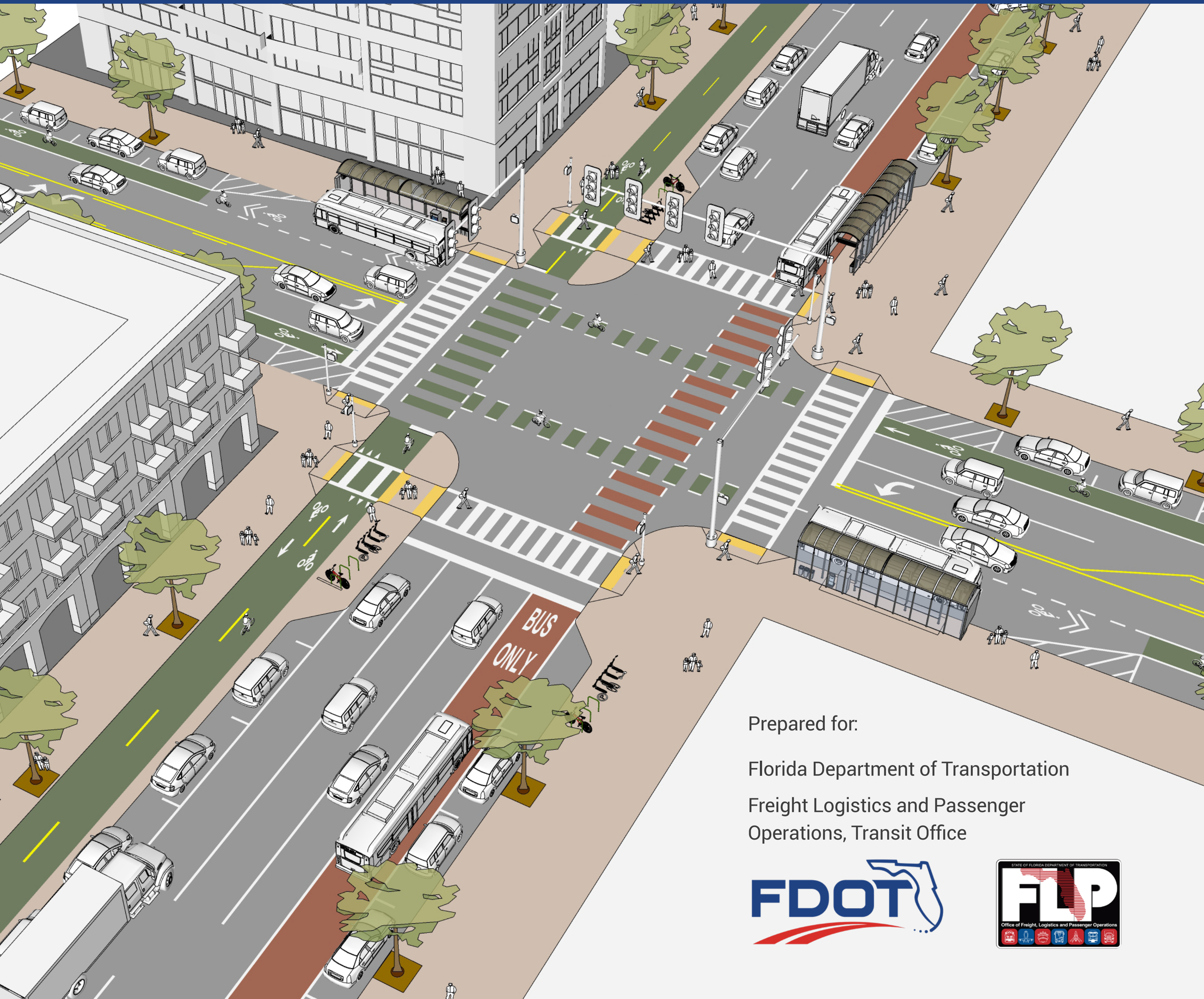
CONTEXT CLASSIFICATION FRAMEWORK FOR BUS TRANSIT

DECEMBER 2020



Prepared for:

Florida Department of Transportation

Freight Logistics and Passenger Operations, Transit Office

FDOT

FLP
Office of Freight, Logistics and Passenger Operations

CONTEXT CLASSIFICATION FRAMEWORK FOR BUS TRANSIT

December 2020

WHY THIS DOCUMENT?

This document was developed to provide general guidance to transit agency, local government, and Florida Department of Transportation (FDOT) planners and designers who are working to better incorporate transit service and infrastructure along state roadways. Safe and efficient transit service is key to advancing FDOT's mission to enhance mobility and economic prosperity while preserving the quality of our environment and communities.

As a partner to transit agencies and local governments, FDOT is committed to providing the tools, guidance, and design expertise to help plan and design state roads so that these roadways do not only accommodate transit, but also enhance the transit experience of Florida's citizens and visitors.

Prepared for:
FDOT Public Transit Office
605 Suwannee Street
Tallahassee, FL 32399

Prepared by: Kittelson & Associates, Inc.

CONTENTS

BACKGROUND

This document describes how bus-based transit fits into each of the Florida Department of Transportation (FDOT) Context Classification categories. Strategies and amenities suitable for typical state roadways in each Context Classification are illustrated and briefly described. These strategies and amenities were identified through a literature review of industry best practices and interviews of staff at several Florida transit agencies, MPOs, and FDOT districts. In addition, case studies based on implementations of these strategies by Florida agencies are included to serve as inspiration and reference.

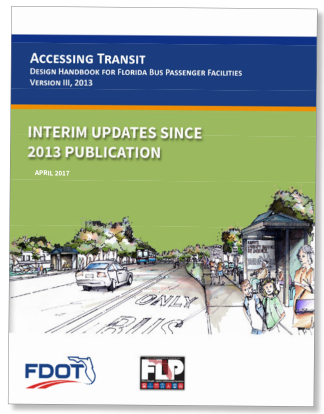
As with other elements of roadway design, the approach to integrating transit is not one-size-fits-all. As such, the level of investment and priority for transit may be tailored based on the role that a street plays within a transportation network and a transit network. A single corridor should not be over-emphasized: transit should be oriented to connecting origins and destinations (including major activity centers).The level of pedestrian and bicyclist activity is another important consideration. As such, this guidebook also illustrates strategies that can support non-motorized access to transit.

To differentiate between different levels of transit service (either existing or planned), the figures in this document use the following notation:

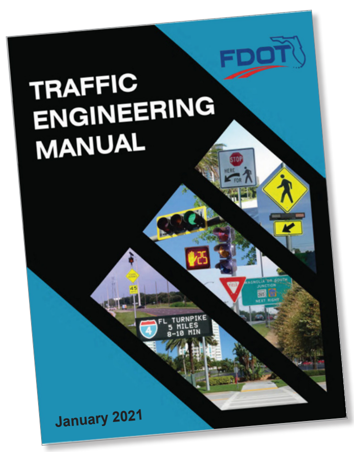
- **Basic elements:** Strategies and amenities that can be considered for any transit service.
- **Desired elements:** Strategies and amenities suitable for transit service operating with shorter headways (i.e., 15 minutes or shorter) and offering a higher level of service than typical fixed-route local bus transit.

Where applicable, this document references FDOT Design Manual's (FDM) design criteria and procedures that can be used to advance these elements. The *FDOT Accessing Transit Design Handbook* is also referenced for guidance on the design, location, and installation of transit facilities. Finally, the FDOT Traffic Engineering Manual (TEM) is cited when discussing considerations related to traffic signage and markings.

The FDOT Design Manual sets forth geometric and other design criteria, as well as procedures, for FDOT projects.



The FDOT *Accessing Transit Design Handbook* provides guidance to state and local governments and transit agencies in the design, location, and installation of transit facilities consistent with state and federal laws and regulations.



The FDOT Traffic Engineering Manual (TEM) provides traffic engineering standards and guidelines to be used on the State Highway System.

WHAT IS CONTEXT CLASSIFICATION

The context classification system broadly identifies the various built environments existing in Florida, as illustrated in the figure below. State roadways extend through a variety of context classifications. FDOT's context classification system describes the general characteristics of the land use, development patterns, and roadway connectivity along a roadway, providing cues as to the types of uses and user groups that will likely utilize the roadway. The figure below should not be taken literally to imply all roadways will have every context classification or that context classifications occur in the sequence shown. Identifying the context classification is a step in the planning and design processes, as different context classifications will have different design criteria and standards. Source: FDOT Context Classification Guide, page 4

C1-Natural

Lands preserved in a natural or wilderness condition, including lands unsuitable for settlement due to natural conditions.

C2-Rural

Sparsely settled lands; may include agricultural land, grassland, woodland, and wetlands.

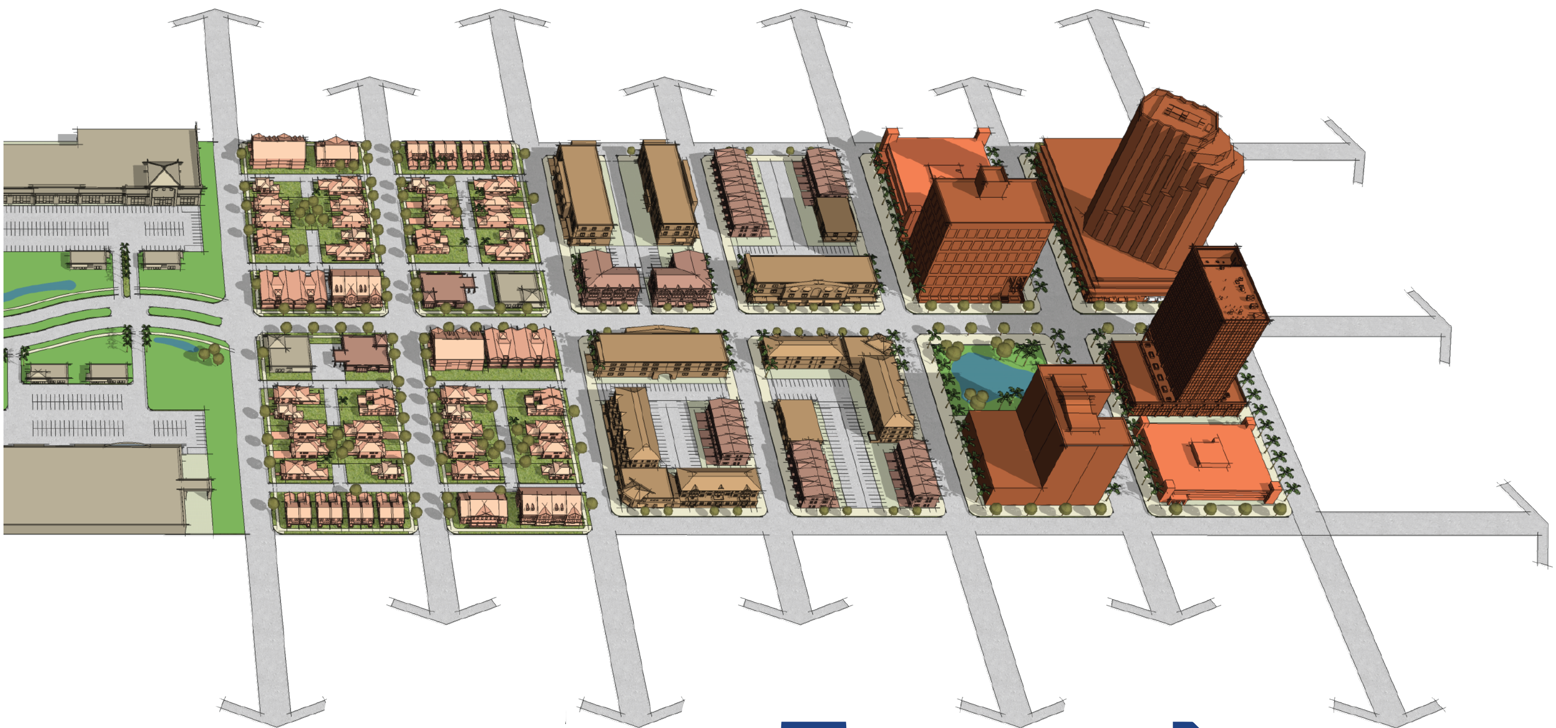
C2T-Rural Town

Small concentrations of developed areas immediately surrounded by rural and natural areas; includes many historic towns.

C3R-Suburban Residential

Mostly residential uses within large blocks and a disconnected or sparse roadway network.

THE FDM AND THE FDOT TEM USE CONTEXT CLASSIFICATION IN SETTING ENGINEERING AND DESIGN CRITERIA FOR DESIGN SPEEDS, LANE WIDTHS, SIDEWALK WIDTHS, MIDBLOCK CROSSINGS, AND MORE.



C3C-Suburban Commercial

Mostly non-residential uses with large building footprints and large parking lots within large blocks and a disconnected or sparse roadway network.

C4-Urban General

Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor or behind the uses fronting the roadway.

C5-Urban Center

Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of a civic or economic center of a community, town, or city.

C6-Urban Core

Areas with the highest densities and building heights, and within FDOT classified Large Urbanized Areas (population >1,000,000). Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadway, and are within a well-connected roadway network.

SUMMARY MATRIX

This framework relies heavily on illustrative graphics to convey the elements that can contribute to better transit service across a variety of Context Classifications. The following table summarizes the elements that were considered and illustrated in each of the images. The selection of these elements, and the resulting images, were based on general characteristics commonly found or ideal in each Context Classification. This framework can be used as general guidance and a starting point by FDOT, local governments, and transit agencies to start planning and designing for transit along state roadways. The selection of elements to implement on actual projects can be tailored to recognize local conditions, opportunities, and constraints.

LEGEND

- ○ Basic amenities
- ● Desired amenities
- ● Both

THE SELECTION OF DESIGN ELEMENTS TO IMPLEMENT ON ACTUAL PROJECTS CAN BE TAILORED TO RECOGNIZE LOCAL CONDITIONS, OPPORTUNITIES, AND CONSTRAINTS.

	Elements	C1/C2	C2T	C3R	C3C	C4	C5/C6
Transit Stops	Bus Stop Pad	● (light)	● (dark)	● (dark)	● (dark)	● (dark)	● (dark)
	Basic Bus Stop Shelter		○	○	○	○	○
	Large Bus Stop Shelter				● (light)	● (light)	● (light)
	Boarding Island			● (light)	● (light)	● (light)	● (light)
	Level Boarding Platform				● (light)		● (light)
Transit Operations	Queue Jumps			● (light)	● (light)	● (dark)	● (dark)
	TSP/Signals, ITS			● (light)	● (light)	● (light)	● (light)
	Stops in Bus Pull-Out			● (dark)	● (dark)	○	
	Stops in Travel Lane			● (light)	● (light)	● (light)	● (dark)
	Shared (Mixed-Flow) Lane	● (dark)	● (dark)	● (dark)	○	○	○
	BAT Lane				● (dark)	● (light)	● (dark)
	Exclusive Lane				● (light)		● (light)
Pedestrian & Bicyclist	Shoulders	● (dark)					
	Safety Edge	● (dark)					
	Sidewalk		● (dark)	● (dark)	● (dark)	● (dark)	
	Wide Sidewalk or Path		● (light)	● (light)	● (light)	● (light)	● (dark)
	Marked Crosswalk		● (dark)	● (dark)	● (dark)	● (dark)	● (dark)
	Mid-block Crossings		● (dark)		● (dark)	● (dark)	● (dark)
	Pedestrian Refuge Islands		● (light)	● (light)	● (light)	● (light)	● (dark)
	Shade	● (light)	● (dark)	● (dark)	● (dark)	● (dark)	● (dark)
	Pedestrian-friendly Signal Timing		● (dark)	● (dark)	● (dark)	● (dark)	● (dark)
	Buffered Bicycle Lane		● (dark)	● (dark)	● (dark)	● (dark)	○
	Parking-Protected Bicycle Lane		● (dark)			● (dark)	● (light)
	High-Visibility Bicycle Lane Markings		● (light)	● (light)	● (light)	● (light)	● (light)
	Cycle Track					● (light)	● (light)
	Protected Intersection		● (light)			● (light)	● (light)
VEHICULAR	On-Street Back-in Angled Parking		● (light)			● (light)	
	On-Street Parallel Parking		● (dark)			● (dark)	● (dark)

NOTE: Not all elements listed here are included in the illustrations

HOW TO USE THIS DOCUMENT

Context Classification

This title identifies Context Classification illustrated in the graphic.

Level of Elements

Indicates intended level of transit service along a roadway. In general, elements illustrated ias “basic elements” are also applicable as “desired elements” of the same Context Classification.

Description

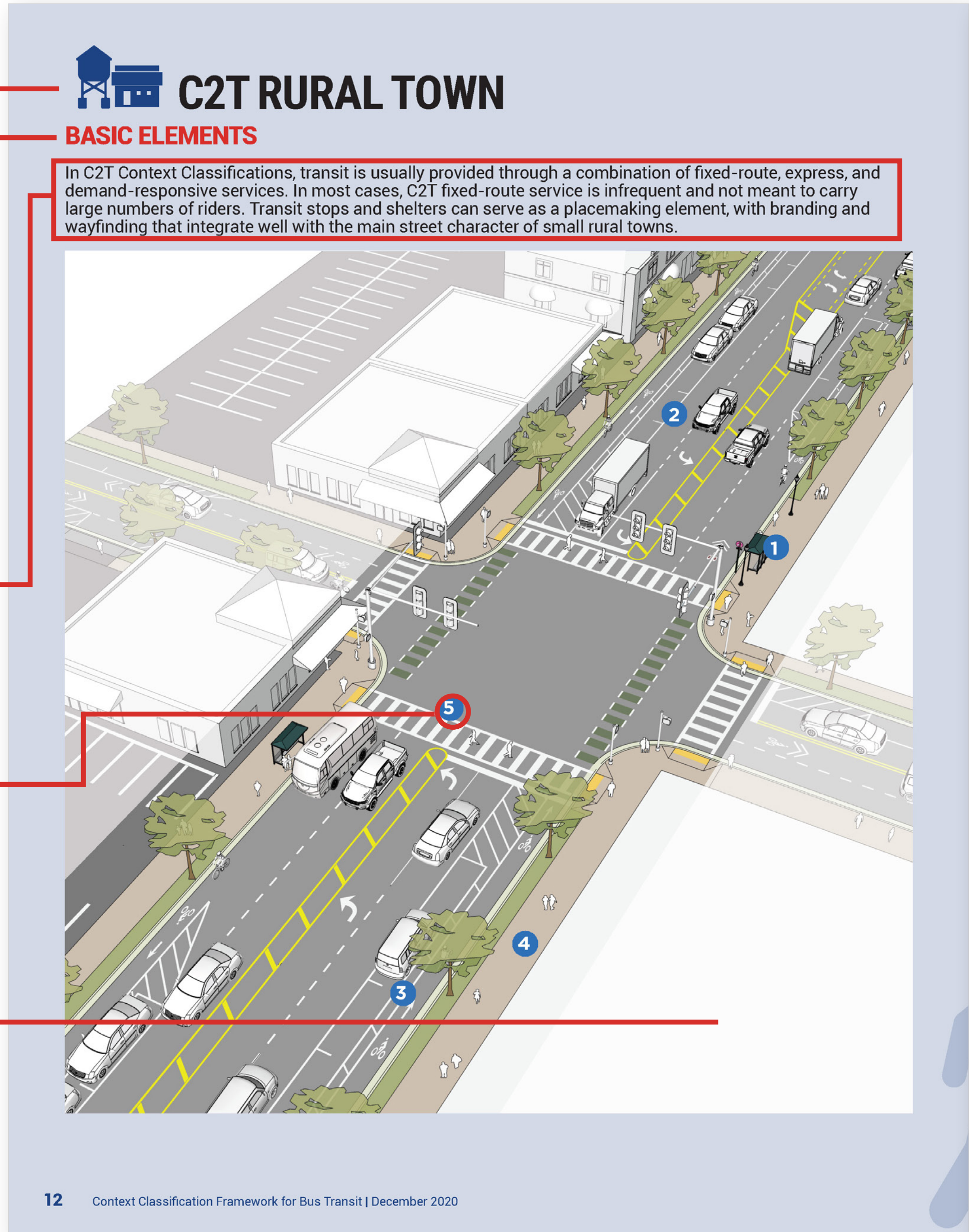
Brief description of the typical characteristics of transit service in this Context Classification.

Call-out Bubbles

Certain strategies/roadway elements are identified by numbered bubbles and described on the following page.

White Overlay

The illustrative graphics for each context classification show two intersecting roadways. To focus on the roadway showing the basic or desired elements, a white overlay mask is used.



Context Classification

Level of Elements

C2T RURAL TOWN

Basic Elements

Source: Panthus (via wikipedia)

Source: Kittelson & Associates, Inc

Sources: Eric Fischer

BUS-BICYCLE CONFLICTS

Streets serving transit and bicycles can manage conflicts between buses and people riding bicycles, especially at bus stops. In most cases, where traffic volumes and transit service are relatively low (fewer than 6 buses per hour) buses can stop in the bike lane and allow bicyclists to continue around the stopped bus. On streets with higher transit service, consider installing bus islands that allow bicycles to continue behind the bus stop.

1 BUS STOP SHELTER

Far-side stops are preferable for transit operations and gaps in traffic created by the signal allow transit operators to merge back into the travel lane. A shelter provides shade, refuge from weather, and seating and other amenities to transit users. Shelters also provide branding and wayfinding opportunities in small downtowns.

2 ON-STREET PARALLEL PARKING

On-street parking provides convenient parking for customers, delivery vehicles, and curbside pick-up/drop-off space for shared mobility providers that can provide connections to transit. Parallel parking requires a narrower space than angled or perpendicular parking, allowing for more space to be allocated for pedestrian, bicyclist, or transit infrastructure. Near bus stops, parallel on-street parking may need to be restricted to allow for boarding islands or pull-outs.

3 PARKING-PROTECTED BICYCLE LANE

By placing the bicycle lane between the curb and on-street parking, bicyclists have additional separation from moving vehicular traffic. A narrow buffer strip (at least 3') on the passenger side of vehicles—painted but preferably with vertical elements—will reduce the possibility of "dooring" crashes. Beyond increasing bicycling comfort, bicycle lanes protected by parking are also less likely to be blocked by double-parked vehicles or freight deliveries. The FHWA *Bikeway Selection Guide* (2019) can be used to understand trade-offs in selecting bicycle facility types.

4 SIDEWALK

Sidewalks are essential to connecting pedestrians and bicyclists to transit service.

5 CROSSWALK

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Call-out Descriptions

The elements identified with numbered bubbles are described and accompanied by a representative picture.

Note that not all elements pertaining to a Context Classification are described in detail. More urban Context Classifications may include elements that are previously illustrated and described in full detail in less urban Context Classifications earlier in the document.

Informational Note

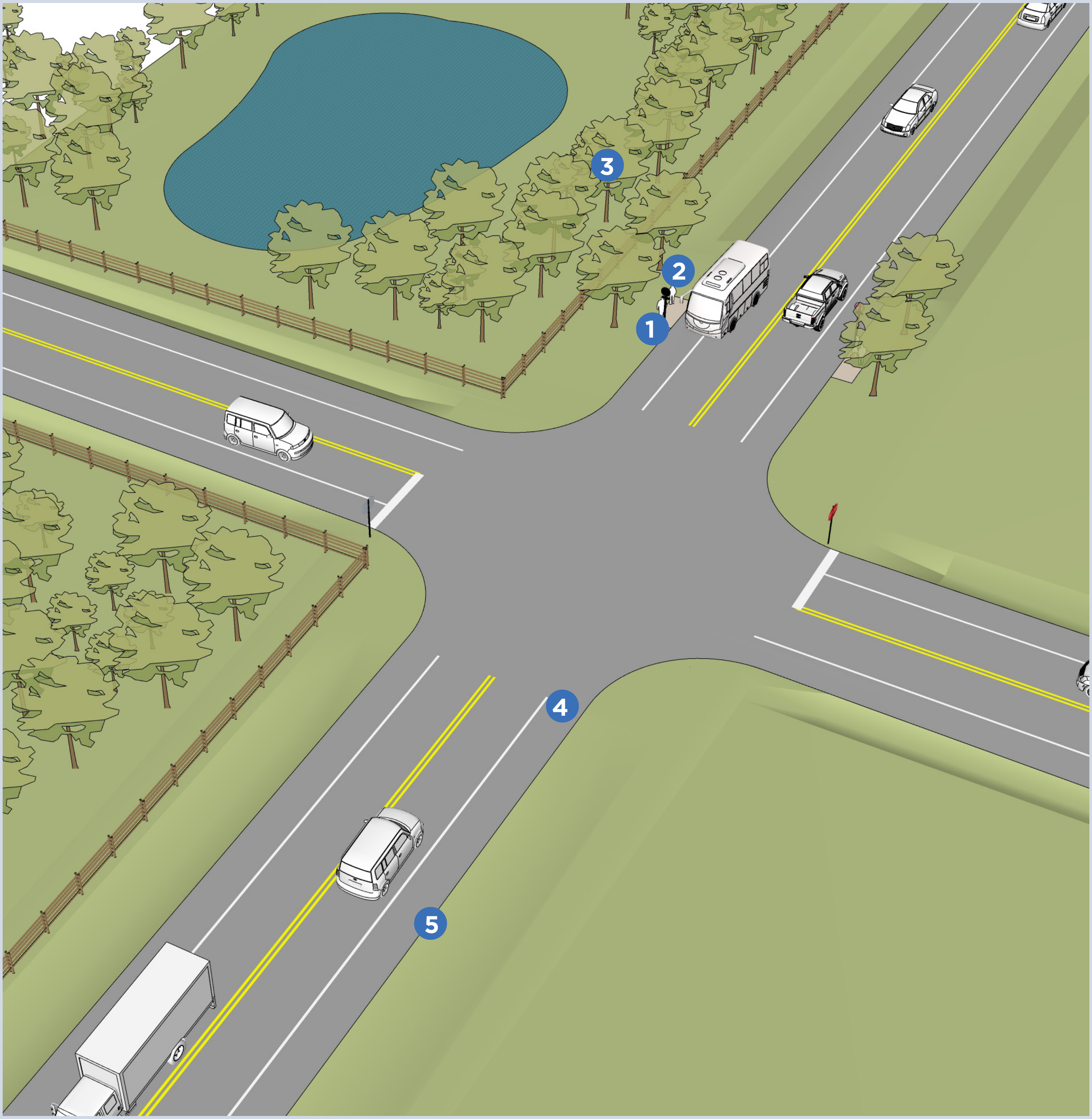
When applicable, useful information not directly tied to a specific element is provided in a separate box.

CASE STUDIES (pg. 32)

Real-world applications of these concepts are highlighted as case studies.

C1 NATURAL/ C2 RURAL

Transit service in C1/C2 Context Classifications is generally infrequent. The transit modes more likely to operate in these Context Classifications are demand-responsive vans, express buses, and intercity buses. These services have few—if any—permanent stops or stations along their rural segments.



Source: Peter Titmuss (via Alamy Stock Photo)

Source: Votran

Source: Google Earth

Source: Kittelson & Associates, Inc

Source: FHWA

1 TRAVELER INFORMATION

With infrequent rural transit service, up-to-date route and schedule information helps travelers gauge their wait times, plan their trips, and reduce anxiety while waiting. Information may be provided at bus stops through printed material or signage. Phone-based or Internet-based travel information is a good addition to (but not a substitute for) hard copies—especially in areas with poor cellphone connectivity or where smartphone availability is lower.

2 BUS STOP PAD

At bus stops where a shelter is provided, ADA requires a firm, stable, and slip-resistant surface. Refer to the FDM and the FDOT Accessing Transit Design Handbook for bus stop pad design considerations.

A simple bus stop with only a sign on a post should be located on a pedestrian accessible route (within a public right of way or on a site/facility). Source: FDOT ADA Q&A, February 2018

3 SHADE

In Florida's climate, direct or indirect shade greatly increases the comfort of transit users walking to/ from the bus stops or waiting for the bus. Natural vegetation or shade trees could be planted along roadways and adjacent to transit stops to provide shade from the sun.

4 SHOULDER

C1 and C2 roadways typically do not have continuous sidewalks and transit users will routinely walk on shoulders (paved or unpaved) to access bus stops. Keep shoulders free of debris and overgrown vegetation to improve the transit experience.

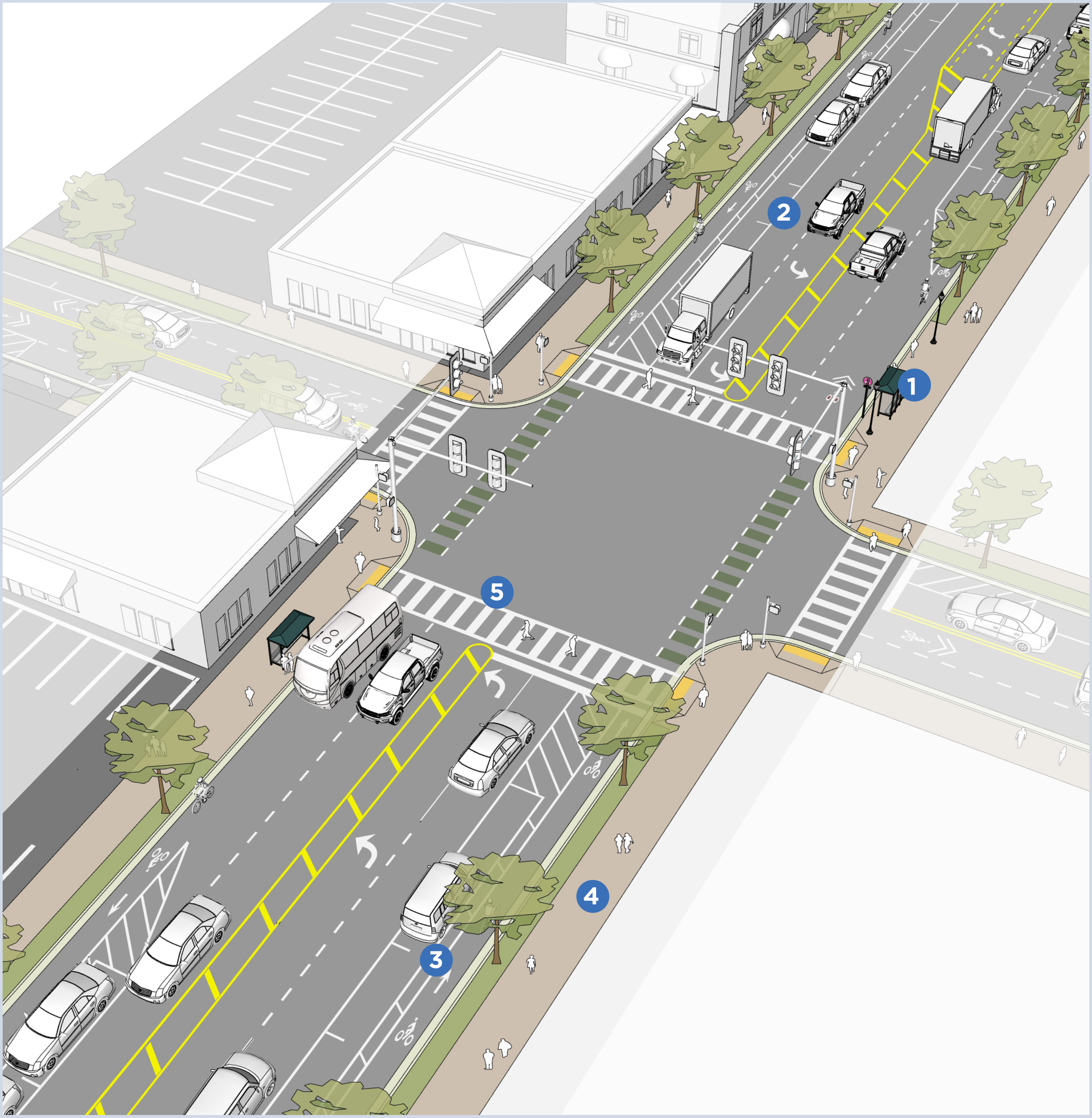
5 SAFETY EDGE

The safety edge is a simple but effective solution that can improve safety by allowing drivers who drift off highways to return to the road safely. Instead of a vertical drop-off, the safety edge shapes the edge of the pavement to 30 degrees. This also helps maintain the shoulder free of overgrown vegetation.

C2T RURAL TOWN

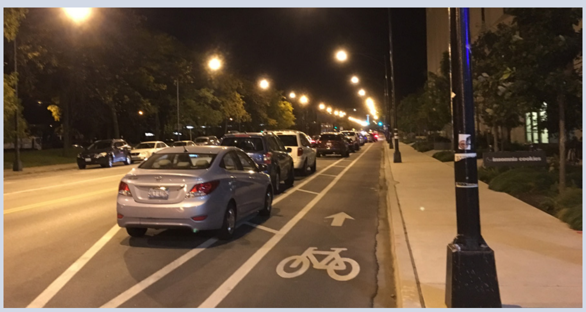
BASIC ELEMENTS

In C2T Context Classifications, transit is usually provided through a combination of fixed-route, express, and demand-responsive services. In most cases, C2T fixed-route service is infrequent and not meant to carry large numbers of riders. Transit stops and shelters can serve as a placemaking element, with branding and wayfinding that integrate well with the main street character of small rural towns.



Source: Panthus (via wikipedia)

Source: Kittelson & Associates, Inc



Sources: Eric Fischer

BUS-BICYCLE CONFLICTS

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By placing the bicycle lane between the curb and on-street parking, bicyclists have additional separation from moving vehicular traffic. A narrow buffer strip (at least 3') on the passenger side of vehicles—painted but preferably with vertical elements—will reduce the possibility of "dooring" crashes. Beyond increasing bicycling comfort, bicycle lanes protected by parking are also less likely to be blocked by double-parked vehicles or freight deliveries. The FHWA *Bikeway Selection Guide* (2019) can be used to understand trade-offs in selecting bicycle facility types.

4 SIDEWALK

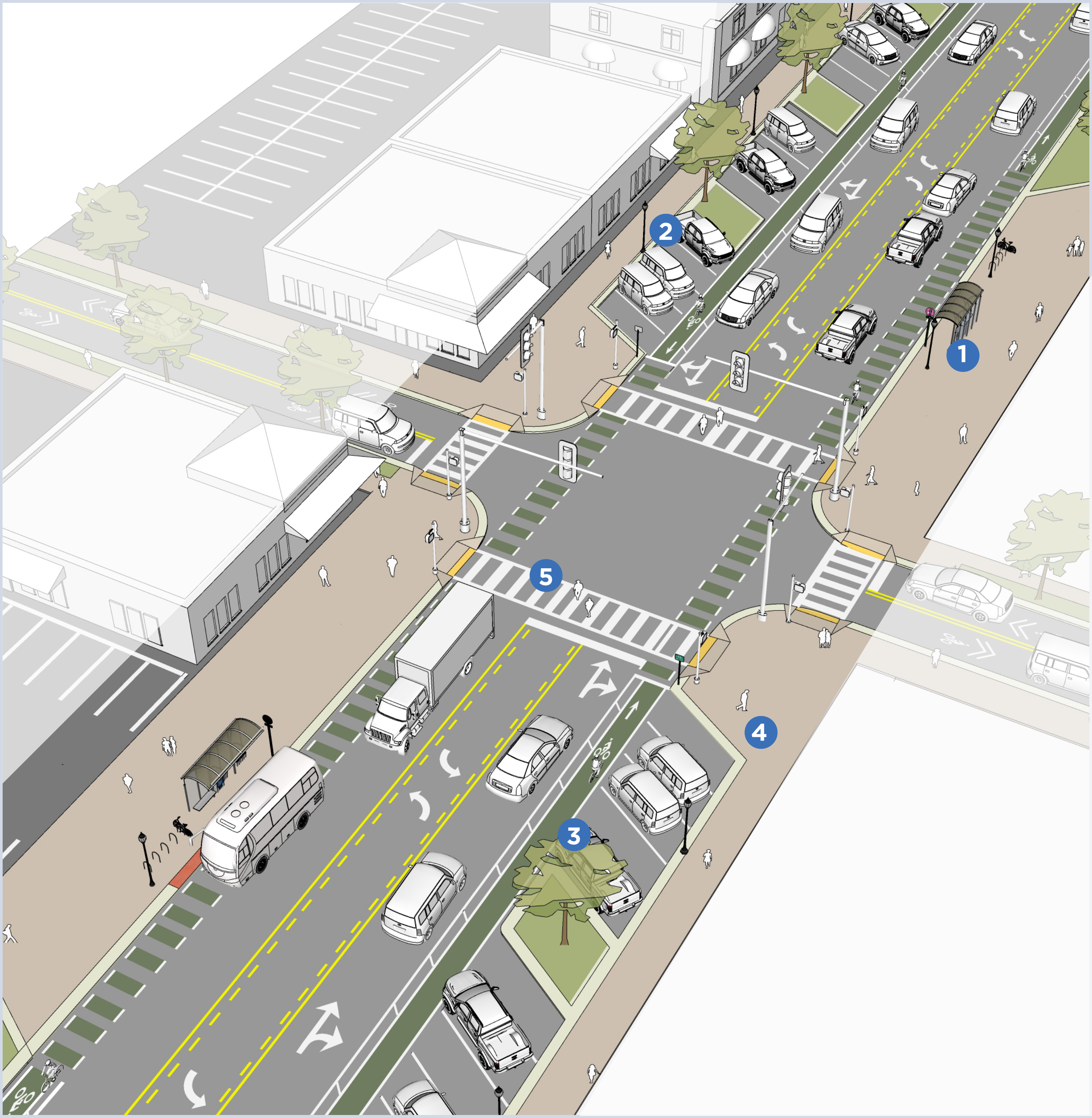
Sidewalks are essential to connecting pedestrians and bicyclists to transit service.

5 CROSSWALK

C2T RURAL TOWN

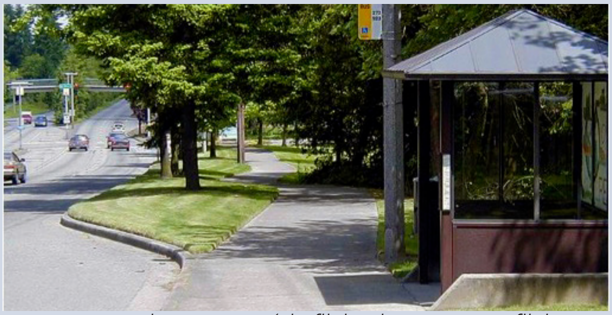
DESIRED ELEMENTS

In C2T Context Classifications, transit is usually provided through a combination of fixed-route, express, and demand-responsive services. In most cases, C2T fixed-route service is infrequent and not meant to carry large numbers of riders. Transit stops and shelters can serve as a placemaking element, with branding and wayfinding that integrate well with the main street character of small rural towns.



C2T RURAL TOWN

Desired Elements



Source: Complete Streets (via flicker https://www.flickr.com/photos/completestreets/)

Source: Google StreetView

Source: Kittelson & Associates, Inc

Source: Kittelson & Associates, Inc

1 LARGER BUS STOP SHELTER

Aside from providing shade and refuge from the elements; larger, more substantial shelters can accommodate more seating and additional transit amenities like covered bicycle parking, enhanced lighting, ticket vending, or travel information screens. By implementing a bus station rather than a simple bus stop, agencies can convey a sense of permanence of public investment to property owners, transit users, businesses, and residents; this permanence and predictability encourages a corresponding investment/development response from the development community.

2 ON-STREET BACK-IN ANGLED PARKING

Rural towns and cities often have head-in angled parking on their main roads. When adjacent to a bicycle lane, head-in angled parking can exacerbate conflicts between drivers backing out of a spot and bicyclists using the bicycle lane. Back-in angled parking resolves much of the visibility issues inherent in those conflicts. Back-in angled parking also has the benefit of reducing the difficulty that drivers—especially older drivers—have when backing into moving traffic.

3 BUFFERED BIKE LANE

For roadways with relatively low vehicular speeds and traffic volumes, a buffered bicycle lane with green paint will be comfortable to a large share of the population. The FHWA *Bikeway Selection Guide* (2019) can be used to understand trade-offs in selecting bicycle facility types.

4 WIDE SIDEWALK OR PATH

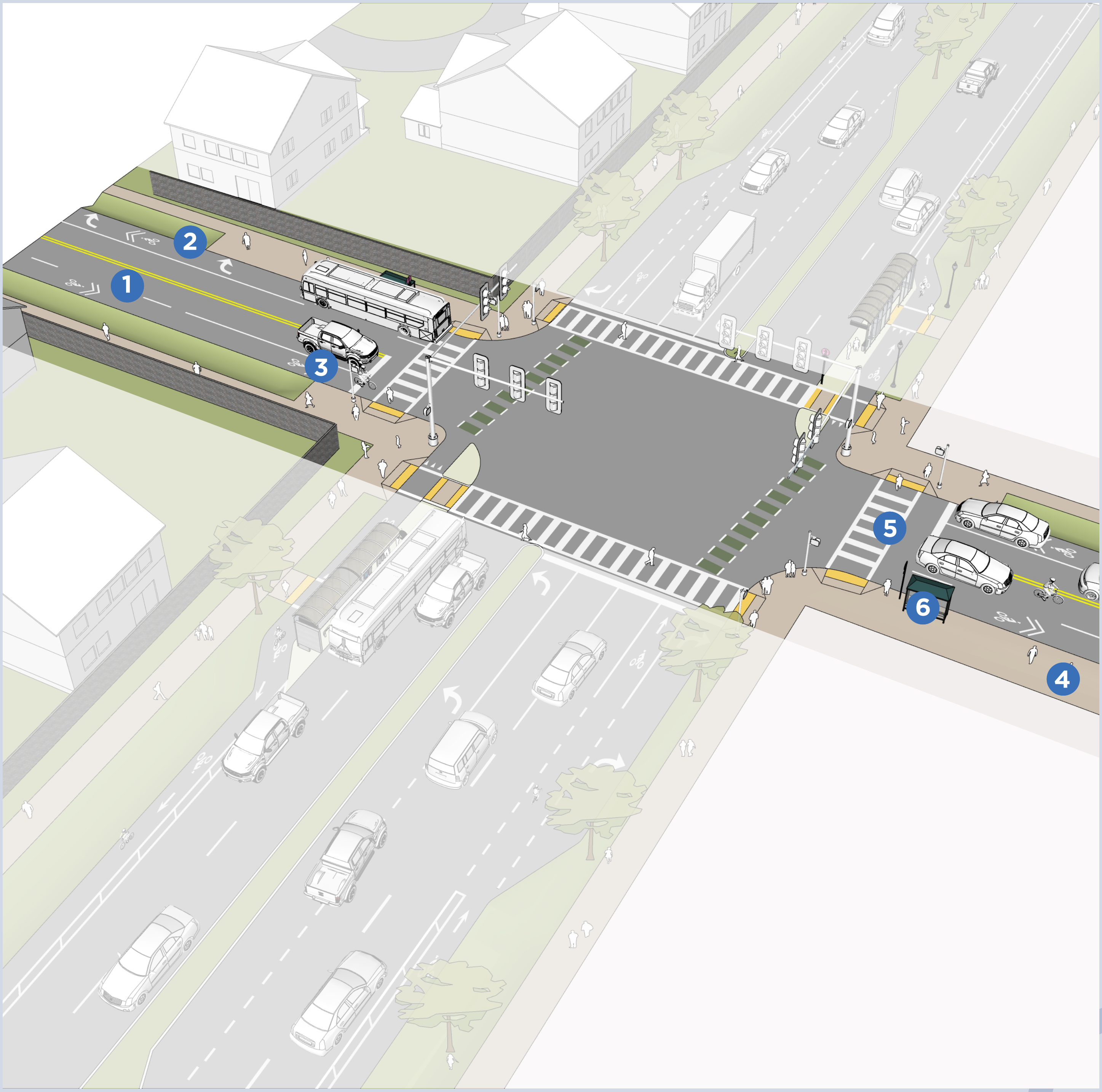
Wide sidewalks or paths enhance pedestrian comfort and safety, and can allow for more amenities at transit stops, including bicycle parking, seating, traveler information signs or maps, and pedestrian-scale lighting.

5 CROSSWALK

C3R SUBURBAN RESIDENTIAL

BASIC ELEMENTS

In many Florida communities, C3R transit is typified by relatively lower frequency fixed-route local service, although demand-responsive and express buses can be found in certain settings. C3R generally has lower density development and few (if any) concentrated land uses that are attractors and generators of transit users. Where denser residential pockets are found, transit can be paired with sidewalk and bicycle facility connectivity to extend its reach. Along state roadways, many C3R corridors have relatively fewer access points/driveways and may allow for relatively uninterrupted segments for exclusive bus lanes that serve regional/long-distance transit service.



Source: Kittelson & Associates, Inc

1 TRAVEL LANE WIDTH

The FDM allows for lane widths narrower than 12' for certain speed and Context Classification combinations (see FDM Table 210.2.1).

Coordination between FDOT, local governments, and transit agencies is strongly recommended to ensure that lane widths accommodate the needs of transit operators.

Source: Kittelson & Associates, Inc

2 BUS PULL OUT IN RIGHT-TURN LANE

On roadways with high travel speeds and where buses operate in mixed traffic, a bus pull out may be necessary to reduce the likelihood of rear-end collisions. Far-side stops can be used so that the bus operator can take advantage of gaps in traffic created by the signal to merge into the travel lane. A long right-turn lane may be used instead of a dedicated bus pull out, provided that drivers are discouraged from turning right across the front of the bus.

Source: FDOT

3 SHARED LANE MARKINGS

On lower speed (35 MPH or lower) roadways, shared lane markings or "sharrows," can be used to indicate a shared lane environment for bicycles and automobiles. Although shared lane markings are allowed on roadways up to 35 MPH, the preference is that they be used on roadways operating at 25 MPH or lower and with up to 3,000 vehicles per day. The FHWA Bikeway Selection Guide (2019) can be used to understand trade-offs in selecting bicycle facility types.

NOTE: State roadways in C3R contexts generally have posted speed limits in excess of 35 MPH.

Sources: Kittelson & Associates, Inc

4 SIDEWALK

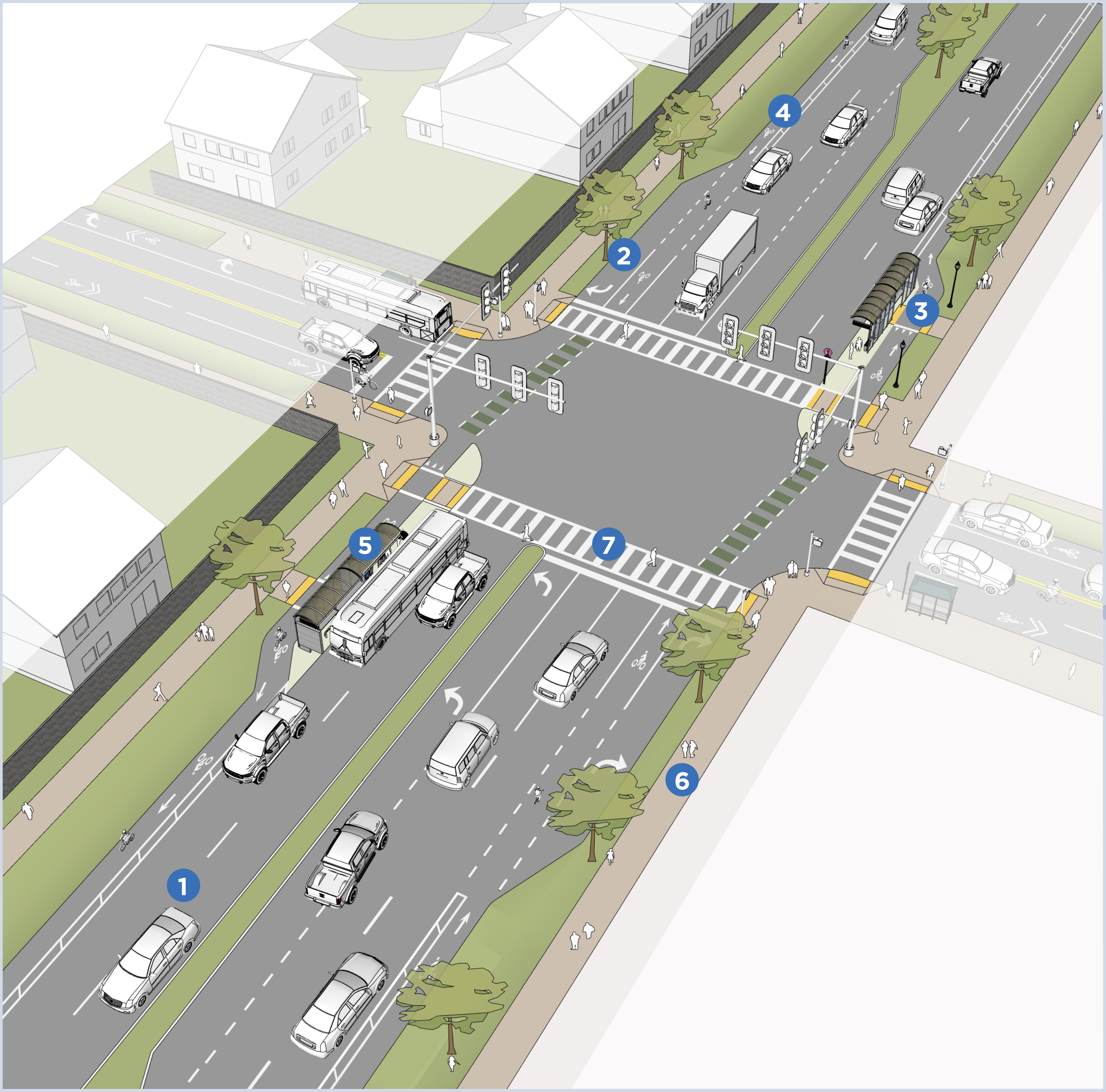
5 CROSSWALK

6 BUS STOP SHELTER

C3R SUBURBAN RESIDENTIAL

DESIRED ELEMENTS

In many Florida communities, C3R transit is typified by relatively lower frequency fixed-route local service, although demand-responsive and express buses can be found in certain settings. C3R generally has lower density development and few (if any) concentrated land uses that are attractors and generators of transit users. Where denser residential pockets are found, transit can be paired with sidewalk and bicycle facility connectivity to extend its reach. Along state roadways, many C3R corridors have relatively fewer access points/driveways and may allow for relatively uninterrupted segments for exclusive bus lanes that serve regional/long-distance transit service.



