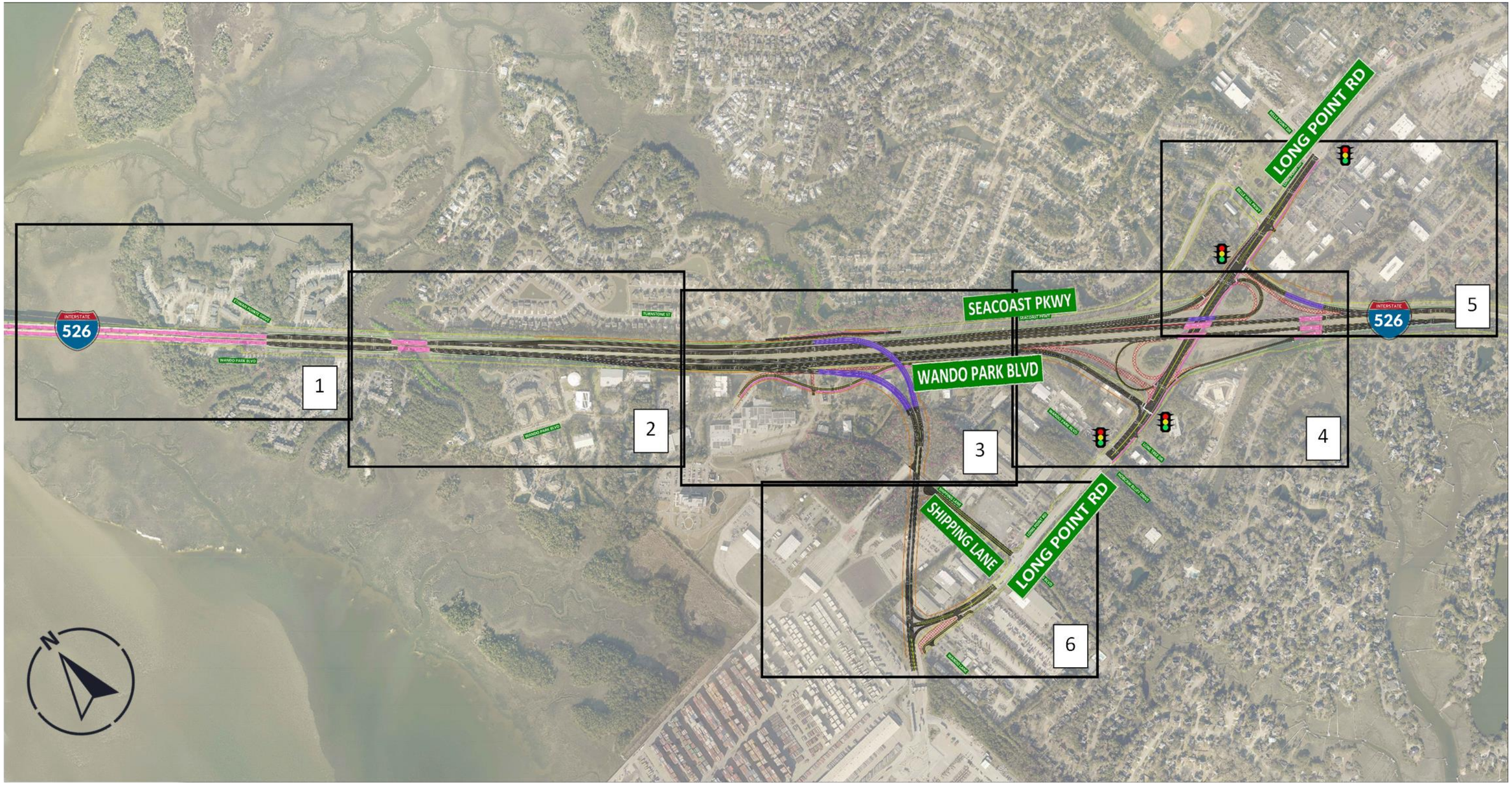
[1] https://www.walkbikebcd.com/documents.html
[2] https://www.tompsc.com/1347/Mount-Pleasant-Way

# Appendix A
# Figures of Reasonable Alternative

# CONCEPTUAL DESIGN


*The content of this display is conceptual only and not to be used for any type of construction, maintenance, or acquisition of right-of-way. As of February 2023.*

# OVERVIEW MAP




*NOTE: Numbered segments are shown individually on the following pages.*


1
