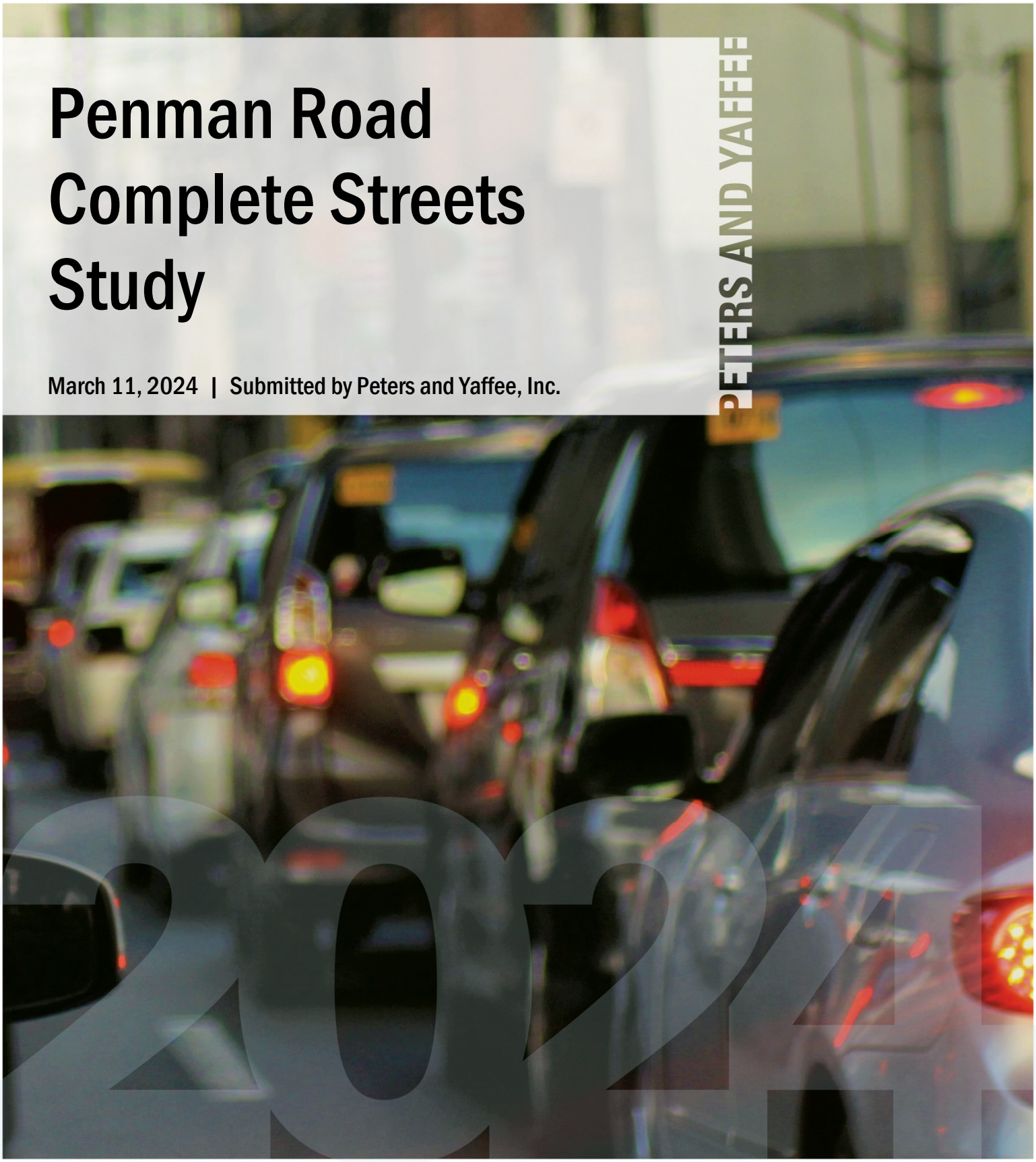
Penman Road Complete Streets Study

March 11, 2024 | Submitted by Peters and Yaffee, Inc.