Source: FDOT Design Manual

Source: Bellingham Herald

Source: Pi.1415926535 (via wikipedia)

1 SPEED MANAGEMENT

C3R – Suburban Residential Context Classification corridors in Florida are candidates for speed management given the significant pedestrian and bicycle safety challenges along these corridors. Reductions in speeding and lower overall travel speeds not only decrease the incidence and severity of crashes, but also lead to a more comfortable walking and bicycling environment. Because transit users are also pedestrians and bicyclists, speed management can help build transit ridership too.

FDM Chapter 202 Speed Management can be consulted for guidance on roadway design elements by Context Classification.

2 QUEUE JUMP

Queue jumps are a form of transit preferential treatment which allows buses to jump ahead of vehicle queues at signalized and congested intersections. There are two types of queue jump lanes: a queue jump lane with a bus-only signal phase (as shown here) and a queue bypass lane (without a bus-only signal phase). Bus operators using a queue bypass lane use the through movement's green signal to proceed to a receiving lane on the far side of the signal.

3 BOARDING ISLAND

Boarding islands can be used to reduce bus-bicycle conflicts near transit stations. Bus boarding islands place passengers adjacent to the bus lane or travel lane, enabling the bus operator to load/unload passengers without having to merge back into traffic and without conflicting with bicycle traffic. Striping and curb ramps can be used to connect the boarding island to the sidewalk, reinforcing to bicyclists that they must yield to pedestrians.

4 BUFFERED BIKE LANE

5 BUS STOP SHELTER

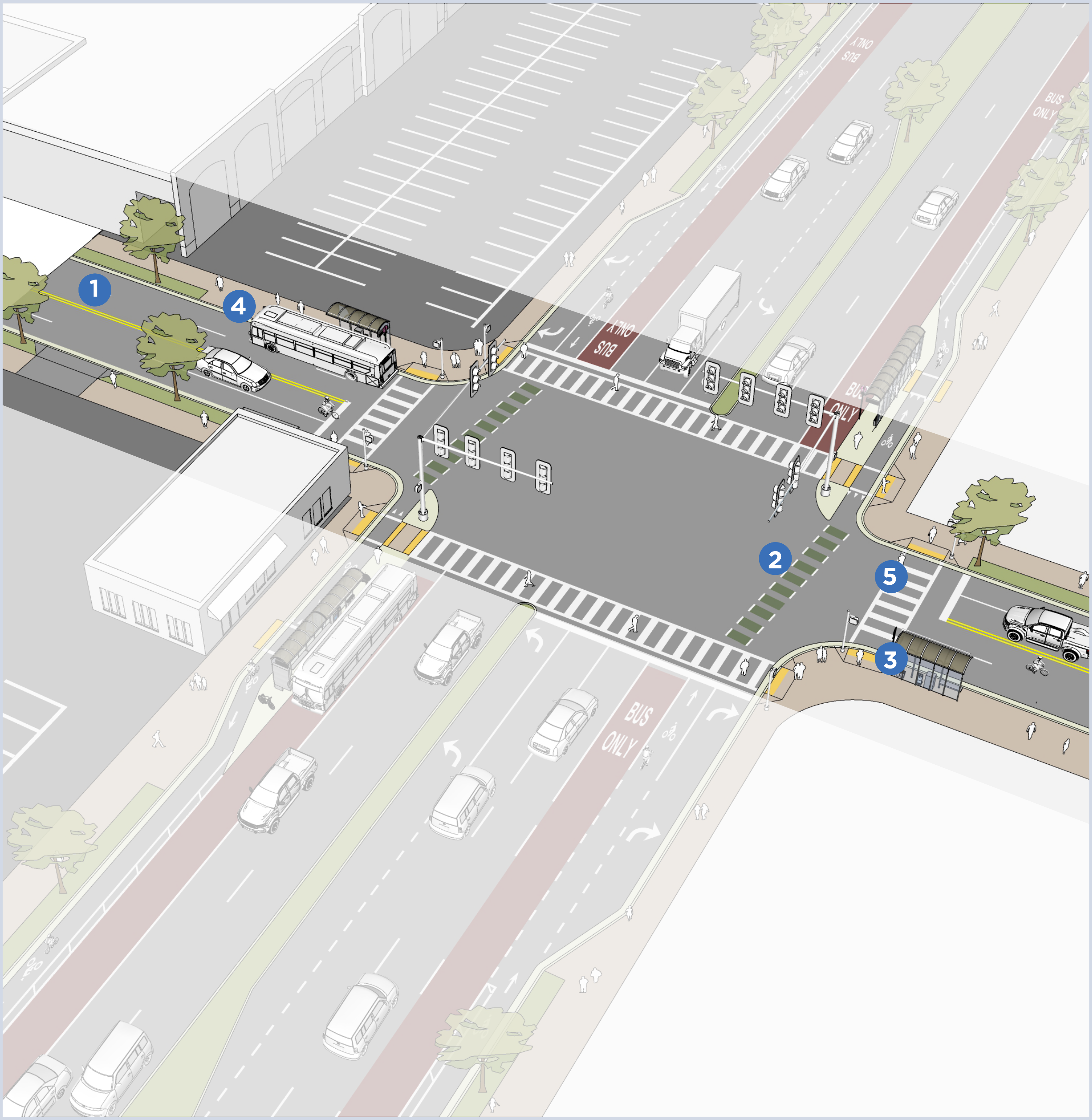
6 SIDEWALK

7 CROSSWALK

C3C SUBURBAN COMMERCIAL

BASIC ELEMENTS

In Florida, C3C Context Classifications are typically where key regional and local transit routes operate because of concentrations of transit generators and attractors (e.g. large shopping centers, employment hubs, multi-family apartments, etc.) and because C3C corridors typically provide continuous regional connections. For most transit agencies, these routes account for a substantial portion of regional ridership and transfer activity. Transit service on C3C corridors is generally local fixed-route service but may include express buses during commute peak periods. Many local governments and transit agencies are exploring upgrades including exclusive and semi-exclusive bus lanes to achieve safety and transit mobility goals along these corridors.



Source: Kittelson & Associates, Inc

Source: NACTO

1 SHARED LANE

On streets where multiple modes share limited right-of-way and regional or high-speed mobility is not the priority, a mixed-flow travel lane may be the best available option for transit. In these types of settings, buses generally have close bus stop spacing and would not achieve high speeds even with exclusive lanes. During periods of congestion, bus delay can be reduced by using queue jumps or transit signal priority at intersections.

2 HIGH-VISIBILITY BICYCLE LANE MARKINGS

Green paint can be applied within the standard bicycle lane striping to increase awareness of a bicycle lane and bicyclists riding on it. The green paint may be applied where added visibility is desired—such as conflict points with turning vehicles or across intersections. Setting a maintenance plan for keeping the green paint from fading could be part of the implementation of high-visibility bicycle lane markings. Refer to the FDM §223.2.1.4 for more information on high-visibility bicycle lane markings.

3 BUS STOP SHELTER

4 SIDEWALK

5 CROSSWALK

C3C SUBURBAN COMMERCIAL

DESIRED ELEMENTS

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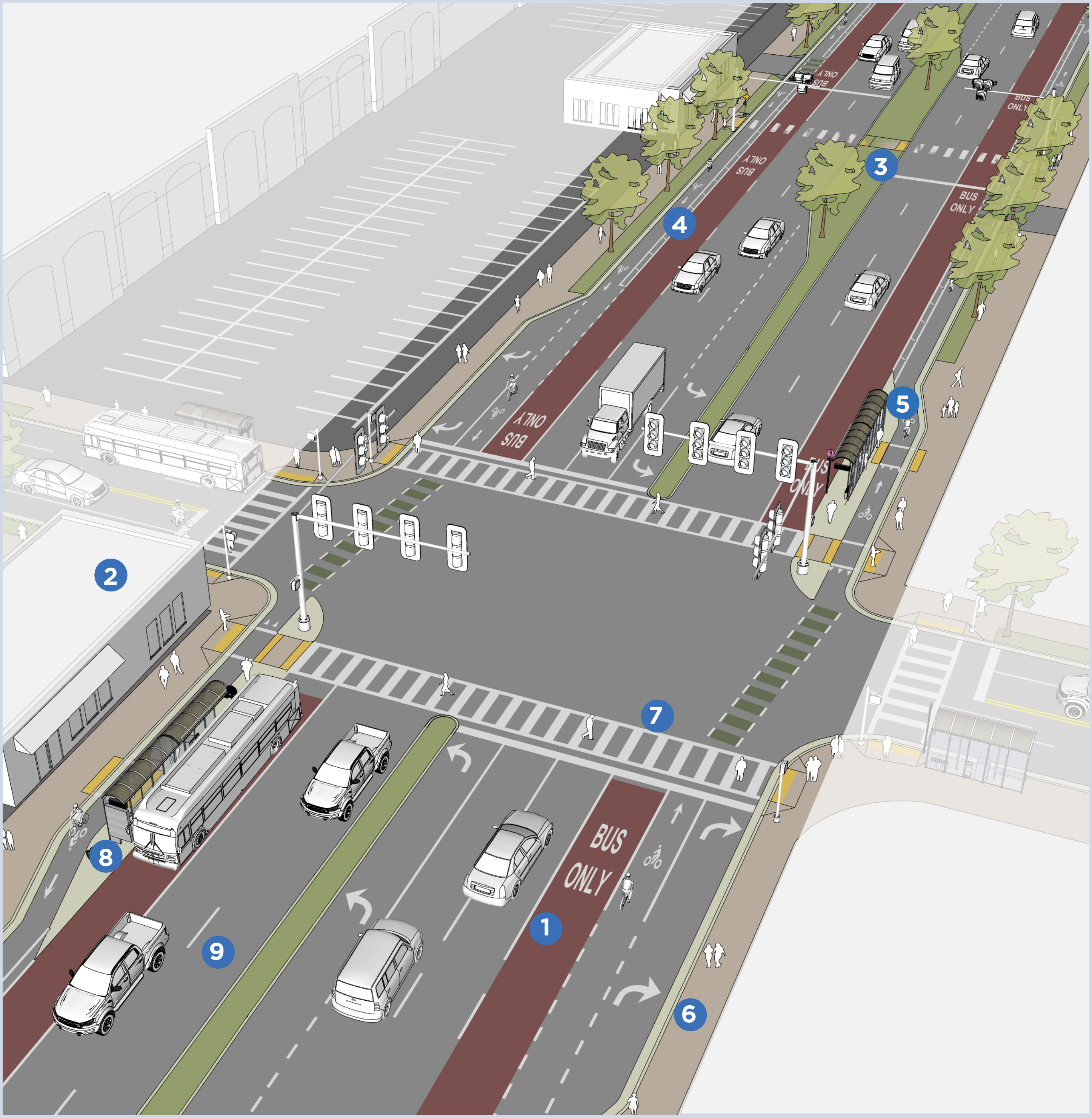


C3C SUBURBAN COMMERCIAL

Source: Complete Streets (via flicker https://www.flickr.com/photos/completestreets/)

Source: Google Maps

Source: Kittelson & Associates, Inc

Source: Sree Gajula (via pedbikephotos.org)

Desired Elements

1 BUS LANE

Many of Florida's suburban arterials are high transit ridership corridors. On corridors where more premium transit service (increased frequency, more substantial shelters, and larger vehicles) is targeted, exclusive bus lanes may be considered to provide added reliability and speed to transit users. There are different types of exclusive bus lanes with varying benefits and costs. The "offset curbside lane" shown in this graphic enables the placement of stations on the sidewalk—closer to destinations—and does not disrupt turning traffic. Where ridership is highest, median-running exclusive lanes can be considered, as they provide an even higher level of exclusivity and may require less enforcement.

Red paint has been used on a pilot basis by some jurisdictions across the country to reinforce the exclusivity of the bus lanes. The treatment is currently considered experimental by the Federal Highway Administration (FHWA). Delineators beyond simple striping—including vertical elements—can also be considered to reduce the need for enforcement.

2 TRANSIT SUPPORTIVE SITE DESIGN

Suburban site layouts are typically car-oriented. Transit agencies can work with local governments to encourage retrofits of existing sites or to set new site design policies that require shallower setbacks, reduce or remove parking minimums, consolidate and redesign driveways, increase network connectivity, and require comfortable and direct pedestrian accommodations from transit stations to buildings.

3 MID-BLOCK CROSSING

Suburban arterials often have long distances between traffic signals, forcing pedestrians and bicyclists to walk out-of-direction to cross the street. Mid-block crossings can help alleviate this issue. On wide roads with high operating speeds, signalization is necessary for mid-block crossings. Pedestrian hybrid beacons—as the one shown in this example—may be applicable only where high crossing volumes are anticipated. Other options include incorporating crosswalks into alternative intersection designs.

4 BUFFERED BIKE LANE

5 BUS STOP SHELTER

6 SIDEWALK

7 CROSSWALK

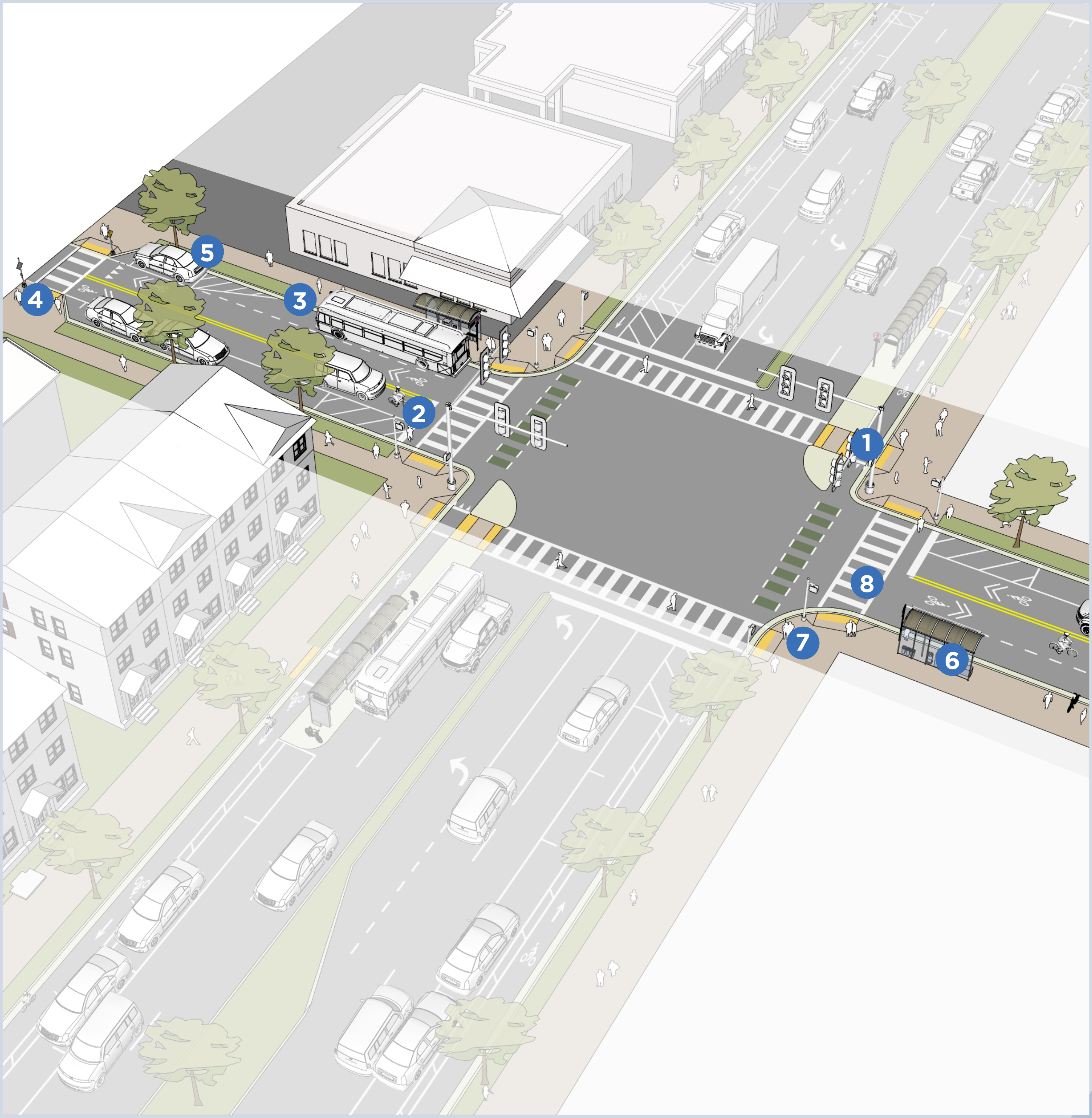
8 BOARDING ISLAND

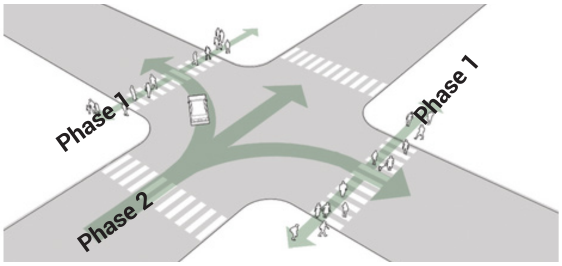
9 SPEED MANAGEMENT

C4 URBAN GENERAL

BASIC ELEMENTS

The higher density and mix of land uses in C4 Context Classifications can support relatively higher levels of transit service. This may include multiple local bus routes operating along the same segment, as well as transfer opportunities to intersecting routes. At the same time, increased street connectivity and developments that "front" state roadways encourage pedestrian and bicycle activity that is generally higher than in C1 through C3 Context Classifications. This may lead to added emphasis on improving the pedestrian and bicyclist experience over implementing high-capacity, high-speed transit service





Phase 1: Pedestrian Only Pedestrians are given a minimum 3-7 second head start entering the intersection.

Phase 2: Pedestrian and cars Through and turning traffic are given the green light. Turning traffic yields to pedestrians already in the crosswalk.

Source: NACTO

Source: Shadowlink1014 (via wikipedia)

Source: Pima County Regional Transportation Authority

Source: Kittelson & Associates, Inc

ⓘ Shown here is a ladder crosswalk with curb extensions and retroreflective signage. This type of setup is generally adequate for lower speed two-lane roadways.

1 PEDESTRIAN-FRIENDLY SIGNAL TIMING

Traffic signals—especially those near transit stations—can be re-timed to be friendlier to pedestrians and bicyclists. For example, shorter cycle lengths can be used to reduce crossing wait time. Other simple and low-cost techniques like leading pedestrian intervals (LPIs), protected left-turns, or pedestrian-only phases can significantly improve the visibility and comfort of crossing pedestrians and bicyclists. Refer to the FDOT Traffic Engineering Manual for guidance on these strategies.

2 LEFT-TURN RESTRICTIONS

At intersections that have high vehicular volumes, left-turn restrictions on the main road may be considered to free up green time for other movements or to mitigate the impact of pedestrian-friendly or transit-supportive signal timing strategies. Signs can be used to indicate how drivers wishing to turn left can complete their movement. Where left-turn restrictions are implemented, drivers are either diverted to another signal or to a U-turn location.

3 BUS PULL OUT

With pull outs, bus operators can load and unload passengers without impeding vehicular traffic flow. On the other hand, transit users incur delay if drivers do not yield to the bus operator when merging back into the travel lane. Transit agencies and roadway owners could collaborate to strike the right balance based on roadway and transit needs and characteristics. Consider person-delay when evaluating pull outs, as the number of passengers on a bus can be greater than the number of people in cars affected.

4 MID-BLOCK CROSSING

Where major transit trip generators and attractors are located midblock, transit stations are usually placed midblock as well. The FDOT TEM provides guidance on evaluating the need for mid-block crossings and on determining the appropriate design and traffic control.

5 ON-STREET PARKING

6 BUS STOP SHELTER

7 SIDEWALK

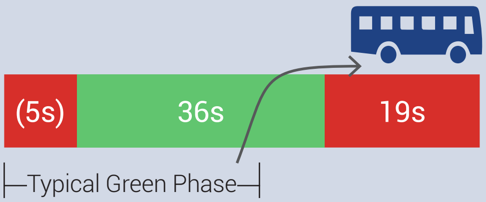
8 CROSSWALK

C4 URBAN GENERAL

DESIRED ELEMENTS

The higher density and mix of land uses in C4 Context Classifications can support relatively higher levels of transit service. This may include multiple local bus routes operating along the same segment, as well as transfer opportunities to intersecting routes. At the same time, increased street connectivity and developments that "front" state roadways encourage pedestrian and bicycle activity that is generally higher than in C1 through C3 Context Classifications. This may lead to added emphasis on improving the pedestrian and bicyclist experience over implementing high-capacity, high-speed transit service

Source: Jehyun Sung (via Unsplash)



Source: Kittelson & Associates, Inc. (based on NACTO)


Source: Oran Viriyincy (via Flicker)


Source: Kittelson & Associates, Inc

Shown here is a ladder crosswalk with a curb extension, advanced yield lines, a median refuge island, and a crossing sign equipped with a rectangular rapid flashing beacon (RRFB). This type of setup is generally adequate for lower speed (35 MPH or lower) roadways up to four lanes wide.

1 TRANSIT SIGNAL PRIORITY

Transit signal priority (TSP) is a relatively low-cost way of giving priority to transit vehicles at intersections. As commonly implemented, TSP introduces subtle changes to the traffic signal timing when a transit vehicle is approaching. These changes usually involve shortening a red signal by 5-15 seconds or lengthening a green signal by a similar amount of time. TSP can be either conditional (for example, serving late-running buses only) or always-on.

Conditional TSP may be appropriate where transit reliability is the main concern and where impacts to the auto mode must be minimized. Always-on TSP results in travel time savings for all buses on the approach(es) being prioritized. These savings can ultimately reduce the number of buses needed to achieve a given frequency. At locations with intersecting transit routes or with very high frequencies, carefully evaluate TSP settings to achieve the desired results. TSP is most effective when stations are placed far-side.

2 IN-LANE BUS STOP

On this example, the bus stops in the travel lane to load/unload passengers instead of using a bus pullout. Bus pullouts require space, which may not be readily available in a constrained right-of-way. In addition, if bus operators would struggle to merge back into traffic after using a bus pullout—perhaps due to congestion or too few gaps in vehicular traffic—then an in-lane stop would be preferable to reduce delay for transit users. Situations in which the stopped bus partially blocks the lane should be avoided, as some drivers may see a partial lane blockage as an opportunity to squeeze by between the stopped bus and vehicular traffic on other lanes.

3 MID-BLOCK CROSSING

Where major transit trip generators and attractors are located midblock, transit stations are usually placed midblock as well. The FDOT TEM provides guidance on the appropriate design and traffic control for mid-block crossings.

4 ON-STREET PARKING

5 PARKING-PROTECTED BIKE LANE

6 WIDE SIDEWALK OR PATH

7 CROSSWALK

8 PEDESTRIAN-FRIENDLY SIGNAL TIMING

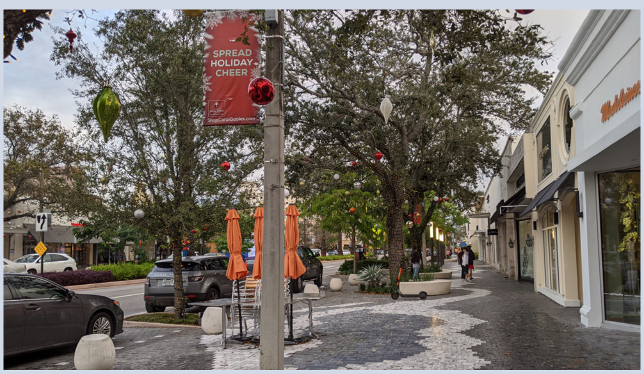
C5 URBAN CENTER/ C6 URBAN CORE

BASIC ELEMENTS

The cores of Florida's urban areas have relatively high transit activity, drawn by denser residential and employment pockets, as well as large regional community venues and activity centers. In C5/C6 areas, high-speed throughput mobility is typically secondary to multimodal access to support businesses, residents, and visitors. As such, transit in these areas can be prioritized over single-occupant automobile travel while enhancing pedestrian and bicycle travel. Interaction with rail modes or circulators—sometimes at large transfer stations or "hubs"—is a common need in C5/C6 Context Classifications. C5/C6 stations range from smaller stations that can be seamlessly integrated with the adjacent land uses to landmark structures that have placemaking functions. Concentrations of micro-mobility and shared mobility (scooters, bicycles, electric bikes, and car-shares) also occur more frequently in these locations, increasing the demand on limited sidewalk and curb space along state roadways.

Source: Kittelson & Associates, Inc.

Source: Kittelson & Associates, Inc.



Source: Kittelson & Associates, Inc

1 TWO-WAY URBAN ARTERIAL

Local governments may consider converting or restoring one-way couplets to two-way streets. This increases bicycling connectivity, makes transit more intuitive to use, and enhances the visibility of businesses along the corridor. In the two-way downtown street shown here, the bus shares a lane with general traffic and uses bus pull-outs to reduce vehicular delay. Far-side stops are used so that the bus operator can take advantage of gaps in traffic created by the signal to merge into the travel lane.

2 MANAGED CURB SPACE

Transit users rely on functioning curb space as this is where riders interface with transit service. Florida's local governments are facing more and more demands for their curb space in urban cores. In the past, curb space has traditionally been allocated to vehicle storage at little or no cost. With increases in ride-hailing pick-ups and drop-offs, micro-mobility devices, e-commerce deliveries, and demand for food trucks and parklets, local governments are now rethinking how they allocate this valuable space. A curb management program can help balance supply and demand in alignment with a local government's goal for a street or group of streets.

3 WIDE SIDEWALK OR PATH

Wide sidewalks or paths enhance the pedestrian experience and can allow for more amenities at transit stops, including bicycle parking, traveler information signs or maps, and pedestrian-scale lighting. In urban core settings, sidewalk space may be used for sidewalk dining, displays, or other similar business uses. Increasingly, wider sidewalks can also be used for micro-mobility modes, including bikeshare, e-scooter, and ride-hailing pick-up and drop-off areas.

4 ON-STREET PARKING

5 BIKE LANE

6 BUS STOP SHELTER

7 CROSSWALK

8 PEDESTRIAN-FRIENDLY SIGNAL TIMING

9 MID-BLOCK CROSSING

C5 URBAN CENTER/ C6 URBAN CORE

DESIRED ELEMENTS

The cores of Florida's urban areas have relatively high transit activity, drawn by denser residential and employment pockets, as well as large regional community venues and activity centers. In C5/C6 areas, high-speed throughput mobility is typically secondary to multimodal access to support businesses, residents, and visitors. As such, transit in these areas can be prioritized over single-occupant automobile travel while enhancing pedestrian and bicycle travel. Interaction with rail modes or circulators—sometimes at large transfer stations or "hubs"—is a common need in C5/C6 Context Classifications. C5/C6 stations range from smaller stations that can be seamlessly integrated with the adjacent land uses to landmark structures that have placemaking function. Concentrations of micro-mobility and shared mobility (bike and car-shares) also occur more frequently in these locations, increasing the demand on limited sidewalk and curbs space along state roadways.

C5 URBAN CENTER/ C6 URBAN CORE

Desired Elements

Source: Kittelson & Associates, Inc

1 BUS LANE

Many of Florida's urban cores have corridors designed to provide high peak-hour vehicular throughput. In these locations, there may be opportunities to re-allocate street space to transit through exclusive or semi-exclusive bus lanes. The curb-adjacent bus lane shown here is shared with right-turning vehicles. Some jurisdictions that have implemented semi-exclusive bus lanes also allow private transit providers to use them (e.g., the I-Ride trolley on International Drive in Orlando). Other bus lane configurations—ranging from a peak-period parking lane conversion to an exclusive busway—may be considered given a street's Context Classification and role in the transit network.

Source: Kittelson & Associates, Inc

Source: Kittelson & Associates, Inc

2 CYCLE TRACK

In more urban conditions where a higher volume of bicyclists of all ages and abilities is expected and encouraged, a cycle track can be used. Cycle tracks are generally separated from vehicular lanes by striping, vertical elements, or (as shown here) by on-street parking. Cycle tracks can be one-way or two-way. On one-way streets, two-way cycle tracks can provide contraflow access to bicyclists. Two-way operation generally requires bicycle signals, staging boxes for turning, striping, and signage. These elements are used to reduce conflicts at intersections or driveways and to remind drivers of contra-flow traffic on the one-way street. Positioning a cycle track on the left side of a one-way street eliminates bus/bike conflicts and simplifies operations at intersections. Two-way cycle tracks can also be used on two-way streets. Decisions on the type of bicycle facility to used depend on many factors, including Context Classification, driveway frequency, traffic volume, among other factors. At bus stops, cycle tracks can be paired with bus boarding islands to reduce bus-bicycle conflicts. Striping, raised pavement, and/or curb ramps can be used to connect the boarding island to the sidewalk, reinforcing to bicyclists that they must yield to pedestrians.

Source: Kittelson & Associates, Inc.

3 PROTECTED INTERSECTIONS

The design of "protected" intersections was adapted from Dutch practices and brought over to the United States in the early 2010s. This design uses curb extensions with gaps to separate bicycle traffic from auto traffic. The curb extensions also slow down turning vehicles, increase bicyclist and pedestrian visibility, and shorten crosswalk distances.

4 MANAGED CURB SPACE

5 BUS STOP SHELTER

6 TRANSIT SIGNAL PRIORITY

7 ON-STREET PARKING

8 CROSSWALK

9 PEDESTRIAN-FRIENDLY SIGNAL TIMING

TRANSIT CASE STUDIES

Transit service exists within the various Context Classifications throughout Florida. The following case studies highlight examples of Florida transit systems and routes and how roadway design treatments vary within each Context Classification to support transit. Each of the scans outlines how FDOT Context Classifications and Complete Streets considerations were incorporated into or influenced the roadway design solutions. These case study summaries were compiled using information from interviews with transit service providers, FDOT district staff, and MPO/TPO representatives.

BIG BEND TRANSIT

CONNECTING RURAL GADSDEN COUNTY TO TALLAHASSEE

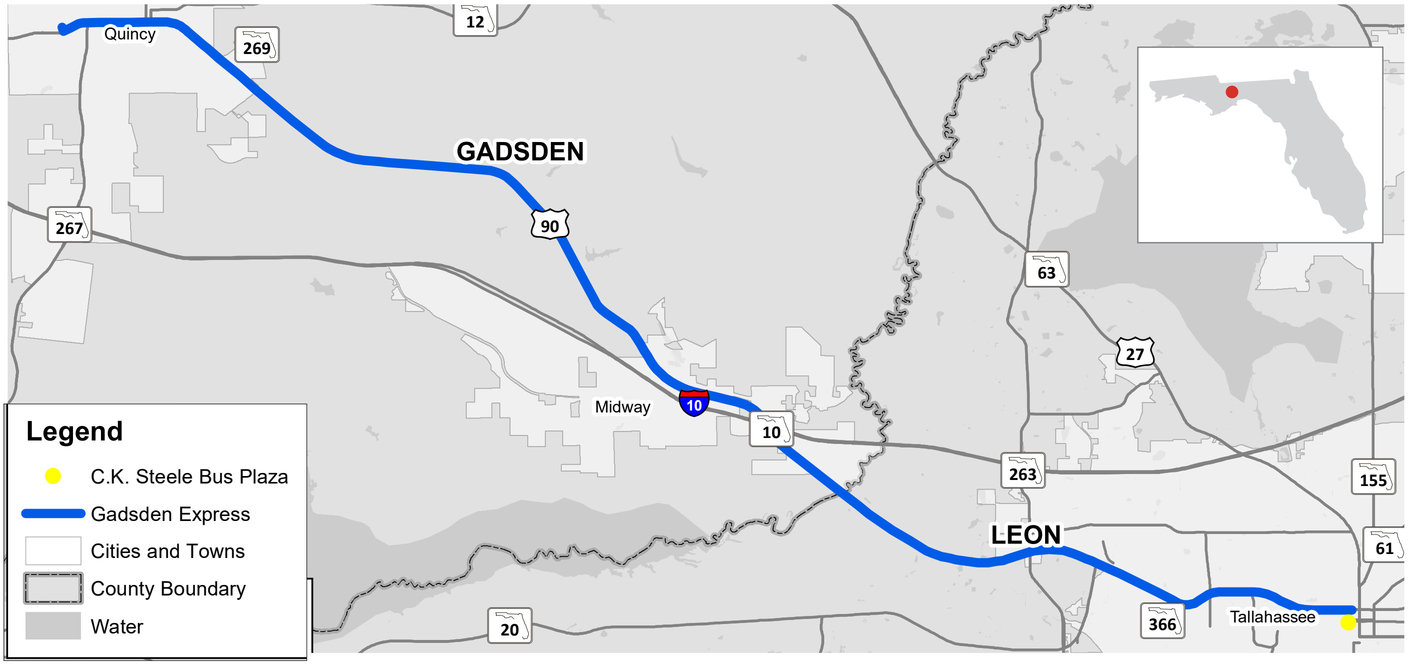
PROJECT BACKGROUND

Big Bend Transit is a private non-profit transit operator responsible for operating the Gadsden Express, a rural flex-route express bus connecting Quincy to Tallahassee. Per their 2017 National Transit Database profile, Big Bend Transit operates 67 Americans with Disabilities Act (ADA) accessible revenue vehicles that travel 1.7 million revenue miles per year. Big Bend Transit's operation covers five counties: Leon, Gadsden, Jefferson, Madison, and Taylor.

The overall process that was used to design the transit project began at Big Bend Transit's public meetings for the transportation disadvantaged. This is where the interest and need stemmed for rural express bus service to Tallahassee since a significant portion of the residents in Quincy are employed in Tallahassee. After the initial interest in transit service to Tallahassee was identified, Big Bend Transit distinguished the population pockets that would benefit the most from this service through additional public meetings and public outreach.


Source: Kittelson & Associates, Inc

PROJECT	CONTEXT CLASSIFICATION
Gadsden Express – Unincorporated Gadsden County and Leon County bus stops	C2
Gadsden Express – Quincy bus stops	C2T
Gadsden Express – Tallahassee Community College bus stop	C3C
Gadsden Express – C.K. Steele Plaza	C4



CREATING CONNECTIONS

A significant element of the Gadsden Express bus service is that it interacts with a larger transit shelter. The service stops at C.K. Steele Bus Plaza in Tallahassee, which provides seating, shelter, and opportunities to connect to Tallahassee's StarMetro fixed-route bus system.

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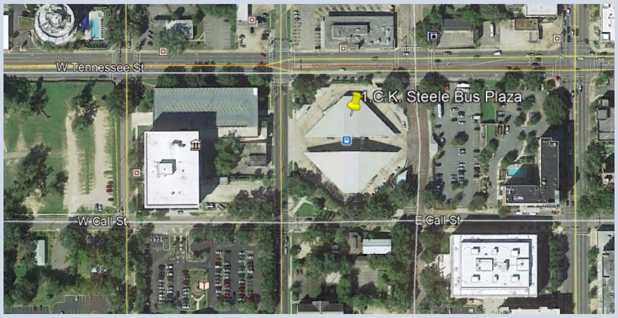


ource: Google Earth

Source: Kittelson & Associates, Inc

THE PROCESS

PROJECTS GUIDELINES

Although the majority of Big Bend Transit's service are local shuttles and dial-a-ride, this case study is focused on its rural express bus. The Gadsden Express is a collaboration with the Federal Transit Administration (FTA), Florida Department of Transportation (FDOT), Gadsden County, the Capital Region Transportation Planning Agency (CRTPA), Commuter Services of North Florida, and StarMetro.

In 2010, FDOT provided service development funding for three years of new express bus service.

A TEAM APPROACH

Federal, state, regional and local agencies are involved in the Gadsden Express service. Thanks to the efforts of the CRTPA, Commuter Services of North Florida, StarMetro, and the FTA, the Gadsden Express began operating in April 2010. The CRTPA planned, organized, and coordinated the public outreach meetings. Commuter Services of North Florida provided marketing and branding services. StarMetro wanted to gain more ridership from the Gadsden Express bus service; subsequently, StarMetro provided 50% of the FTA's §5316 (now §5307) funding match for the federal Job Access and Reverse Commute Program (now Urbanized Area Formula Grants).

GETTING RESULTS

The Gadsden Express offers rural express bus service from Quincy to Tallahassee, with stops in Midway and Tallahassee Community College, for $1 a ride. Twenty-ride and forty-ride passes are available at a discount.

In addition to Gadsden Memorial Hospital, the Gadsden Express makes stops at two park-and-ride lots located in 1) Quincy at 1632 W. Jefferson Street (Winn-Dixie) and 2) Midway City Hall at 50 MLK Boulevard. Illustrated in the map on the previous page, the Gadsden Express route takes US 90 from Tallahassee to Quincy, linking a rural region to Tallahassee.

Gadsden County had significant buy-in where they provided the other 50% of the FTA's §5316 (now §5307) funding match.

CHALLENGES AND SOLUTIONS

The main challenges faced by Big Bend Transit concerning the Gadsden Express stemmed from bus stop placement and private sector buy-in.

BUS STOP PLACEMENT

Challenge: Lack of existing or planned infrastructure to use as bus stops or the funding to build it out.

A priority for Big Bend Transit was to place stops where there is an existing sidewalk and an ADA compliant concrete pad, but this was not always an option due to funding constraints. Where sidewalks or concrete pads are not present, StarMetro's stops are simply a pole in the ground with a sign that has the route information and a phone number.

Challenge: Lack of Right of Way (ROW) to provide transit amenities, such as shelters and benches.

Instead of acquiring ROW for bus stops from public and private landowners, Big Bend Transit was able to obtain more space for bus stops using a Memorandum of Agreement with property owners.

PRIVATE SECTOR BUY-IN

Challenge: Private sector pushback to having bus stops located in the vicinity of their shopping plazas and smaller corner stores.

A representative of Big Bend Transit visited the businesses and explained the ridership projections for the Gadsden Express. This representative also explained that the rider could increase the business's sales by stopping in to make purchases before boarding the bus or after alighting. Through investing time into garnering private sector buy-in into the proposed bus stop location, the bus was able to stop on the premises of the proposed businesses.

Source: Gadsden Express Brochure

INCORPORATING CONTEXT CLASSIFICATION AND COMPLETE STREETS

Big Bend Transit explicitly mentioned Complete Streets in its Gadsden Express project. The Director of Big Bend Transit stated that it was imperative to locate stops where there are existing sidewalks, away from busy intersections, and where the bus can make safe stops for boarding and alighting. In addition, their project development was guided by several goals closely associated with Complete Streets concepts, including:

- Support economic development
  - Some stops were placed at a drugstore or a grocery store plaza. It was important to have private sector buy-in to have the ability to place stops at these locations.
  - Other stops were regional employment centers and attractors such as the regional hospital and Tallahassee Community College.
- Increase interrelationships with other modes
  - Establish connections to other transit services like StarMetro's C.K. Steele Bus Plaza
  - Locating stops adjacent to existing sidewalks.

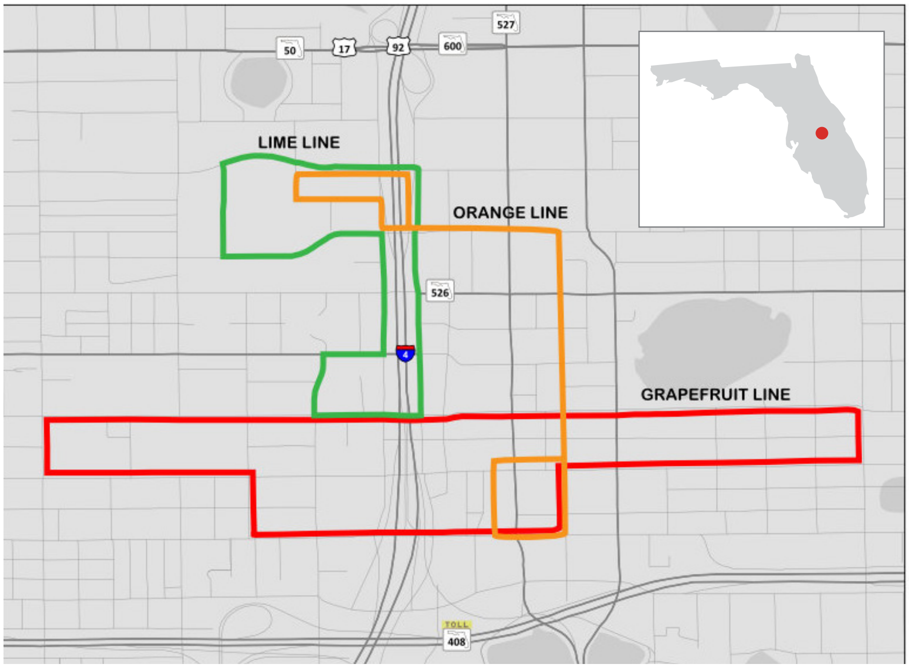
LYMMO (ORLANDO)

COMPLETING DOWNTOWN STREETS WITH EXCLUSIVE TRANSIT LANES

PROJECT BACKGROUND

The City of Orlando pioneered the use of exclusive lanes for bus transit in the United States with the opening of LYMMO in 1997. The original LYMMO Orange line was constructed with 100 percent dedicated bus lanes and with ample pedestrian infrastructure to provide safe and accessible connections to and from stations.

Source: Michael Rivera.



PROJECT	CONTEXT CLASSIFICATION
Lime Line	C4, C5, and C6
Grapefruit Line	C5 and C6

BUILDING ON A TRANSIT SPINE

According to the Federal Transit Administration's (FTA) *LYMMO BRT: 15 Years Later* evaluation report published in 2013, the original LYMMO line ranked in the top five LYNX routes by ridership.

- LYMMO outperformed several rail streetcar systems in the U.S. in annual passenger trips and cost per trip.
- LYMMO continued to be rated highly by passengers, scoring a 4.5 out of 5 in overall customer satisfaction.
- Fifteen percent of downtown Orlando employers said in a survey that LYMMO was a factor in their decision to remain downtown.

The success of this original spine led the City of Orlando to expand LYMMO to connect the under served Parramore neighborhood and the emerging Creative Village district. These expansions would become known as the Grapefruit Line and the Lime Line, respectively. Fortunately, a federal funding program had become available to help the City of Orlando build these new lines. This funding source required that at least 50 percent of the length of the projects have dedicated bus lanes.

The combination of this requirement and the existing built environment led to careful roadway redesign that accommodates exclusive lanes and the principles of Complete Streets.

THE PROCESS

A TEAM APPROACH

On both expansion projects, the City of Orlando worked closely with the Florida Department of Transportation (FDOT) and LYNX the area's transit system agency. Additionally, the FTA served as the funding agency.

Significant coordination also occurred with the University of Central Florida (UCF) and the various utility providers given that the Lime Line project included the construction of a new roadway that is now part of the UCF downtown campus. Because of contamination issues at this site, the Florida Department of Environmental Protection was also involved.

Finally, LYNX and the City of Orlando worked with two design-build firms that were awarded the construction projects.

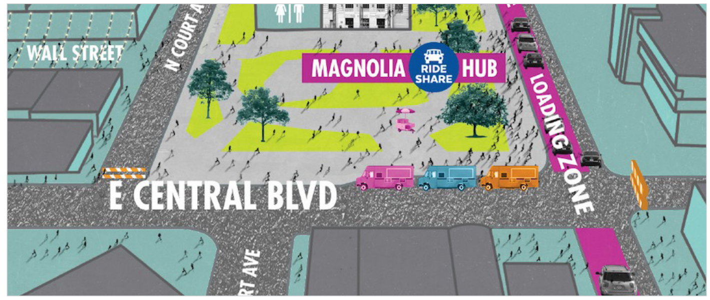
GETTING RESULTS

A key lesson learned is that the federal funding process for major transit projects is lengthy and dynamic. As such, each of the partners involved should be aware of the process and potential changes along the way. Continued public involvement is key to garnering support from the community when significant changes are proposed.

Another lesson learned is to not be afraid to use new delivery methods. The two expansion projects were constructed using design-build approaches, not typical for joint projects that LYNX has done with the City of Orlando. This approach greatly accelerated the delivery time of the projects. It is critical that all parties are aware of the intricacies of this delivery method. Awareness led to contract documents and staff experience that allowed for the best management practices for design-build. LYNX was fortunate to have both excellent design builders and a partner in the City of Orlando for these projects.

CHALLENGES AND SOLUTIONS

Source: Google Maps (2019)



Source: Downtown Orlando Development Board

REINFORCING TRANSIT EXCLUSIVITY

Challenge: Orlando motorists were not accustomed to seeing travel lanes that were not for their use. Errant use of the exclusive lanes would have posed safety challenges, especially in downtown Orlando's multiple one-way streets.

LYMMO's design team made extensive use of signage and pavement painting—including specialized paving and hardscape on the exclusive lanes. LYMMO lanes are separated from vehicular lanes by a double-striped buffer with raised reflective pavement markers.

FUNDING RESTRICTIONS

Challenge: An overarching challenge during the planning stage was ensuring that all parties understand the funding mechanisms and their requirements. As these were federally funded FTA projects, Buy America requirements were in place. Additionally, as the Lime Line was funded by a Federal TIGER (Transportation Investment Generating Economic Recovery) grant, there was initial confusion regarding whether "betterments" or elective improvements were allowed as part of the project. Another challenge was construction on adjacent properties after the transit projects were completed. As federally purchased assets must meet a certain useful life prior to being removed from service, the potential for adjacent construction to impact the transit projects was a concern.

Resolving these federal stipulations required extensive meetings with all partners involved. In the cases where adjacent construction affected sheltered stations, LYNX worked with the City and the developers to fund the removal and replacement of the affected infrastructure.

EMPTY LANE SYNDROME

Challenge: A common argument against exclusive transit lanes is that the lanes are underutilized, especially if there is congestion on adjacent vehicular lanes.

In 2019, the City of Orlando and its downtown redevelopment agency worked with LYNX to pilot a first-in-the-country ride-hailing hub at one of LYMMO's busiest stops. On weekend nights—after LYMMO buses stop running—the exclusive transit lanes are made available for pick-up and drop-off of ride-hail passengers. The hub also offers security staff, food trucks, and bathrooms.

PUBLIC PERCEPTION OF TRANSIT

Challenge: An early challenge was the public perception of transit services. After construction of the expansion projects was complete, some members of the community demanded that two transit stops be moved due to perceived loitering issues.

LYNX conducted extensive public outreach with the community including affected adjacent properties prior to design and during the design process. Ultimately, LYNX and the City of Orlando made the decision that one stop would not be moved and that the City would manage the perceived loitering issue with additional enforcement.

INCORPORATING CONTEXT CLASSIFICATION AND COMPLETE STREETS

Although FDOT's Complete Streets and Context Classifications policies would not be published for another 15-20 years, the City of Orlando applied many of their basic concepts on the original LYMMO line. For example, most LYMMO stops are located on Wide sidewalks or paths and have shelters with seating and traveler information. This emphasis on serving all users continued through the two expansion projects.