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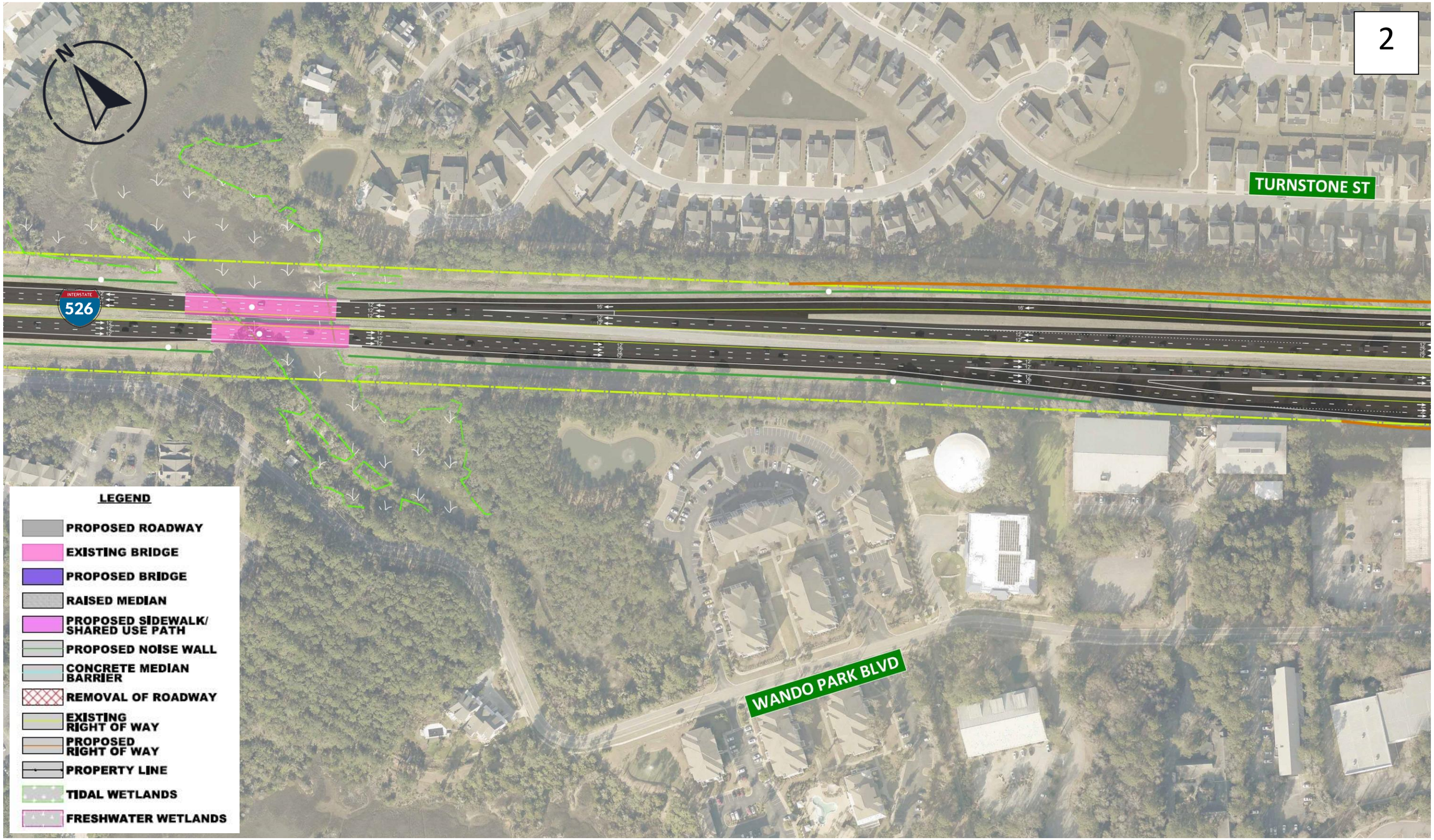
WANDO PARK BLVD
INTERSTATE
526
LEGEND
PROPOSED ROADWAY
EXISTING BRIDGE
PROPOSED BRIDGE
RAISED MEDIAN
PROPOSED SIDEWALK/ SHARED USE PATH
PROPOSED NOISE WALL
CONCRETE MEDIAN BARRIER
REMOVAL OF ROADWAY
EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
PROPERTY LINE
TIDAL WETLANDS
FRESHWATER WETLANDS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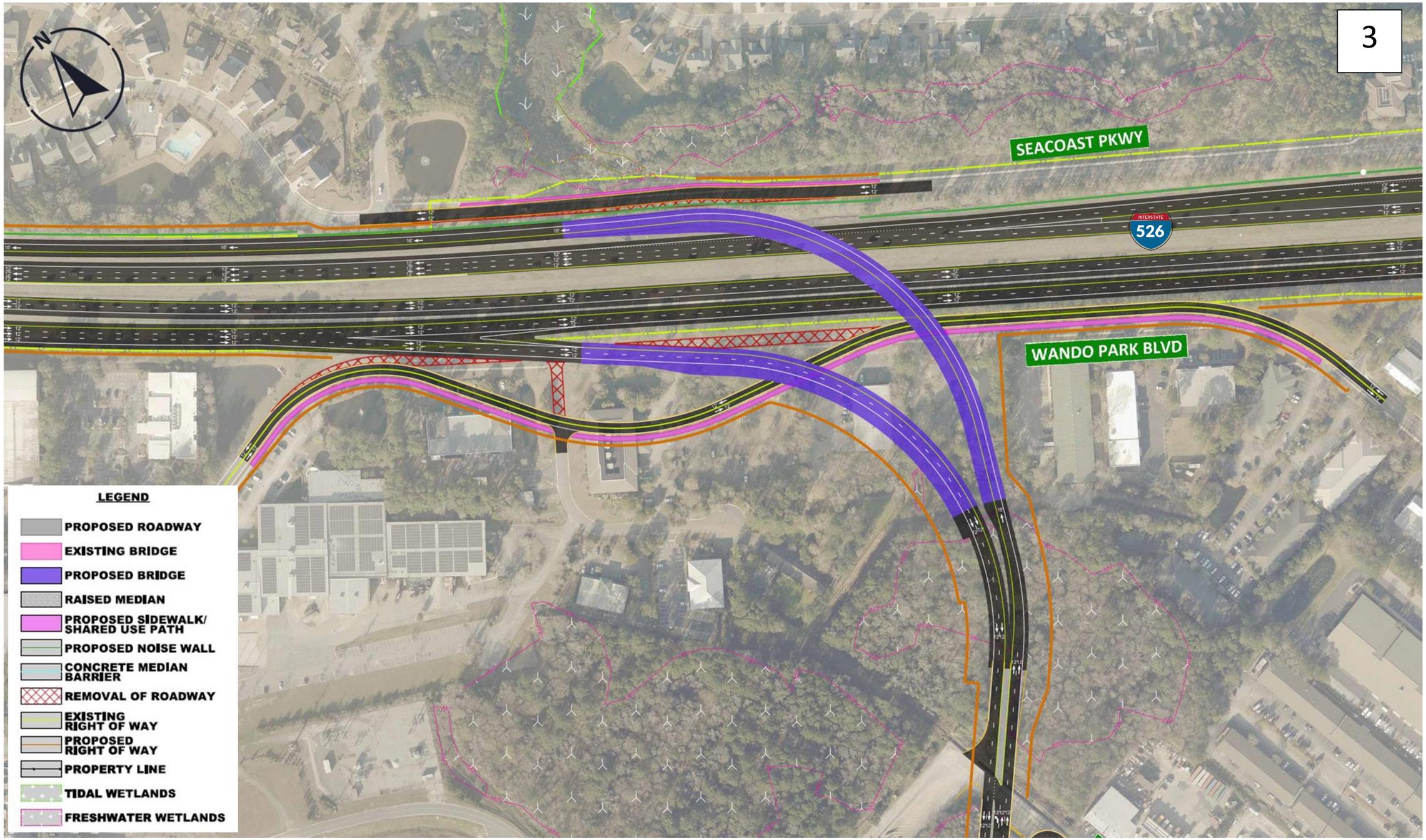
526
TURNSTONE ST