PETERS AND YAFFEE



peters yaffee
TRANSPORTATION & TRAFFIC ENGINEERING

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Introduction

A complete streets study has been prepared to determine the projected operations of Penman Road from Beach Boulevard to Atlantic Boulevard in Duval County, Florida. The goal of this complete streets project is to facilitate the comfortable use of the corridor by all modes of travel. The specific objectives of this project are to enhance safety for all users, reduce vehicle speed, add additional pedestrian crossing points along Penman Road, and provide improved facilities for non-motorized users alongside Penman Road.

The Penman Road/Florida Boulevard/Forest Avenue intersection stands out as one of the busiest on Penman Road, operating as a five-leg signalized intersection with the following geometry:

- Eastbound (Florida Boulevard): One shared left-turn/through lane and one right-turn lane.
- Westbound (Florida Boulevard): One left-turn lane and one shared through/right-turn lane.
- Northbound (Penman Road): One left-turn lane and one shared through/right-turn lane.
- Southbound (Penman Road): One left-turn lane and one shared through/right-turn lane.
- North Eastbound (Forest Avenue): One shared left/through/right-turn lane.

Alternatives

To achieve the goal of this complete streets project, the following alternatives were considered for the Penman Road/Florida Boulevard/Forest Avenue intersection:

- One-lane roundabout with a northbound right-turn bypass lane (the proposed concept)
- No-build
- Signal timing modifications
- Remove/close Forest Avenue
- Add a northbound through (NBT) lane and a southbound through (SBT) lane on Penman Road
- Add a northbound left-turn (NBL) lane on Penman Road and a westbound through receiving lane on Florida Boulevard
- One-plus lane roundabout

One-Lane Roundabout with a Northbound Right-Turn Bypass Lane

This option replaces the existing signalized intersection with a circular, single-lane configuration. Additionally, incorporating a dedicated right-turn bypass lane for northbound Penman Road traffic aims to further improve traffic flow and accommodate northbound right-turning movements. Exhibit 1 presents a concept design of this option.

Pros:

- Promotes continuous traffic flow as roundabouts will reduce stops and starts.
- Safety benefits as roundabouts significantly reduce the severity of crashes and eliminate certain types of serious injury crashes such as angle crashes, left-turn crashes, head-on crashes, etc.
- Pedestrian friendly with crosswalks and refuge islands, and lower vehicle speeds.
- Lower fuel consumption and emissions due to smoother traffic flow.

Cons:

- Right-of way issues as roundabouts may require more physical space than traditional intersections.
- Driver education required as some drivers may initially find roundabouts unfamiliar.
- Construction disruption may impact traffic and cause inconvenience to residents and businesses.

The one-lane roundabout with a northbound right-turn bypass lane option is recommended as it aims to improve intersection efficiency, reduce congestion, and enhance overall safety for all roadway users. It aligns well with the complete streets goals of creating a more sustainable and pedestrian-friendly transportation system.

No-Build

The No-Build option maintains the current intersection configuration without implementing any proposed changes, preserving existing infrastructure and traffic patterns. While activities such as pavement rehabilitation may occur, the overall operations remain unchanged.

Pros:

- Cost savings as there will be no expenses associated with design and construction.
- Minimal disruption to existing traffic flow, avoiding inconveniences for nearby residents.

Cons:

- Mobility and safety issues persist without improvement, potentially worsening with population growth.
- Failure to meet complete streets goals, as safety and accommodation of all modes of travel cannot be enhanced.

The No-Build option may be selected in situations where current conditions are deemed satisfactory, and there is a desire to avoid potential drawbacks associated with construction and changes.

Signal Timing Modifications

The signal timing improvements option enhances the timing at the intersection without altering physical infrastructure. Four options can be implemented:

1. Optimize splits and cycle length using Synchro.
2. Remove/decrease the 46.4 seconds all-red pedestrian phase (to 25 seconds).
3. Remove WBL (phase 4) and change WBL from protected-only to permissive.
4. Combination of #2 and #3 and optimize splits and cycle length using Synchro.

Pros:

- Cost effective with no major infrastructure changes.
- Immediate implementation and benefits for traffic efficiency without long construction timelines.
- Flexible adjustment to the changing traffic patterns.
- Improve traffic efficiency and reduce congestion.