Source: Kittelson & Associates, Inc. (2019)

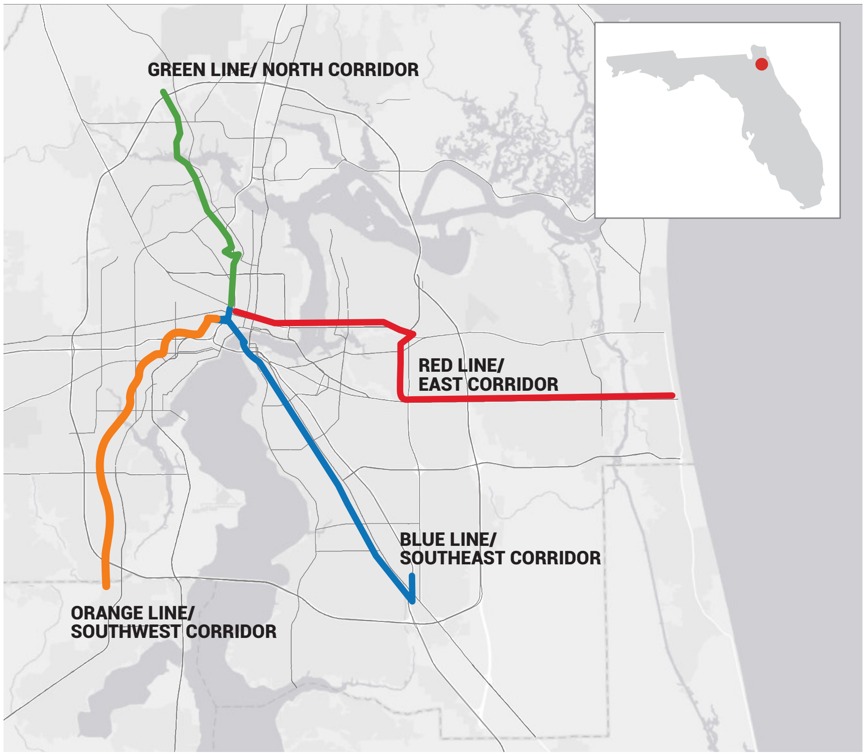
JACKSONVILLE TRANSPORTATION AUTHORITY

BUILDING PREMIUM TRANSIT

PROJECT BACKGROUND

The Jacksonville Transportation Authority (JTA) is the independent agency responsible for public transit in the city of Jacksonville. Per their 2017 National Transit Database profile, JTA operates 153 buses that travel 8.8 million miles and serve 10.8 million unlinked passenger trips.

Although the majority of JTA's service is local bus, this case study is focused on its First Coast Flyer system. The First Coast Flyer is JTA's premium transit system. Three First Coast Flyer routes have opened between 2015 and 2018, with one more route in the works.

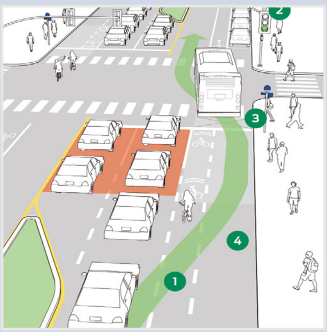


PROJECT	CONTEXT CLASSIFICATION
Kings Avenue and the Southwest Corridor Business Access & Transit (BAT) Lanes	C4
Forsyth Street Queue Jump	C5
Beach Boulevard Bus Pull Out	C3C
Lem Turner Road Transit Signal Priority	C4

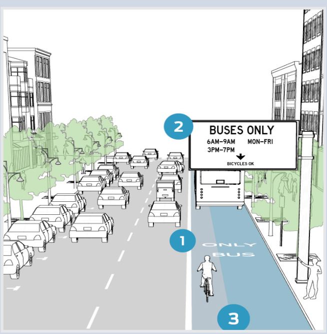
BUILDING BLOCKS OF PREMIUM TRANSIT

JTA recognized that premium bus-based transit is not a monolith. Instead, it is made up of several building blocks—some bigger, some smaller—that stack together to provide the transit user with a comfortable, reliable, and fast travel experience.

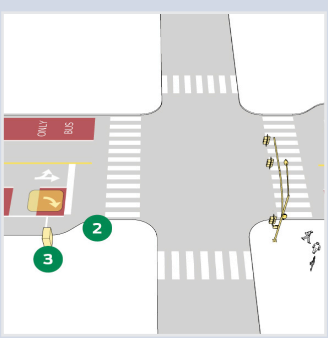
JTA has successfully delivered projects which include basic premium transit building blocks that are still uncommon in Florida:.



Queue jumps, which prioritize bus movement through intersections by enabling them to get ahead of queued vehicles



Business access and transit (BAT) lanes are semi-exclusive transit runningways that allow for turning traffic to share the lane with buses



Transit signal priority (TSP) makes minor modifications to signal timing to save time for approaching buses

Image Sources: NACTO Transit Street Design Guide

THE PROCESS

PROJECTS GUIDELINES

The overall process that was used to design the transit projects aligned with the Federal Transit Agency (FTA) Small Starts projects guidelines. Small Starts projects require a design criterion report to be reviewed and accepted with the agency and by partner agencies prior to the start of design of the project.

A TEAM APPROACH

Multiple federal, state, and local agencies were involved in the First Coast Flyer North Corridor project. In addition to the FTA and the Federal Highway Administration (FHWA), nine other federal agencies participated in the process. Agency coordination was done through the Efficient Transportation Decision-Making (ETDM) online tools. As part of the ETDM online tools, agency comments we received in the Environmental Screening Tool.

FTA & FHWA
10 agencies
5 state & **5** local

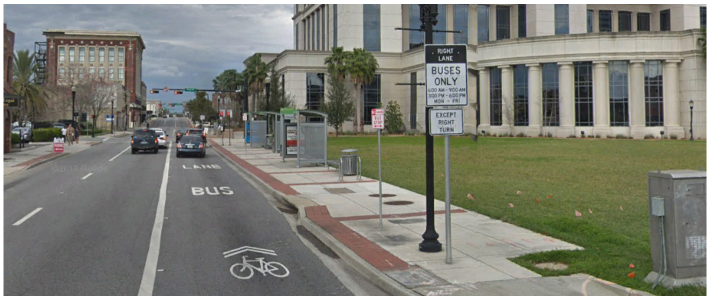
GETTING RESULTS

The completed transportation and environmental analysis from agency and public comments further informed the recommendations for the station alternatives and the First Coast Flyer North Corridor. As a result of the analysis—including understanding of engineering constraints—adjustments were made to some of the station alternatives.

The design of the queue jumps were coordinated with City of Jacksonville traffic engineering staff and an iterative process was used to arrive at a solution that was supported by all stakeholders.

CHALLENGES AND SOLUTIONS

The main challenges faced by JTA on these projects related to getting stakeholder support.



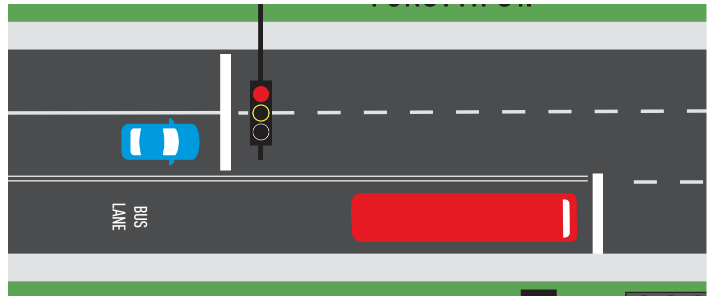


Image Source: JTA

BUSINESS ACCESS AND TRANSIT (BAT) LANES

Challenge: Acceptance of a bus-only lane in downtown Jacksonville

JTA was able to implement BAT lanes through prior education and outreach, including billboards and public meetings, done by JTA as part of the planned BAT lane on Blanding Boulevard. With targeted educational efforts and comprehensive signage/ wayfinding system, JTA reported relatively good compliance with the downtown BAT lane.

Challenge: On-street parking in right of way

The on-street parking on Broad Street, where parking was already not permitted during peak periods, was relocated on adjacent streets such as Jefferson Street and Ashley Street.

QUEUE JUMPS

Challenge: Stakeholder resistance to Downtown/ Forsyth Street queue jump

JTA focused on ensuring and communicating that the queue jump would not interfere with fixed-time signal operations in downtown. The education of operators was also a critical part of the queue jump installation.

Challenge: Enforcement of bus lanes or queue jumps

JTA used traffic flexible pole separators to delineate the queue jump lanes, but these were damaged soon after installation. Without the poles, some motorists were observed to illegally use the queue jump lanes. With the opening of the regional bus transfer facility in 2020 at a location near the queue jumps, JTA sees more regularity in having buses use the queue jump lanes and therefore prevent misuse by other vehicles.

BUS PULL-OUTS

Challenge: Existing bus pull-outs on Beach Boulevard not optimal for existing road condition making safe re-entry difficult

JTA moved First Coast Flyer stops to locations that generally had easier access (i.e., longer pull outs or in right-turn lanes). Placing the First Coast Flyer stops in longer pull-outs or right-turn lanes mitigated other issues as well—including sight distances and the risk of rear-end collisions.

Source: Google Earth (2019)

TRANSIT SIGNAL PRIORITY

Challenge: High level of traffic at proposed Lem Turner Road and Edgewood Avenue station made it challenging to implement without impacts to right-of-way

TSP was implemented on the Lem Turner Road (State Road 117) corridor, except for a 1,000-foot segment between Edgewood Avenue and Palmdale Street.

JTA worked with FDOT to evaluate alternative locations and configurations that would avoid and/or minimize traffic impacts. The station was placed at Lake Forest Boulevard, a couple blocks north of Edgewood Avenue and TSP was incorporated. The TSP on this corridor provides a 10 percent transit travel time reduction by extending the green time to approaching buses.

INCORPORATING CONTEXT CLASSIFICATION AND COMPLETE STREETS

Although JTA did not explicitly mention Context Classification or Complete Streets in its First Coast Flyer projects, their project development was guided by several goals closely associated with these concepts, including:

SUPPORT ECONOMIC DEVELOPMENT

Identify bus stop locations in regions that are being considered for redevelopment

Offer access to transit-oriented development

INCREASE INTERRELATIONSHIPS WITH OTHER MODES

Establish connections to other modes like the park-n-ride facilities and planned community shuttles

MAXIMIZE EXISTING CAPACITY

Offer high-capacity transit vehicles within existing travel corridors, thereby increasing person throughput

REGIONAL TRANSIT SYSTEM (RTS)

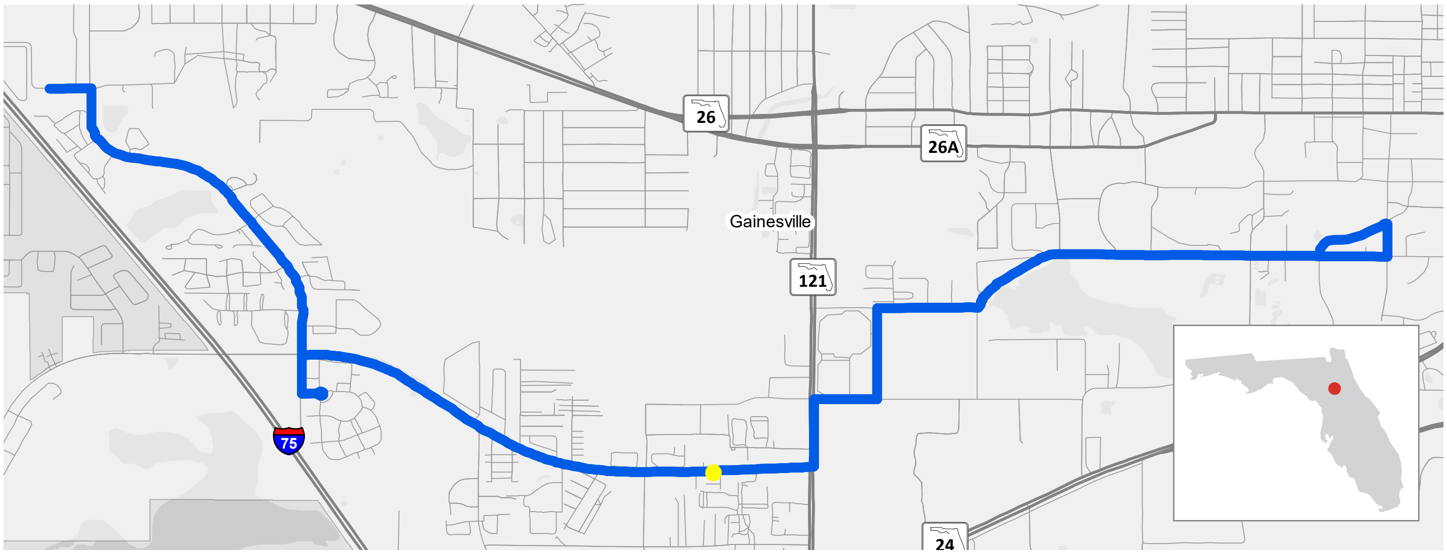
GAINESVILLE SMART BUS BAY

PROJECT BACKGROUND

The Regional Transit System (RTS) is the City of Gainesville's transit agency. According to the 2018 Florida Transit Information and Performance Handbook, RTS operated 143 buses and vans that travel 3.9 million miles per year.

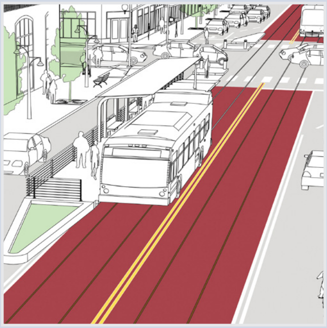
RTSs provides fixed-route bus service on close to 60 routes serving the City of Gainesville, Alachua County, and the University of Florida (UF). This case study is focused on a mid-block bus station for Route 20 which travels from Reitz Union to Oaks Mall. Route 20 has the highest annual ridership of all routes on RTS' system. This midblock bus station is located between SW 37th Way and SW 36th Way on 20th Avenue.

PROJECT	CONTEXT CLASSIFICATION
20th Avenue Midblock Smart Bus Bay	C3R
Bus Stop Design Guidelines and Improvement Plan	Applicability for Various Context Classes (both Existing and Future Context Classification)



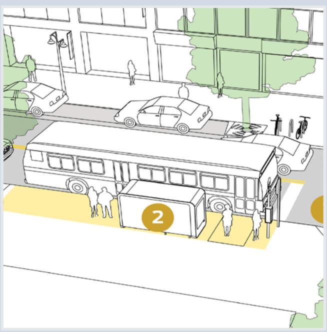
A STATION, NOT A STOP

RTS treats the Route 20 customers to a full-featured transit station.



Boarding Bulb Stop, utilize curb extensions to facilitate side-running transit vehicles to stop in lane, thereby enhancing transit reliability and speed as well as establishing space for waiting transit users and other amenities.

.



The larger transit shelter is a key element of the 20th Avenue Midblock Smart Bus Bay that provides seating, shelter, and bicycle parking on both sides of the road. Located above the larger transit shelter is a Pedestrian Hybrid Beacon (PHB) used to stop automobile traffic and permit pedestrians to cross the road safety.

.Image Sources: NACTO Transit Street Design Guide

THE PROCESS

PROJECTS GUIDELINES

The 20th Avenue Midblock Smart Bus Bay concept was developed in response to congestion and high transit ridership along the corridor. SW 20th Avenue is a two-lane road that is at capacity; the land uses surrounding the corridor are predominantly multi-family residential and populations that rely on transit. Many of the apartments are complexes along the corridor and are student-oriented. The project also addresses a safety concern in the area related to midblock crossings associated with the transit stops as there are no signals for several miles; it introduced a pedestrian activated Pedestrian Hybrid Beacon (PHB) push button and signalization that allows pedestrians to cross safely and allows the bus to reenter the travel lane.

The project was funded with a federal earmark associated with congestion relief in the project vicinity. In 2008, the top priority project for the Gainesville Metropolitan Transportation Planning Organization (MTPO) was the widening of 20th Avenue to four lanes and the extension of the SW 62nd Boulevard as a reliever to major state corridors in the area, connecting Archer Road State Road [SR] to Newberry Road (SR 26).

However, due to funding and environmental constraints, two interim projects were authorized and implemented in the area as contributors to the overall goal, one being the Midblock Smart Bus Bay.

A TEAM APPROACH

Federal, regional, and local agencies were involved in the 20th Avenue Midblock Smart Bus Bay project. The Federal Transit Administration (FTA), Alachua County, Gainesville MTPO, and the City of Gainesville coordinated their efforts on this county-owned roadway.

The Florida Department of Transportation (FDOT) was primarily involved in the *Bus Stop Design Guidelines and Improvement Plan* because it was developed based on the accessibility guidelines published by FDOT.

GETTING RESULTS

The 20th Avenue Midblock Smart Bus Bay accommodates two buses with the crosswalk in between them, as shown on the next page.

The second project was the development of a *Bus Stop Design Guidelines* and Improvement Plan. This plan has several examples that can be incorporated into the bus stop amenities for Context Classifications. For more information see page 4.

CHALLENGES AND SOLUTIONS

The main challenges faced by RTS on the 20th Avenue Midblock Smart Bus Bay project related to right-of-way (ROW), drainage, and utility issues/conflicts. The *Bus Stop Design Guidelines and Improvement Plan* also faced challenges such as ROW and utility conflicts, in addition to funding constraints and providing recommendations for overcoming these challenges.

INCORPORATING TRANSIT AMENITIES

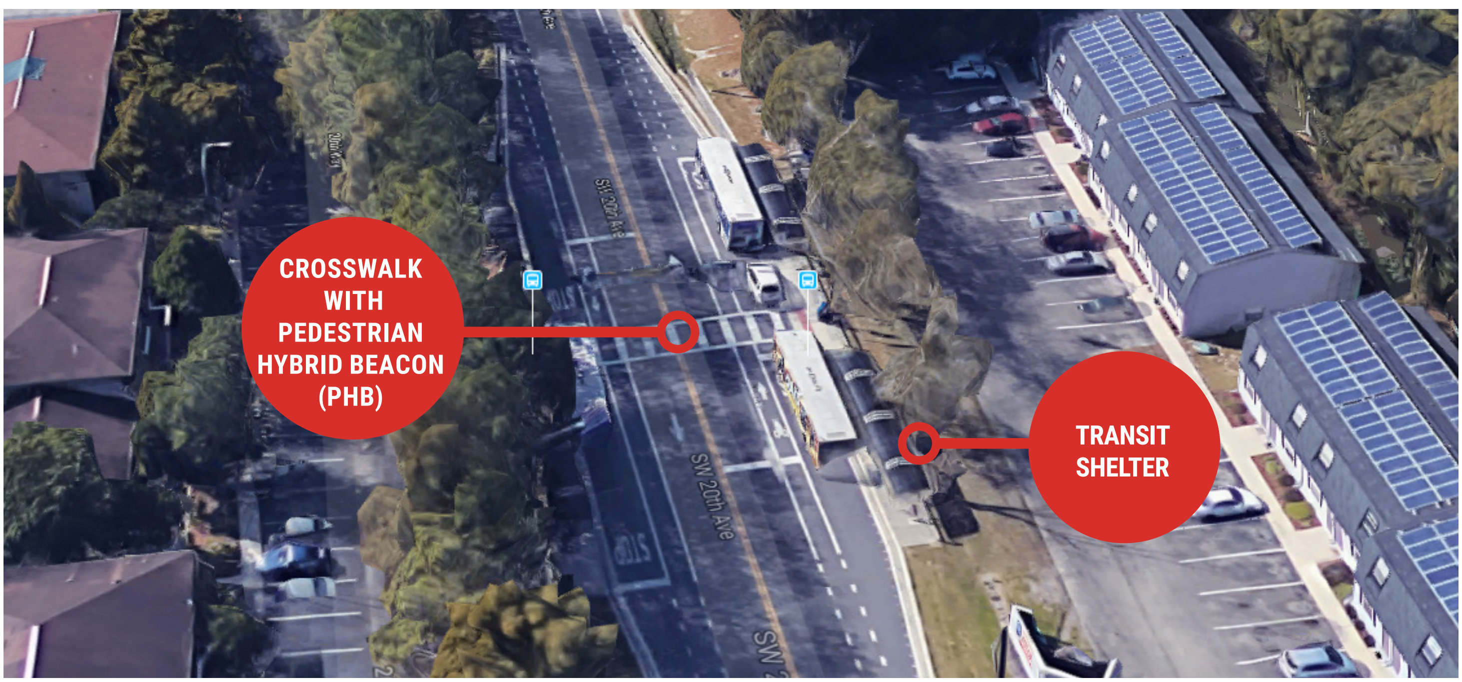
Challenge: ROW, drainage, and utility conflicts hindered incorporating the PHB, boarding bulb stop, and large transit amenities needed at the proposed bus stop location.

The transit amenities at this midblock bus bay included a canopy shelter (roof), benches, and bicycle parking. Relocating 360 feet of existing 12-inch dip water main and horizontally adjusting fiber optic utilities to avoid conflicts with the PHB mast arm installation was necessary.

MAKING ROOM

Challenge: Congestion and safety concerns at the proposed bus stop location.

The issues of congestion and safety were alleviated by upgrading a regular midblock bus stop and connecting it to the multifamily residential development nearby.



Source: Google Earth (2019)

INCORPORATING CONTEXT CLASSIFICATION AND COMPLETE STREETS

RTS stated that at the time of this project, the term "Complete Streets" was not well known. Although the concept was not developed as a Complete Streets project, its emphasis on transit user safety helped it achieve goals typically associated with Complete Streets. The RTS *Bus Stop Design Guidelines and Improvement Plan* was completed following FDOT accessibility guidelines. Complete Streets were not a priority for that project, even though the project advanced similar goals.

The RTS *Bus Stop Design Guidelines and Improvement Plan* has several concepts of bus stop design that can be easily incorporate into Complete Street Context Classifications by providing:

- A bus stop classification system that could be applied to the different Context Classifications,
- Current and Future Classification Requirements,
- Bus Stop Design Standards,
- Bus Stop Placement, and
- Agency Coordination – Easements for Bus Stop Improvements.

These design-specific guidelines show promise as a reference for statewide, Context-based design of transit stop amenities.

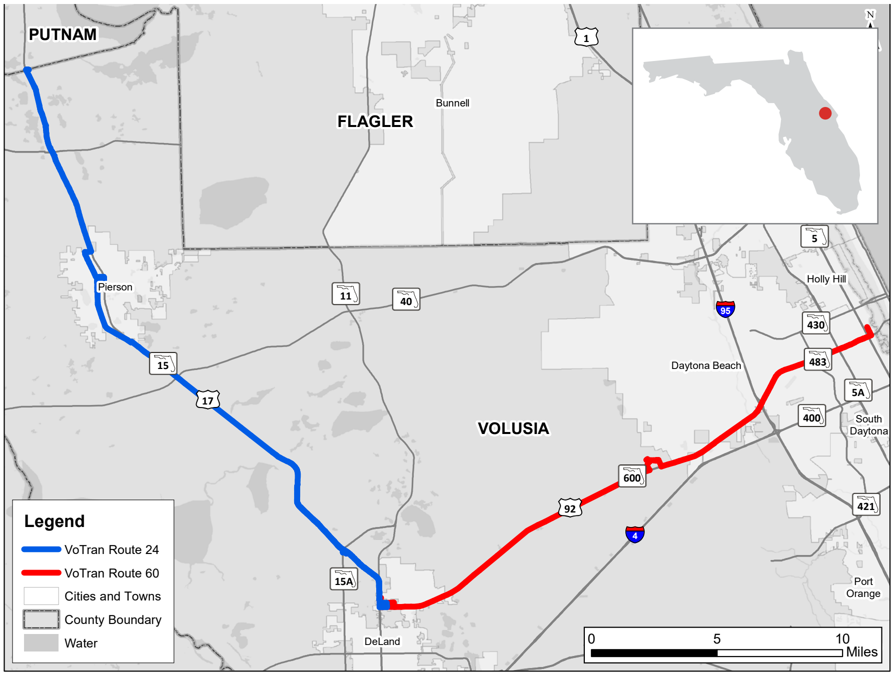
VOTRAN

RURAL TRANSIT PLANNING

PROJECT BACKGROUND

Development density (both population and employment) is a key parameter for determining level of transit service for transit agencies. Transit agencies prefer to operate routes where there is likely ridership, since fewer people should equate to fewer riders. Where development is not concentrated, agencies are challenged with serving a sparse population base that requires longer routes, which leads to inefficient operations and higher operating costs. As such, fixed-route transit is typically more readily available in developed areas. Rural areas (C2) are defined by characteristics associated with relatively larger expanse of open and undeveloped areas, lower intensity of development, relatively fewer people, and fewer businesses than other Context Classifications. Where fixed-route service occurs in rural areas, it is often to connect two urban areas or serve a targeted destination.

Source: http://www.votran.org



PROJECT	CONTEXT CLASSIFICATION
Bus pad installation on State Road 44	C2

RURAL TRANSIT

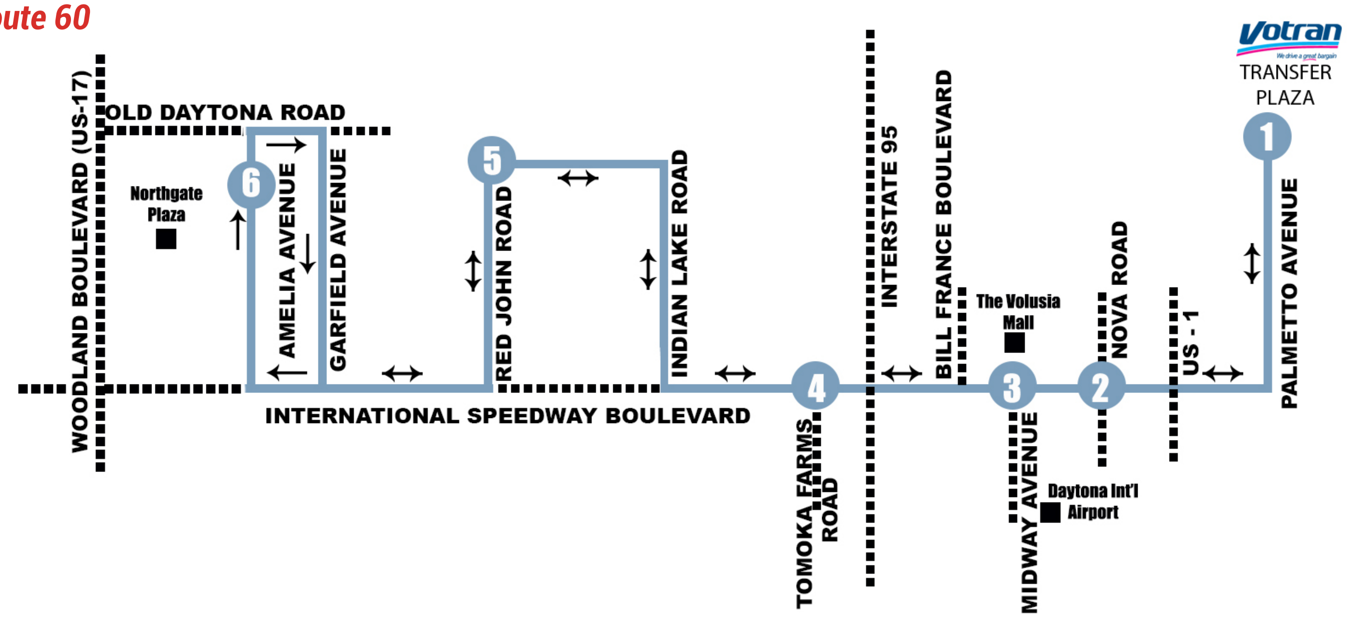
Volusia County deployed a countywide transit service, Votran, in 1975. Votran's Route 24 and Route 60 service portions of Volusia County's rural areas. These transit routes traverse through areas that could be qualified, in FDOT's Context Classification, as either C1-Natural or C2-Rural. C-1 Natural pertains to lands preserved in a natural condition, no agricultural, tree farms, nor settlements. C-2 Rural pertains to land that is sparsely settled and may include agricultural land. In this synopsis both C1 and C2 will be referred to as "rural". There are bus stops associated with these two routes in rural areas.

Votran's primary north/south rural route is Route 24. This route makes 3 trips a day traveling on US-17 between DeLand and Seville, leaving Deland at 5:40 a.m., 11:30 a.m., and 5:30 p.m. (Monday through Saturday). The route goes north on US-17 through largely agricultural area of Volusia County that contains cattle and fern farms.

Votran's primary east/west rural route, Route 60, operates on US-92 between Daytona Beach and DeLand from roughly 6:00 a.m. to 6:00 p.m. Route 60 operates at more frequent headways than Route 24, serving stops every 30 minutes Monday through Saturday. There are approximately 10 miles of this route in the rural area of the county.

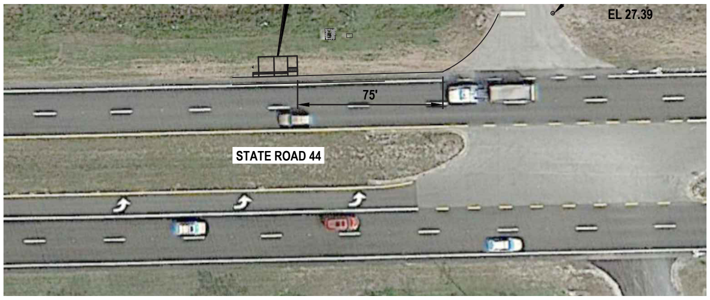
Route 24

Route 60



CHALLENGES AND SOLUTIONS

The main challenges faced by Votran is ensuring safe access for transit riders and minimize uncertainty for riders and potential long wait times.



SERVICE AREA

Challenge: Little to no existing guidance on rural transit design

Even limited resources to accommodate their full range of needs, Votran pays particular attention to establishing minimum design standards and accommodation for rural bus stops. Votran provides Americans with Disabilities Act (ADA)-compliant concrete pads, and a sign on a post at rural bus stops. Guidance in Votran's Transit Development Design Guidelines (TDDG) suggest that a rural stop with 10 or more boardings per day could be considered for a bus shelter. It also suggests that "bicycle racks are beneficial in rural areas where the distance to access the transit stop is greater."

Requirements taken from a recent bus stop implemented on State Road (SR) 44 included sidewalk cross slopes not exceeding a 2% grade and sidewalk curb ramps (in compliance with FDOT Standard Index No. 304). The rural characteristics bring attention to earthwork requirements when constructing bus stops. Votran required the removal of muck and backfilling with clean granular fill dirt based on AASHTO requirements.

Challenge: Pockets of urban areas that are separated by vast swaths of undeveloped land requiring buses to traverse through rural areas as part of a transit trip connecting one urban area to another.

Votran provides transportation to all urban areas of the county with a fleet of 55 fixed-route buses and 44 paratransit vehicles.

Those who cannot access a fixed-route bus can register for Votran's Transportation Disadvantaged (TD) service. This service follows the guidelines set by the State Commission for Transportation Disadvantaged. Votran's TD service allows citizens, who meet the criteria, to call and make ride reservations. When a ride is scheduled, Votran sends out one of the Paratransit (Gold Service) vehicles. Multiple passengers can be served in a single pick-up or trip.

BUILDING TRANSIT STOP AMENITIES

Challenge: Transit service in rural areas has infrequent headways, potentially leaving riders with long wait times

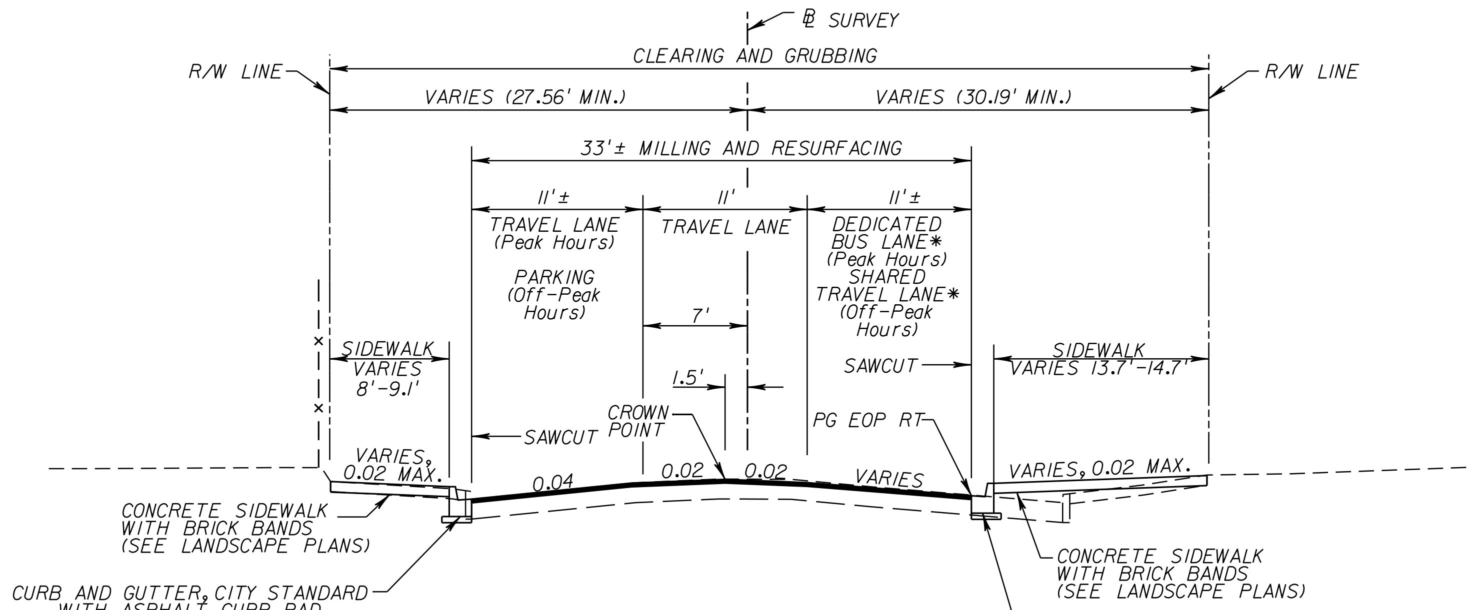
Transit service in rural areas is likely to have infrequent headways potentially leaving riders with long wait times in areas with fewer riders and sparser development. Though benches and other amenities are ideal, transit agencies typically have limited resources and focus infrastructure investments, including bus stop amenities, in higher ridership routes and areas. Understandably, the TDDG recommends not placing a bench near undeveloped areas with no immediate land use that accesses the bus stop. Instead, Votran recommends designing bus pads with appropriate ADA accommodation and clear information on the bus scheduled time of arrival. Their goals are to ensure safe access for transit riders and minimize uncertainty for riders and potential long wait times.

Challenge: Limited bus stop amenities

Without appropriate infrastructure including sidewalks, crosswalks, curb ramps, or other pedestrian amenities, transit riders are at risk when boarding or alighting the bus. In a rural area where there is a grassy knoll without a sidewalk and without a paved edge of roadway, there is not a designated area for boarding and alighting. The swale, vegetation overgrowth, or other obstructions leave no space for passengers to maneuver boarding a bus. Where these conditions exist, a more suitable location must be identified to establish a bus stop unless site conditions and traffic patterns allow the bus to stop in the roadway and board or alight passengers directly onto an existing shoulder. It is assumed that the roadway shoulder provides the pathway to and from the bus stop.

Image Source: Votran

APPENDIX 1
JACKSONVILLE TRANSPORTATION AUTHORITY BUILDING PREMIUM TRANSIT BAT LANES



TYPICAL SECTION NO. 6
STA. 101+06.19 TO STA. 103+12.35

BROAD STREET BETWEEN
FORSYTH STREET AND HOUSTON STREET

POSTED SPEED = 30 MPH
DESIGN SPEED = 35 MPH

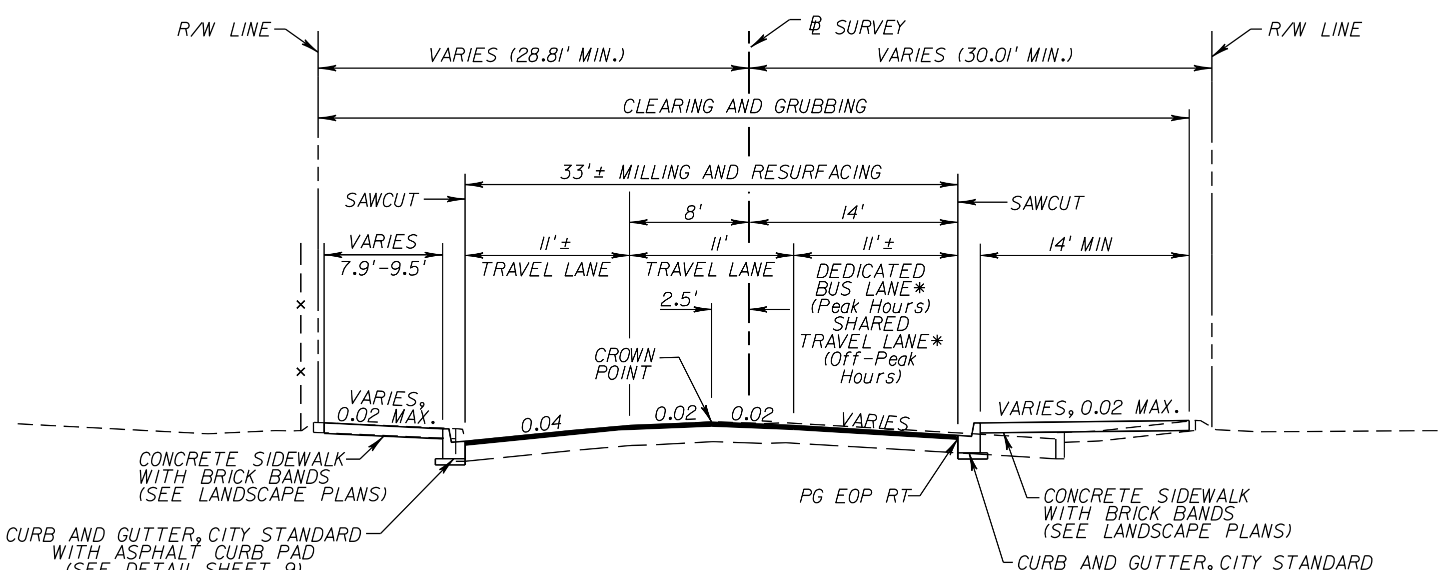
* BUS LANE IN AFFECT DURING WEEKDAY PEAK HOURS ONLY. (6:00 AM - 9:00 AM AND 3:00 PM - 6:00 PM)
SHARED BIKE LANE IN AFFECT 24 HOURS PER DAY.

MILLING

MILL EXISTING ASPHALT PAVEMENT (1½" AVG. DEPTH)

RESURFACING

TYPE SP STRUCTURAL COURSE (TRAFFIC C)(1½")



TYPICAL SECTION NO. 7
STA. 103+12.35 TO STA. 105+60.00

BROAD STREET BETWEEN
HOUSTON STREET AND ADAMS STREET

POSTED SPEED = 30 MPH
DESIGN SPEED = 35 MPH

* BUS LANE IN AFFECT DURING WEEKDAY PEAK HOURS ONLY. (6:00 AM - 9:00 AM AND 3:00 PM - 6:00 PM)
SHARED BIKE LANE IN AFFECT 24 HOURS PER DAY.

MILLING

MILL EXISTING ASPHALT PAVEMENT (1½" AVG. DEPTH)

RESURFACING

TYPE SP STRUCTURAL COURSE (TRAFFIC C)(1½")

NOTE:
1. ALL COMPACTION FOR ANY MATERIAL SHALL BE LIMITED TO THE STATIC MODE ONLY, UNLESS APPROVED BY THE ENGINEER.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: KRISTINA M. PRICE
P.E. NO: 54523

HDR Employee-owned
HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

TYPICAL SECTION
BROAD STREET

SHEET NO.
11

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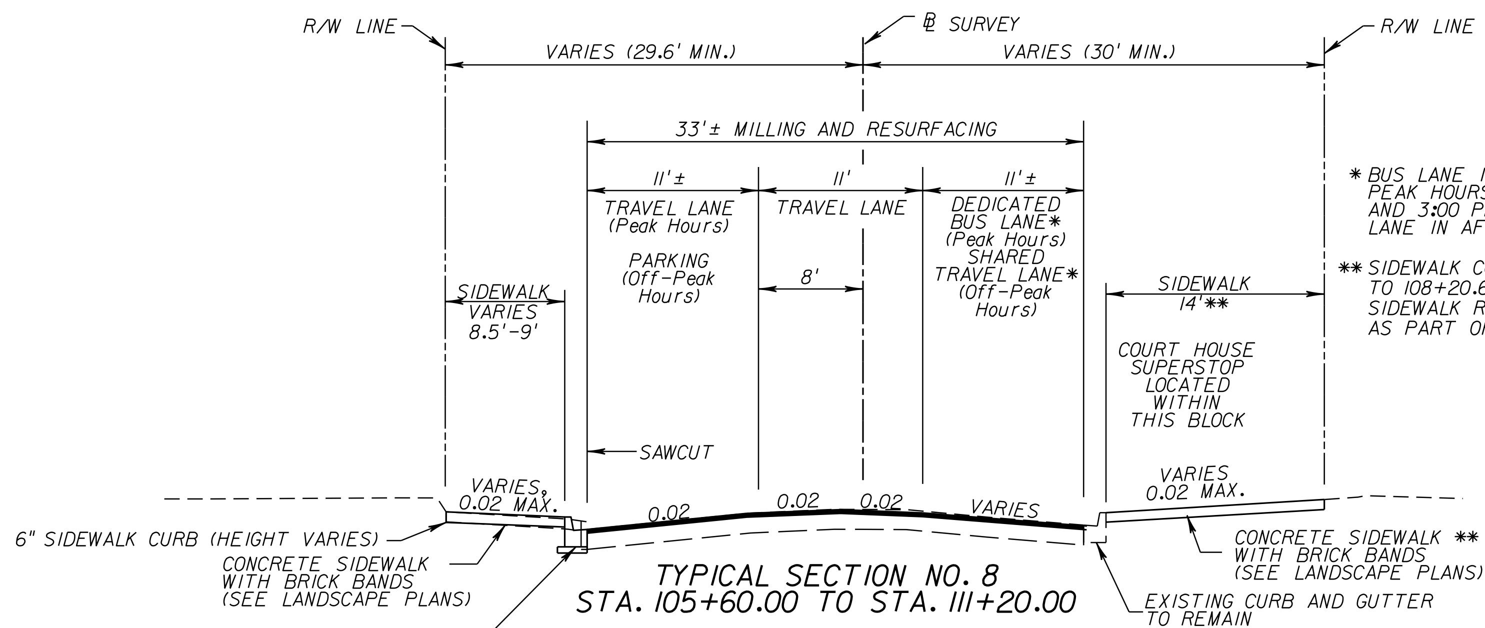


TYPICAL SECTION NO. 8
STA. 105+60.00 TO STA. 111+20.00

BROAD STREET BETWEEN
ADAMS STREET AND DUVAL STREET

POSTED SPEED = 30 MPH
DESIGN SPEED = 35 MPH

* BUS LANE IN AFFECT DURING WEEKDAY PEAK HOURS ONLY. (6:00 AM - 9:00 AM AND 3:00 PM - 6:00 PM). SHARED BIKE LANE IN AFFECT 24 HOURS PER DAY.

** SIDEWALK CONSTRUCTION STA. 105+94.70 TO 108+20.64. REMAINDER OF BLOCK, SIDEWALK RECENTLY CONSTRUCTED AS PART OF THE COURTHOUSE PROJECT.

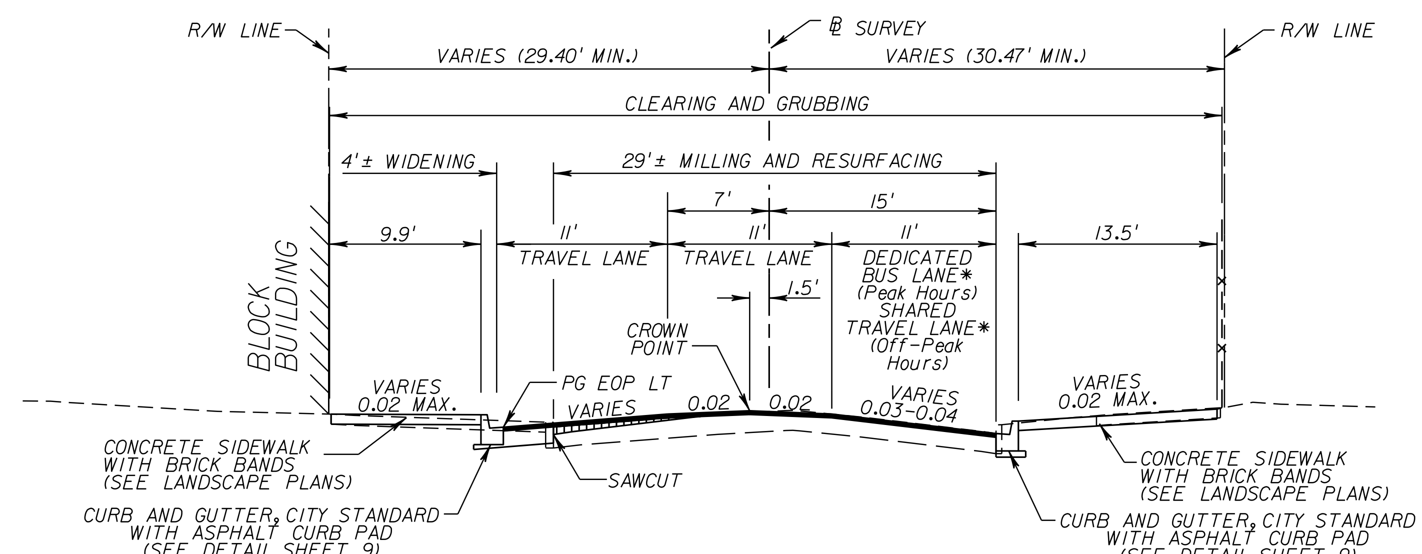
Note: COURTHOUSE SUPERSTOP BETWEEN ADAMS ST. AND MONROE ST.

MILLING

MILL EXISTING ASPHALT PAVEMENT (1½" AVG. DEPTH)

RESURFACING

TYPE SP STRUCTURAL COURSE (TRAFFIC C) (1½")



TYPICAL SECTION NO. 9
STA. 111+20.00 TO STA. 113+98.61

BROAD STREET BETWEEN
DUVAL STREET AND CHURCH STREET

POSTED SPEED = 30 MPH
DESIGN SPEED = 35 MPH

* BUS LANE IN AFFECT DURING WEEKDAY PEAK HOURS ONLY. (6:00 AM - 9:00 AM AND 3:00 PM - 6:00 PM). SHARED BIKE LANE IN AFFECT 24 HOURS PER DAY.