WANDO PARK BLVD
LEGEND
PROPOSED ROADWAY
EXISTING BRIDGE
PROPOSED BRIDGE
RAISED MEDIAN
PROPOSED SIDEWALK/ SHARED USE PATH
PROPOSED NOISE WALL
CONCRETE MEDIAN BARRIER
REMOVAL OF ROADWAY
EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
PROPERTY LINE
TIDAL WETLANDS
FRESHWATER WETLANDS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SEACOAST PKWY
INTERSTATE
526
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LEGEND
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PROPOSED BRIDGE
RAISED MEDIAN
PROPOSED SIDEWALK/ SHARED USE PATH
PROPOSED NOISE WALL
CONCRETE MEDIAN BARRIER
REMOVAL OF ROADWAY
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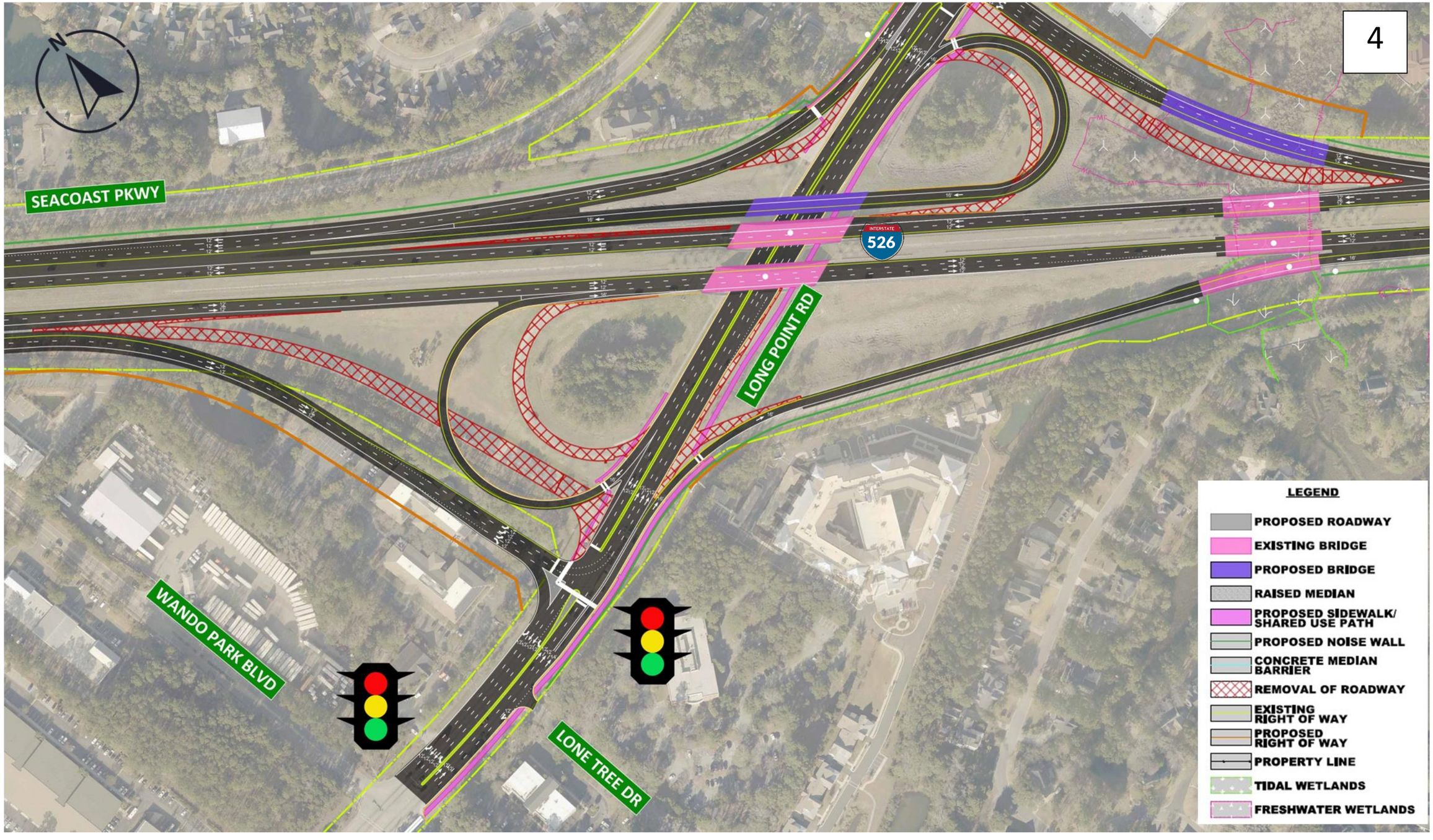
TIDAL WETLANDS
FRESHWATER WETLANDS


4
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SEACOAST PKWY
INTERSTATE
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WANDO PARK BLVD
LONE TREE DR
LEGEND
PROPOSED ROADWAY
EXISTING BRIDGE
PROPOSED BRIDGE
RAISED MEDIAN