Cons:

- Limited improvements on capacity, not addressing over-capacity intersections or long-term traffic growth.
- Requires continuous monitoring as traffic patterns and demands may change over time.
- Failure to meet complete streets goals, as it may not address accommodation of various travel modes.

The all-red pedestrian phase was reduced from 46.6 seconds to 25 seconds. However, the alteration of the WBL phasing was not implemented due to safety concerns. Additional signal timing modifications would be implemented if any changes are made to the roadway geometry.

Remove/Close Forest Avenue

The remove/close Forest Avenue option eliminates Forest Avenue from the intersection, converting the five-leg intersection into a regular four-leg intersection. As a four-leg intersection, the signal timing will be adjusted accordingly and remove/decrease all-red pedestrian phase to better improve the operation at the intersection can be considered. Exhibit 2 presents a concept design of this option.

Pros:

- Improve traffic efficiency and reduce congestion as the removal of Forest Avenue will contribute to a simplified intersection geometry and result in smoother traffic flow and reduced congestion.
- Enhance safety for all users by reducing conflicting points with one less road entering the intersection.
- Cost savings compared to more extensive modifications.
- Potential for more space for public use if Forest Avenue is permanently closed.

Cons:

- Access issues may arise in certain areas, requiring residents to detour as much as 1.5 miles, leading to longer travel times.
- Traffic redistribution may increase traffic on alternative routes, causing congestion or safety concerns on Kings Road and Florida Boulevard.

The remove/close Forest Avenue option may be chosen when the priority for improving operations at the intersection outweighs the significant detour imposed on some drivers.

Add a NBT and a SBT Lane

This option adds dedicated through lanes for both northbound and southbound traffic on Penman Road at the intersection. This will require 1,000 feet length extension of existing travel lane width for traffic on both approaches to diverge and merge. Exhibit 3 presents a concept design of this option.

Pros:

- Improve overall intersection capacity as the addition of dedicated through lanes for both directions can significantly enhance traffic flow and reduce congestion.

Cons:

- Right-of way issues as expanding the roadway for additional lanes may require additional right-of-way.
- Construction disruption may impact traffic and cause inconvenience to residents.
- Failure to meet complete streets goals, as adding a through lane may result in higher speeds and a wider roadway to cross for non-motorist users.

Adding a northbound through and a southbound through lane on Penman Road was not recommended in the context of a complete streets project, as it is contrary to the goal of a comfortable non-motorist experience.

Add a NBL Lane

This option adds a northbound left-turn lane on Penman Road and a westbound through receiving lane on Florida Boulevard at the intersection. This will require 1,000 feet length extension of existing travel lane width for northbound traffic to diverge and westbound traffic to merge. Exhibit 4 presents a concept design of this option.

Pros:

- Efficient left-turn movements are facilitated by the double left-turn lanes, allowing for the smooth flow of more northbound left-turn traffic at the intersection. This configuration will reduce delays and wait times for northbound left-turn, through, and right-turn traffic.

Cons:

- Right-of way issues as expanding the roadway for additional lanes may require additional right-of-way.
- Construction disruption may impact traffic and cause inconvenience to residents and businesses.
- Failure to meet complete streets goals, as adding a left-turn lane may result in higher speeds and a wider roadway to cross for non-motorist users.

This option was not recommended in the context of a complete streets project, as it is contrary to the goal of a comfortable non-motorist experience.

One-Plus Lane Roundabout

The one-plus lane roundabout enables two circulating lanes for northbound and southbound traffic but one circulating lane for other approaches. Despite the benefit of one-lane roundabouts, this design accommodates higher traffic volumes for northbound and southbound traffic on Penman Road, providing additional capacity at the intersection. However, it could also increase intersection complexity, require more right-of-way, and potentially result in higher speeds than a one-lane roundabout, creating a wider roadway to cross for pedestrians. Exhibit 5 presents a concept design of this option.