MILLING

MILL EXISTING ASPHALT PAVEMENT (1½" AVG. DEPTH)

RESURFACING

TYPE SP STRUCTURAL COURSE (TRAFFIC C) (1½")

OVERBUILD

TYPE SP STRUCTURAL COURSE (TRAFFIC C)
(VARIABLE DEPTH)

WIDENING

OPTIONAL BASE GROUP 10 (6.5" TYPE B-12.5 ONLY) WITH TYPE SP STRUCTURAL COURSE (TRAFFIC C) (3")

NOTE:

1. ALL COMPACTION FOR ANY MATERIAL SHALL BE LIMITED TO THE STATIC MODE ONLY, UNLESS APPROVED BY THE ENGINEER.

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

TYPICAL SECTION
BROAD STREET

SHEET NO.
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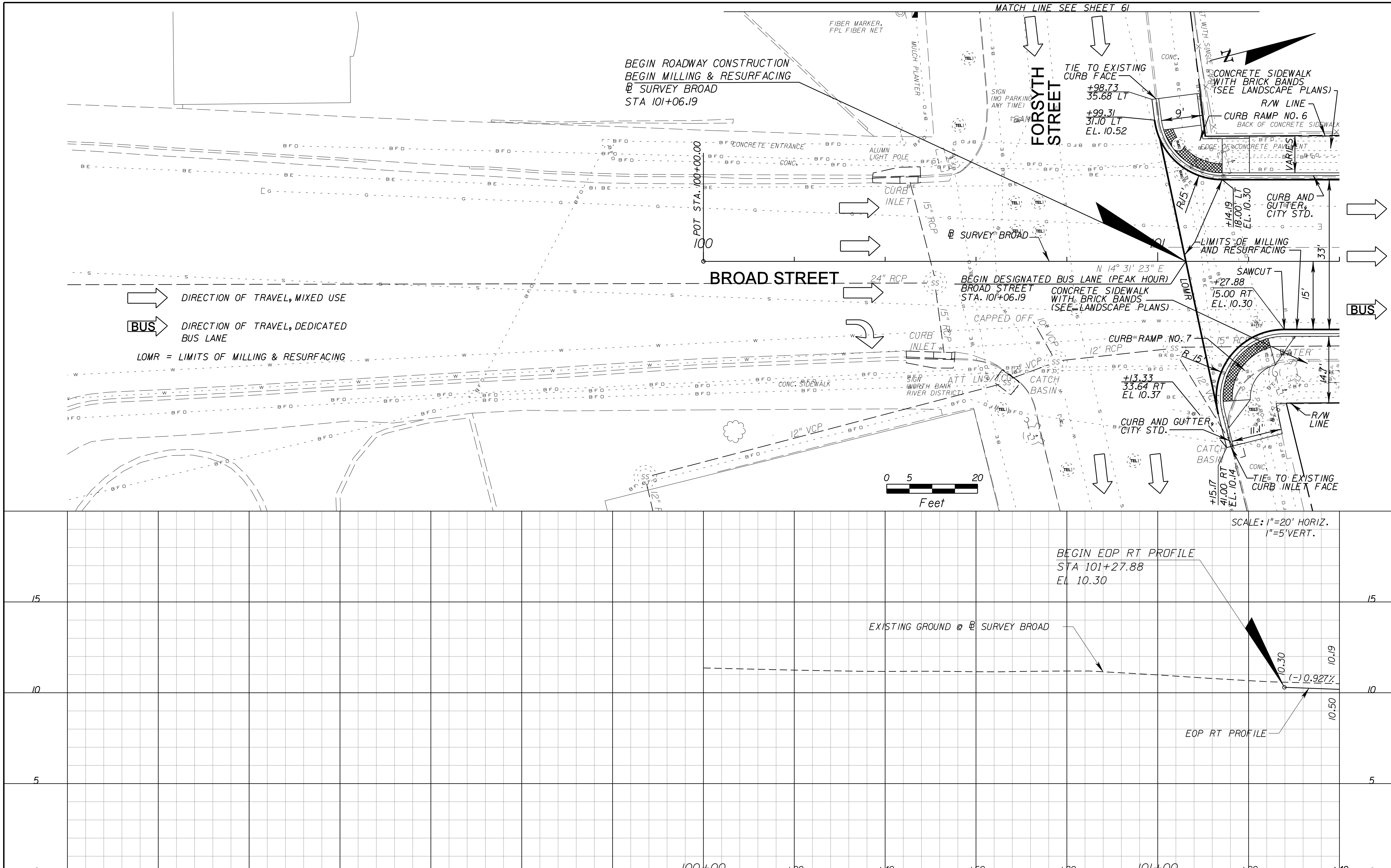

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N/A	DUVAL	430036-1-94-01

PLAN-PROFILE
BROAD STREET

SHEET NO.
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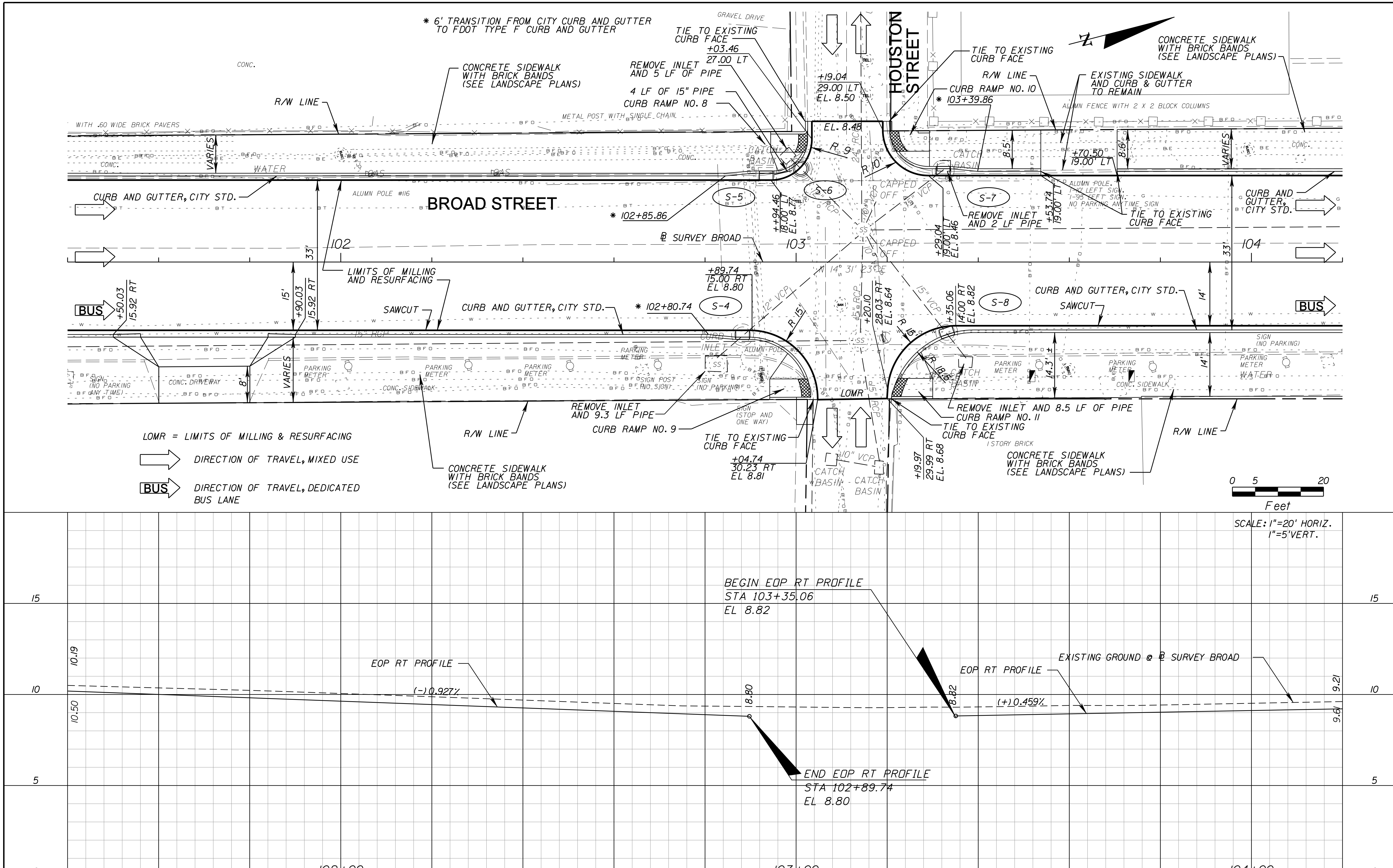

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N/A	DUVAL	430036-1-94-01

PLAN-PROFILE
BROAD STREET

SHEET NO.
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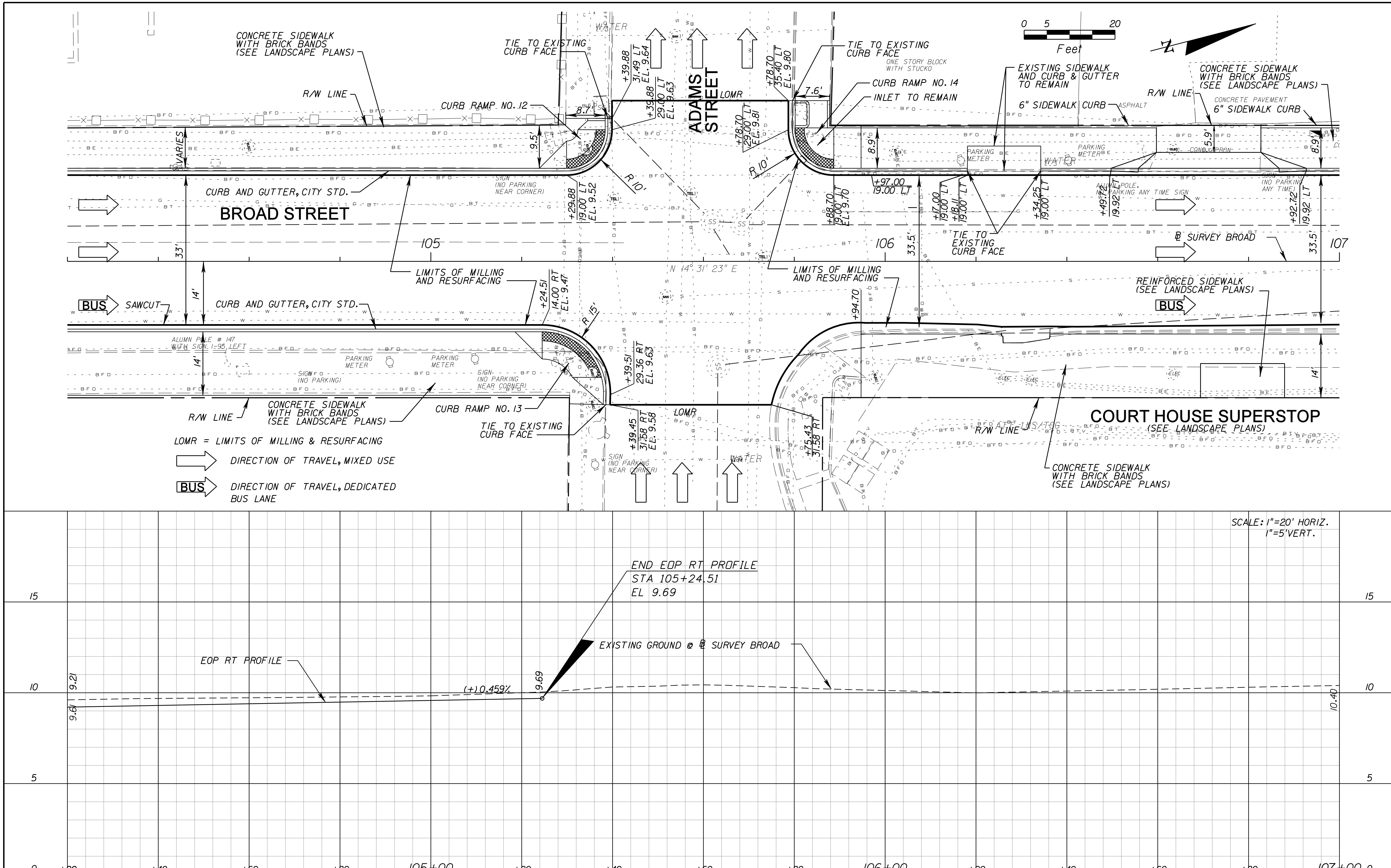

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N/A	DUVAL	430036-1-94-01

PLAN-PROFILE
BROAD STREET

SHEET NO.
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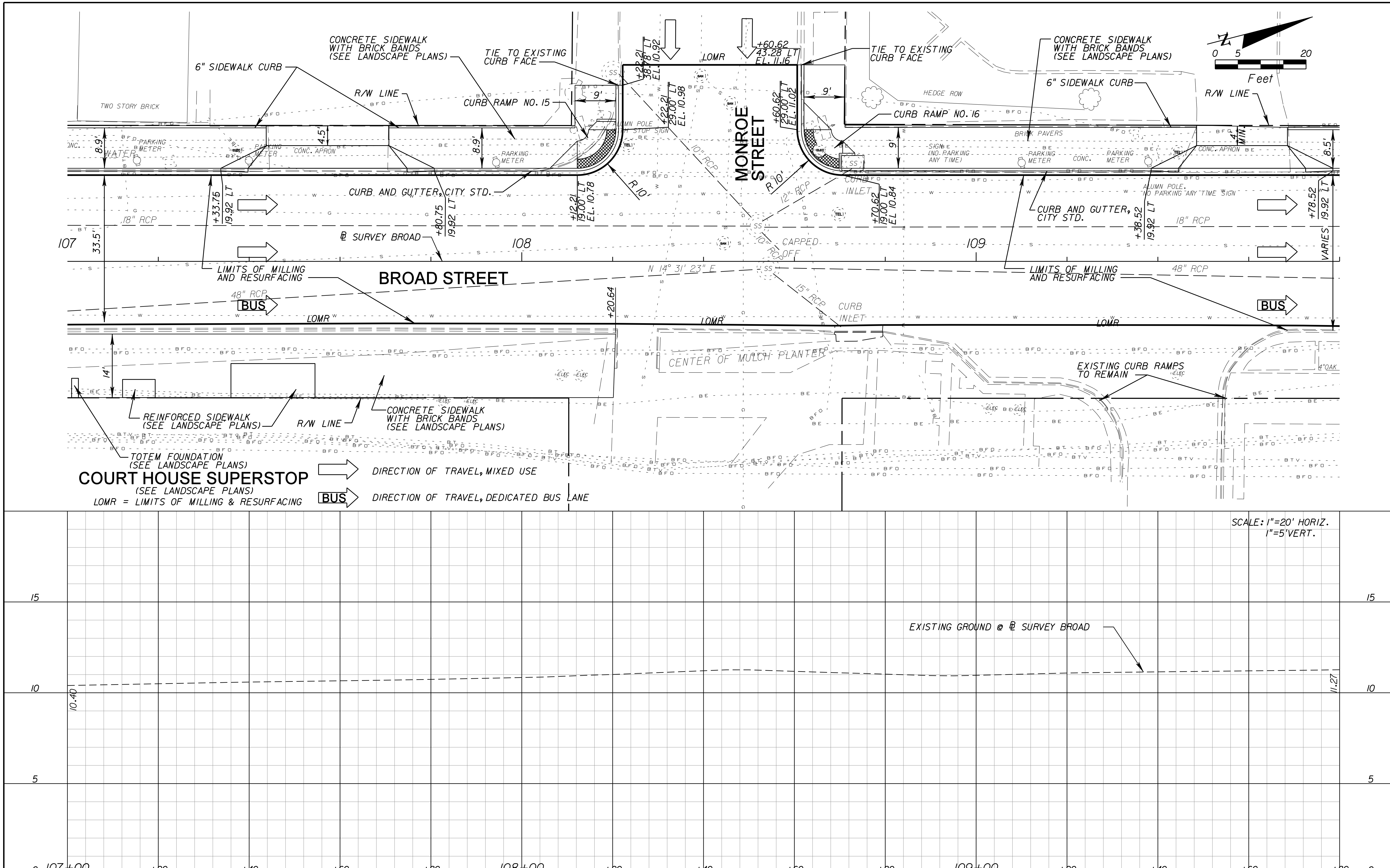

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N/A	DUVAL	430036-1-94-01

PLAN-PROFILE
BROAD STREET

SHEET NO.
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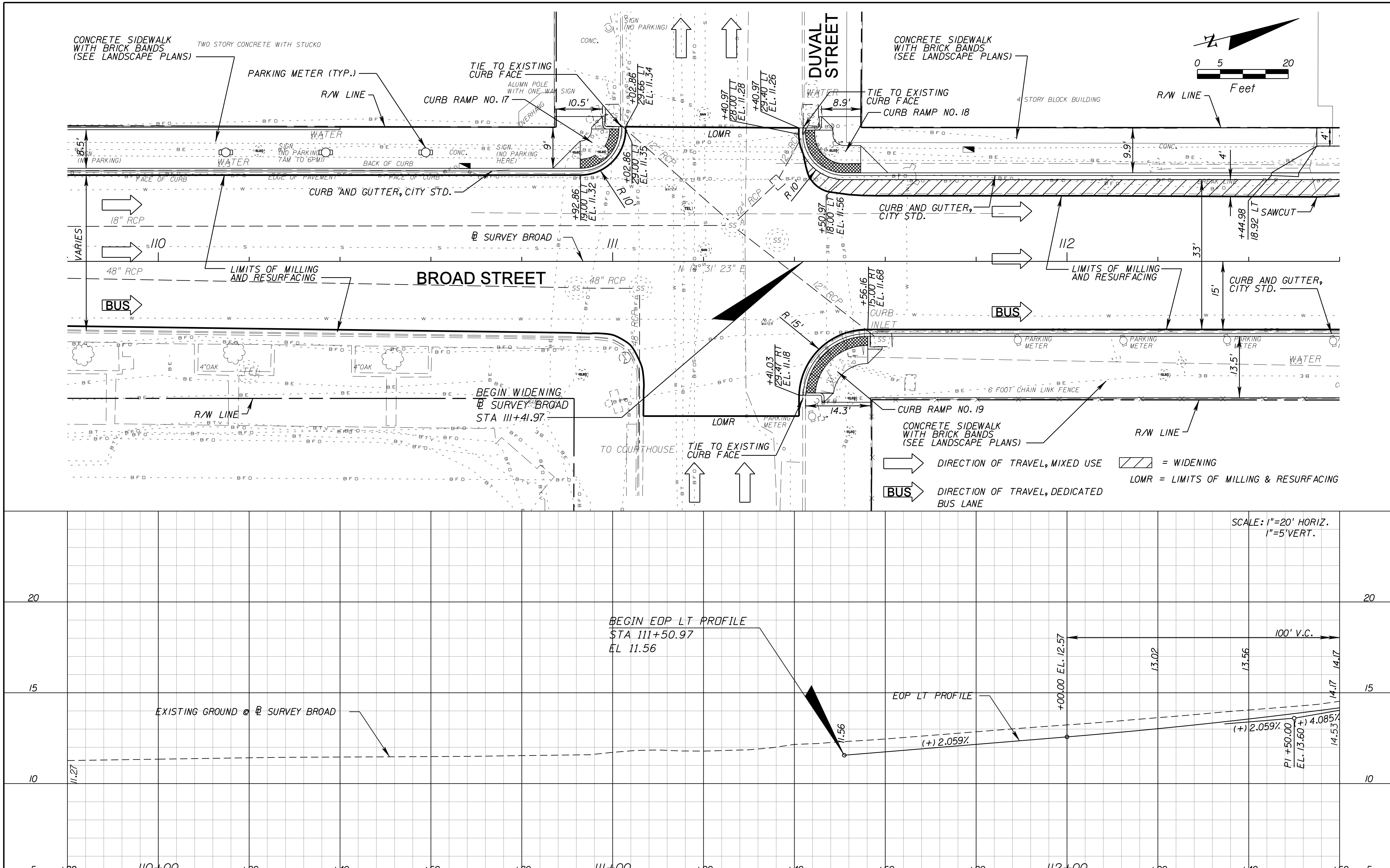

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N/A	DUVAL	430036-1-94-01

PLAN-PROFILE
BROAD STREET

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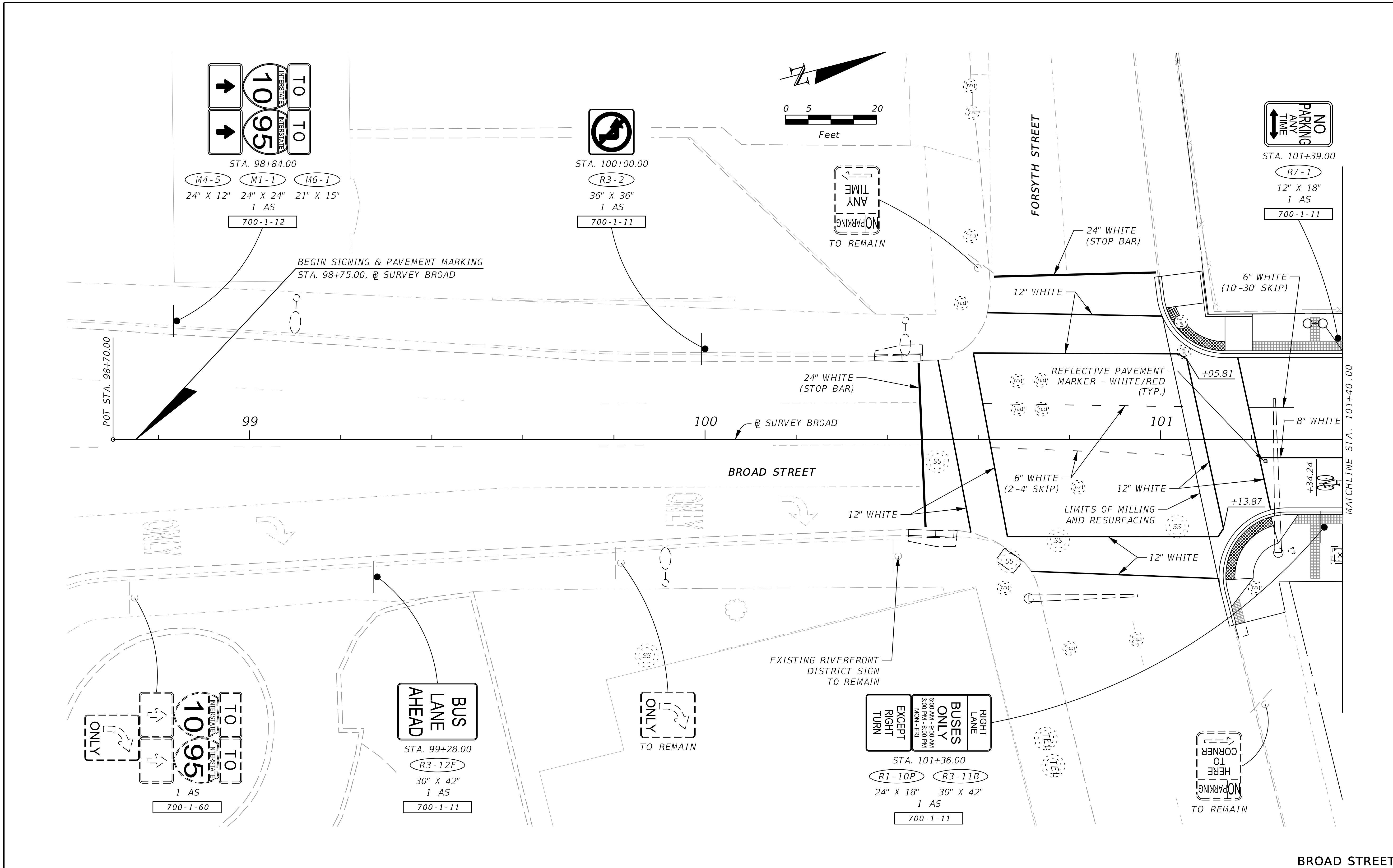


BROAD STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131

WAITZ&MOYE
3738 Southside Blvd, Suite 101
Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

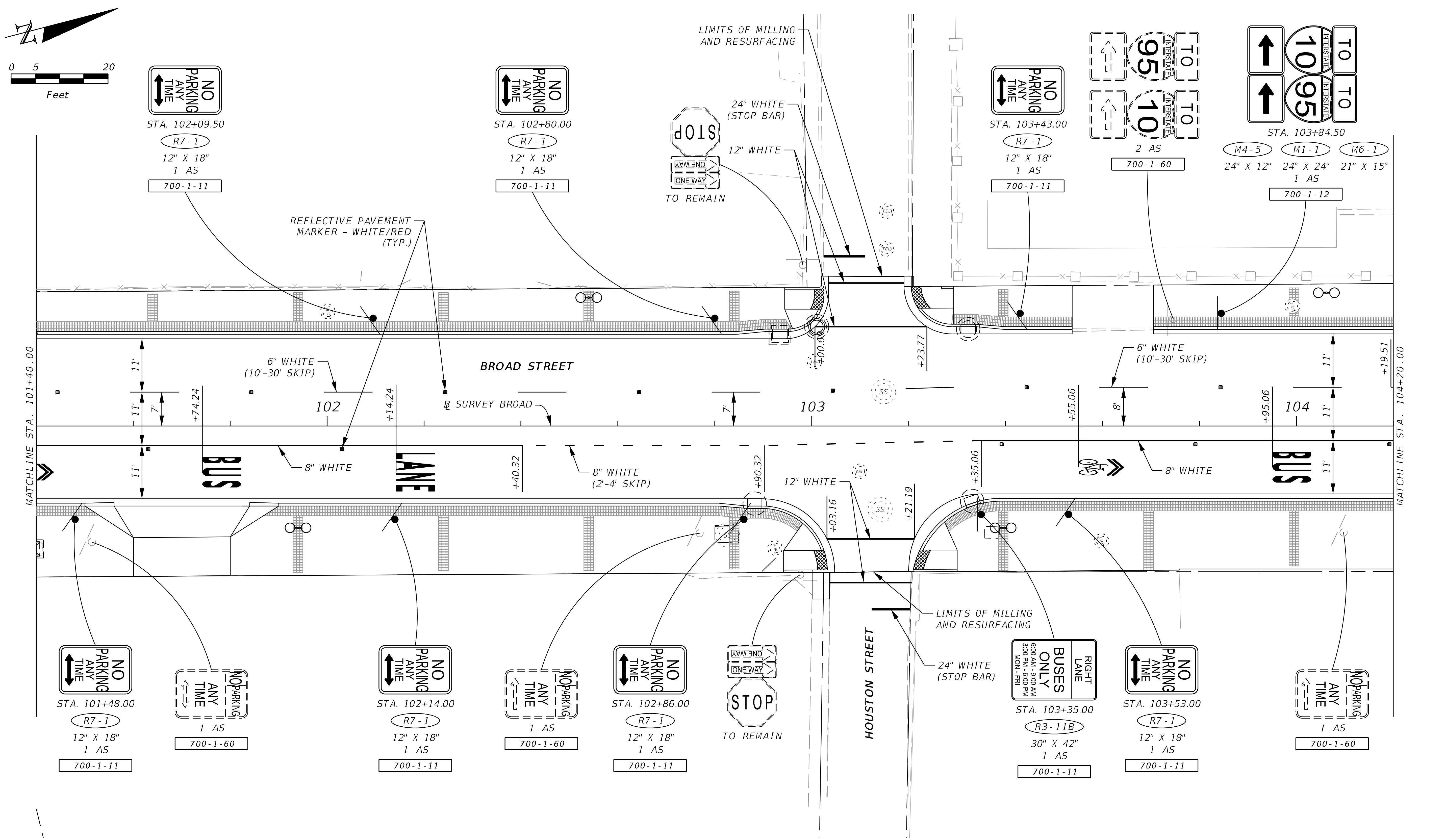
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNING & PAVEMENT MARKING PLAN

SHEET NO.
SP-47

KPrice 7/11/2014 11:03:00 AM PW:\200731\000000000147131\13.00_CAD\40003619401\signing\planssp41.dgn



BROAD STREET

REVISIONS			
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ENGINEER OF RECORD:
John H. Moye PE License No. 36131

WAITZ&MOYE
3738 Southside Blvd, Suite 101
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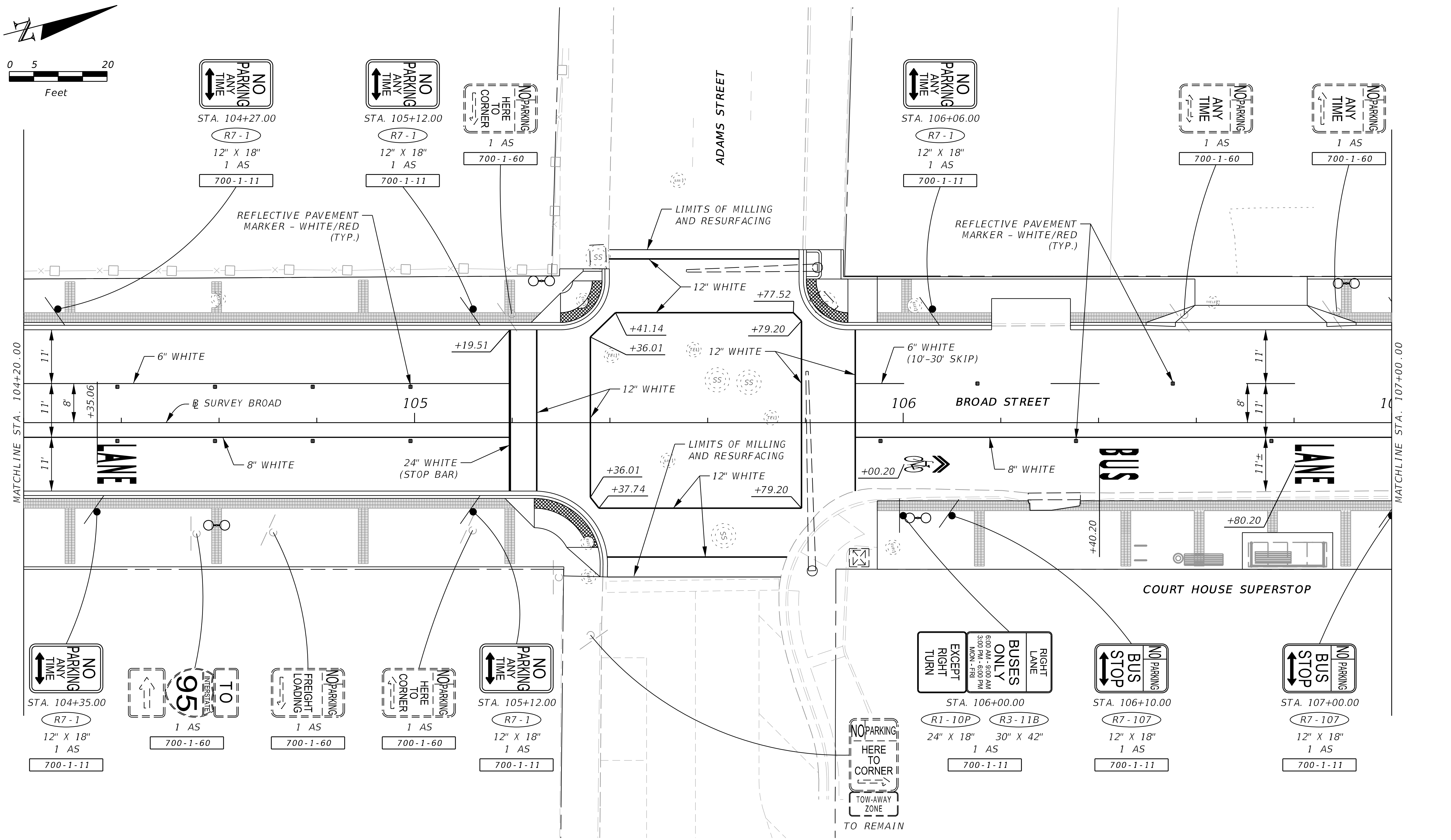
C.A. No. 6234 • 904.642.8311

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNING & PAVEMENT MARKING PLAN

SHEET NO.
SP-48



BROAD STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131

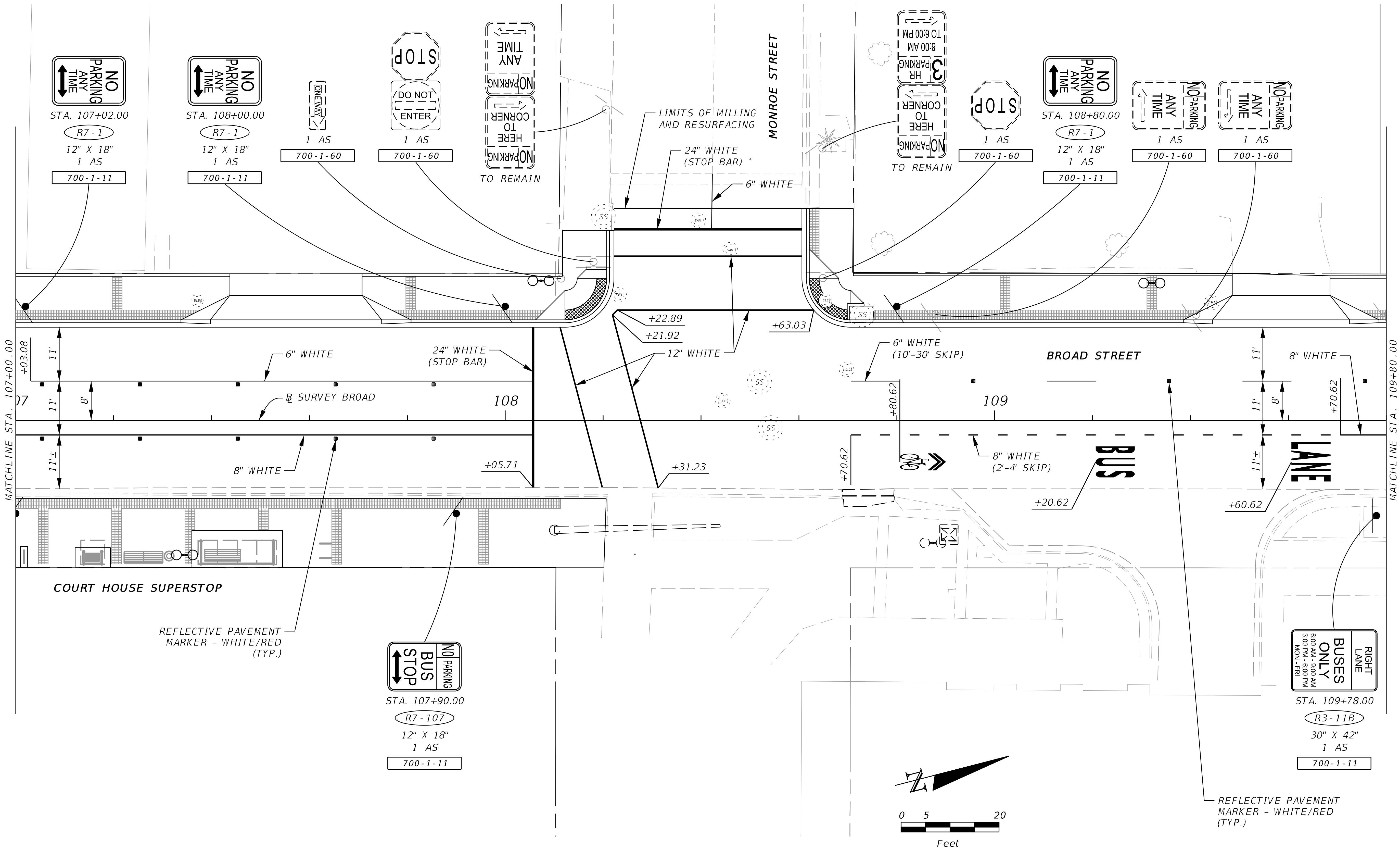
WAITZ&MOYE
3738 Southside Blvd, Suite 101
Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNING & PAVEMENT MARKING PLAN

SHEET NO.
SP-49



BROAD STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131
WAITZ&MOYE
3738 Southside Blvd, Suite 101
Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

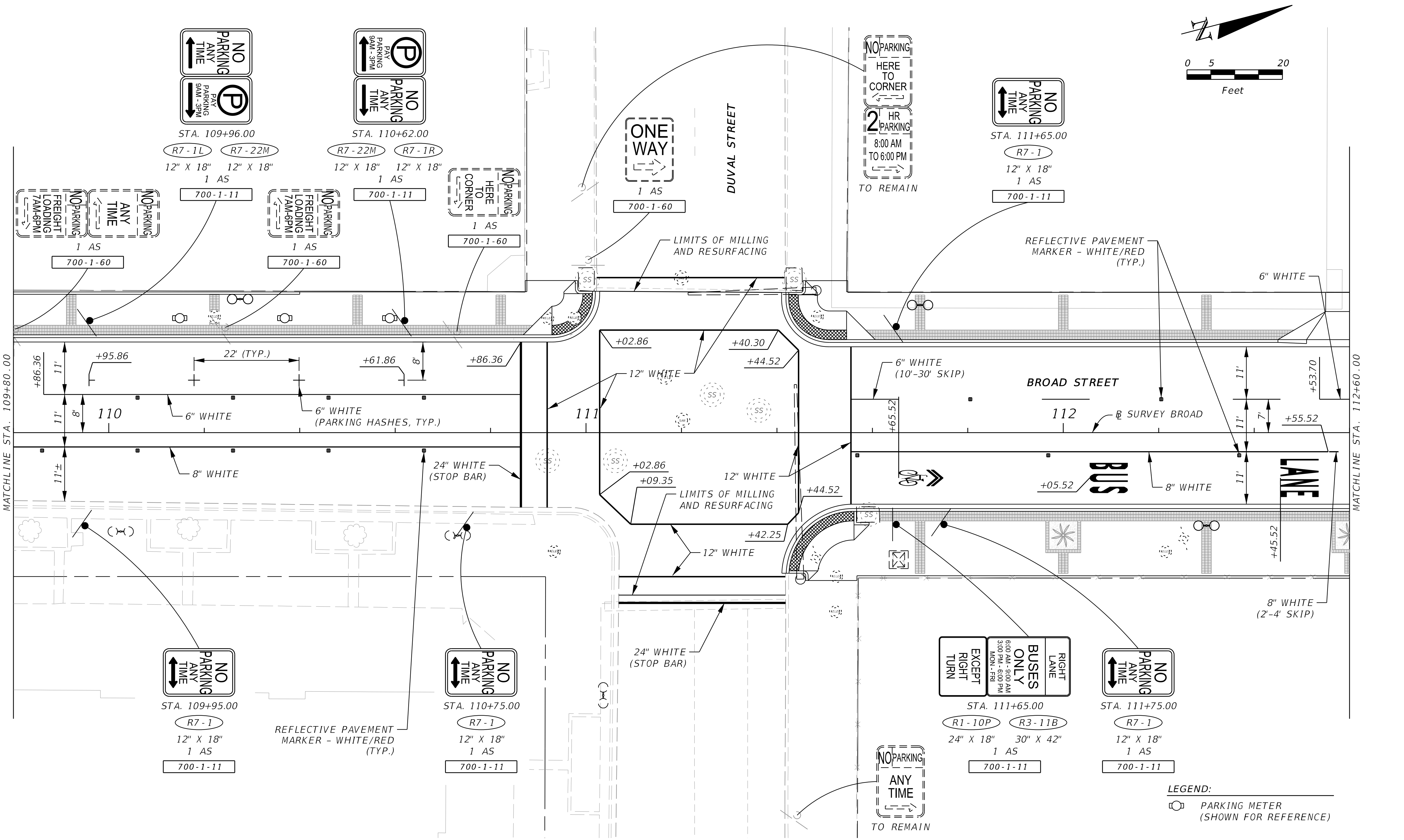
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNING & PAVEMENT MARKING PLAN

SHEET NO.
SP-50

KPrice 7/11/2014 11:03:41 AM PW:\200731\000000000147131\13.00_CAD\40003619401\signing\plansp44.dgn



BROAD STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131
WAITZ&MOYE
3738 Southside Blvd, Suite 101
Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNING & PAVEMENT MARKING PLAN

SHEET NO.
SP-51

KPrice 7/11/2014 11:03:54 AM PW:/200731\000000000147131\13.00_CAD\40003619401\signing\plansp45.dgn

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

LANDSCAPE ARCHITECT OF RECORD: CAROL C. WORSHAM R.L.A. NO.: 603

HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213

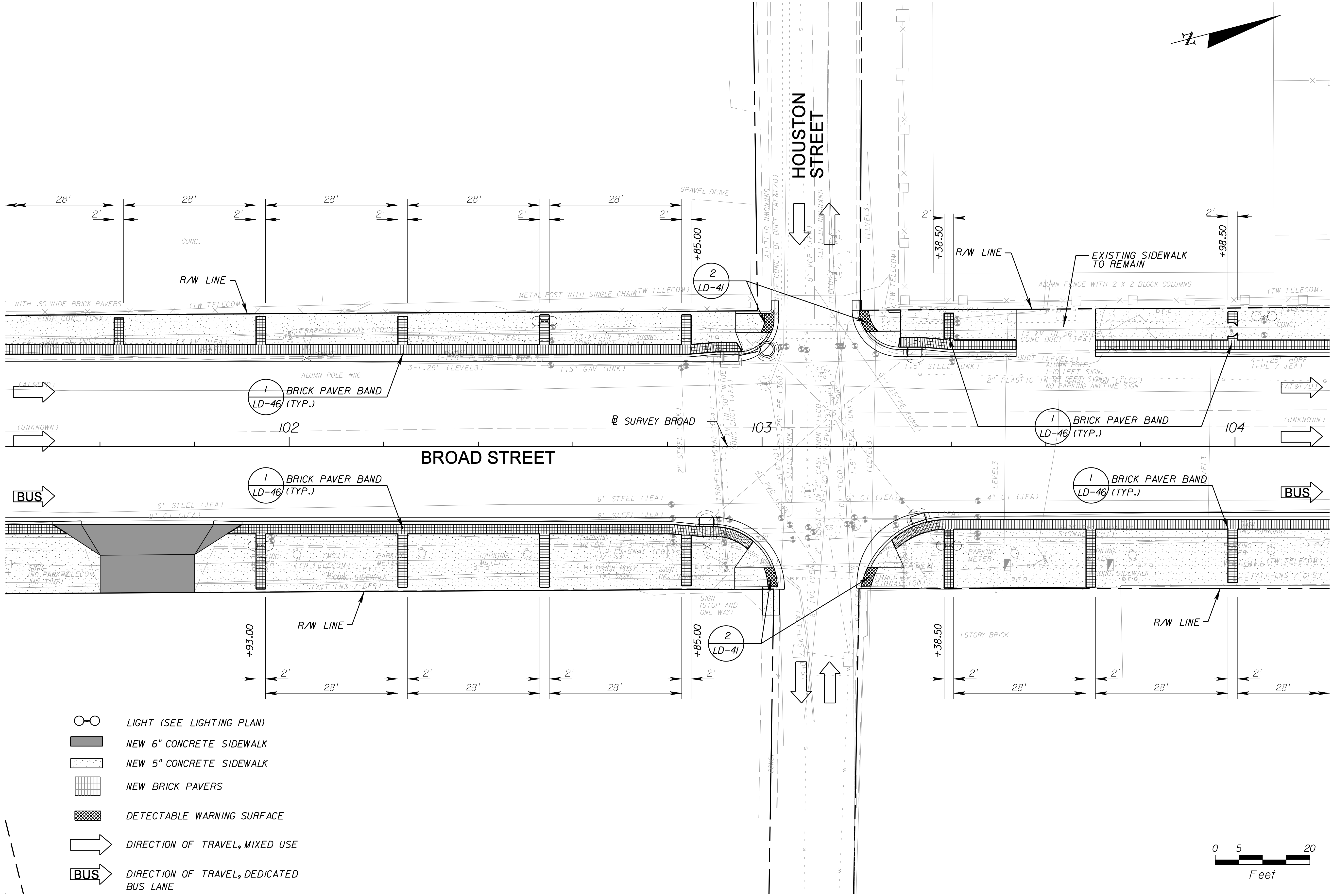
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LANDSCAPE PLAN
BROAD STREET

SHEET NO. LD-13

$USER$ $DATE$ $TIME$ $FILE$



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

LANDSCAPE ARCHITECT OF RECORD: CAROL C. WORSHAM R.L.A. NO.: 603

HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213
Employee-owned

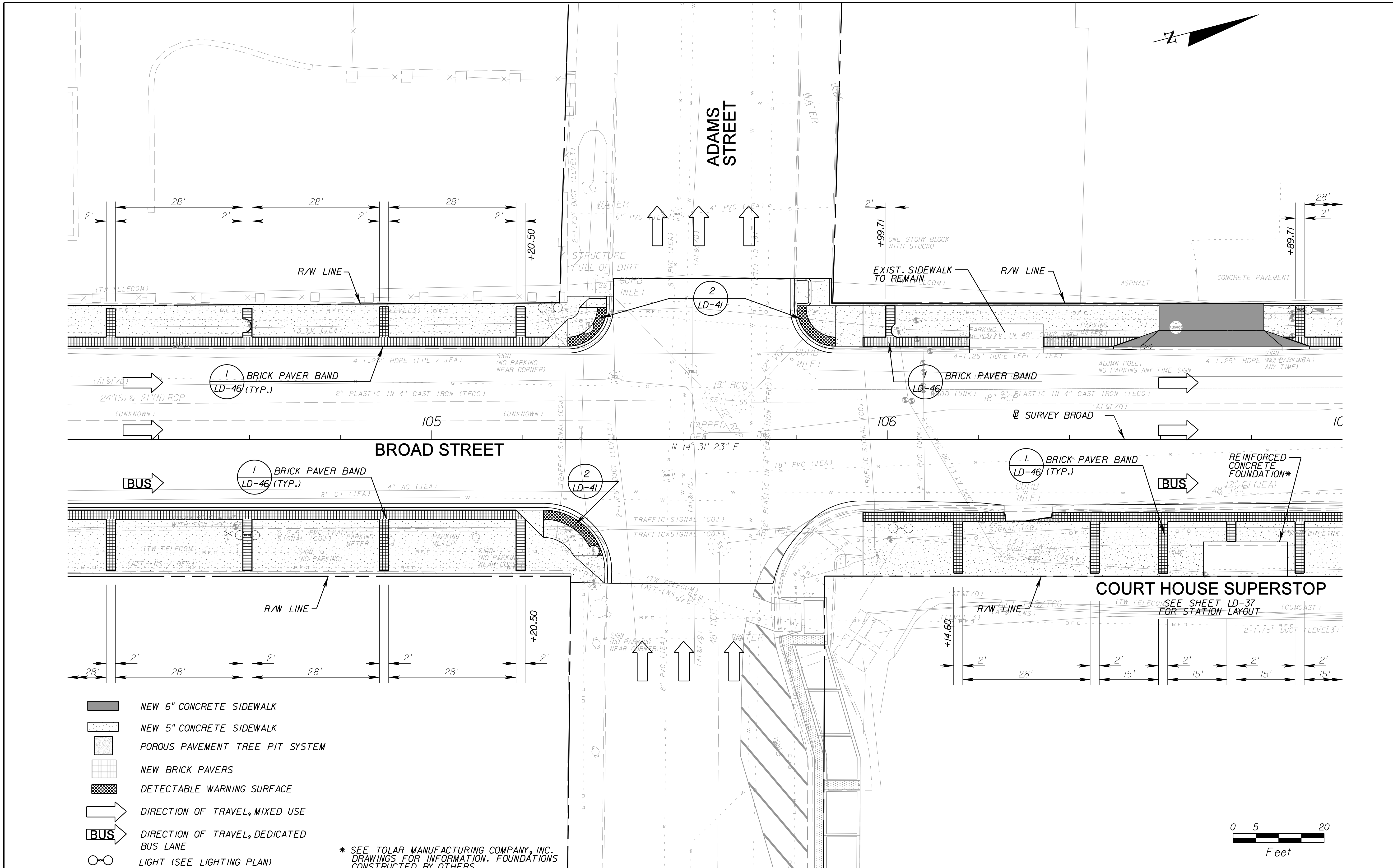
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LANDSCAPE PLAN BROAD STREET

SHEET NO. LD-14

$USER$ $DATE$ $TIME$ $FILE$



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

LANDSCAPE ARCHITECT OF RECORD: CAROL C. WORSHAM R.L.A. NO.: 603

HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213
Employee-owned

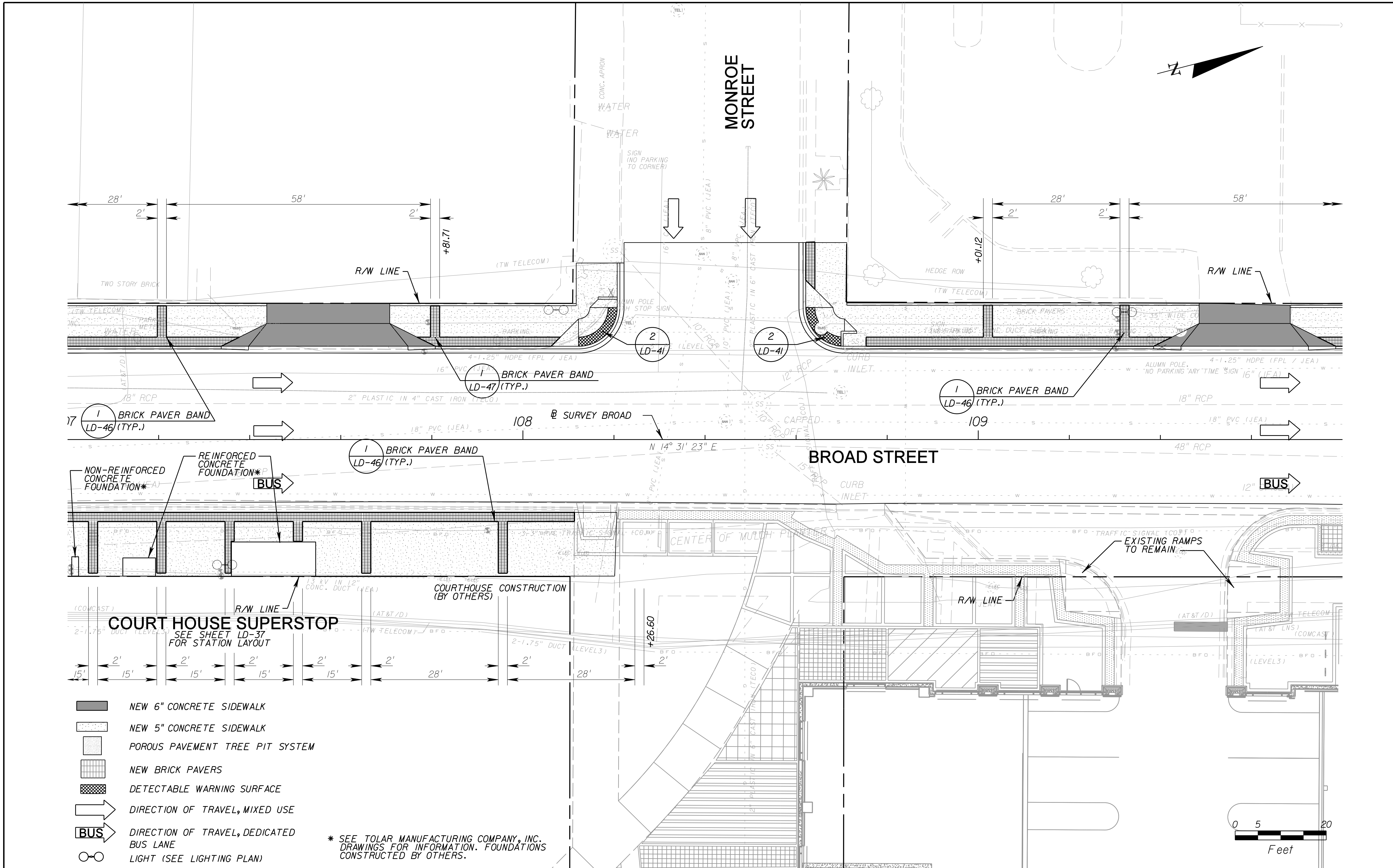
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LANDSCAPE PLAN
BROAD STREET