PROPOSED SIDEWALK/ SHARED USE PATH
PROPOSED NOISE WALL
CONCRETE MEDIAN BARRIER
REMOVAL OF ROADWAY
EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
PROPERTY LINE
TIDAL WETLANDS
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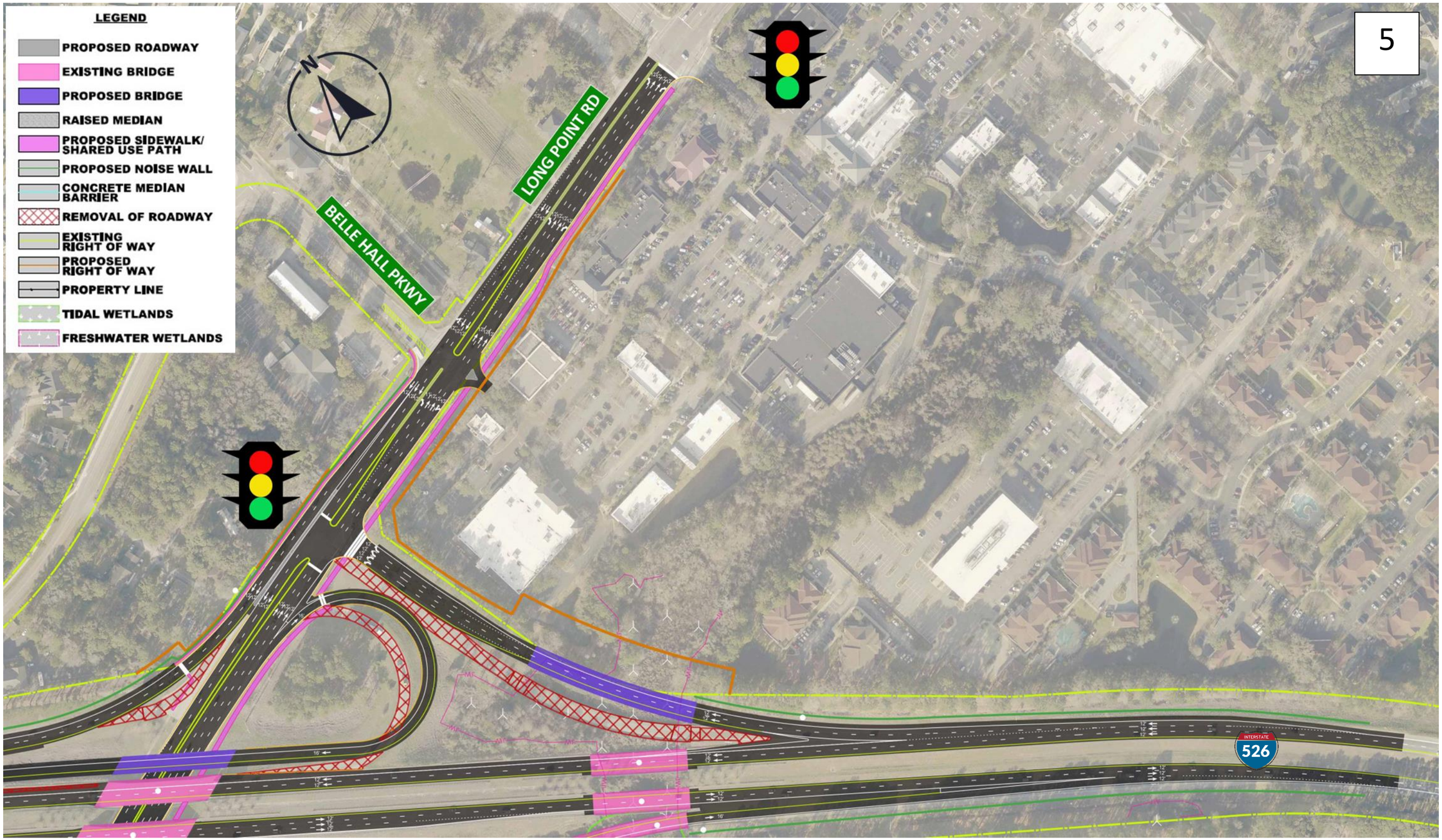
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PROPOSED BRIDGE
RAISED MEDIAN
PROPOSED SIDEWALK/ SHARED USE PATH
PROPOSED NOISE WALL
CONCRETE MEDIAN BARRIER
REMOVAL OF ROADWAY
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TIDAL WETLANDS