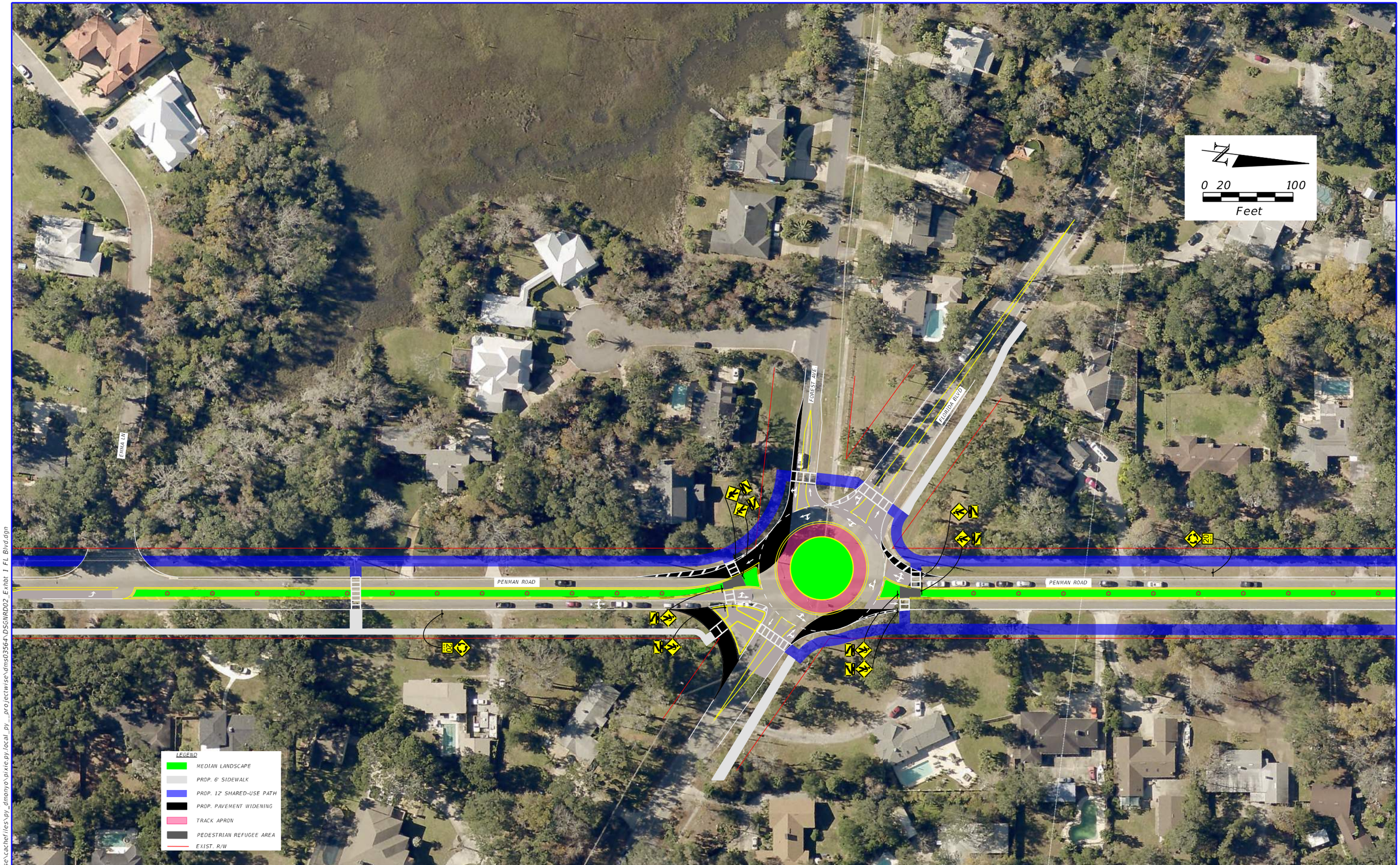
The one-plus lane roundabout was not recommended because it would require significant roadway widening on Penman Road, which goes against the complete streets goal of this project.

Recommendations and Conclusions

Based on the goals of this project and the evaluation of alternatives for Penman Road/Florida Boulevard/Forest Avenue intersection, it is recommended to proceed with the one-lane roundabout with a northbound bypass lane. This option aligns with the goals of the complete streets project by addressing intersection efficiency and enhancing overall safety for all roadway users.