SHEET NO.
LD-15

$USER$ $DATE$ $TIME$ $FILE$



NEW 6" CONCRETE SIDEWALK

NEW 5" CONCRETE SIDEWALK

POROUS PAVEMENT TREE PIT SYSTEM

NEW BRICK PAVERS

DETECTABLE WARNING SURFACE

DIRECTION OF TRAVEL, MIXED USE

BUS DIRECTION OF TRAVEL, DEDICATED BUS LANE

LIGHT (SEE LIGHTING PLAN)

* SEE TOLAR MANUFACTURING COMPANY, INC. DRAWINGS FOR INFORMATION. FOUNDATIONS CONSTRUCTED BY OTHERS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

LANDSCAPE ARCHITECT OF RECORD: CAROL C. WORSHAM R.L.A. NO.: 603

HDR Employee-owned

HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213

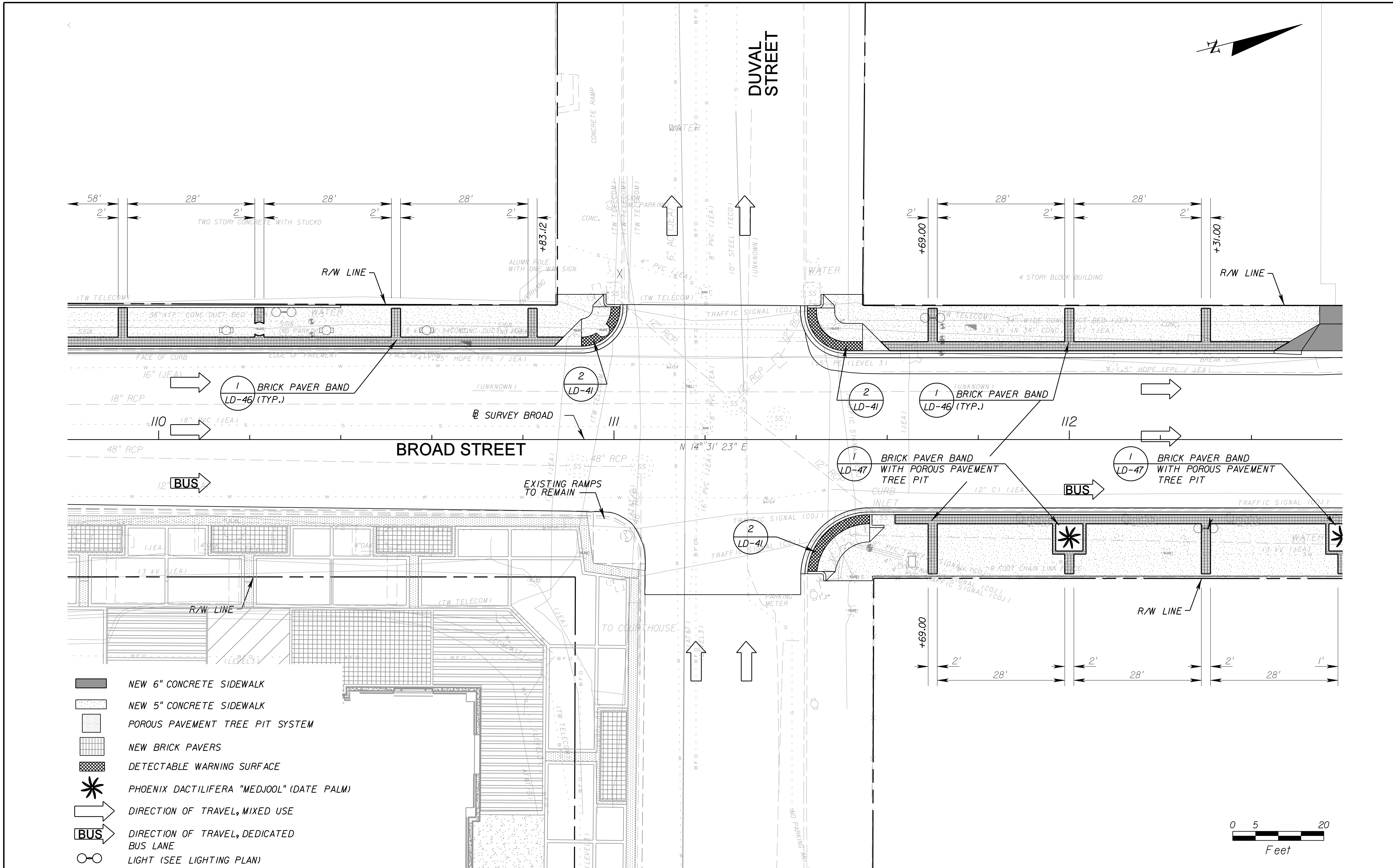
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LANDSCAPE PLAN BROAD STREET

SHEET NO. LD-16

$USER$ $DATE$ $TIME$ $FILE$



REVISIONS

DATE	DESCRIPTION	DATE	DESCRIPTION

LANDSCAPE ARCHITECT OF RECORD: CAROL C. WORSHAM R.L.A. NO.: 603

HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213

HDR Employee-owned

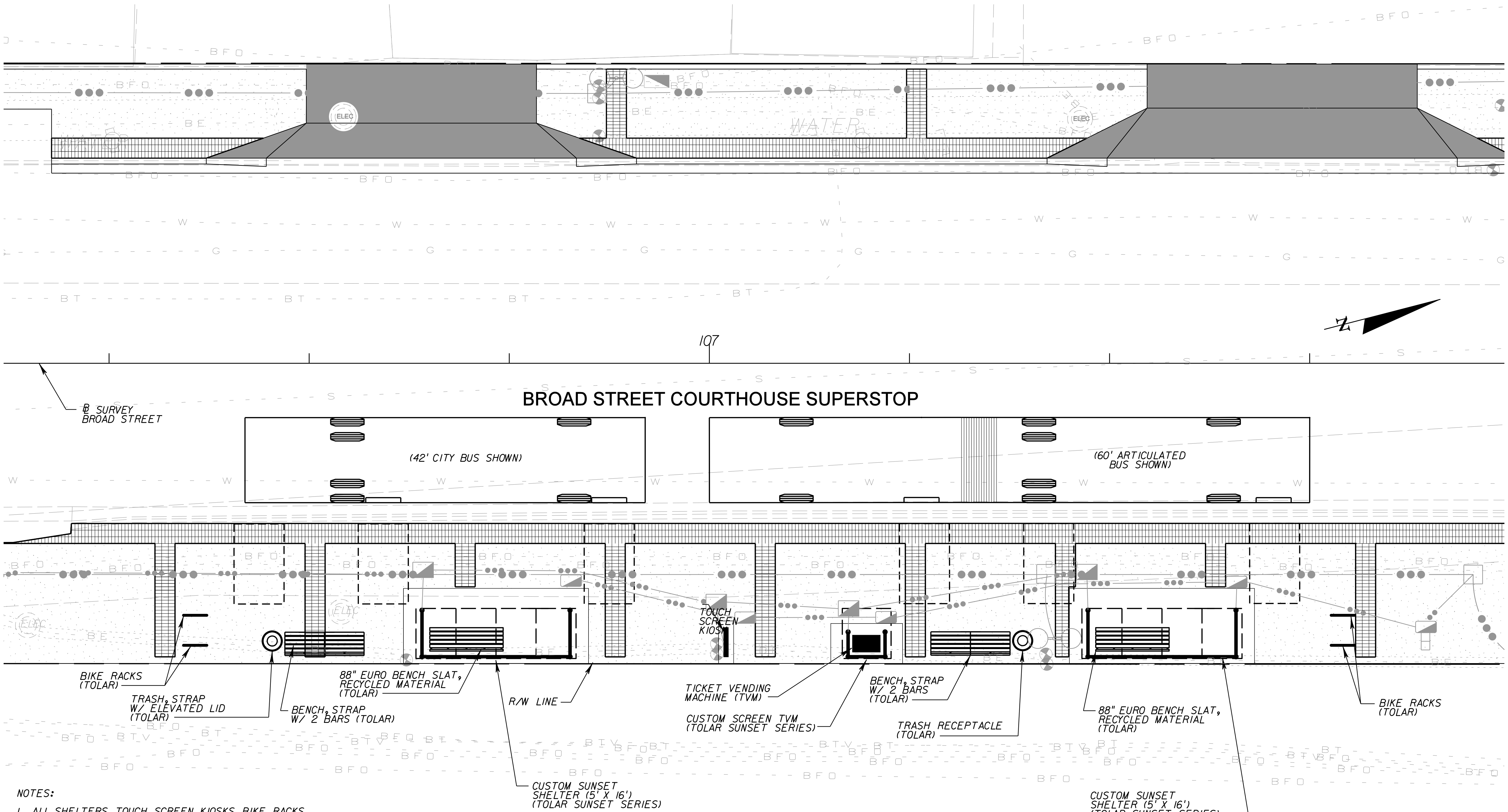
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LANDSCAPE PLAN
BROAD STREET

SHEET NO.
LD-17

$USER$ $DATE$ $TIME$ $FILE$



NOTES:

1. ALL SHELTERS, TOUCH SCREEN KIOSKS, BIKE RACKS, BENCHES AND TRASH CANS SHOWN FOR LOCATION PURPOSES ONLY. PRODUCT INFORMATION AND INSTALLATION DETAILS ARE PROVIDED ON PLAN SHEETS PREPARED BY TOLAR MANUFACTURING COMPANY, INC. THESE ITEMS WILL BE FURNISHED AND INSTALLED BY OTHERS.

2. TICKET VENDING MACHINE WILL BE FURNISHED AND INSTALLED BY OTHERS.

5'X8' BOARDING AREA (42' OR 60' BUS)

0 2 10 Feet

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

LANDSCAPE ARCHITECT OF RECORD: CAROL C. WORSHAM R.L.A. NO.: 603

HDR Employee-owned
HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213

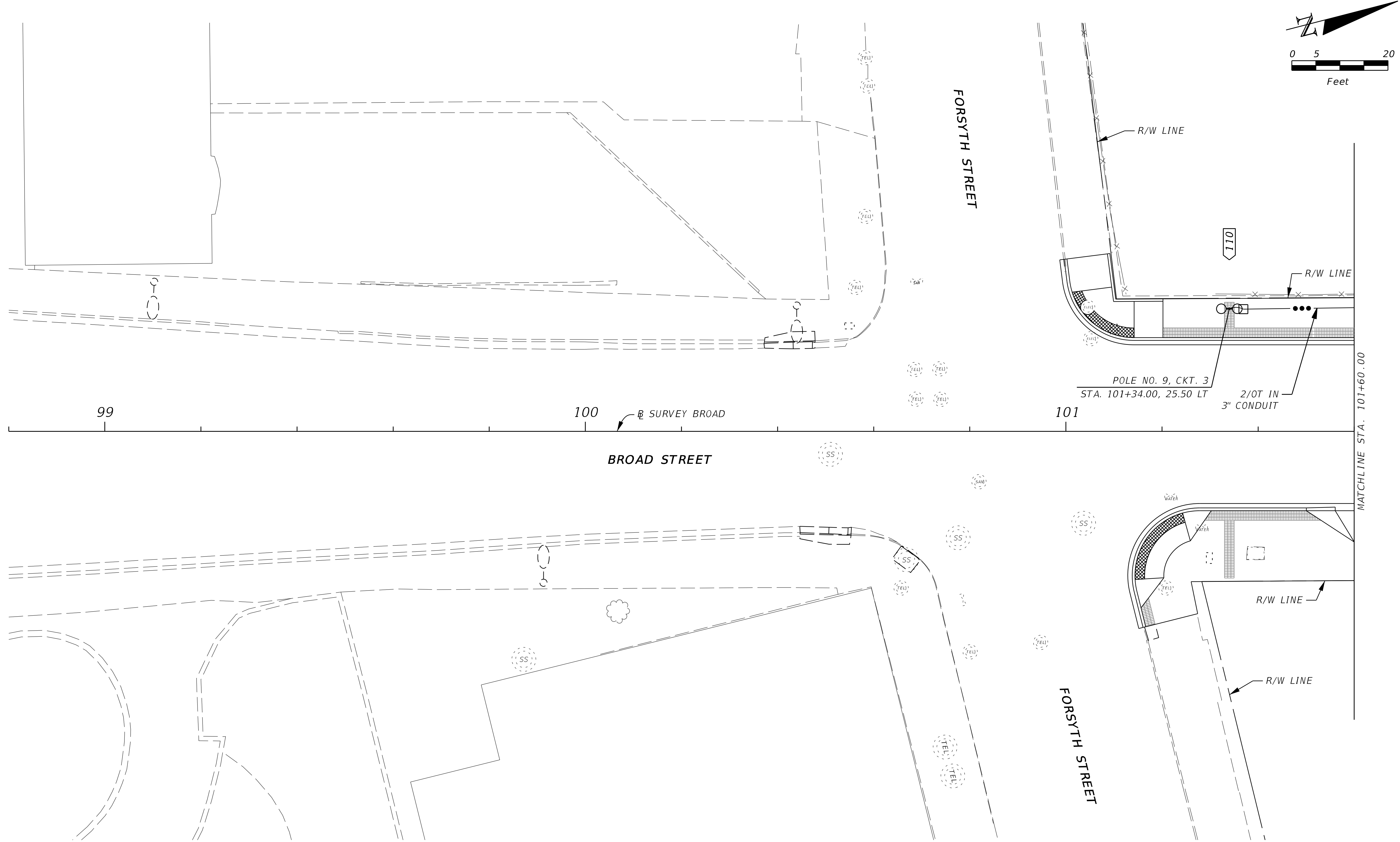
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

STATION LAYOUT
BROAD STREET

SHEET NO. LD-37

$USER$ $DATE$ $TIME$ $FILE$



BROAD STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131

WAITZ&MOYE
3738 Southside Blvd, Suite 101
Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LIGHTING PLAN

SHEET NO.
L-10

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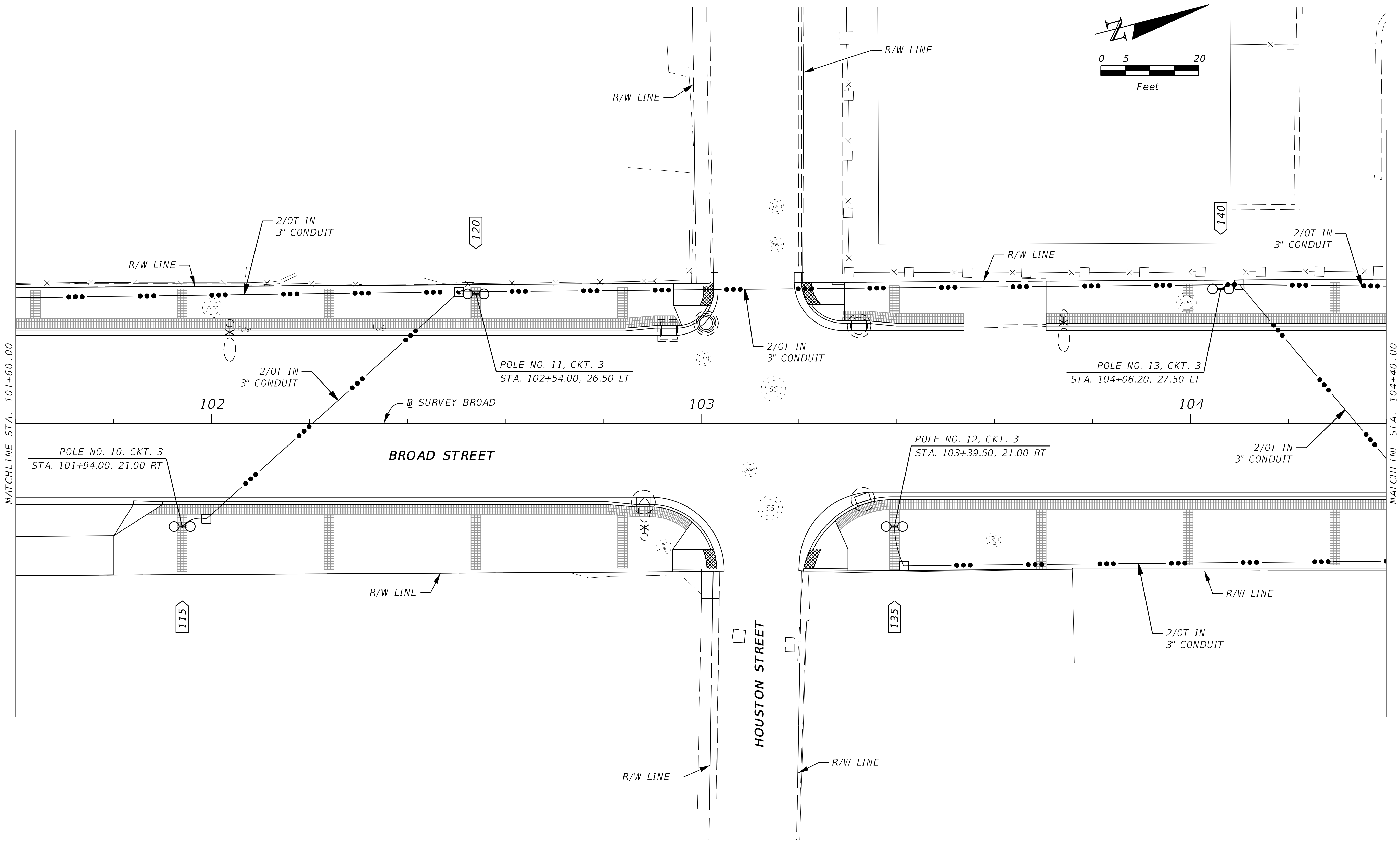

BROAD STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131

WAITZ&MOYE
3738 Southside Blvd, Suite 101
Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LIGHTING PLAN

SHEET NO.
L-11

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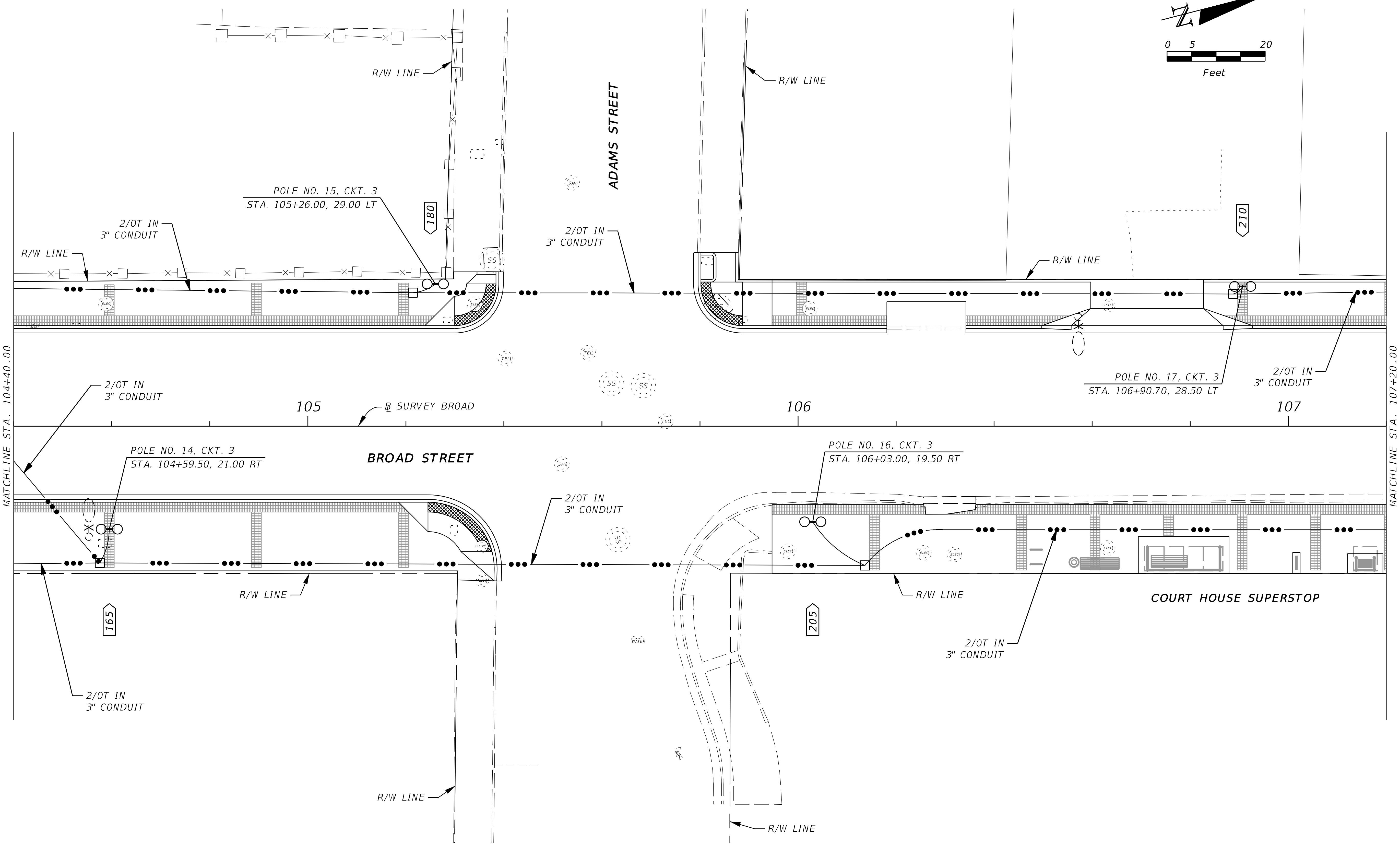


BROAD STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131

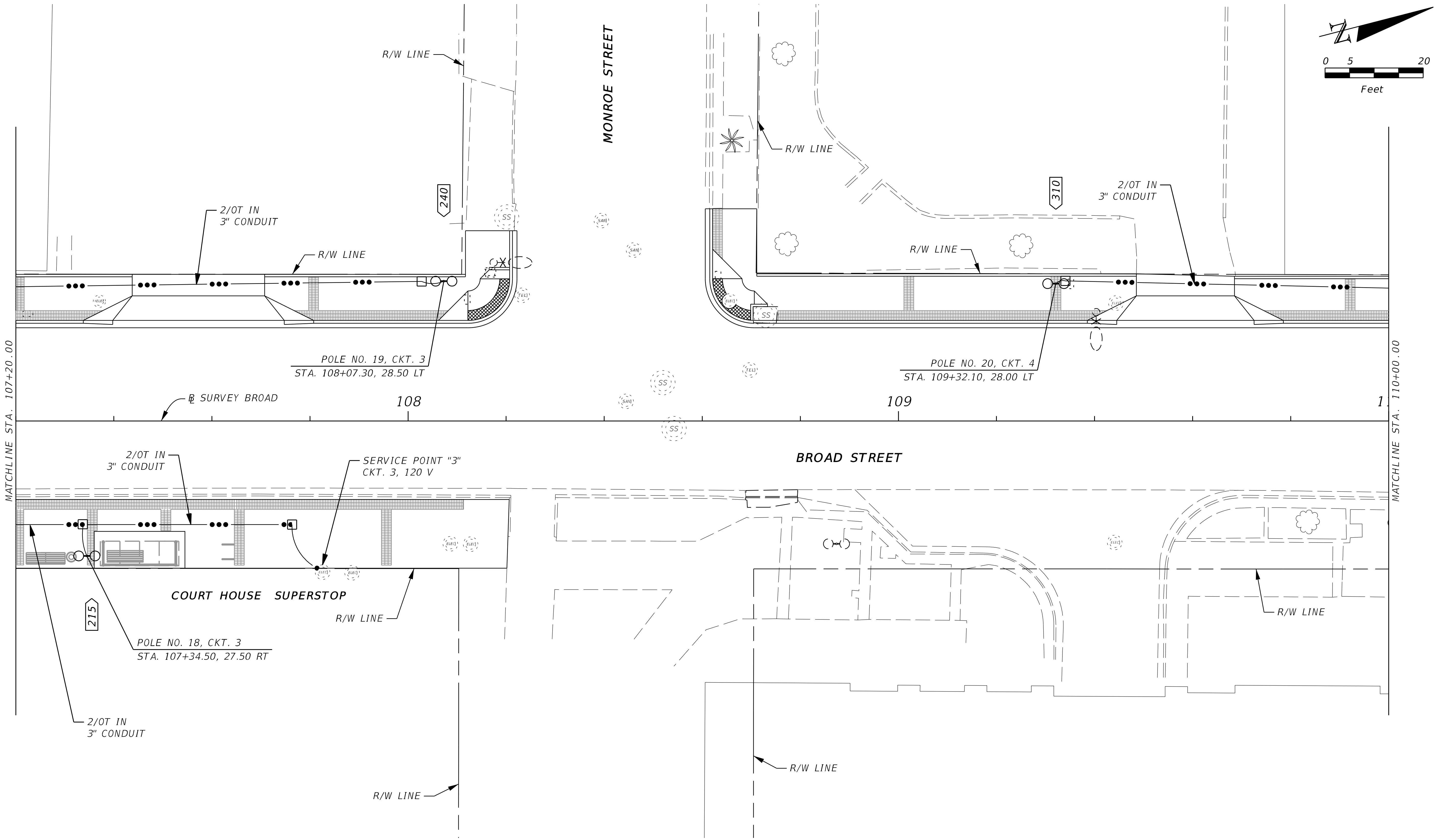
WAITZ&MOYE
3738 Southside Blvd, Suite 101
Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LIGHTING PLAN

SHEET NO.
L-12



BROAD STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131

WAITZ&MOYE
3738 Southside Blvd, Suite 101
Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LIGHTING PLAN

SHEET NO.
L-13

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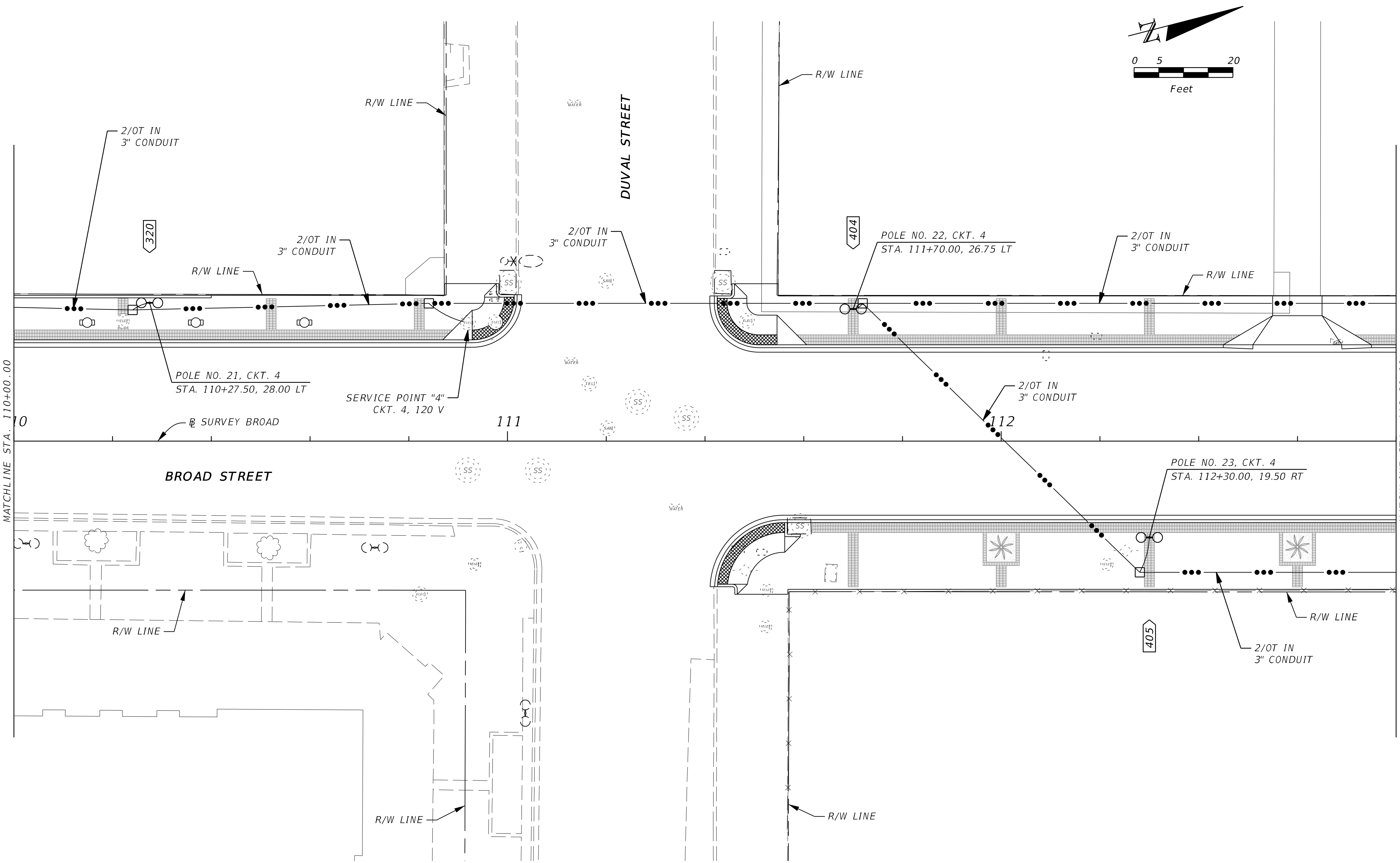

BROAD STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131
WAITZ&MOYE
3738 Southside Blvd, Suite 101
Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LIGHTING PLAN

SHEET NO. L-14

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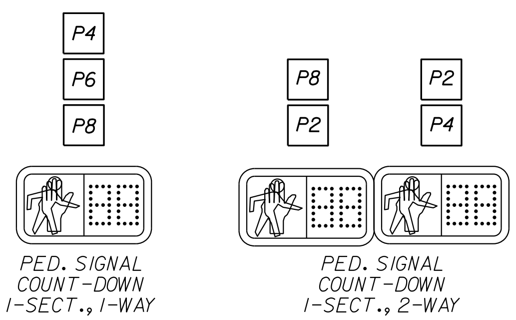
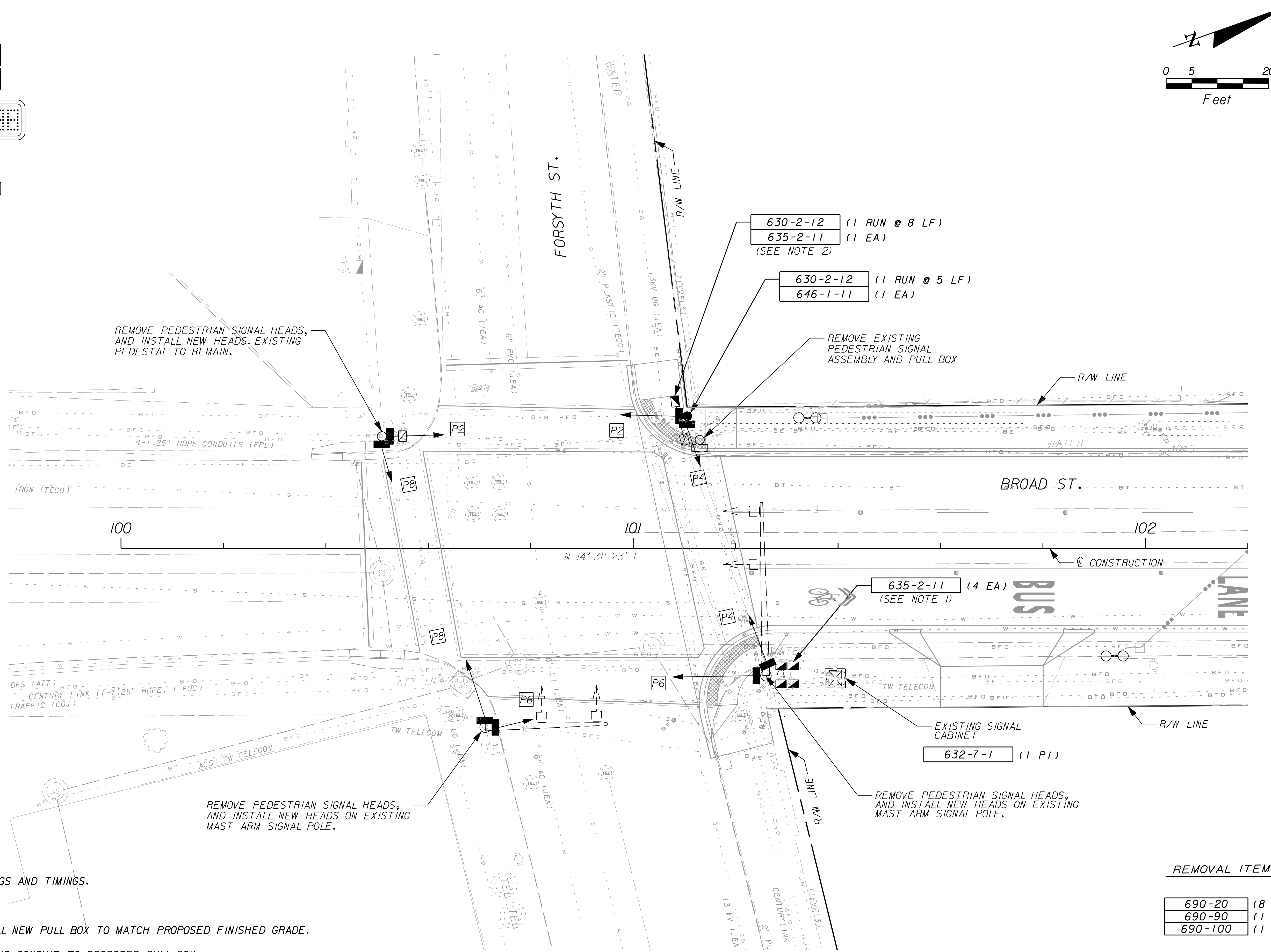
PEDESTRIAN HEAD DETAILS





CONTROLLER OPERATIONS:

1. MAINTAIN EXISTING CONTROLLER SETTINGS AND TIMINGS.

NOTES:

1. REMOVE EXISTING PULL BOX AND INSTALL NEW PULL BOX TO MATCH PROPOSED FINISHED GRADE.

2. REMOVE EXISTING PULL BOX AND EXTEND CONDUIT TO PROPOSED PULL BOX.

REMOVAL ITEMS

690-20	(8 EA)
690-90	(1 PI)
690-100	(1 PI)

REVISIONS

DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: RICHARD ATTA-ARMAH
P.E. NO: 57961
HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213
Employee-owned

JACKSONVILLE TRANSPORTATION AUTHORITY

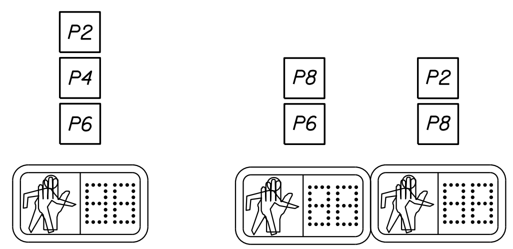
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNALIZATION PLAN
BROAD ST. AT FORSYTH ST.

SHEET NO. T-7

fweary 3/13/2014 4:39:52 PM c:\pwworking\tpa\d0254064\plansg07.DGN

PEDESTRIAN HEAD DETAILS

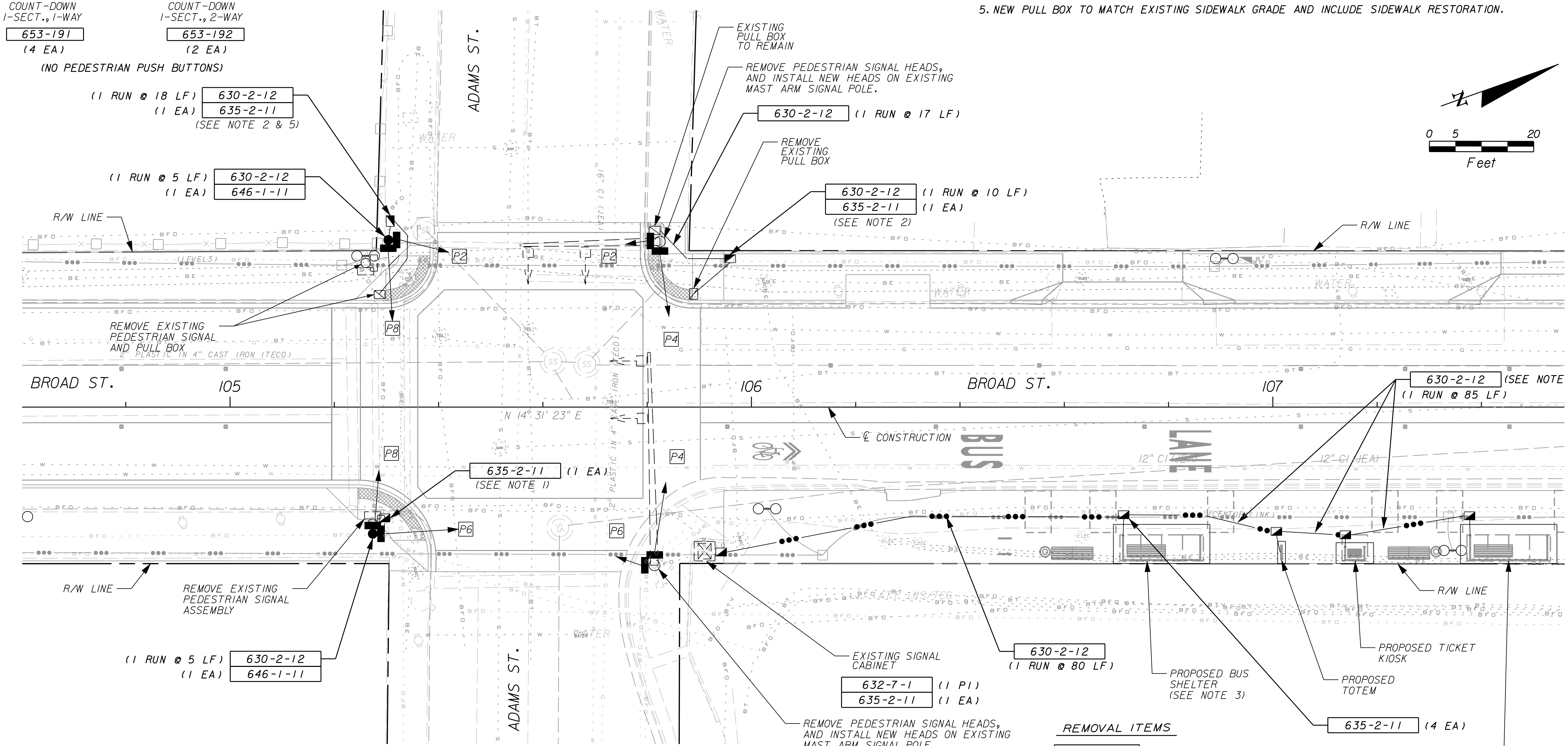


CONTROLLER OPERATIONS:

1. MAINTAIN EXISTING CONTROLLER SETTINGS AND TIMINGS.

NOTES:

1. REMOVE EXISTING PULL BOX AND INSTALL NEW PULL BOX TO MATCH PROPOSED FINISHED GRADE.
2. REMOVE EXISTING PULL BOX AND EXTEND EXISTING CONDUIT TO PROPOSED PULL BOX.
3. REFER TO LANDSCAPE AND STATION LAYOUT PLANS FOR DETAILS.
4. CONDUIT QUANTITY INCLUDES ALL RUNS FROM PULL BOX TO ACCESS POINT.
5. NEW PULL BOX TO MATCH EXISTING SIDEWALK GRADE AND INCLUDE SIDEWALK RESTORATION.



REMOVAL ITEMS

690-20	(7 EA)
690-90	(1 PI)
690-100	(1 PI)

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: RICHARD ATTA-ARMAH P.E. NO: 57961

HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900 Cert. of Auth. No. 4213
www.hdrinc.com

JACKSONVILLE TRANSPORTATION AUTHORITY

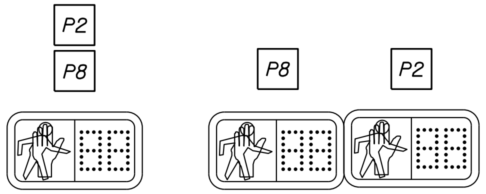
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNALIZATION PLAN BROAD ST. AT ADAMS ST.

SHEET NO. T-8

fweary 3/13/2014 4:40:08 PM c:\pwworking\tpa\d0254064\plansg08.DGN

PEDESTRIAN HEAD DETAILS

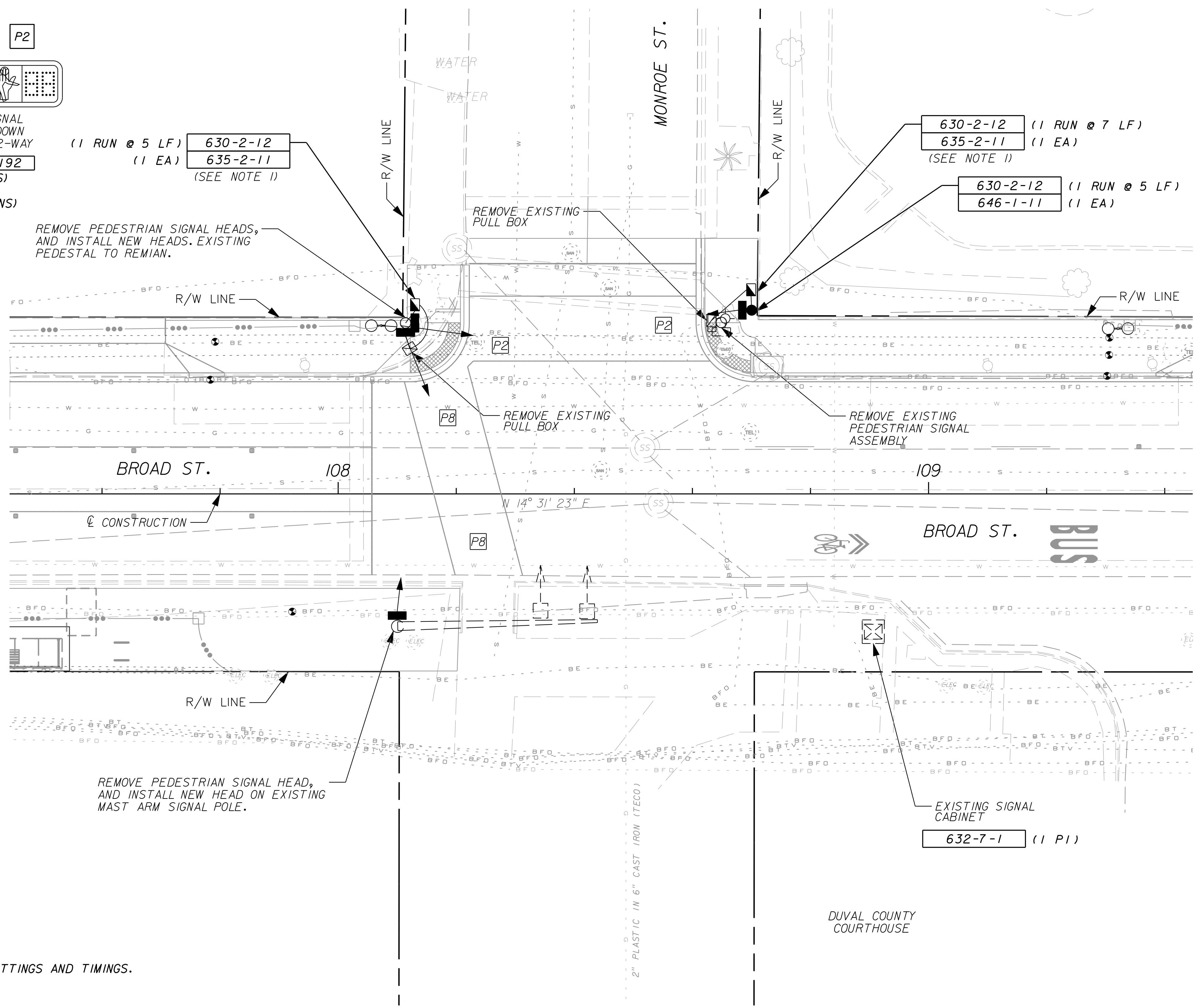


PED. SIGNAL COUNT-DOWN I-SECT., I-WAY
653-191
(2 AS)

PED. SIGNAL COUNT-DOWN I-SECT., 2-WAY
653-192
(I AS)

(NO PEDESTRIAN PUSH BUTTONS)

0 5 20
Feet



CONTROLLER OPERATIONS:

I. MAINTAIN EXISTING CONTROLLER SETTINGS AND TIMINGS.

NOTES:

I. REMOVE EXISTING PULL BOX AND EXTEND EXISTING CONDUIT TO PROPOSED PULL BOX.

REMOVAL ITEMS

690-20	(3 EA)
690-31	(I EA)
690-90	(I PI)
690-100	(I PI)

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: RICHARD ATTA-ARMAH P.E. NO: 57961
HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213
Employee-owned

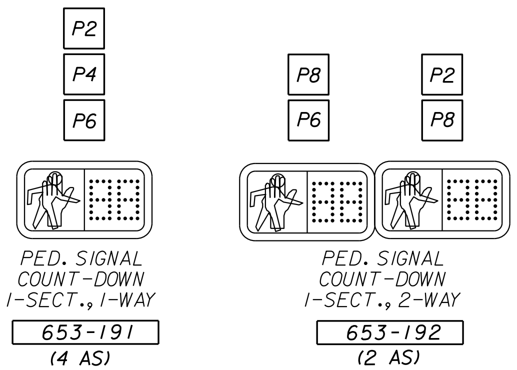
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

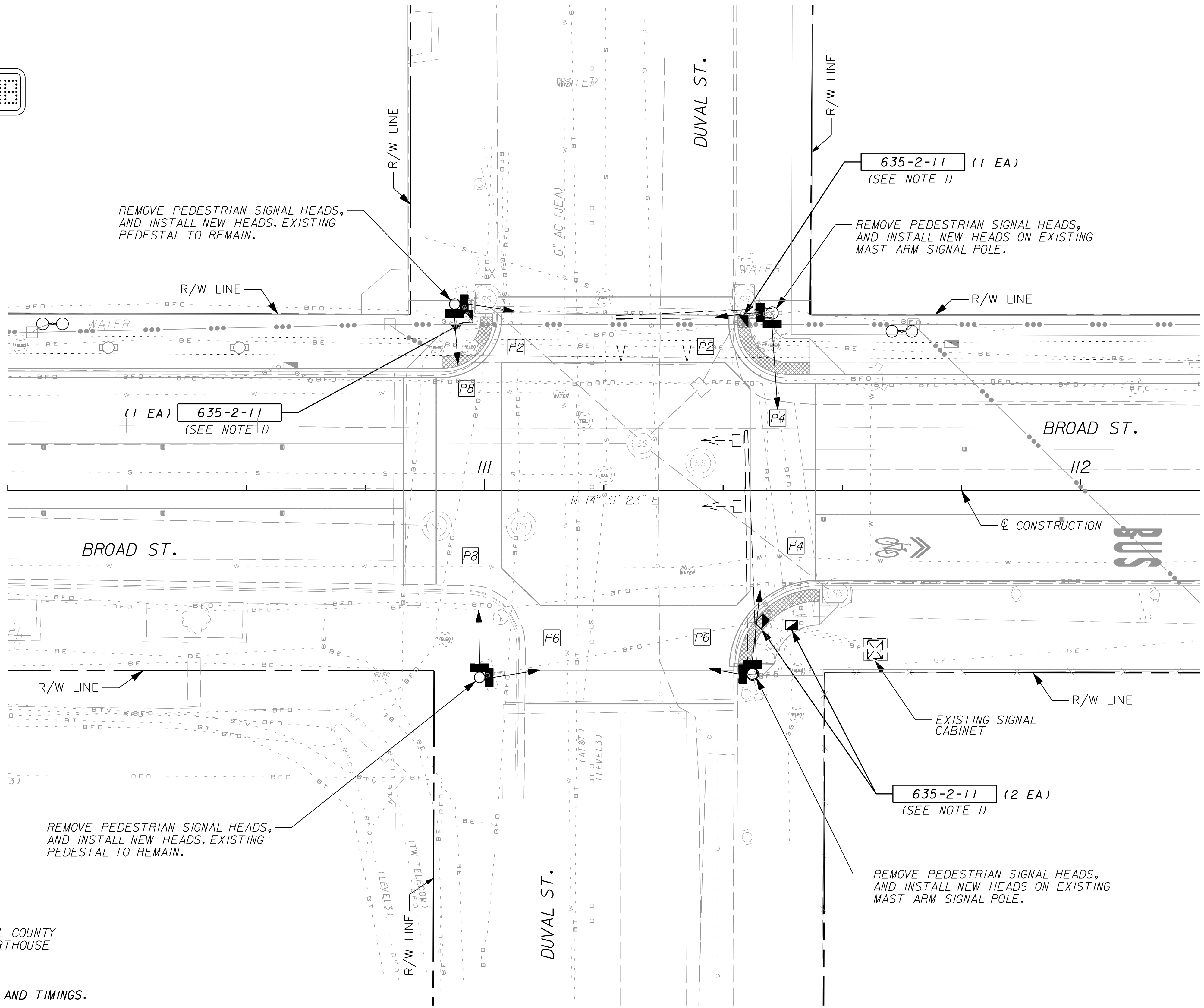
SIGNALIZATION PLAN
BROAD ST. AT MONROE ST.