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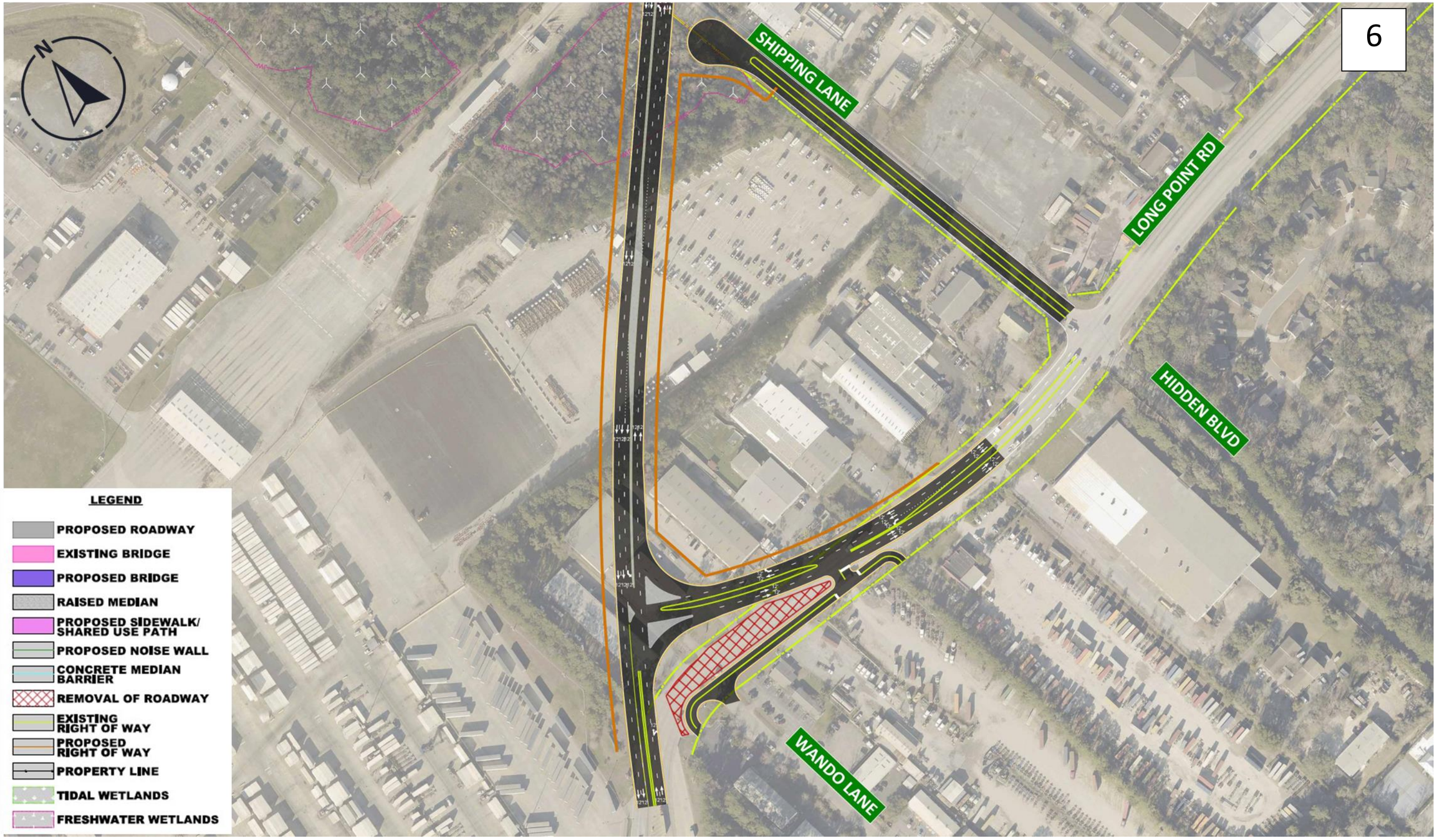
6
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SHIPPING LANE
LONG POINT RD
HIDDEN BLVD
WANDO LANE
LEGEND
PROPOSED ROADWAY
EXISTING BRIDGE
PROPOSED BRIDGE
RAISED MEDIAN
PROPOSED SIDEWALK/ SHARED USE PATH
PROPOSED NOISE WALL
CONCRETE MEDIAN BARRIER
REMOVAL OF ROADWAY
EXISTING RIGHT OF WAY
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FRESHWATER WETLANDS