Exhibit 1

One-Lane Roundabout with a Northbound Right-Turn Bypass Lane



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CITY OF JACKSONVILLE, FLORIDA
DEPARTMENT OF PUBLIC WORKS

ROAD NO.	COUNTY	PROJECT NO.
PENMAN ROAD	DUVAL	71237-21

EXHIBIT 1
ONE LANE ROUNDABOUT WITH A NB RIGHT-TURN BYPASS LANE

SHEET NO. 1

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Exhibit 2

Remove/Close Forest Avenue

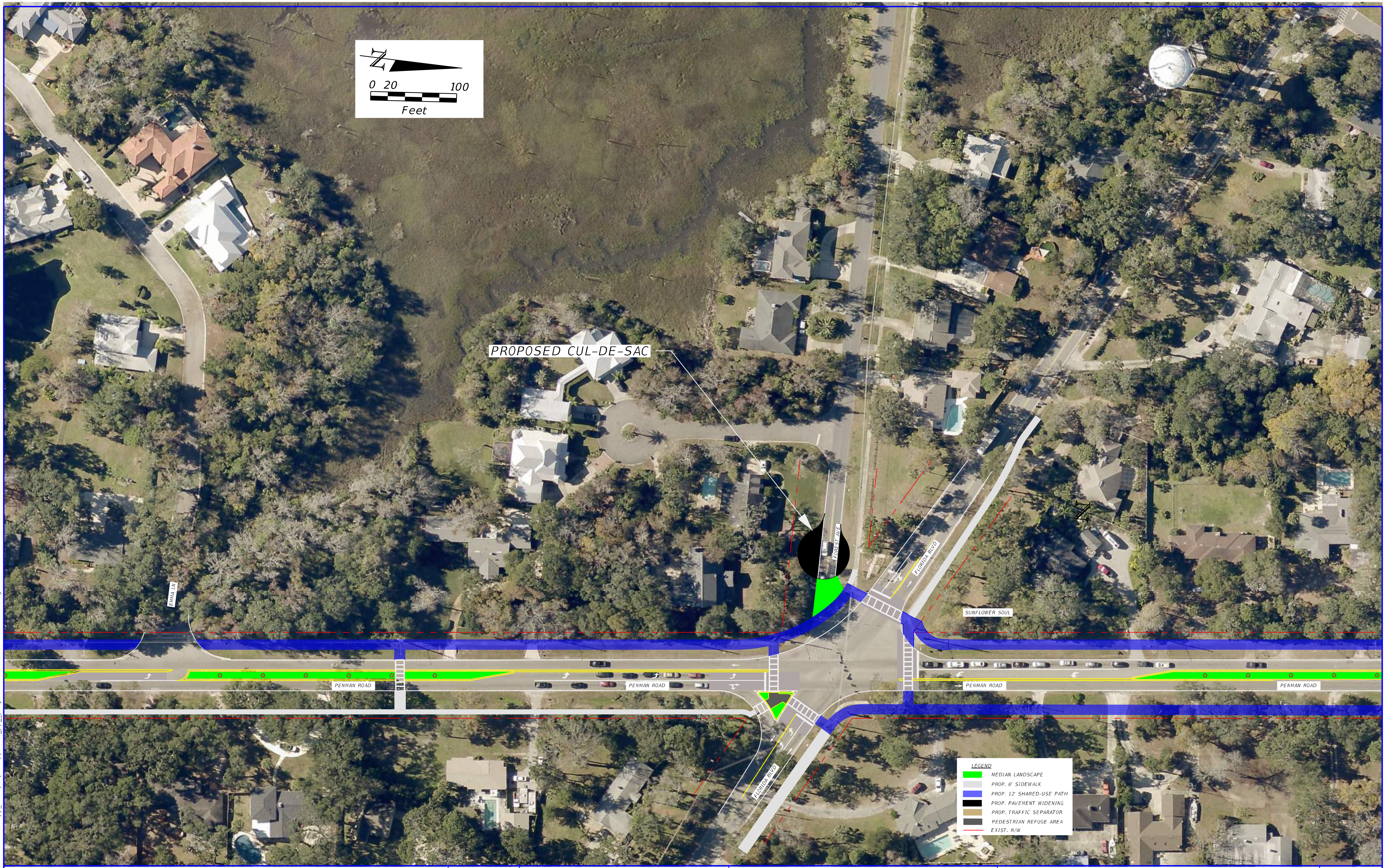

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EXHIBIT 2
REMOVE / CLOSE FOREST AVE.