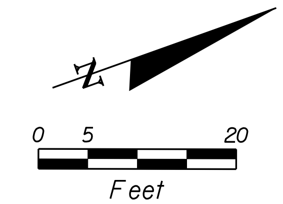
SHEET NO. T-9

PEDESTRIAN HEAD DETAILS



(NO PEDESTRIAN PUSH BUTTONS)





REMOVAL ITEMS

690-20	(6 EA)
690-90	(1 PI)
690-100	(1 PI)

CONTROLLER OPERATIONS:

1. MAINTAIN EXISTING CONTROLLER SETTINGS AND TIMINGS.

NOTES:

1. REMOVE EXISTING PULL BOX AND INSTALL NEW PULL BOX TO MATCH PROPOSED FINISHED GRADE.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: RICHARD ATTA-ARMAH
P.E. NO: 57961

HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNALIZATION PLAN
BROAD ST. AT DUVAL ST.

SHEET NO. T-10

fweary 3/13/2014 4:40:27 PM c:\pwworking\tpa\d0254064\plansg10.DGN

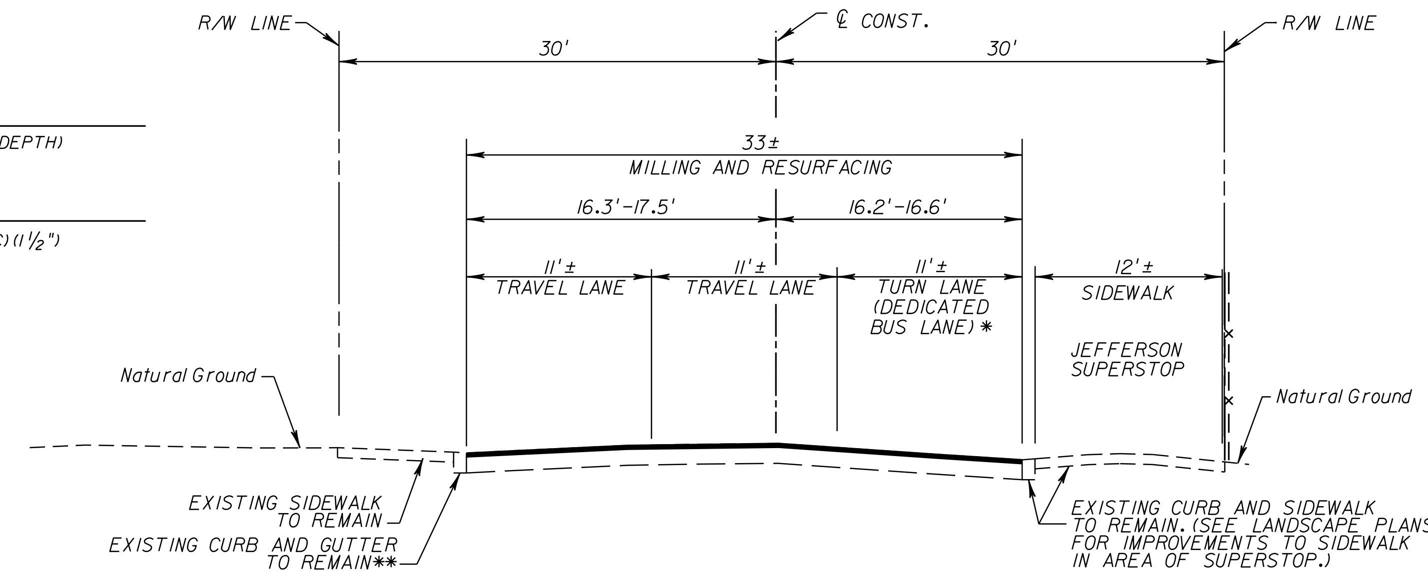
APPENDIX 2 JACKSONVILLE TRANSPORTATION AUTHORITY BUILDING PREMIUM TRANSIT QUEUE JUMP

MILLING

MILL EXISTING ASPHALT PAVEMENT (1½" AVG. DEPTH)

RESURFACING

TYPE SP STRUCTURAL COURSE (TRAFFIC C)(1½")



** STA. 30+70.63 TO STA. 30+92.99 LEFT REMOVE EXISTING CURB AND GUTTER AND CONSTRUCT CURB AND GUTTER CITY STD. RETURN WITH WIDENING. SEE ROADWAY PLANS FOR MORE INFORMATION.

TYPICAL SECTION NO. 5
STA. 23+00.00 TO STA. 31+04.50

FORSYTH STREET BETWEEN DAVIS STREET AND JEFFERSON STREET

POSTED SPEED = 30 MPH
DESIGN SPEED = 35 MPH

* DEDICATED BUS LANE STA. 26+25.60 TO STA. 29+00.00. RIGHT TURN LANE STA 29+00.00 TO STA. 30+67.91.

* BUS LANE IN AFFECT DURING WEEKDAY PEAK HOURS. (6:00 AM - 9:00 AM AND 3:00 PM - 6:00 PM)

NOTE:

1. ALL COMPACTION FOR ANY MATERIAL SHALL BE LIMITED TO THE STATIC MODE ONLY, UNLESS APPROVED BY THE ENGINEER.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: KRISTINA M. PRICE
P.E. NO: 54523

HDR Employee-owned
HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213

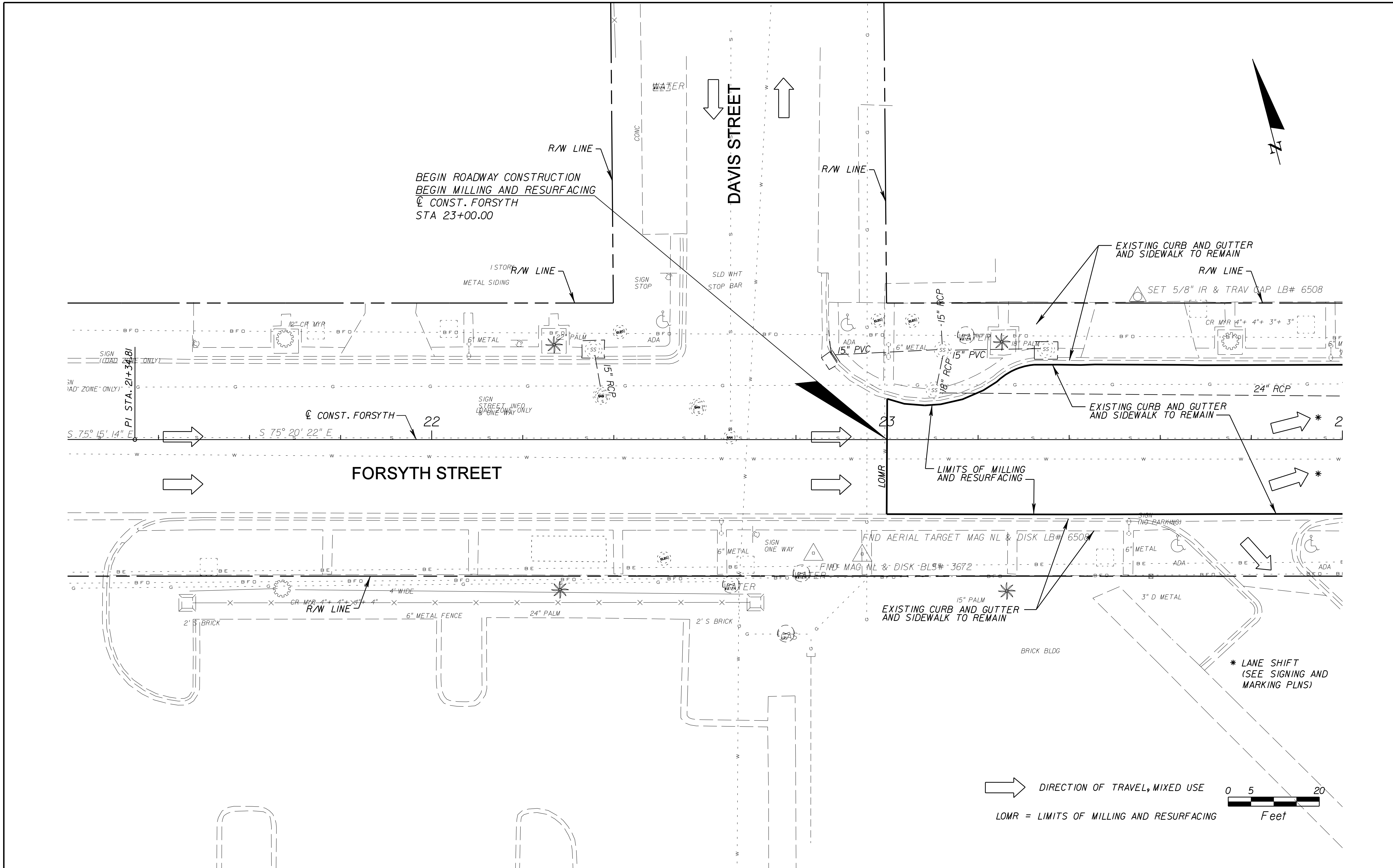
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

TYPICAL SECTION FORSYTH STREET

SHEET NO. 10

$USER$ $DATE$ $TIME$ $FILE$



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: KRISTINA M. PRICE
P.E. NO: 54523

HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213

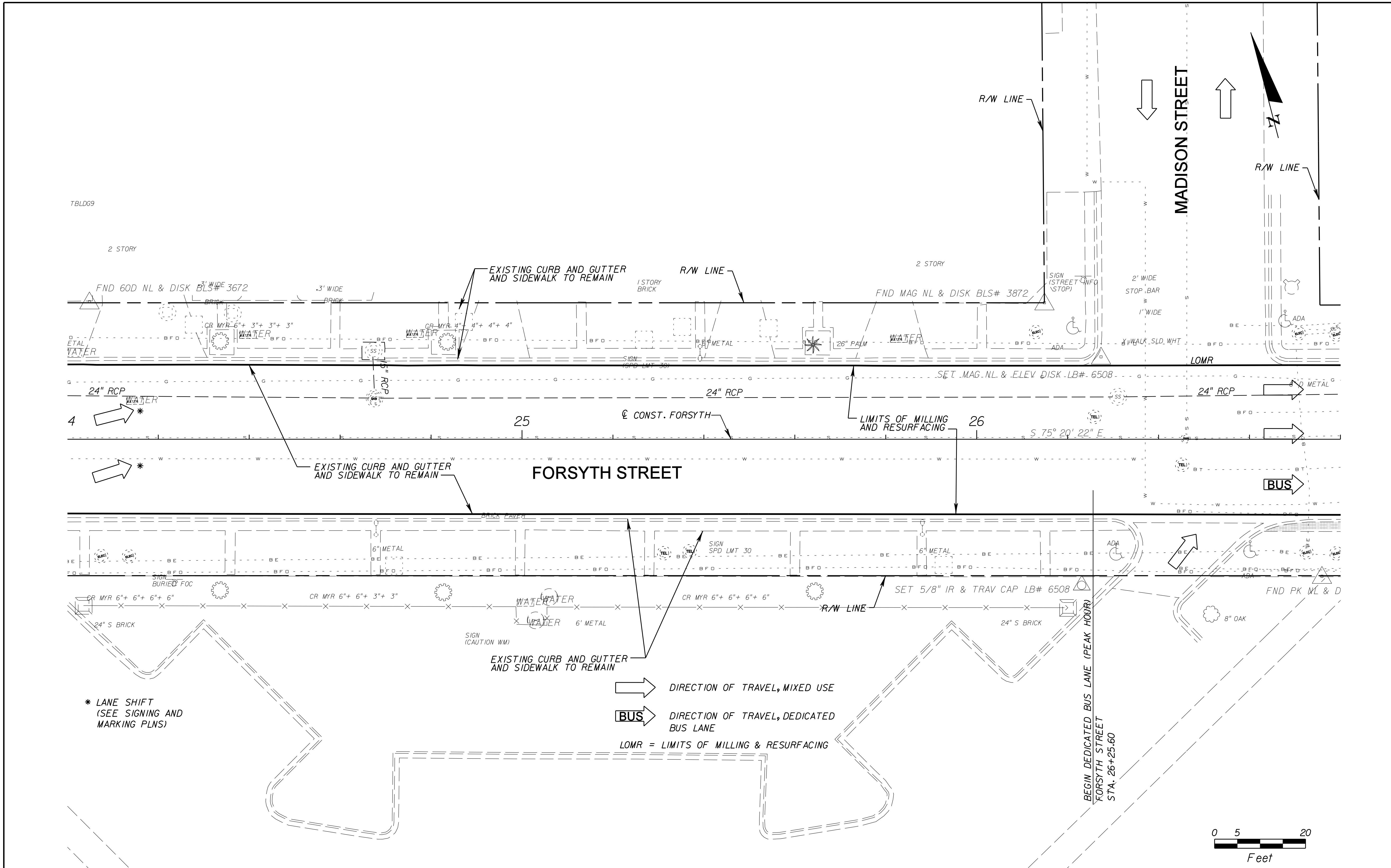
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

PLAN
FORSYTH STREET

SHEET NO. 57

$USER$ $DATE$ $TIME$ $FILE$



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: KRISTINA M. PRICE
P.E. NO: 54523

HDR Employee-owned
HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213

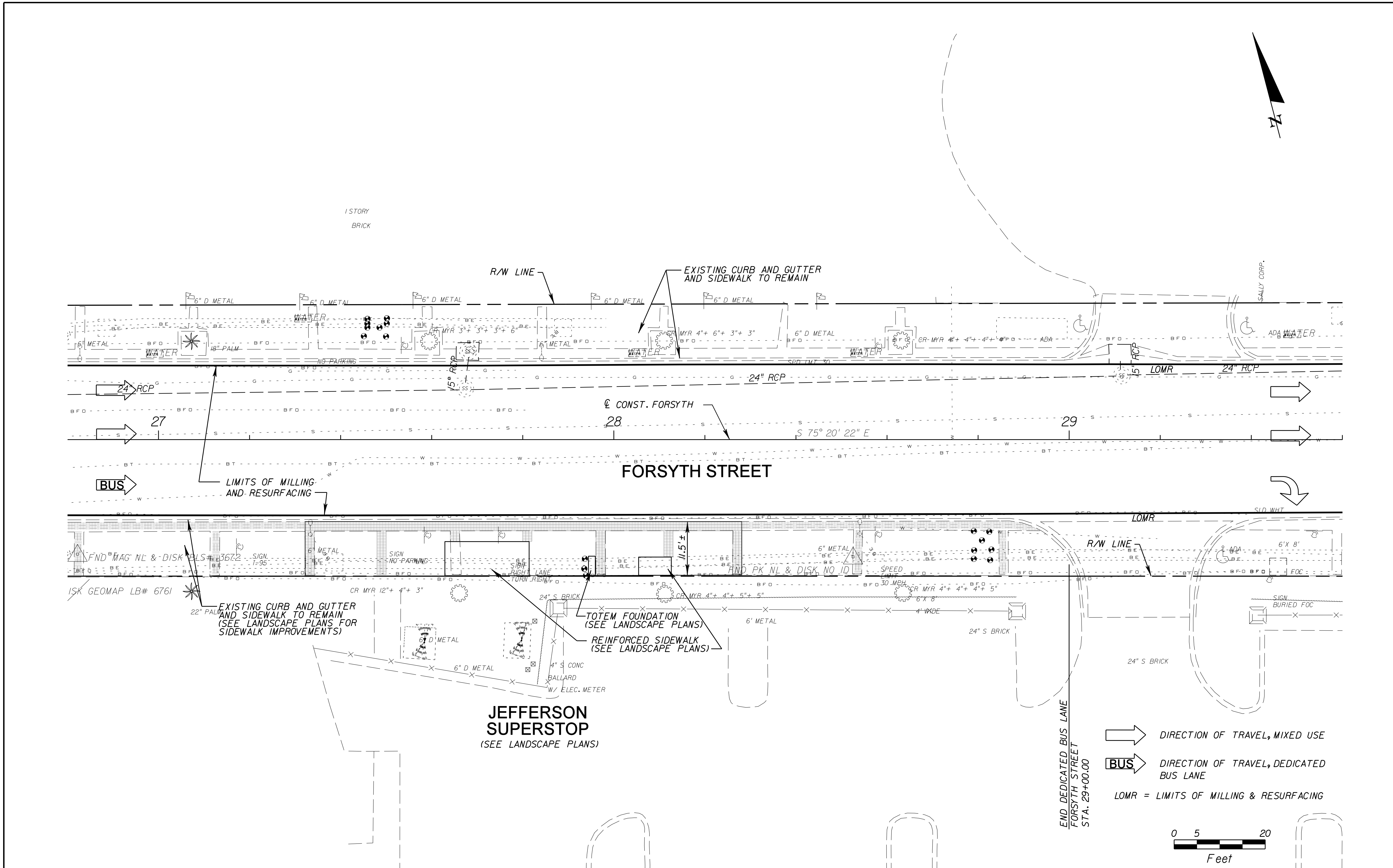
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

PLAN
FORSYTH STREET

SHEET NO. 58

$USER$ $DATE$ $TIME$ $FILE$



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: KRISTINA M. PRICE
P.E. NO: 54523

HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
Jacksonville, FL 32202
(904) 598-8900
www.hdrinc.com
Cert. of Auth. No. 4213
Employee-owned

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

PLAN
FORSYTH STREET

SHEET NO.
59

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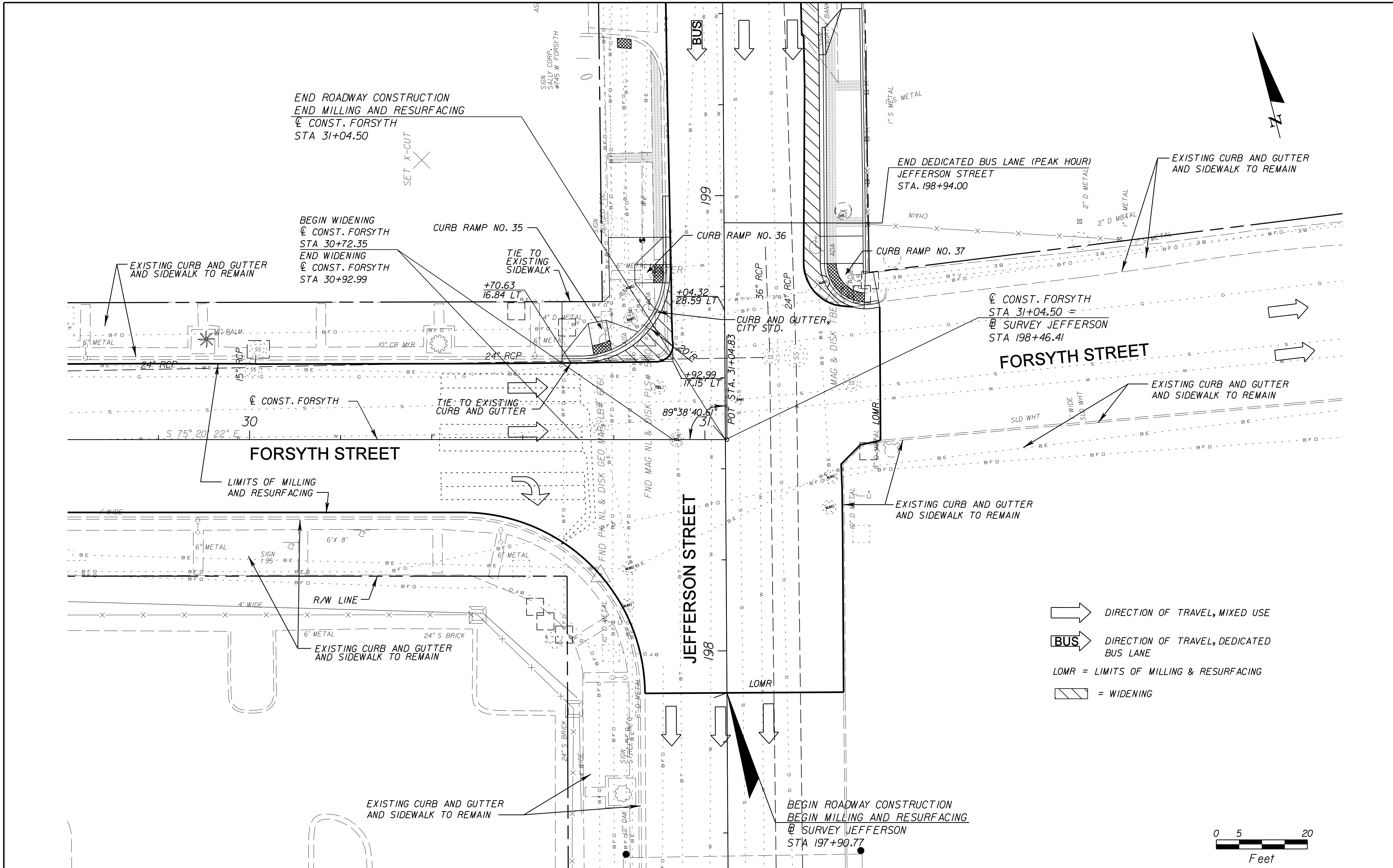

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: KRISTINA M. PRICE
P.E. NO: 54523

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JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

PLAN
FORSYTH STREET

SHEET NO. 60

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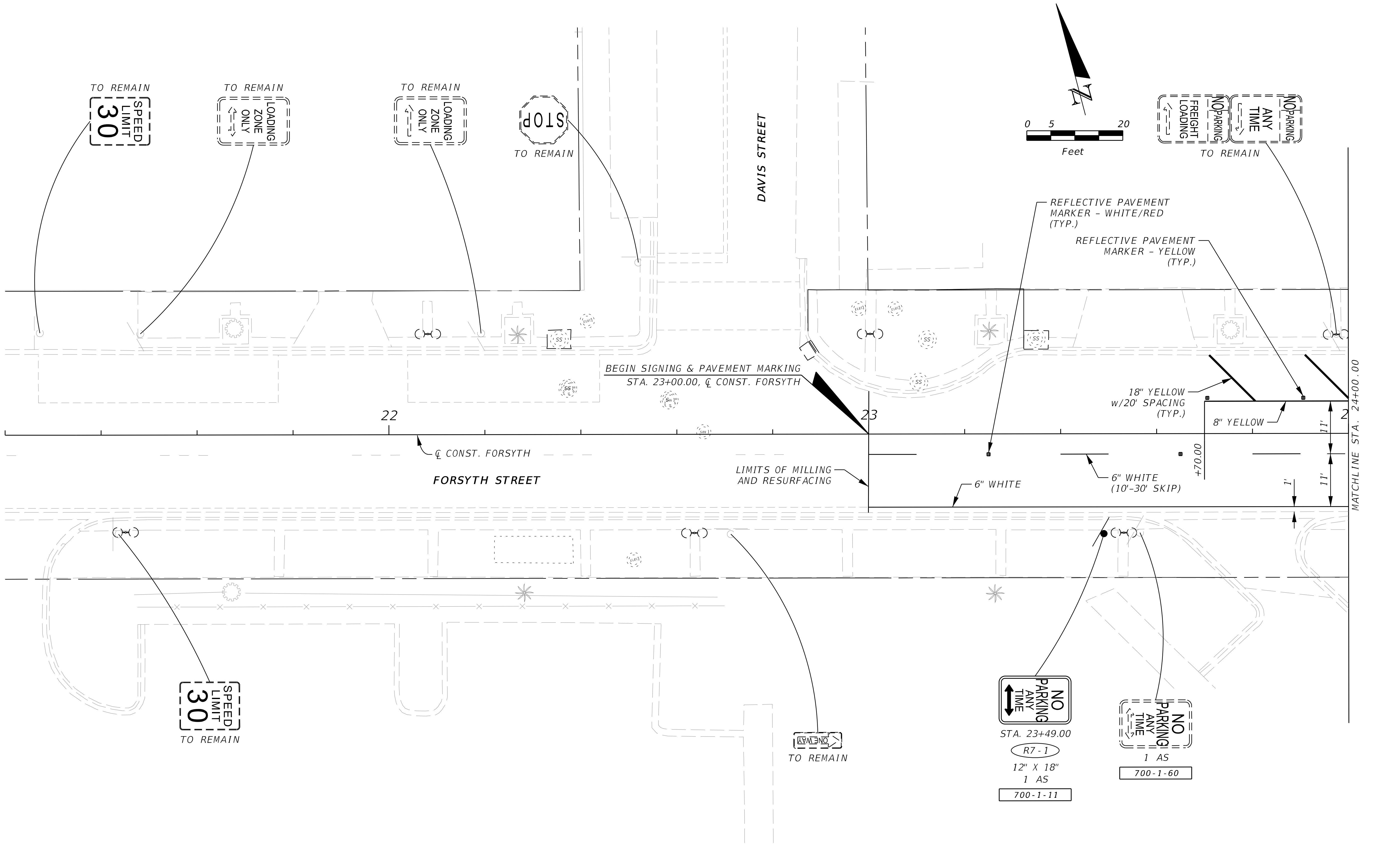

FORSYTH STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131

WAITZ&MOYE
3738 Southside Blvd, Suite 101
Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNING & PAVEMENT MARKING PLAN

SHEET NO.
SP-43

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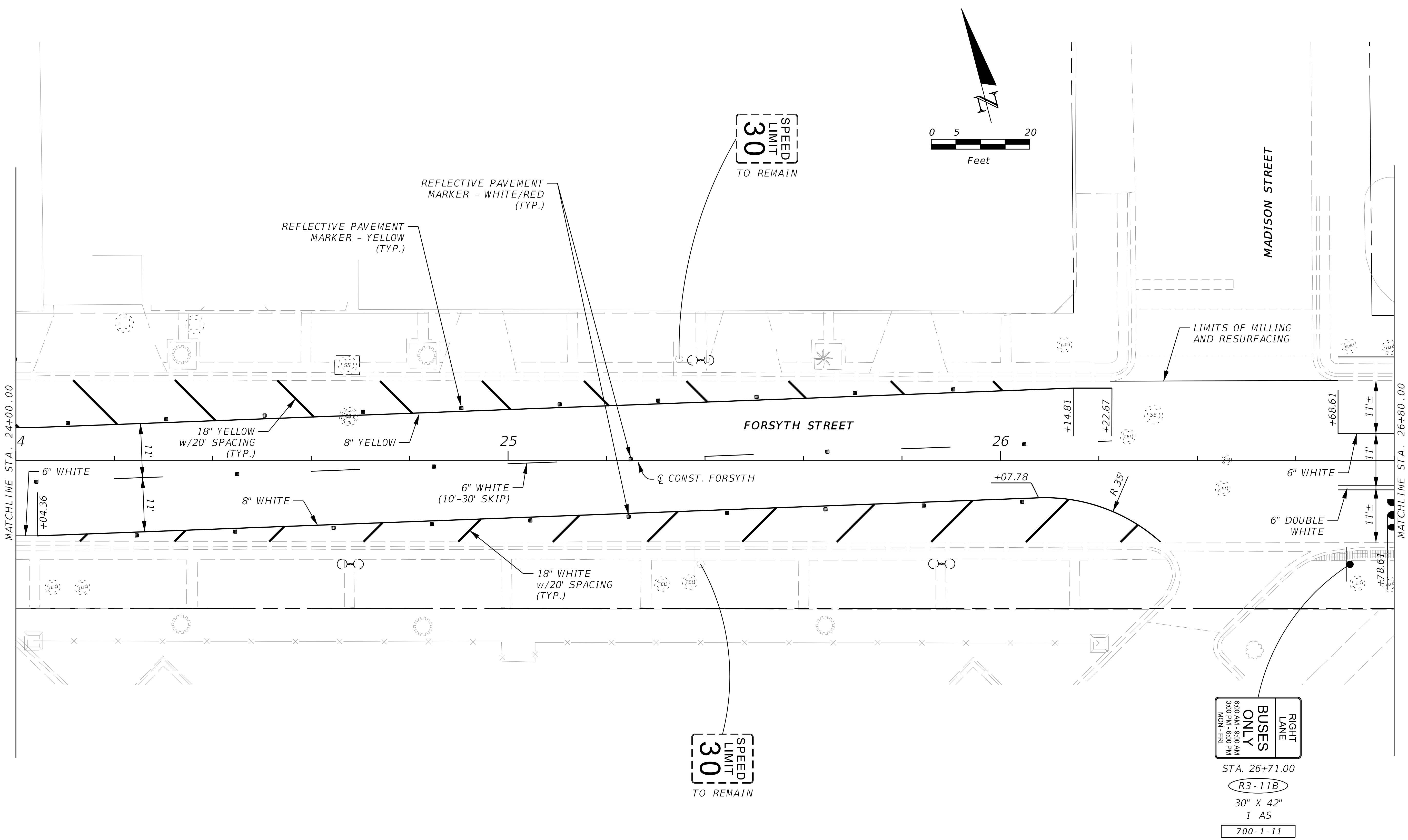

FORSYTH STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131
WAITZ&MOYE
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Jacksonville, Florida 32216
C.A. No. 6234 • 904.642.8311

JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNING & PAVEMENT MARKING PLAN

SHEET NO.
SP-44

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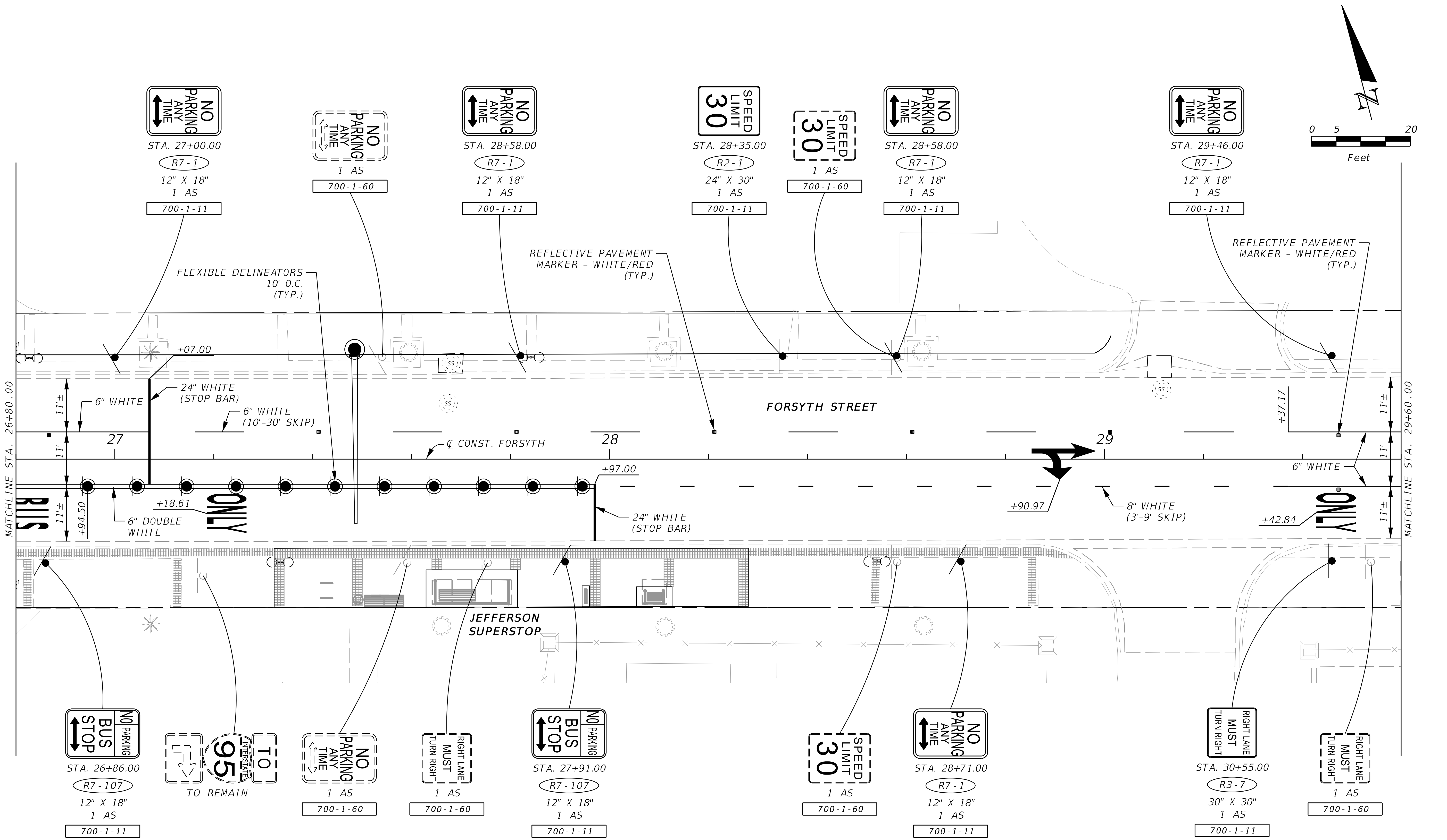

FORSYTH STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131

WAITZ&MOYE
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Jacksonville, Florida 32216
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JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNING & PAVEMENT MARKING PLAN

SHEET NO.
SP-45

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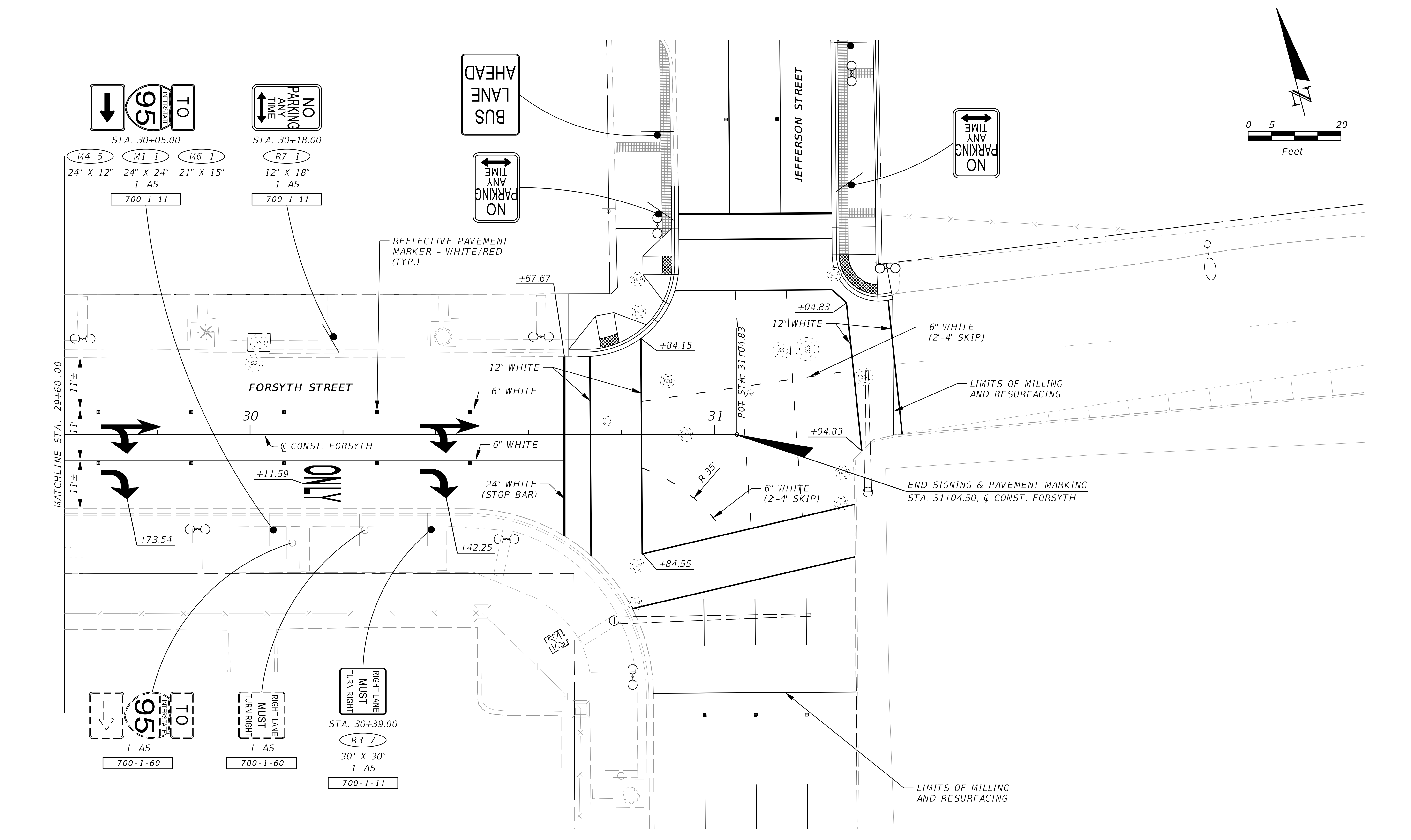

FORSYTH STREET

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
John H. Moye PE License No. 36131
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JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNING & PAVEMENT MARKING PLAN

SHEET NO.
SP-46

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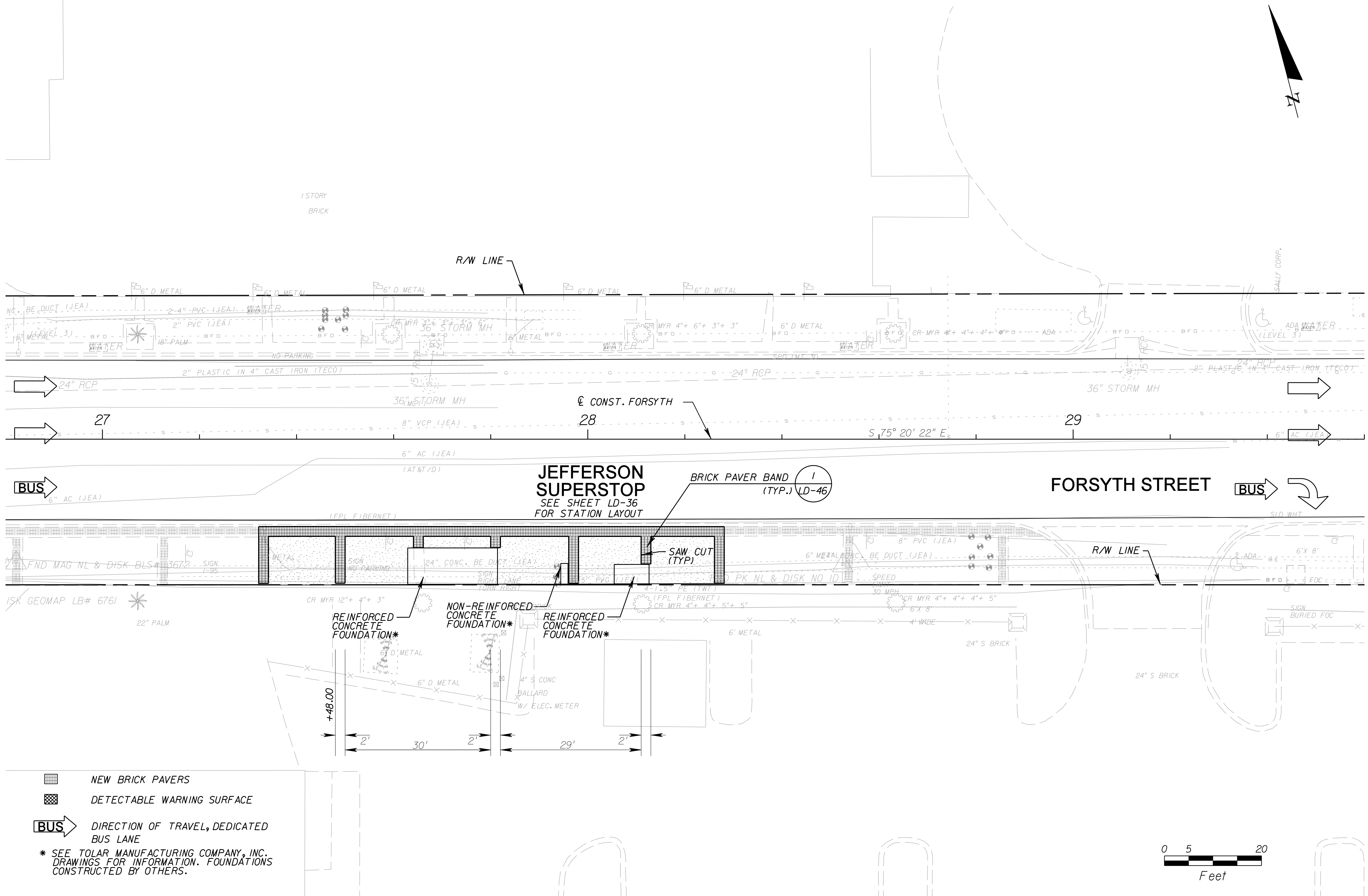

NEW BRICK PAVERS

DETECTABLE WARNING SURFACE

BUS DIRECTION OF TRAVEL, DEDICATED BUS LANE

✱ SEE TOLAR MANUFACTURING COMPANY, INC. DRAWINGS FOR INFORMATION. FOUNDATIONS CONSTRUCTED BY OTHERS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

LANDSCAPE ARCHITECT OF RECORD: CAROL C. WORSHAM R.L.A. NO.: 603

HDR Engineering, Inc.
200 West Forsyth Street, Suite 800
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Employee-owned

JACKSONVILLE TRANSPORTATION AUTHORITY

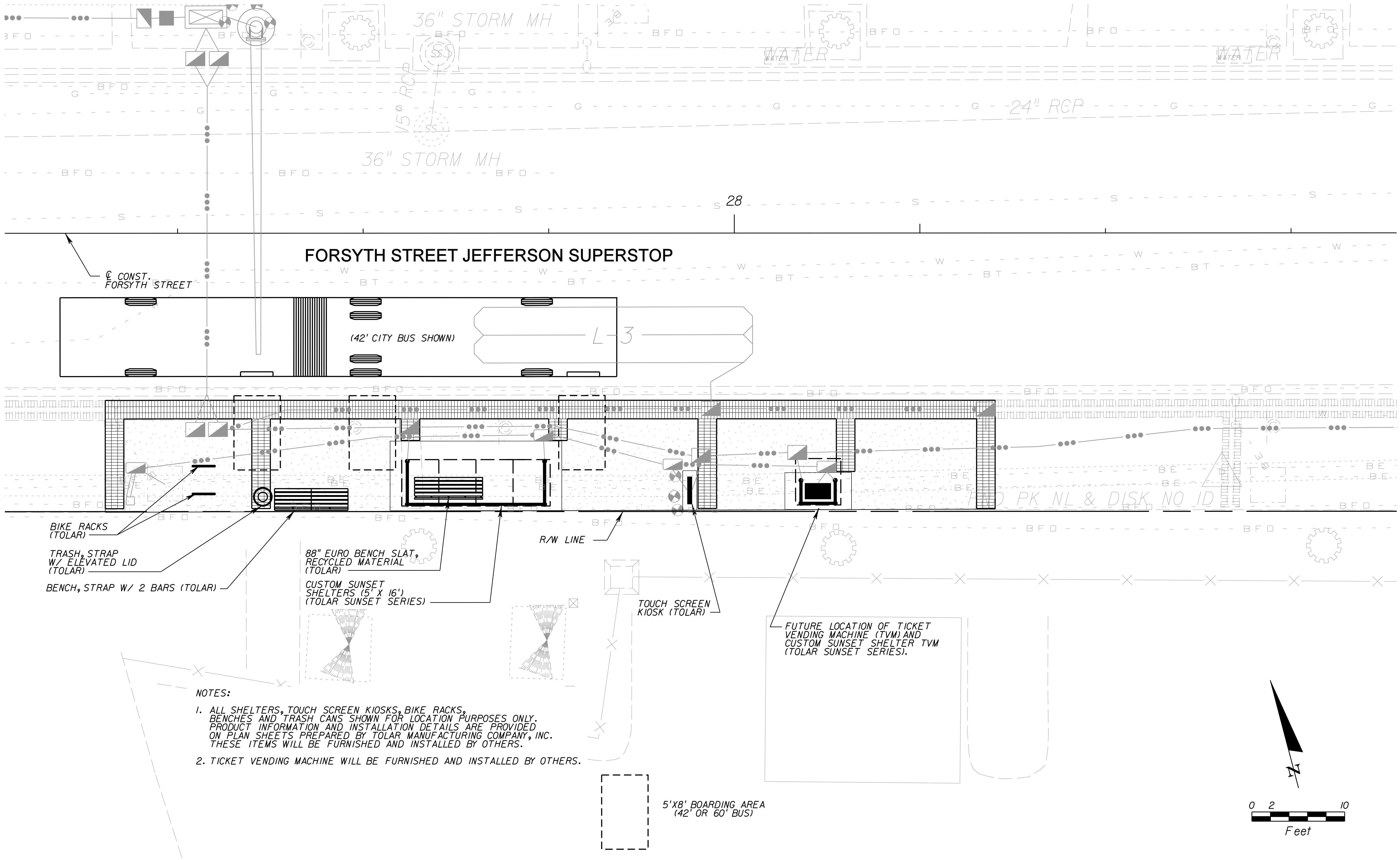
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

LANDSCAPE PLAN FORSYTH STREET

SHEET NO. LD-12

$USER$ $DATE$ $TIME$ $FILE$

FORSYTH STREET JEFFERSON SUPERSTOP



NOTES:

1. ALL SHELTERS, TOUCH SCREEN KIOSKS, BIKE RACKS, BENCHES AND TRASH CANS SHOWN FOR LOCATION PURPOSES ONLY. PRODUCT INFORMATION AND INSTALLATION DETAILS ARE PROVIDED ON PLAN SHEETS PREPARED BY TOLAR MANUFACTURING COMPANY, INC. THESE ITEMS WILL BE FURNISHED AND INSTALLED BY OTHERS.
2. TICKET VENDING MACHINE WILL BE FURNISHED AND INSTALLED BY OTHERS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

LANDSCAPE ARCHITECT OF RECORD: CAROL C. WORSHAM R.L.A. NO.: 603

HDR Employee-owned
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JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

STATION LAYOUT
FORSYTH STREET

SHEET NO. LD-36

$USER$ $DATE$ $TIME$ $FILE$

GENERAL NOTES

1. SEE THE ROADWAY PLANS FOR MAINTENANCE OF TRAFFIC NOTES.

2. ANY DISRUPTION TO THE VEHICULAR DETECTION SYSTEM AT EXISTING SIGNALIZED INTERSECTIONS SHALL BE RE-ACTUATED WITHIN 36 HOURS AFTER INTERRUPTION. THIS INCLUDES FURNISHING AND INSTALLING TEMPORARY LOOP ASSEMBLIES AND/OR OVERHEAD DETECTION DEVICES (THAT ARE APPROVED BY THE PROJECT ENGINEER) AS REQUIRED TO MAINTAIN ALL EXISTING ACTUATED SIGNAL OPERATIONS. IF TEMPORARY LOOPS ARE REQUIRED, THEY SHALL BE THE SAME SIZE AND PLACEMENT AS THE DAMAGED LOOPS.

3. UNLESS OTHERWISE NOTED, ALL REMOVED EQUIPMENT SHALL BE TURNED OVER TO THE CITY OF JACKSONVILLE'S TRAFFIC ENGINEERING DIVISION (904) 387-8967 AS DIRECTED BY THE ENGINEER, EXCEPT POLES, WHICH SHALL BE DISPOSED OF BY THE CONTRACTOR IN AREAS PROVIDED BY HIM.

4. IT SHOULD BE NOTED NO TEST BORINGS WERE MADE WHERE CONDUIT RUNS ARE TO BE INSTALLED BY DIRECTIONAL BORE OR TRENCHING.

5. ALL CONDUIT SHALL BE 2" MINIMUM UNLESS OTHERWISE SPECIFIED IN PLANS.

6. WHEREVER PULL BOXES ARE INSTALLED IN EXISTING SIDEWALK, CONTRACTOR SHALL ENSURE THAT PULL BOXES ARE INSTALLED AT THE SAME ELEVATION AS FINISHED SIDEWALK WITH NO GAP BETWEEN PULL BOXES AND SIDEWALKS. PAYMENT SHALL BE INCLUDED IN ITEM 635-1-11.

7. THE CONTRACTOR SHALL INSTALL A CONDUIT STUB WITH CAP A MINIMUM OF 12 INCHES OUTSIDE THE POLE FOOTING COMPLETE WITH SWEEP UP INTO THE POLE, IN EACH CONDUIT ENTRANCE IN THE POLE. THE FOOTING, TOP OF SIDEWALK, SIDE OF POLE, ETC. SHALL BE MARKED WITH AN APPROPRIATE ETCHED "X" IN ORDER THAT IT MAY BE READILY LOCATED FOR FUTURE USE.

8. SPARE CONDUIT RUNS FROM THE CONTROLLER BASE SHALL BE TERMINATED IN THE NEAREST LOOP LEAD-IN PULL BOX AND SIGNAL CABLE PULL BOX.

9. AS DIRECTED BY THE PROJECT ENGINEER, THE CONTRACTOR SHALL ADJUST CONDUIT & PULL BOXES HORIZONTALLY AND/OR VERTICALLY IN ORDER TO AVOID ANY POSSIBLE CONFLICTS WITH UNDERGROUND UTILITIES.

10. THE CONTRACTOR SHALL ADHERE TO ALL CITY ORDINANCES AND STATE REGULATIONS DURING ALL CONSTRUCTION OPERATIONS.

11. ALL FIELD WIRING SHALL BE NEATLY BUNDLED AND CLEARLY IDENTIFIED WITH PERMANENT, LEGIBLE, WEATHERPROOF TAGS THAT ARE SECURELY ATTACHED TO EACH CABLE. THE TAGGING SYSTEM PROPOSED SHALL BE SUBMITTED FOR APPROVAL WITH THE OTHER EQUIPMENT SUBMITTALS REQUIRED FOR THIS PROJECT.

12. NO OPEN TRENCH WILL BE ALLOWED TO REMAIN AFTER WORK ENDS FOR THE DAY.

13. THE TYPE OF EQUIPMENT USED IN THE INSTALLATION OF MAST ARM / FOUNDATIONS SHALL MEET THE FOLLOWING REQUIREMENTS: 1) OVERHEAD LINE SHALL STAY IN PLACE BOTH VERTICALLY AND HORIZONTALLY 2) CONTRACTOR SHALL MEET ALL APPLICABLE OSHA REQUIREMENTS (10' MINIMUM DISTANCE MAINTAINED BETWEEN THE EQUIPMENT AND THE OVERHEAD FACILITY).

14. SIX FEET OF ADDITIONAL SIGNAL CABLE SLACK SHALL BE WOUND AND SUPPORTED BY THE CABLE CLAMP SUCH THAT THE TERMINAL BLOCK CAN BE REMOVED FROM THE UPRIGHT TO ALLOW FOR TROUBLESHOOTING.

15. CABLE GRIP SHALL BE OF SUFFICIENT SIZE TO NOT COMPROMISE THE INSULATION ON THE SIGNAL CABLE.

16. THESE PLANS REFLECT CONDITIONS KNOWN DURING PLAN DEVELOPMENT. IN THE EVENT ACTUAL PHYSICAL CONDITIONS PREVENT THE APPLICATION OR PROGRESSION OF ANY WORK SPECIFIED IN THESE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY AND PRIOR TO ANY FURTHER WORK ACTIVITY.

17. DUE TO THE CLOSE PROXIMITY OF UNDERGROUND UTILITIES, THE CONTRACTOR SHALL HAND DIG THE FIRST 4' OF ANY POLE/PEDESTAL FOUNDATION.

18. THE CABINET DOOR SHALL OPEN AWAY FROM THE INTERSECTION UNLESS SPECIFIED OTHERWISE.

19. THE CONTROLLER ASSEMBLY BASE SHALL HAVE AN ADJOINING TECH PAD AS WIDE AS THE CABINET BASE; 36" IN DEPTH AND 4" MINIMUM THICKNESS WITH 2" ABOVE GRADE.

20. THE CONTROLLER SHALL REVERT TO TIME BASED COORDINATION UPON DISCONNECTING THE COORDINATING UNIT WHEN VEHICLE DETECTION IS AVAILABLE ON THE NON-COORDINATED APPROACHES.

21. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL SIGNAL POLE AND ROADWAY ELEVATIONS PRIOR TO POLE PLACEMENT.

22. NO POLYCARBONATE HOUSING OR MOUNTING HARDWARE WILL BE PERMITTED FOR VEHICULAR SIGNAL HEAD ASSEMBLIES.

23. CONTRACTOR SHALL PROVIDE A TWO MAN BUCKET TRUCK AND ASSIST THE SIGNAL INSPECTOR IN PHYSICALLY EXAMINING EACH SIGNAL HEAD THE SAME DAY IT IS INSTALLED.

24. RED-LINE AS BUILT PLANS SHALL BE FURNISHED TO THE CITY OF JACKSONVILLE (904) 387-8967 AT THE TIME OF OR BEFORE THE INITIAL TRAFFIC SIGNAL INSPECTION.

25. ALL PULL-BOX COVERS SHALL BE UNBOLTED AT THE TIME OF INITIAL TRAFFIC SIGNAL INSPECTION AND THEN RE-BOLTED BY THE CONTRACTOR AFTER THE INSPECTION PROCESS IS COMPLETED.

26. ALL MAST ARM NUT COVERS SHALL BE REMOVED FOR ANCHOR BOLT/NUT INSPECTION AND THEN RE-INSTALLED BY THE CONTRACTOR AT THE TIME OF INITIAL INSPECTION.

27. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING JEA (STEVE BELLINGER @ 904-655-6583) TO DETERMINE IF A SERVICE PROCESSING FEE IS REQUIRED. IF REQUIRED, PAYMENT SHALL BE INCLUDED IN THE PAY ITEM FOR ELECTRICAL POWER SERVICE.

28. ALL DETECTOR LOOPS OR SYSTEM SENSORS SHALL BE CUT ONTO THE ASPHALTIC CONCRETE STRUCTURAL COURSE WHENEVER POSSIBLE. ALL LOOP LEAD-IN CABLES SHALL BE PLACED IN CONDUIT. LOOP LEAD-IN CABLE SHALL NOT EXIT THE ROADWAY WITHIN THE CORNER RADIUS AT AN INTERSECTION.

29. ALL GROUND RODS FOR THE SIGNAL CABINET AND MAST ARMS MUST BE INSTALLED IN THE CLOSEST RESPECTIVE SIGNAL CABLE PULL BOX TO THE CABINET OR POLE. PEDESTRIAN POLE GROUND RODS MAY BE INSTALLED IN THE POLE FOUNDATION OR CLOSEST SIGNAL CABLE PULL BOX.

30. THE LOCATION(S) OF THE UTILITIES SHOWN IN THE PLANS SHOULD BE CONSIDERED APPROXIMATE ONLY. PRIOR TO DIGGING, THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL UTILITIES.

31. UTILITY CONTACT INFORMATION CAN BE LOCATED ON THE INDIVIDUAL UTILITY SCHEDULE AS SHOWN IN SECTION 7-11.6.3 OF THE FDOT SPECIFICATIONS. THE CONTRACTOR SHALL NOTIFY OWNERS THROUGH SUNSHINE ONE CALL OF FLORIDA, INC. (1-800-432-4770) AND UTILITY OWNERS TWO (2) FULL BUSINESS DAYS IN ADVANCE OF BEGINNING EXCAVATION.

32. THE CONTRACTOR SHALL NOTIFY CITY OF JACKSONVILLE TRAFFIC ENGINEERING DEPARTMENT AT (904) 387-8967 AT LEAST FIVE BUSINESS DAYS BEFORE BEGINNING WORK AND AT LEAST TWO BUSINESS DAYS PRIOR TO LOOP CUTTING SO THE CITY MAY OBSERVE THEIR INSTALLATION.

UTILITY:	CONTACT:	CONTACT #:
AT&T FLORIDA	JOGIE MARQUEZ	904-727-1542
AT&T CORPORATION	SUNIL PARRAY	352-331-9294
AT&T LNS	JIM PICARELLI	904-545-8541
CITY OF JACKSONVILLE TRAFFIC	TERRY SANDEEN	904-255-7553
COMCAST	JAMES GRAHAM	904-380-6341
DEDICATED FIBER SYSTEMS	JERED BEARDEN	904-264-3036
FPL FIBERNET	BILL MOORE	904-355-9742
JACKSONVILLE TRANSPORTATION AUTHORITY	VAN DYKE WALKER	904-633-8518
JEA - ELECTRIC	STEVE BELANGER	904-665-6583
JEA - FIBER	KENNEY WATSON	904-591-2252
JEA - WATER & SEWER	WAYNE MCDOWELL	904-665-8054
LEVEL 3	JAMES DAVIS	904-813-2063
MCI (VERIZON)	JOHN MCNEIL	863-965-6438
QWEST	JERRY NESMITH	918-640-5964
SUNSHINE ONE CALL OF FLORIDA	-	800-432-4770
TECO PEOPLES GAS	DONNA SPOHN	904-443-7316
TW TELECOM	WES PARSONS	904-394-2202

PAY ITEM NOTES:

1. 632-7-1 TO INCLUDES THE ADDITIONAL SLACK CABLE STORED IN THE UPRIGHT.

2. 635-2-11 UNLESS SPECIFIED OTHERWISE,, ALL PULL BOXES TO BE FURNISHED AND INSTALLED SHALL BE FDOT APPROVED OF NON-METALLIC CONSTRUCTION WITH RECESSED COVER LOGO "TRAFFIC SIGNALS".

3. 650-1-311 INCLUDES FURNISH AND INSTALLATION OF TRANSIT SIGNAL ASSEMBLY.

4. 670-5-132 INCLUDES A NAZTEC ATC CONTROLLER AND SHALL BE FULLY COMPATIBLE WITH THE CITY OF JACKSONVILLE SIGNAL SYSTEM OR APPROVED EQUAL, SEE TSP FOR ADDITIONAL INFORMATION.

5. 670-5-410 INCLUDES ADDING ADDITIONAL CONDUITS TO THE EXISTING CABINET BASE. THE CONTRACTOR SHALL DETERMINE THE NUMBER AND SIZE OF CONDUITS REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING THE CABINET EQUIPMENT AND WIRING FROM INITIAL AS WELL AS RESIDUAL DAMAGE. THE EXISTING CABINET SUBSOIL MUST BE COMPACTED AS TO PROHIBIT ANY SETTLING OR CRACKING OF THE FOUNDATION IF THE BASE IS UNDERMINED. IN THE EVENT THE CABINET BASE, EQUIPMENT OR WIRING FAILS OR BEGINS TO OPERATE ERRATICALLY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY ITEMS AT NO ADDITIONAL COST IN KIND FOR A COMPLETE AND OPERATIONAL SYSTEM. CORING INTO THE SIDE OF THE BASE OR CABINET IS NOT ALLOWED.

6. 690-20 INCLUDES REMOVAL OF PEDESTAL FOUNDATION, BASE, CONDUIT, ANCHOR BOLTS AND ALSO INCLUDES SIDEWALK RESTORATION WHERE APPLICABLE.

6. 700-3-602 INCLUDES REMOVAL OF EXISTING OVERHEAD STREET NAME SIGN PANEL(S) AND HARDWARE FROM SIGNAL POLE MAST ARMS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: RICHARD ATTA-ARMAH
P.E. NO: 57961

HDR
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HDR Engineering, Inc.
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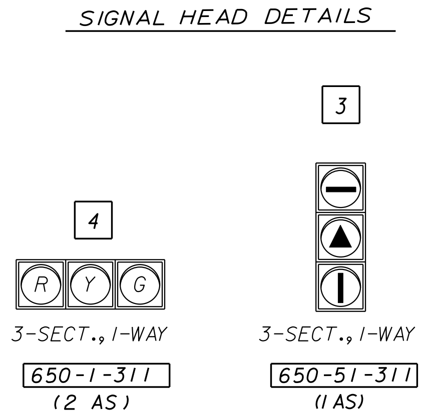
www.hdrinc.com
Cert. of Auth. No. 4213

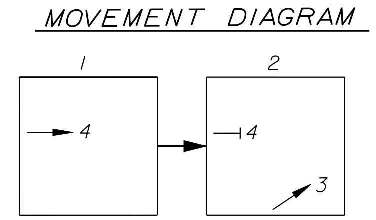
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

GENERAL NOTES

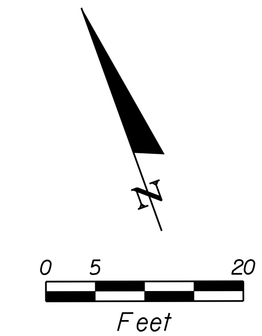
SHEET NO. T-4

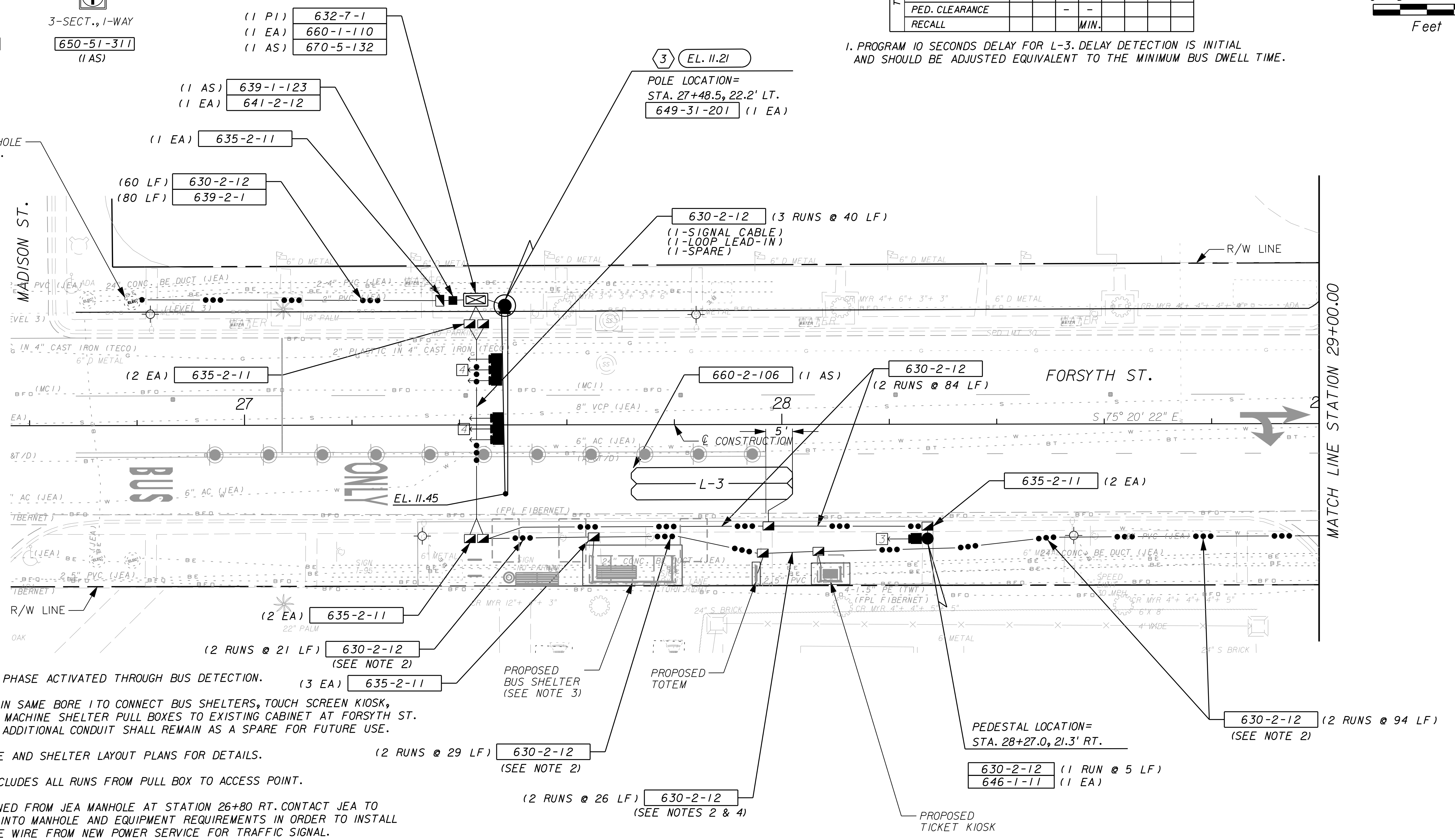




CONTROLLER TIMINGS								
TIMING FUNCTION								
MOVEMENT NUMBER	1	2	3	4	5	6	7	8
MINIMUM GREEN			7	20				
EXTENSION			3	3				
MAXIMUM GREEN 1			20	50				
MAXIMUM GREEN 2			-	-				
YELLOW CLEARANCE			3.7	3.7				
ALL RED			2	2				
PEDESTRIAN WALK			-	-				
PED. CLEARANCE			-	-				
RECALL				MIN.				

1. PROGRAM 10 SECONDS DELAY FOR L-3. DELAY DETECTION IS INITIAL AND SHOULD BE ADJUSTED EQUIVALENT TO THE MINIMUM BUS DWELL TIME.





NOTES:

1. PHASE 3 IS A DUMMY PHASE ACTIVATED THROUGH BUS DETECTION.
2. INSTALL 2 CONDUITS IN SAME BORE I TO CONNECT BUS SHELTERS, TOUCH SCREEN KIOSK, AND TICKET VENDING MACHINE SHELTER PULL BOXES TO EXISTING CABINET AT FORSYTH ST. AND JEFFERSON ST. ADDITIONAL CONDUIT SHALL REMAIN AS A SPARE FOR FUTURE USE.
3. REFER TO LANDSCAPE AND SHELTER LAYOUT PLANS FOR DETAILS.
4. CONDUIT QUANTITY INCLUDES ALL RUNS FROM PULL BOX TO ACCESS POINT.
5. POWER TO BE OBTAINED FROM JEA MANHOLE AT STATION 26+80 RT. CONTACT JEA TO COORDINATE ACCESS INTO MANHOLE AND EQUIPMENT REQUIREMENTS IN ORDER TO INSTALL CONDUIT AND SERVICE WIRE FROM NEW POWER SERVICE FOR TRAFFIC SIGNAL. JEA CONTACT IS STEVE BELANGER AT 904-665-6583.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: RICHARD ATTA-ARMAH
P.E. NO: 57961
HDR Engineering, Inc.
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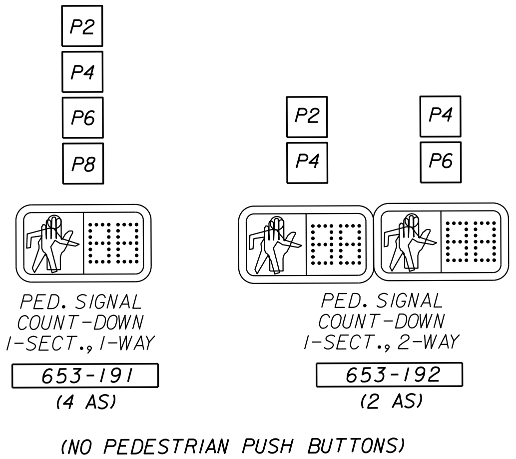
JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNALIZATION PLAN FORSYTH ST. AT JEFFERSON SUPERSTOP

SHEET NO. T-19

PEDESTRIAN HEAD DETAILS

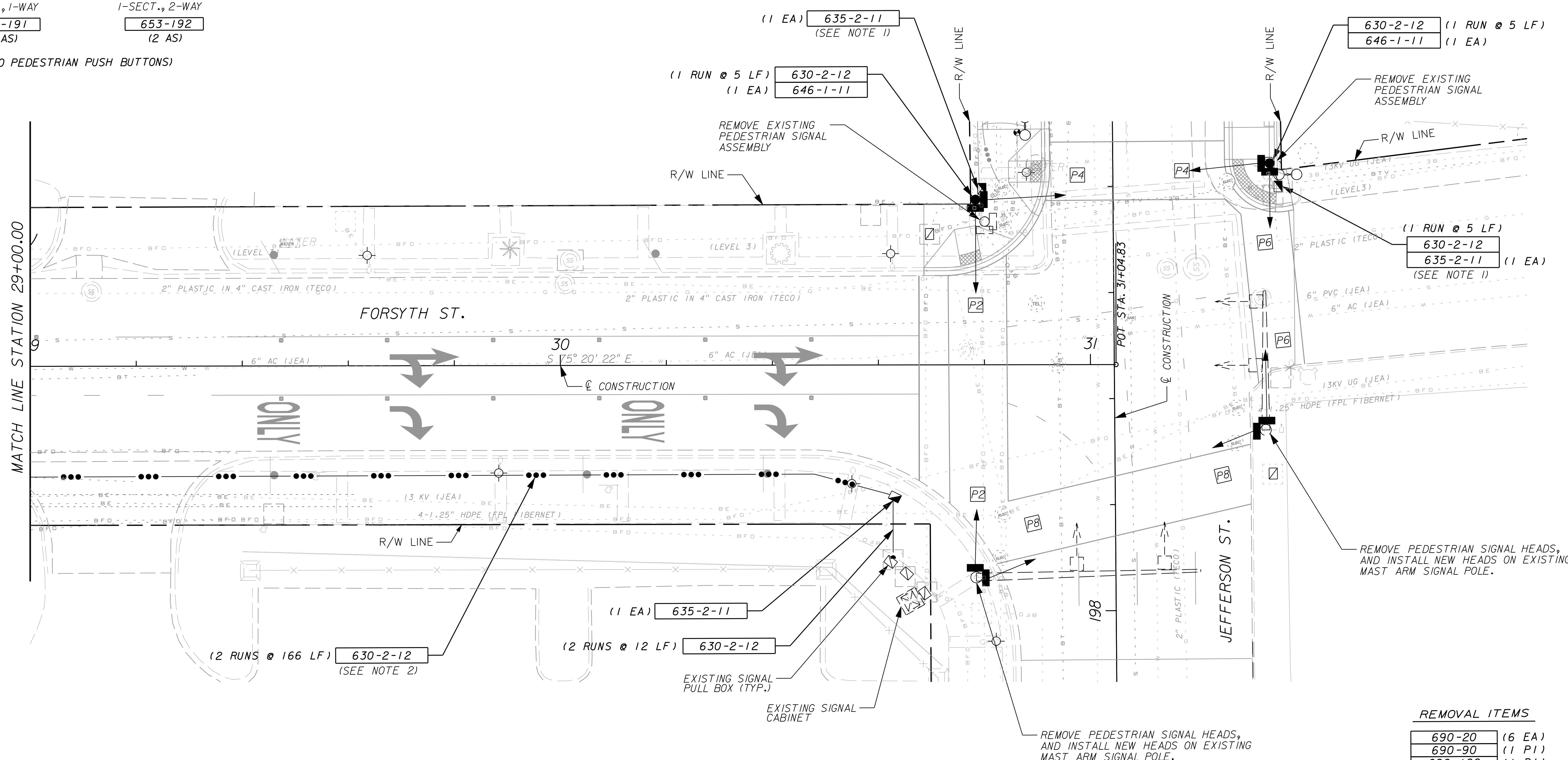


CONTROLLER OPERATIONS:

1. MAINTAIN EXISTING CONTROLLER SETTINGS AND TIMINGS.

NOTES:

1. REMOVE EXISTING PULL BOX AND INSTALL NEW PULL BOX TO MATCH PROPOSED FINISHED GRADE.
2. INSTALL 2 CONDUITS IN SAME BORE 1 TO CONNECT BUS SHELTERS, TOTEM AND TICKET KIOSK PULL BOXES TO AS SHOWN ON SHEET T-19. REMAINING CONDUIT SHALL BE USED AS A SPARE, FOR FUTURE USE.



REMOVAL ITEMS

690-20	(6 EA)
690-90	(1 PI)
690-100	(1 PI)

REVISIONS

DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD: RICHARD ATTA-ARMAH
P.E. NO: 57961

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JACKSONVILLE TRANSPORTATION AUTHORITY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	DUVAL	430036-1-94-01

SIGNALIZATION PLAN JEFFERSON ST. AT FORSYTH ST.

SHEET NO. T-20

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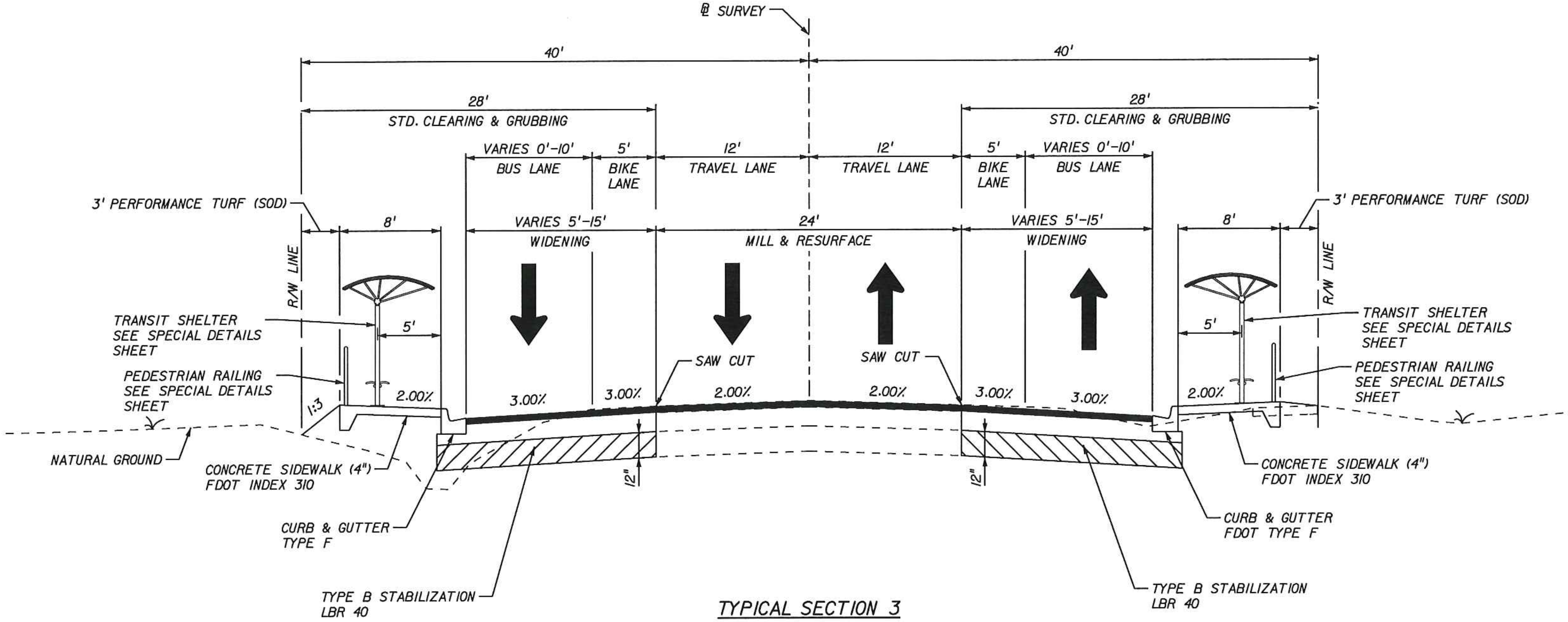
APPENDIX 3

REGIONAL TRANSIT SYSTEM (RTS)
GAINESVILLE SMART BUS BAY
SMART BUS BAY



TYPICAL SECTION 3
SW 20TH AVENUE
STA. 181+90.00 TO STA. 184+90.00
DESIGN SPEED = 35 MPH

MILLING

MILL EXISTING ASPHALT PAVEMENT (1.50" AVG. DEPTH)

RESURFACING

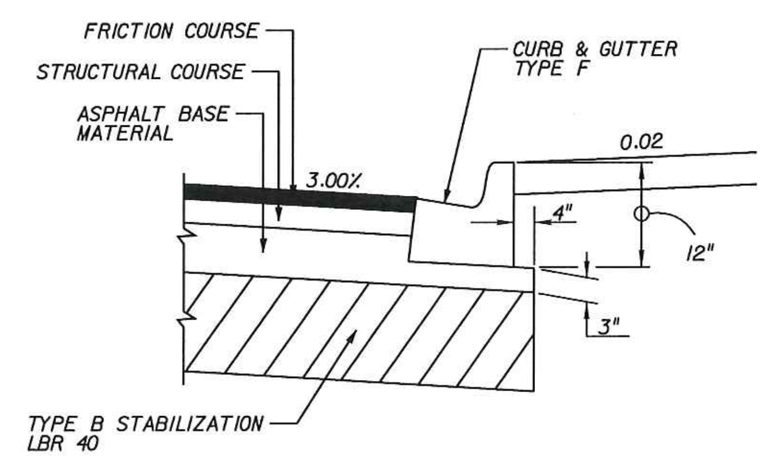
FRICTION COURSE FC-12.5 (TRAFFIC C, PG 76-22) (1.50")

WIDENING

OPTIONAL BASE GROUP 9 (TYPE B-12.5 ONLY) (6.00") WITH TYPE SP-12.5 STRUCTURAL COURSE (TRAFFIC C, PG 76-22) (3.00") AND FRICTION COURSE FC-12.5 (TRAFFIC C, PG 76-22) (1.50")

TRAFFIC DATA

CURRENT YEAR = 2008 AADT = 26,700
ESTIMATED OPENING YEAR = 2010 AADT = 27,800
ESTIMATED DESIGN YEAR = 2035 AADT = 41,300
K = 9.5% D = 60% T = 2% (24 HOUR)
DESIGN HOUR T = 1%
DESIGN SPEED = 35 MPH



DETAIL OF ASPHALT BASE CURB PAD

TERREL SHAW, P.E. LICENSE No. 50096 STATE OF FLORIDA PROFESSIONAL ENGINEER

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
TERREL SHAW, P.E.
LIC. No. 50096
HNTB
7077 BONNEVAL ROAD, SUITE 600
LIBERTY CENTER
JACKSONVILLE, FLORIDA 32216
PHONE: (904) 296-0207
CA NO.: 6500

ALACHUA COUNTY
PUBLIC WORKS DEPARTMENT

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	ALACHUA	211365-5-58

TYPICAL SECTION

SHEET NO. 7

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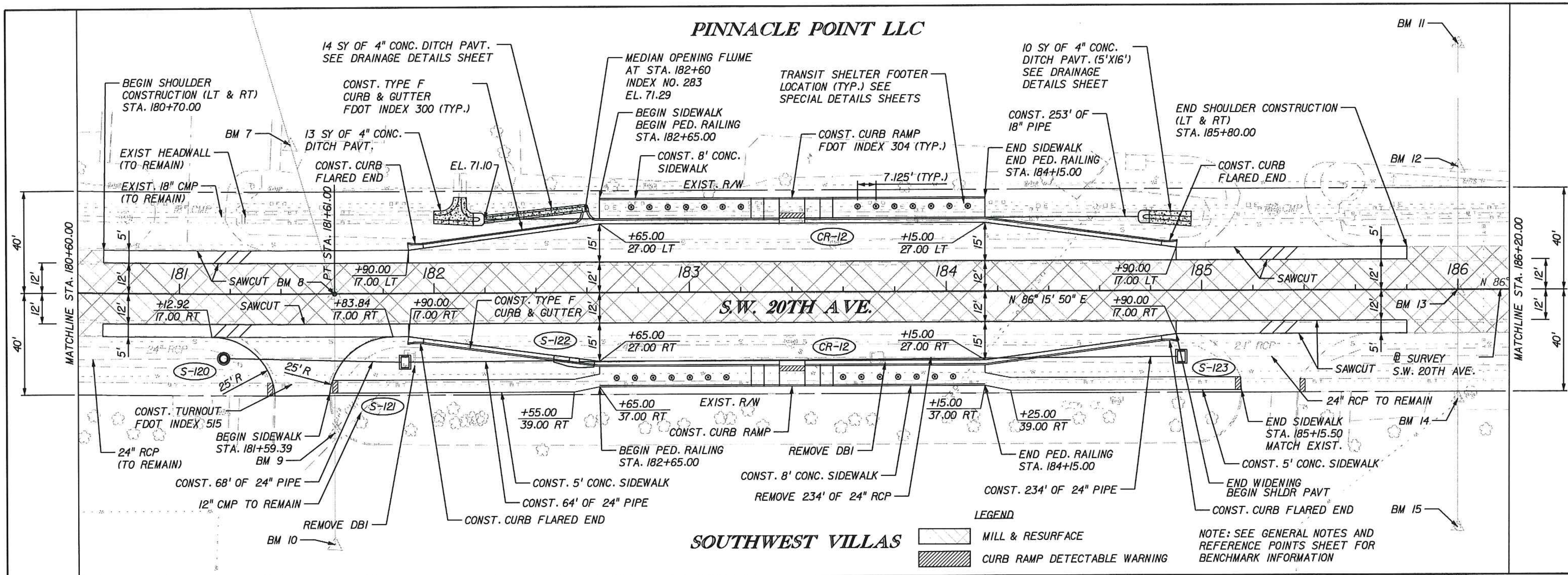

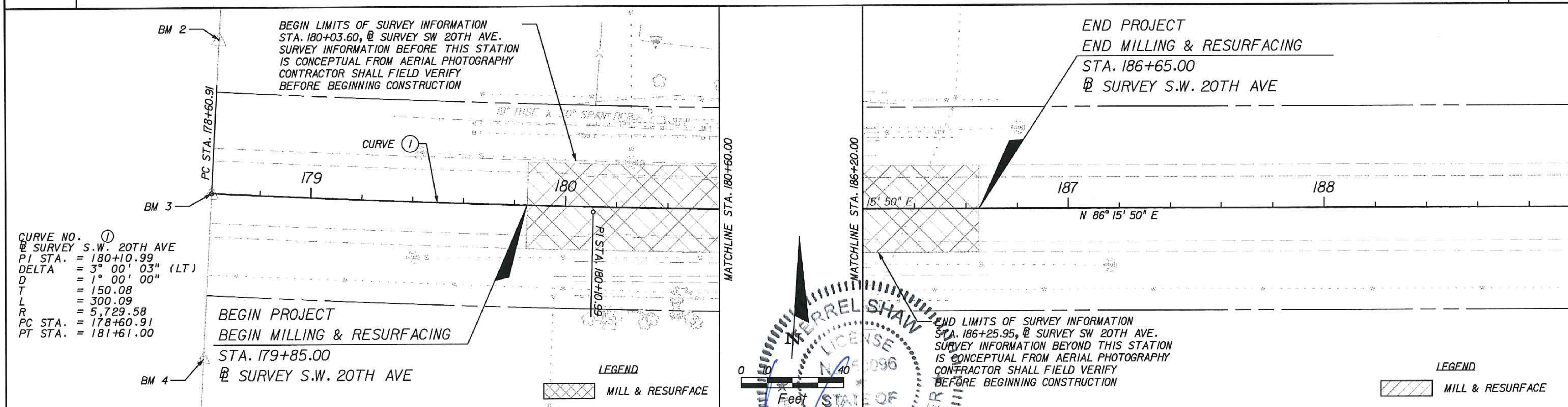

REVISIONS			
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ALACHUA COUNTY
PUBLIC WORKS DEPARTMENT

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	ALACHUA	211365-5-58

ROADWAY PLAN

SHEET NO. 12

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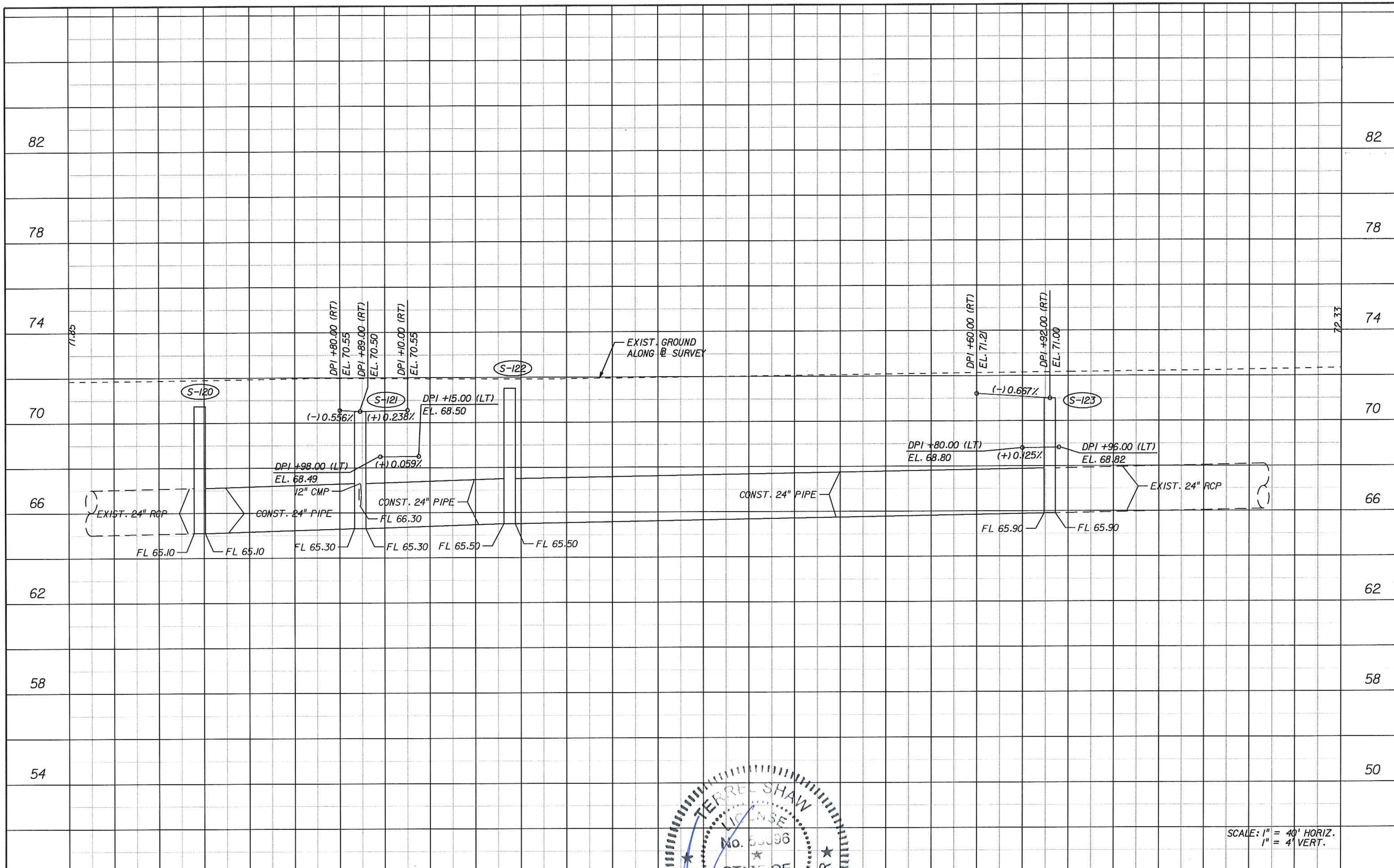

REVISIONS			
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ENGINEER OF RECORD:
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TERREL SHAW LICENSE No. 50096 STATE OF FLORIDA PROFESSIONAL ENGINEER

ALACHUA COUNTY
PUBLIC WORKS DEPARTMENT

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	ALACHUA	211365-5-58

ROADWAY PROFILE

SHEET NO. 13

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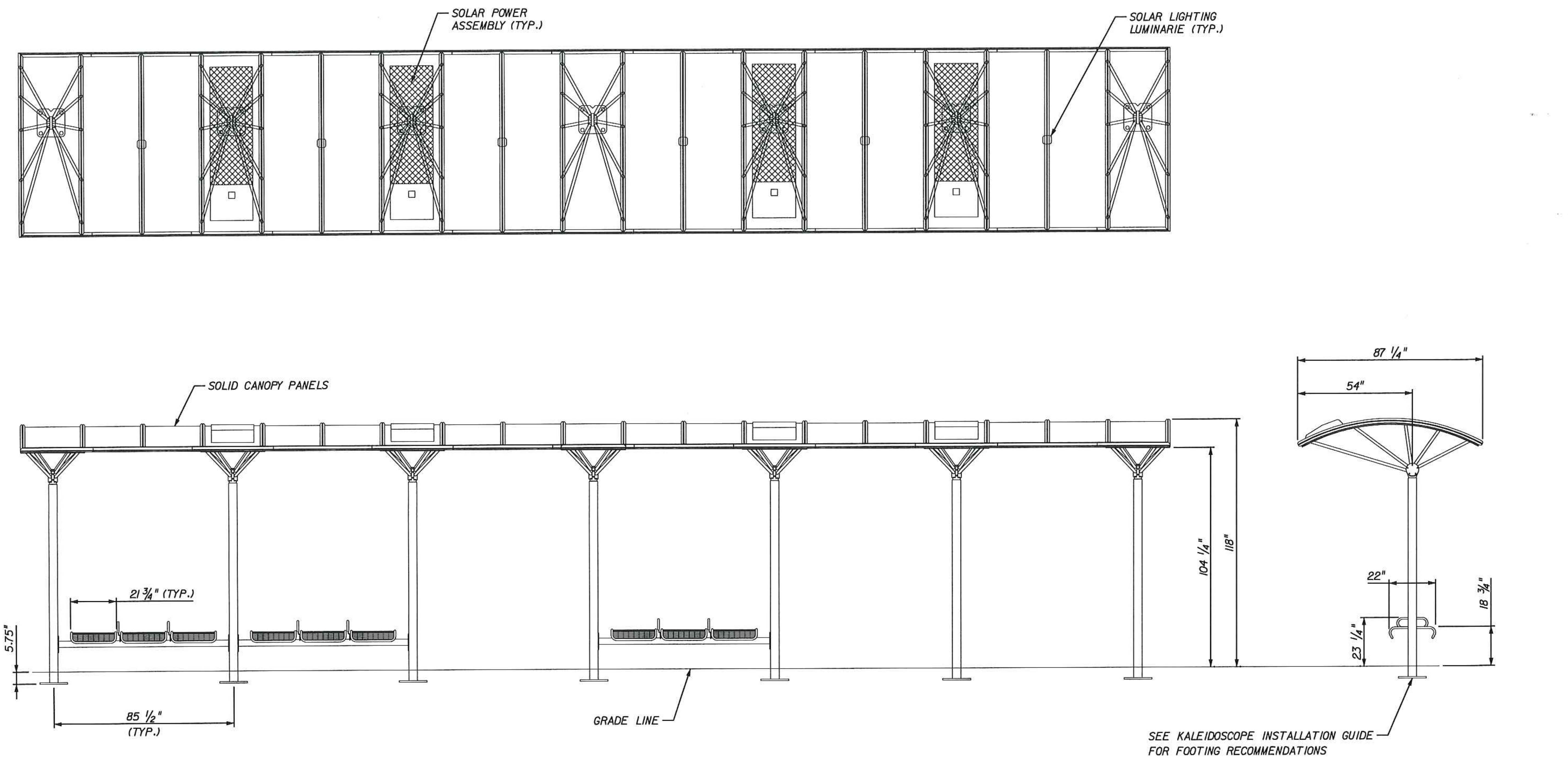

landscapeforms
431 LAWNDALE AVE. PHONE: 800-521-2546
KALAMAZOO, MI 49048 FAX: 269-381-3455

TITLE: KALEIDOSCOPE 4 POST OFFSET SOLID CANOPY & PLEXUS BACKLESS SEATING ALL BAYS, INTERMEDIATE ARMS WITH SOLAR POWERED LIGHTING
DESIGN: KALEIDOSCOPE
PATENT: D432,665; D420,812; D421,132; D429,000; D412,993; D413,314
KA749-06
DATE: 01-12-07
AUTHOR: GLS

TERREL SHAW LICENSE No. 50096 STATE OF FLORIDA PROFESSIONAL ENGINEER

NOTE:
DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR ILLUSTRATION PURPOSES ONLY. FINAL DESIGN OF THE TRANSIT SHELTERS SHALL BE PERFORMED BY THE CONTRACTOR.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
TERREL SHAW, P.E.
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ALACHUA COUNTY
PUBLIC WORKS DEPARTMENT

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	ALACHUA	211365-5-58

SPECIAL DETAILS

SHEET NO. 14

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5	183+05.87	33.50 LT
6	183+13.00	33.50 LT
7	183+20.12	33.50 LT

#	STATION	OFFSET
8	183+65.62	33.50 LT
9	183+72.75	33.50 LT
10	183+79.87	33.50 LT
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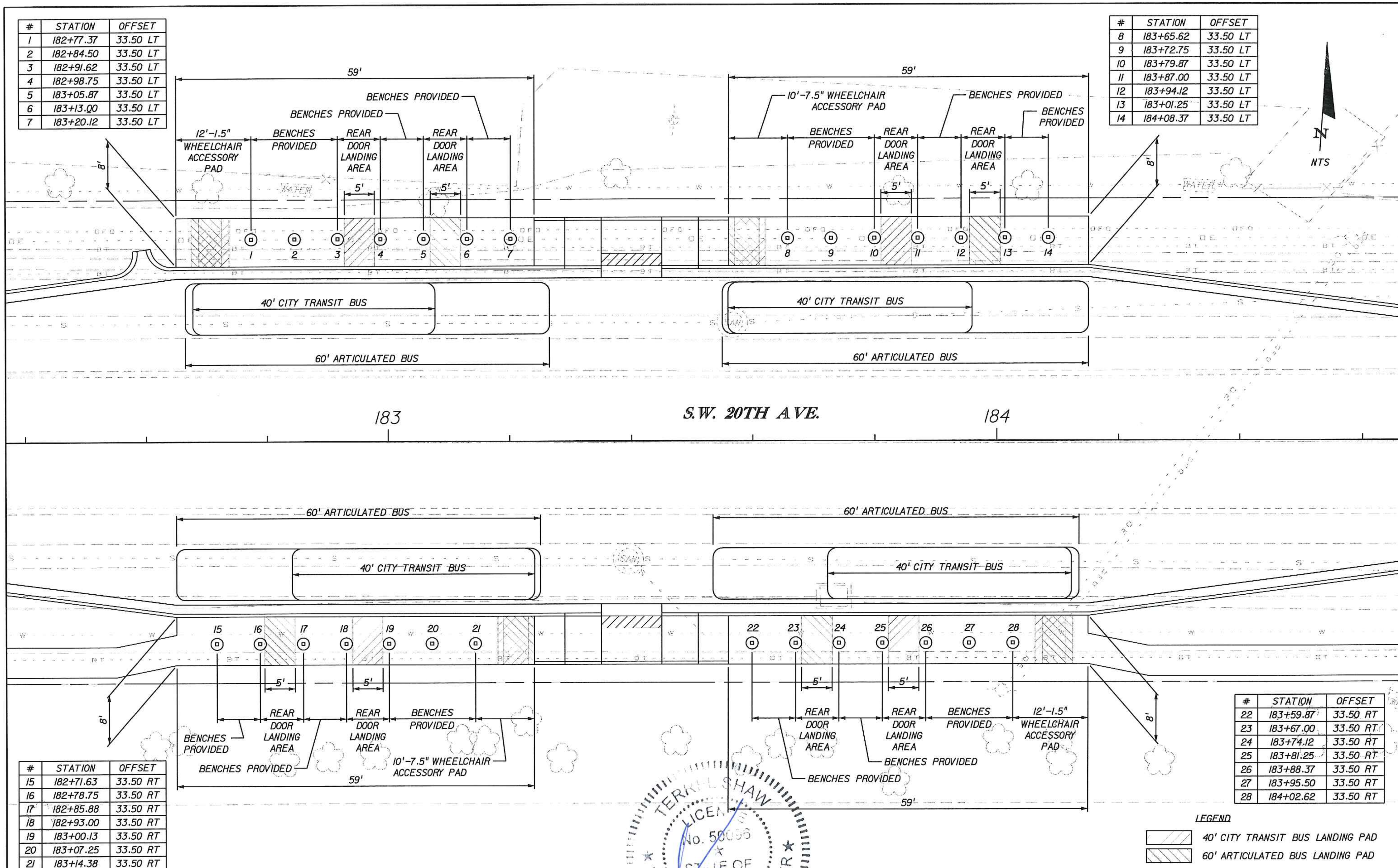

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19	183+00.13	33.50 RT
20	183+07.25	33.50 RT
21	183+14.38	33.50 RT

#	STATION	OFFSET
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23	183+67.00	33.50 RT
24	183+74.12	33.50 RT
25	183+81.25	33.50 RT
26	183+88.37	33.50 RT
27	183+95.50	33.50 RT
28	184+02.62	33.50 RT

REVISIONS

DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
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TERREL SHAW LICENSE No. 50096 STATE OF FLORIDA PROFESSIONAL ENGINEER