SHEET NO.
2

Exhibit 3

Add a NBT and a SBT Lane

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EXHIBIT 3
ADD TRAVEL LANES (NB & SB)

SHEET NO. 3A

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EXHIBIT 3
ADD TRAVEL LANES (NB & SB)

SHEET NO. 3B

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Exhibit 4

Add a NBL Lane

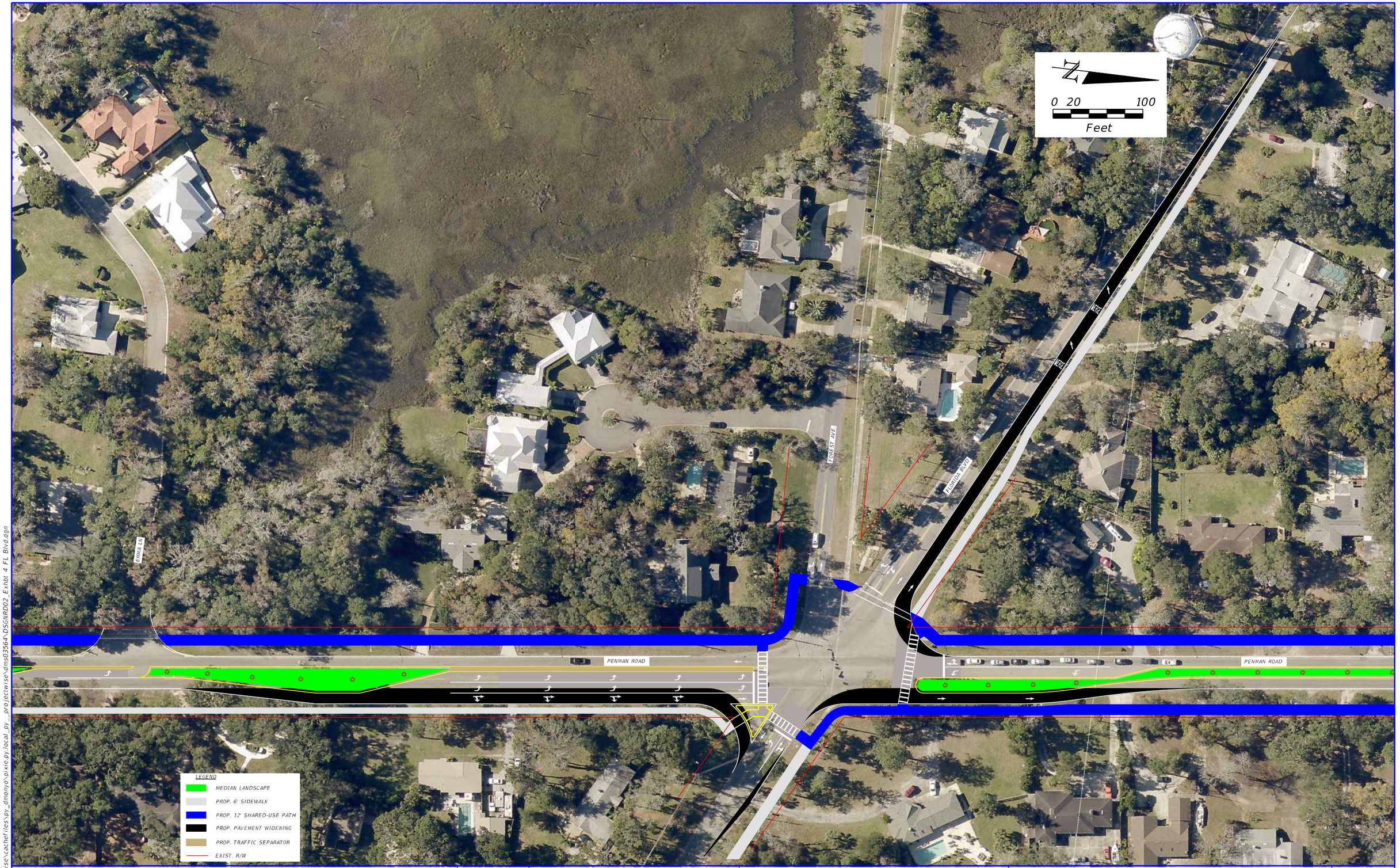

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EXHIBIT 4
ADD A NBL LANE

SHEET NO. 4

Exhibit 5

One-Plus Lane Roundabout

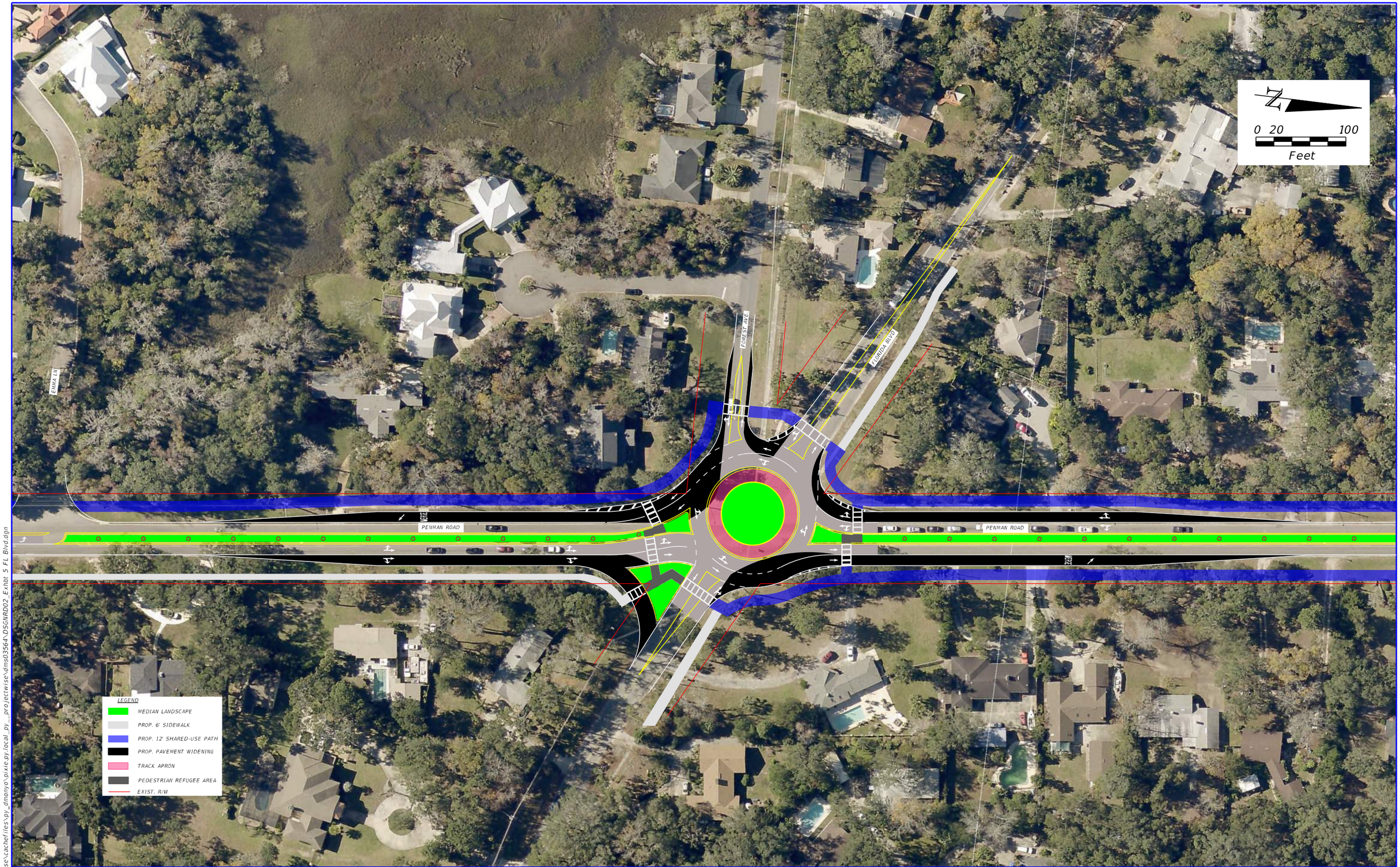

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EXHIBIT 5
ONE-PLUS LANE ROUNDABOUT

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