ALACHUA COUNTY
PUBLIC WORKS DEPARTMENT

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	ALACHUA	211365-5-58

SPECIAL DETAILS

SHEET NO. 18

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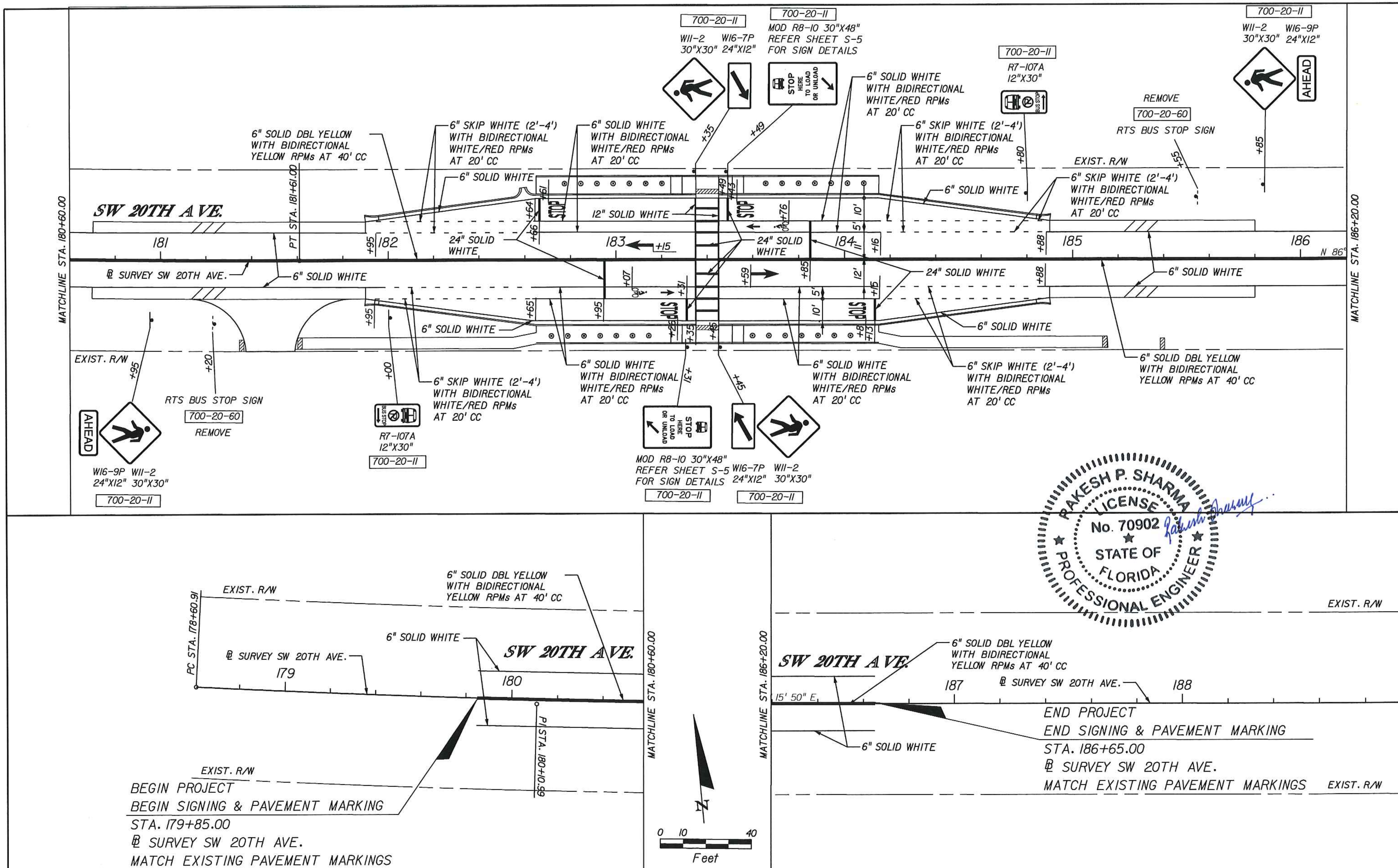

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
RAKESH P. SHARMA, P.E.
LIC. No. 70902
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ALACHUA COUNTY
PUBLIC WORKS DEPARTMENT

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	ALACHUA	211365-5-58

SIGNING & PAVEMENT MARKING PLAN

SHEET NO. S-4

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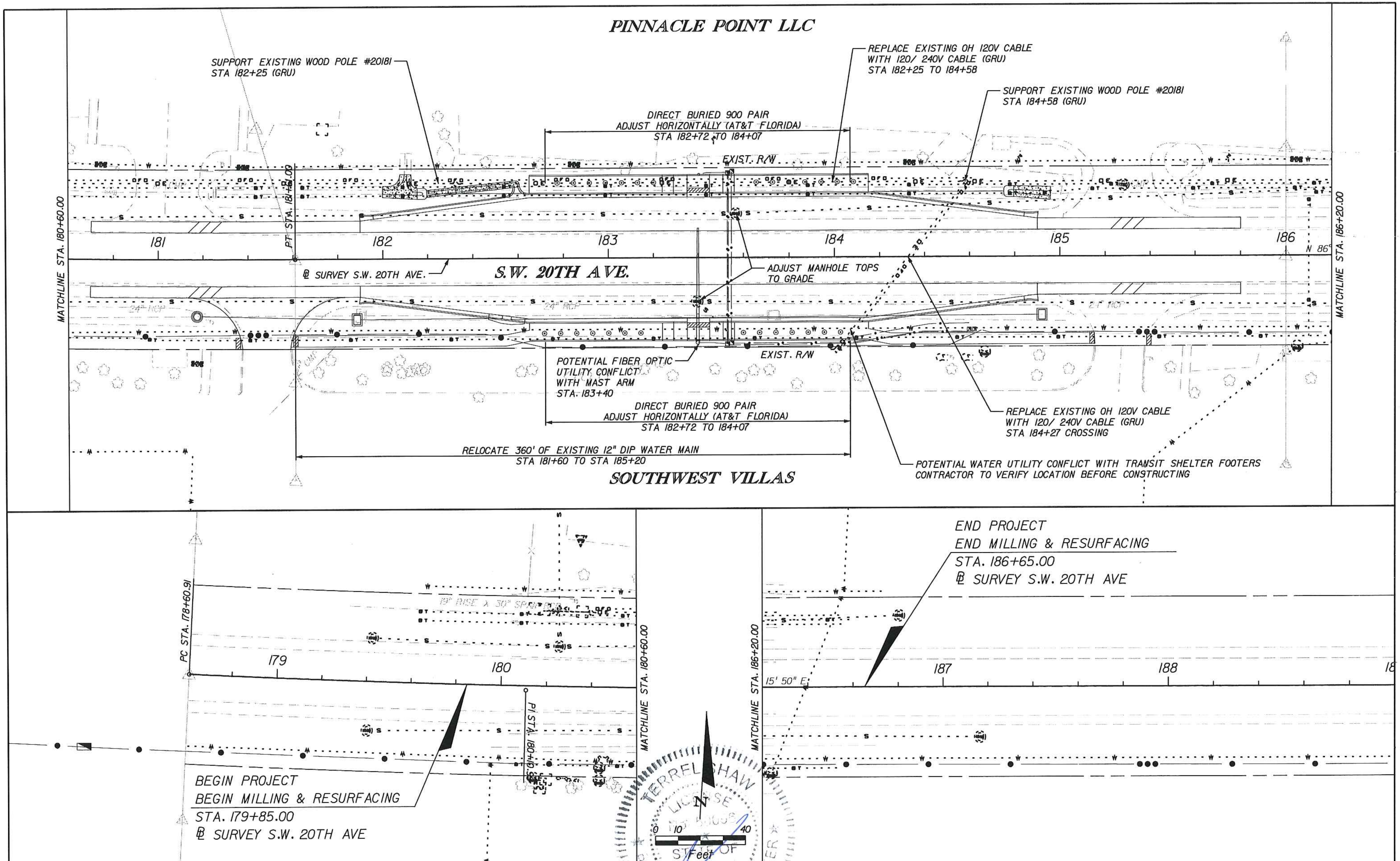

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD:
TERREL SHAW, P.E.
LIC. No. 50096
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JACKSONVILLE, FLORIDA 32216
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ALACHUA COUNTY
PUBLIC WORKS DEPARTMENT

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	ALACHUA	211365-5-58

UTILITY ADJUSTMENT SHEET

SHEET NO. 37

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APPENDIX 4
REGIONAL TRANSIT SYSTEM (RTS) GAINESVILLE SMART BUS BAY

BUS STOP DESIGN GUIDELINES AND IMPROVEMENT PLAN

REGIONAL TRANSIT SYSTEM

FEBRUARY 2012

RTS MISSION:
TO ENHANCE THE QUALITY OF LIFE IN OUR COMMUNITY BY PROVIDING SAFE, COURTEOUS, EQUITABLE, RELIABLE AND ENERGY-EFFICIENT TRANSPORTATION SERVICES.


100 SE 10TH AVENUE
GAINESVILLE, FL 32602

CHAPTER TWO: BUS STOP CLASSIFICATION SYSTEM

The RTS Bus Stop Classification System places system-wide bus stops into one of five stop types: Local Stop, Primary Local Stop, Super Stop, Primary Super Stop and Transit Center. The first four stop types are described below in Table 1. Transit Centers include all essential and beneficial amenities and are designed to the area they are placed. Schematics for all the stop types, excluding the transit center, can be found in Figure 2.

Predetermined criteria allows for a more efficient and equitable distribution of resources across the RTS system. The classification system assists staff in making decisions about types of amenities to implement at both present and future bus stops.

Table 1: Stop Type Classifications

Stop Type	Name	Description	Amenities		
			Essential	Beneficial	Optional
I	**Local Stop**	Less Than 15 Boardings per Day, Low-Density Residential Land Use	Transit Sign, ADA Compliance	Stop Lighting	Bench, Bicycle Storage, Kiosk
II	**Primary Local Stop**	16 to 35 Boardings per Day, Mixed Land Use, Higher Intensity of use than Local Stops	Transit Sign, ADA Compliance, Bench, Trash Receptacle, Stop Lighting	Bicycle Storage, Kiosk, Leaning Rail, Back Door Landing Pad	Bus Shelter, System Map
III	**Super Stop**	36 to 80 Boardings per Day, High-Density Mixed-use Land Use, Located near neighborhood focal points, community centers, parks and schools	Transit Sign, ADA Compliance, Bench, Trash Receptacle, Stop Lighting, Bus Shelter, Kiosk, Landscaping	Bicycle Storage, System Map, Leaning Rail, Back Door Landing Pad, Bus Bays	Emergency Telephone, Retail Kiosk
IV	**Primary Super Stop**	More than 80 Boardings per Day, High-Density Mixed-use Land Use, Major Trip Generators	Transit Sign, ADA Compliance, Bench, Trash Receptacle, Stop Lighting, Bus Shelter, Kiosk, Landscaping, Back Door Landing Pad, Bicycle Storage, Bus Bays	System Map, Leaning Rail, Newspaper Stand, Emergency Telephone	Retail Kiosk

Any future changes to existing RTS bus stops will be determined by changing levels of ridership, the number of routes at a stop, and the types of land use and streets surrounding the stop. RTS intends the classification system to be a dynamic process; therefore, increases in ridership or changes in any of the other variables will warrant an upgrade of classification type. Furthermore, RTS staff will evaluate the impact of any new developments by creating ridership projections requiring construction of RTS bus stop amenities according to stop type. All new development projected to require bus shelters shall provide easements for shelter construction (See “Easements” section of Chapter 6).

Table 2 defines the current and future classification on which bus stop improvements and stop types depend. The current classification describes what is at the bus stop, while the future classification describes what should be at the bus stop.

Table 2: Current and Future Classification Requirements

Classification	Current Requirement	Future Requirement*
I	Sign Only	Located at a non-transit supportive land use Less than 15 riders per day Located on a local street Only 1 route at stop
II	Bench and Trashcan	Located at a transit supportive land use Between 16 and 35 passengers per day Located on a local or minor collector street 2-3 routes at stop
III	Shelter	Located at a medical facility Between 36 and 80 riders per day Located on a collector, major collector or minor arterial 4-5 routes at stop Required if an intermediate time point
IV	Shelter and Bus Bay	More than 80 riders per day Located on a principal arterial More than 5 routes at a stop Required if an end point Required if speed limit is greater than 55 mph

***Future Classifications are determined by a weighted equation of the following variables**

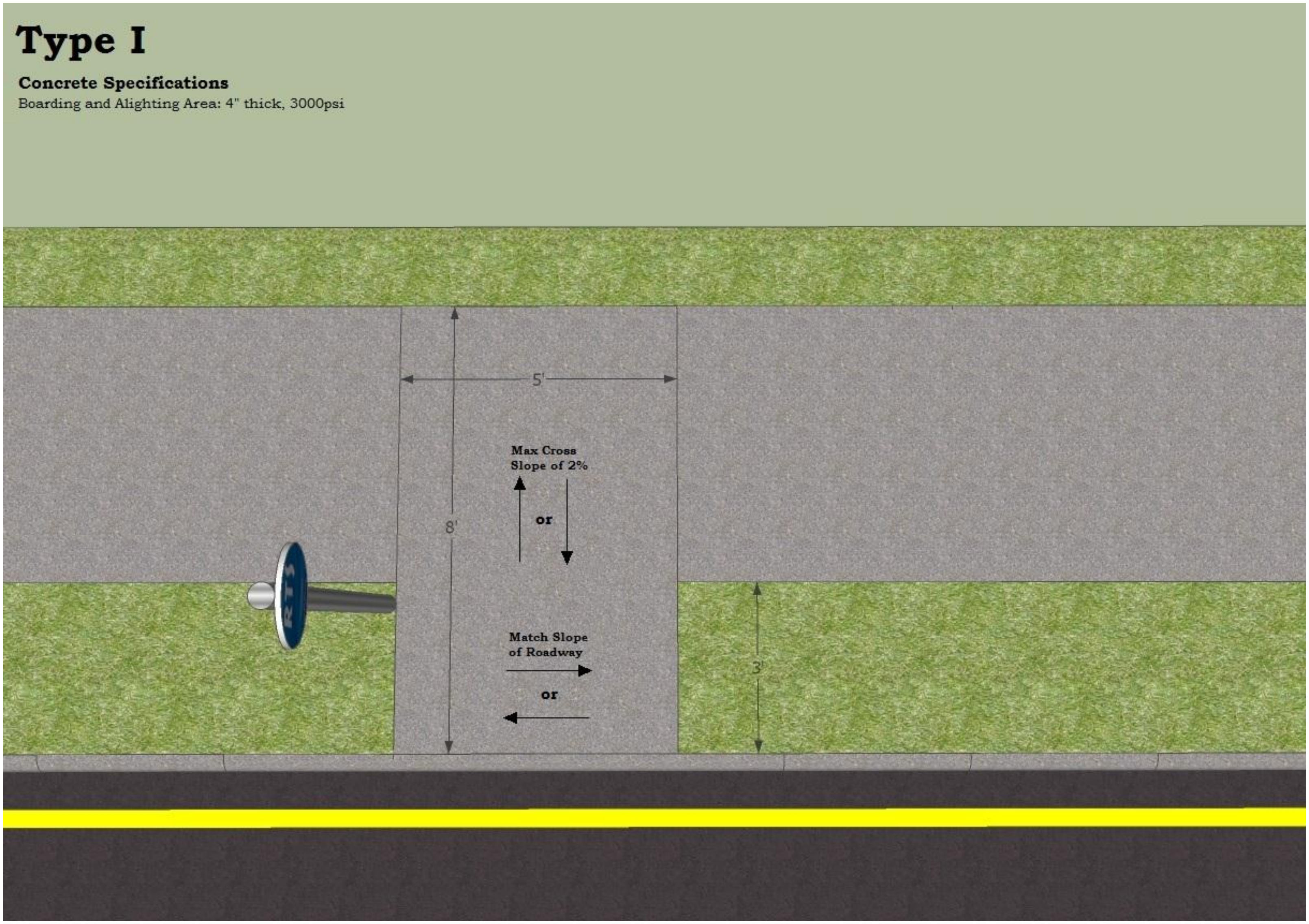


Figure 2: Type 1 Schematic

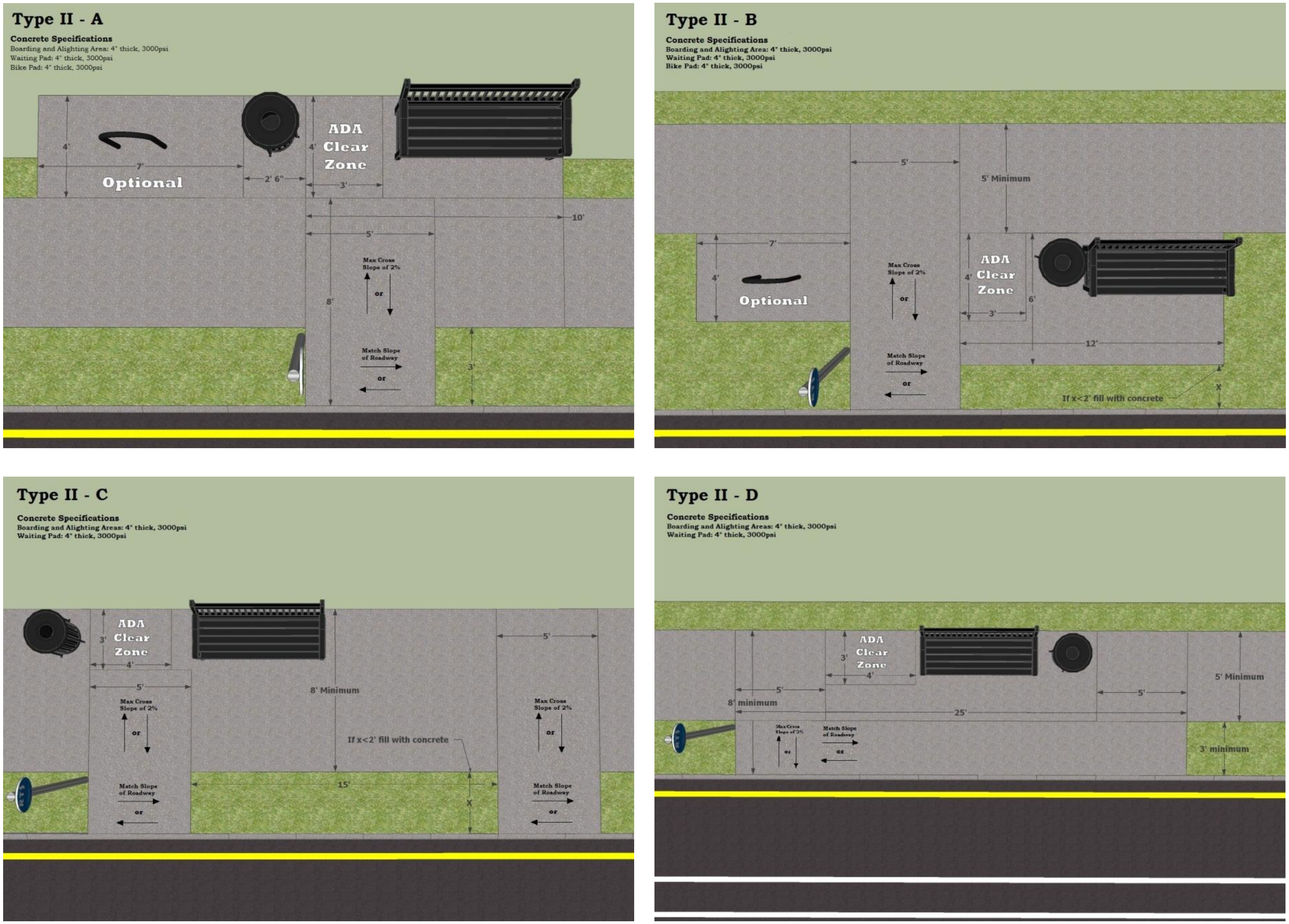
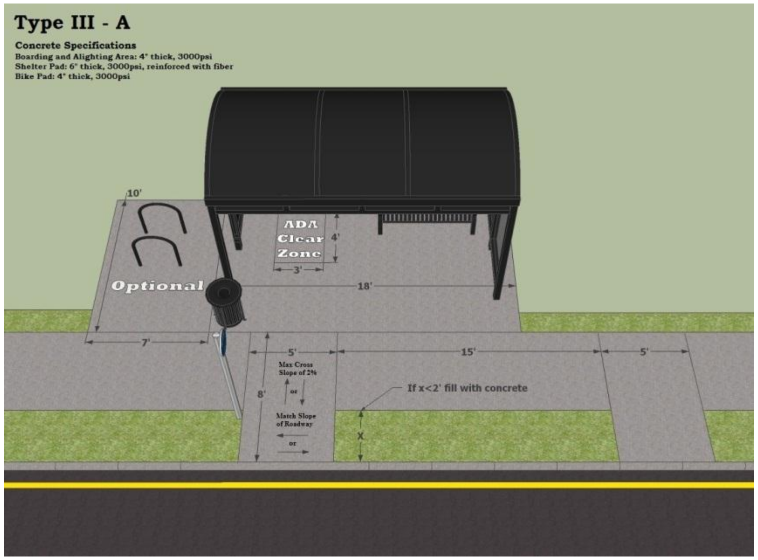
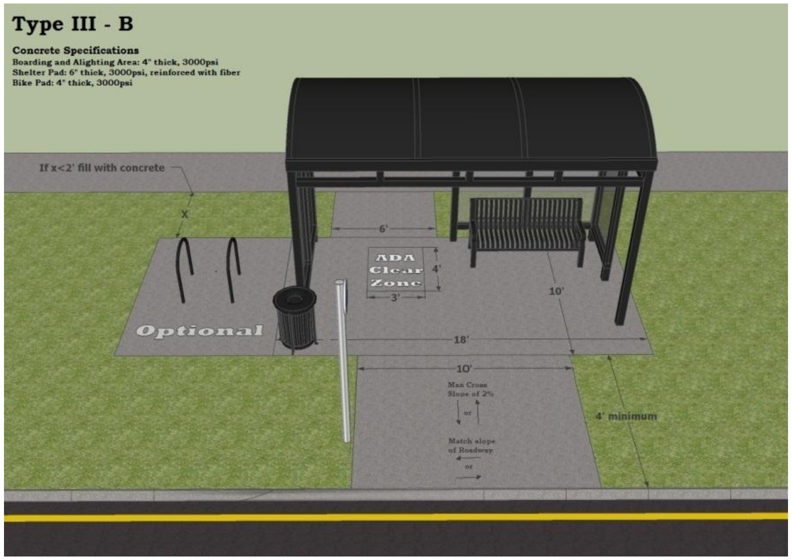


Figure 3: Type II Schematic





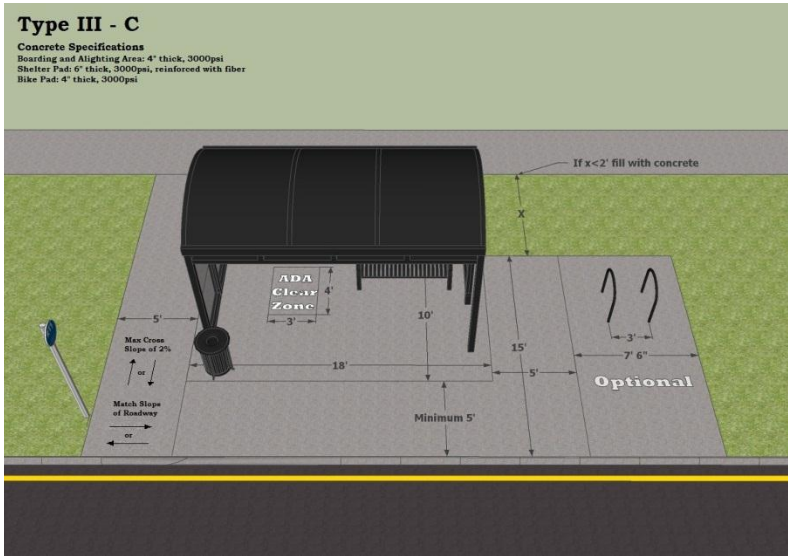


Figure 4: Type III Schematic

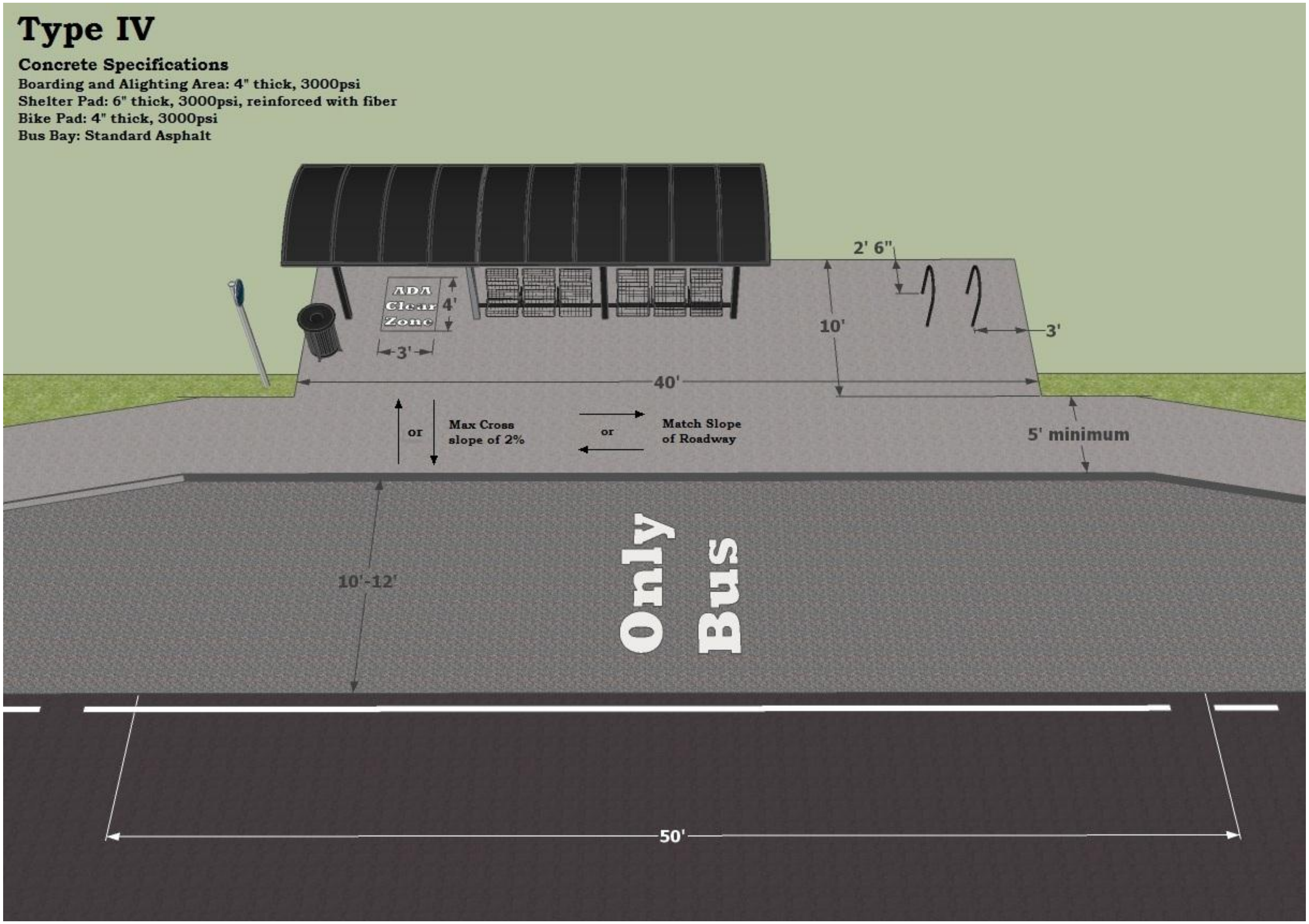


Figure 5: Type IV Schematic

CHAPTER THREE: DESIGN STANDARDS FOR BUS STOPS

Bus Stop Amenities

RTS will use its bus stop inventory to make informed decisions about implementing necessary improvement guidelines and the placement of amenities. Safety is the first priority. RTS wants to ensure that all bus stops will not place any users in danger. The second priority is accessibility. All existing stops must meet the standards set forth by the Americans with Disabilities Act (ADA) of 1990 (USAB, 2004). The ADA and its associated Accessibility Guidelines are to be followed during the design, construction, additions to and alterations of sites, facilities, buildings and elements to the extent required by regulations issued by Federal agencies under the ADA. Thirdly, RTS will evaluate all stops for an appropriate level of comfort and convenience in keeping with the bus stop classification system.

The following tables give descriptions of the recognized requirements for specific types of amenities. Table 3 refers to permanent, or constructed, amenities that are typically found at an RTS bus stop.

Table 3: Permanent Amenity Requirements

Permanent Amenities	Requirements	Source	
Landing Pad	Shall measure 5' long (parallel to the roadway) , 8' wide (perpendicular to the roadway), and be made of concrete 6" think or 4" thick with the appropriate substrate material	**ADA – ABA Accessibility Guidelines for Building and Facilities (ADA-ABA AG)**	Sec. 810.2.2
	Shall be connected to streets, sidewalks or pedestrian paths by an accessible route		Sec. 810.2.3
	Slope shall be the same as the roadway, to the maximum extent practicable, with a Cross Slope no steeper than 2%		Sec. 810.2.4
Waiting Pad	Shall measure 10' long (parallel to the roadway) , 4' wide (perpendicular to the roadway), and be made of concrete 6" think or 4" thick with the appropriate substrate material	**RTS**	
	Street furniture must maintain a clear floor area of 30" by 48" for wheelchair maneuverability	**ADA-ABA AG**	Sec. 305.3
Curb Ramp	At least 5' wide	**ADA-ABA AG**	Sec. 405.5
	Running slope not steeper than 8%		Sec. 405.2
	Cross slope shall not be steeper than 2%		Sec. 405.3
	Curb Ramp landings subject to wet conditions shall be designed to prevent the accumulation of water		Sec. 405.10
	Shall be located so that they do not project into vehicular traffic lanes, parking spaces or parking access aisles		Sec. 406.5
	Curb ramps shall have detectable warnings that consist of truncated domes and shall meet the size, spacing and contrast specifications laid out in section 705 of the ADAAG		Sec. 705.1
	Should be located within 10' in front of or 40' behind bus stop sign, or at nearest intersection	**RTS**	

Rear Door Landing Pad	Should measure 10.5' long (parallel to the roadway), 8' wide (perpendicular to the roadway), and be made of concrete 6" thick or 4" thick with the appropriate substrate material	**RTS**	
	Located 15' behind front door landing pad		
	The space between the front and rear door landing pads may be paved as stable surface as well		
	Shall be connected to streets, sidewalks or pedestrian paths by an accessible route	**ADA-ABA AG**	Sec. 810.2.3
Bus Bays	Minimum 12' wide	**Florida Department of Transportation (FDOT)**	
	Minimum stopping area length of 50' when accommodating standard 40' buses; minimum length of 70' when accommodating articulated buses		
	Entrance and exit tapers must each measure 60' in length		
	When designing a bus bay that is to accommodate multiple buses at once, add 50' for every additional 40' bus and 70' for every additional articulated bus		
	Must be evaluated on a case-by-case basis	**RTS**	
	Required for any stop located on roadway with a speed limit greater than 55 mph		
Bollards	Must not obstruct accessibility; maintain a clear floor area of 30" by 48" between bollards and other fixtures for wheelchair maneuverability	**ADA-ABA AG**	Sec. 305.3
	Bollards with integrated lighting are the preferred choice	**RTS**	
	Bollards should be tall enough to discourage vehicle access, with heights ranging from 24" to 48"		
	Bollards should be spaced 5' apart so as to allow for continued bicycle, wheelchair and pedestrian through them		
	A single bollard should be designed to stop a 36,000 lb. vehicle traveling at 4 mph	**NTSB**	
Landscaping	Must not obstruct views or accessibility; maintain a clear floor area of 30" by 48" for wheelchair maneuverability	**ADA-ABA AG**	Sec. 305.3
	Allow 12' of vertical clearance from sidewalks or transit stop pads and 14' clearance for tree canopies	**FDOT**	
	Height of groundcover plants should not exceed 2' and height of shrubs should not exceed 3' at maturity		
	Use native vegetation		
Pavement Markings and Bus Stop Signage	RTS may request special pavement markings and/or signage to distinguish the bus stop from on-street parking at its discretion	**RTS**	
	May request clearly marked (through signs, pavement markings and/or lights) midblock crossings		
Pavement Marking	All preferential lane word and symbol markings shall be white and shall be positioned laterally in the center of the preferential lane	**Manual on uniform Traffic control Devices (MUTCD)**	Sec. 3D.01.05
	The preferential lane shall be marked with: Bus only lane—the preferential lane-use marking for a bus only lane shall consist of the word marking BUS ONLY		Sec. 3D.01.06 d

Pavement Marking (continued)	There shall be a wide solid double white line along the edges of the buffer space where crossing the buffer space is prohibited	**MUTCD**	Sec. 3D.02.03 d
Bus Bulbs	Shall be implemented in areas where on-street parking is critical and cannot be removed	**RTS**	
	The height of the bulb shall match the elevation of the curbed area from which it extends, 6”		
	Should not be located on streets with speeds exceeding 40 mph	**FDOT**	
	The width should be 6’ to 8’, extending from the sidewalk towards the roadway; making sure not to intrude onto the roadway, but to allow for a bus to pull up to the bulb without risking collisions with street-side features or parked vehicles	**FDOT**	
	The length of the fully extended bulb shall be a minimum of 30’ and go up to 140’ when accommodating articulated buses; the horizontal length of the exit taper for the parking lane on the approach side of the bus bulb shall be between 10’ and 17’	**FDOT**	

The essential amenities referenced in Table 4 refer to amenities that are placed at the stop and are typically required, depending on the stop’s future classification (as discussed in Chapter 2).

Table 4: Essential Amenities Requirements

Essential Amenities	Requirements	Source	
Bus Stop Sign	Minimum ground clearance of 7’ above grade	**TCRP 19**	Ch.3, Pg. 48
	Pole must be at least 32” from back of curb	**FDOT**	
	If there is no curb and gutter at least a minimum of 12' from travel lanes		
	If there is a paved shoulder at least a minimum 6’ from the edge		
	Signs should be located on departure side of the bus stop	**RTS**	
	The design of stop signs, to include character style, spacing, proportion, size and contrast, among other specifications, shall follow the guidelines outlined in the associated documents	**ADA-ABA AG**	Sec. R409.5 PROWAC Sec. 703.5
Benches	Benches placed on the right of way shall not exceed 74 inches in length, 28 inches in depth, and 44 inches in height	**Florida Administrative Code (FAC)**	Sec. 14-20.0032 (1)
	Benches shall not be placed in the median of any divided highway or on limited access facilities		Sec. 14-20.0032 (3)
	The bench location must meet the set back and minimum clear recovery zone requirements established in the Department’s Design Standards Index Number 700- (4’ from curb edge)		Sec. 14-20.0032 (8)
	Shall have seats that are 42” long minimum and between 20” – 24” deep	**ADA-ABA AG**	Sec. 903.3

Benches (continued)	Shall provide for back support or be affixed to a wall that is 42" long minimum and extends no more than 2" above seat surface to a point 18" minimum above the seat surface. Back support shall be 2.5" maximum from the rear edge of the seat measured horizontally	**ADA-ABA AG**	Sec. 903.4
	Top of the bench seat surface shall be between 17"-19" above the floor or ground		Sec. 903.5
	Shall be made of materials that can sustain vertical or horizontal force of 250 lbs. applied at any point on the seat, fastener, mounting device or supporting structure		Sec. 903.6
	When in a location that has the potential to become wet, surface of the seat shall be slip resistant and shall not accumulate water		Sec. 903.7
	Must be located at least 5' from the forward end of a bus stop, but no more than 12'	**FDOT**	
	Non-sheltered stops must be located within 30' of a light source		
	In rural areas distance will vary, bench distance from curb should increase with speed		
	At stops where no curb is present, benches should be located 7'-10' from the paved edge of road	**AASHTO**	
Trash Receptacles	Should not interfere with bus stop accessibility; maintain a clear floor area of 30" by 48" between the receptacle and other fixtures for wheelchair maneuverability	**ADA-ABA AG**	Sec. 305.3
	Must be located at least 4' from back of curb	**FDOT**	
	At stops where no curb is present, should be located between 7'-10' from the paved edge of road	**AASHTO**	
	Allow for at least a 3' separation from other street furniture	**TCRP 19**	Ch. 4, Pg. 80
	Shall be located on the departure side of the stop	**RTS**	
Bus Shelters	Minimum clear floor area measuring 30'' by 48''	**ADA-ABA AG**	Sec. 305.3
	Should be accessible from public accessible route with a minimum clear width of 3'		Sec. 305.7.1
	Minimum interior height of 7' to avoid vandalism of lighting or signs	**FDOT**	
	Must have ADA compliant seating		See "**Benches**"
	Should not be within 15' of a fire hydrant or handicapped parking space and at least 7' from a utility pole		
	Should have a 30° rain angle from vertical		
	Should not be located within 12' of an intersection		
	Opening cannot be positioned so a person in a wheelchair has to maneuver onto the street to enter	**FTA**	Sec. 5.4.2
	Minimum concrete slab area of 10' by 18' (exceptions granted by RTS under special circumstances)	**RTS**	
	Shall maintain a clearance of at least 3' around the shelter and on adjacent sidewalk	**TCRP 19**	Ch. 4, Pg. 67
	Must have unobstructed view in and out		Ch. 4, Pg. 85

Bus Shelters (continued)	Shelters erected outside of the urban limits shall be spaced so that no more than two shelters are erected per mile of a two-lane highway and no more than four shelters are erected per mile on highways with four or more lanes	**FAC**	Sec. 14-20.003 (2)
	The shelter location must meet the set back and minimum clear recovery zone requirements as established in the Department’s Design Standards, Index Number 700 (4’ from curb edge)		Sec. 14-20.003 (4)
	A shelter shall not obstruct any sidewalk, bike path, pedestrian path, driveway, drainage structure, or ditch, etc., and shall provide at least 3’ of clearance for pedestrian traffic		Sec. 14-20.003 (6)
	Sides and internal dividers in shelters shall be constructed in a manner to provide visibility of waiting passengers to passing traffic and pedestrians. No shelter shall be located in such a manner, or be constructed of such materials, so as to adversely affect sight distances at any intersection or obstruct the view of traffic signs or other traffic control devices		Sec. 14-20.003 (13)
	The maximum height of a shelter cannot exceed ten feet		Sec. 14-20.003 (14)
	Shelters must be securely attached to their foundations and must provide for a clear opening between the structure and the ground or foundation to facilitate cleaning and to preclude the accumulation of debris		Sec. 14-20.003 (15)

The suggested amenities referenced in Table 5 refer to amenities that are placed depending on customer suggestion or special generator needs. They are typically found in areas with higher ridership volumes.

Table 5: Suggested Amenity Requirements

Suggested Amenities	Requirements	Source	
Bicycle Racks	Must not obstruct accessibility at the bus stop; maintain a clear floor area of 30” by 48” between bike racks and other fixtures for wheelchair maneuverability	**ADA-ABA AG**	Sec. 305.3
	Must not be placed on landing pad		
	If multiple bicycle racks are placed at a stop, in a side-by-side fashion, they shall be spaced at least 36” apart. If placed in an end-to-end fashion, (typically if multiple rows of bicycle racks are installed) they shall be spaced at least 48” apart	**RTS**	
	Access to utility infrastructure should be in mind when placing bicycle racks and their associated concrete slabs, so as to minimize obstruction and the need for demolition, and subsequent replacement of concrete and bicycle racks		
	Bus stops with bicycle racks should be located near all parks and trails with bicycle facilities	**TCRP 19**	
	Should be installed at locations with repeated observations of bikes locked to fixtures around bus stop		Ch. 4 Pg. 79

Bus Stop Lighting	Non-sheltered stops must be located within 30' of a light source	**FDOT**	
	Shelter lighting should be solar powered	**RTS**	
	RTS may choose to install or request the installation of light beacons at bus stops with poor visibility		
	Flashing lights on shelters are prohibited. All lights must be placed or shielded so they do not interfere with motorists on the roadway. Lights are not permitted for the sole purpose of illuminating advertising	**FAC**	Sec. 14-20.003 (12)
	Shelter lighting should provide 2-5 fc worth of light	**TCRP 19**	Ch. 4 Pg. 84
	Illuminate the person's face in a manner that is not distracting		Ch. 4 Pg. 84
Kiosks	Should be installed at transfer points and/or inside designated bus shelters	**RTS**	
	Shall be located 5' above ground		
	Shall fit legal sized paper: 8 ½" wide x 14" tall		
Large Format Information Displays	Shall be self-supporting with mounting plates at the base of posts	**RTS**	
	Shall be double sided so as to provided a larger variety of information		
System Maps	Install at transfer stations and sheltered bus stops that serve multiple routes	**RTS**	
Leaning Rails	Constructed from anodized aluminum	**FDOT**	
	Should be round with a diameter between 1.5" and 2.5"		
	Rails can be mounted on shelter walls, be freestanding or built into the landscape		
	Freestanding leaning rails should be between 27'' and 42'' tall	**RTS**	
Shopping Cart Corrals	Should measure 3' wide by long 7' and have 3' high sides	**FDOT**	
	At least 4' from face of curb and remain clear of sidewalks		
	Should be provided at bus stops adjacent to retail centers		
Newspaper Stands	Must not obstruct accessibility; maintain a clear floor area of 30" by 48" between newspaper stands and other fixtures for wheelchair maneuverability	**ADA-ABA AG**	Sec. 305.3
	Shall be located on the departure side of the bus stop	**RTS**	

Finally Table 6 references various administration and design requirements that should be taken into account for the construction of any new bus stop or during the improvement of any existing bus stop.

Table 6: Administration and Design Requirements

Admin & Design	Requirements	Source
Sustainability	Use solar-powered light fixtures, signposts and fans	**RTS**
	Enhance bicycle amenities and connectivity to overall transit network	
	Use recycled material in benches, bicycle parking, trash cans, sidewalk and shelter design	
	Use native vegetation in landscaping projects	**FDOT**
Amenity Reuse and Redistribution	Determine bus stops with unsafe amenity conditions	**RTS**
	Redistribute amenities from unsafe bus stops to bus stops in need of amenities, according to the RTS Bus Stop Priority List	
	Phase out concrete benches; consider reuse of bench tops for landing/waiting pads or reuse of concrete material in future RTS construction projects	
Easements	For shelters: Area shall be at least 10’ by 18’ long (parallel to road or bus boarding area)	**RTS**
	For waiting pad: Area shall be at least 4’ by 10’ long (parallel to road or bus boarding area)	
	Easements are required of all new developments expected to require a Type II or higher bus stop.	
	Easements must be recorded with the Alachua County Property Appraiser’s office	
Utilities	Must call “Dial Before You Dig” (811)	**RTS**
	Must gain approval from RTS, GRU and other applicable utility companies	

RTS has identified four districts in which bus stop amenities will be placed. The district in which a stop is located dictates the design and style of amenities to be placed at said stop. These districts are based on the Alachua County boundary, the City of Gainesville boundary, the Gainesville Community Redevelopment Agency areas and the University of Florida campus boundary. The UF campus is excluded from design amenity design considerations as those are choices left to the University to make. See Figure 6 below for a map of the areas.

The Downtown-Urban/CRA district warrants amenities that support the preservation of the character found at the University of Florida, in Gainesville’s downtown, as well as other areas where the City of Gainesville is concentrating on redevelopment and/or revitalization. These amenities should be attractive, comfortable, and appropriate for areas of high visibility, foot traffic and place making.

The Suburban district is prevalent throughout the Gainesville community and can be found within the Gainesville city limits. The amenities in this area should emphasize the presence and comfort of transit, and provide a sense of continuity and familiarity, without taking away from the existing built environment and landscape. These amenities are to be attractive, but time-tested in their appearance, and priced more affordable than those found in the Downtown-Urban/CRA district.

The Low-Density or Rural district is found on the periphery of Gainesville. This district tends to see fewer transit passengers but also less frequent bus service. The priority in this area is comfort for longer wait times and a greater emphasis on a simple, comfortable, durable and affordable amenity design. This district is found in Alachua County, outside of the Gainesville city limits.

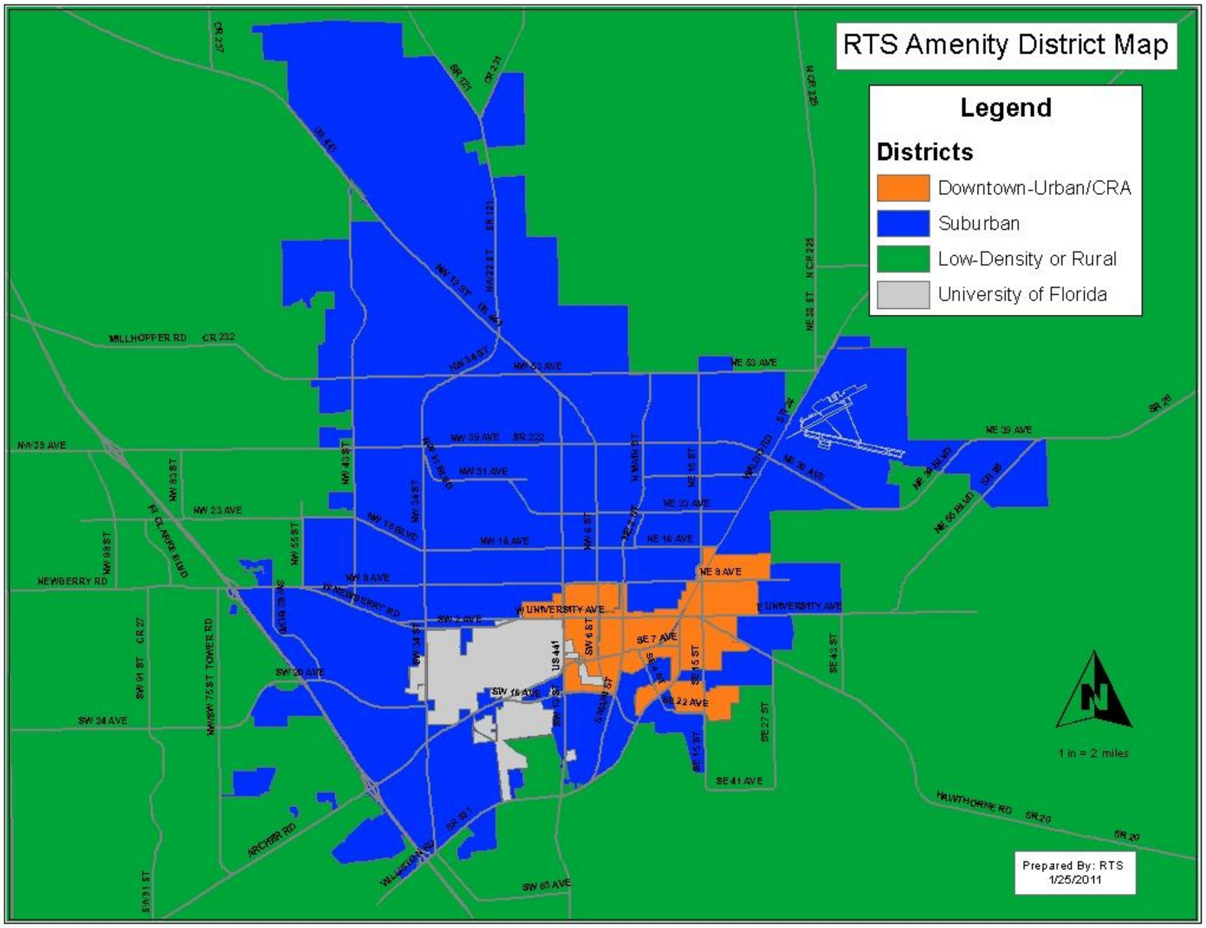


Figure 6: RTS Amenity Districts

CHAPTER FOUR: BUS STOP PLACEMENT

Bus stop placement within the RTS should further the goals of providing a safe, accessible, efficient and comfortable transit system. To achieve overall efficiency, stop spacing at appropriate levels is integral to providing maximum access for passengers, while at the same time optimizing fuel economy by reducing the stop-and-go of buses. The system should also be accessible to all individual passengers by locating stops in areas with sidewalk connectivity and appropriate landing pads. The location of bus stops can affect a passenger's safety before they even get on the bus; sufficient lighting conditions and proximity to roadways are some of the factors that need to be considered to keep our patrons safe. Traffic flows and potential crossings/intersections should always be considered in the decision of stop placement as well.

Location

The bus stop location should minimize the need for buses to change lanes before intersections and before approaching left-hand turns. It should also minimize stopped buses blocking driveways and access ways. For roadways with higher speeds, the distance of the bus stop from the radial point in the road before or after the intersection should be greater. Three different locations of bus stop are defined by RTS:

- Far-side - downstream of the intersection.
- Near-side - upstream of the intersection.
- Mid-block - between intersections.

The preferred choice of RTS is to locate and relocate stops at intersections whenever possible.

Far-Side Stops

Far-side bus stops are generally preferred over near-side stops because they result in fewer traffic delays, provide better vehicle and pedestrian sight distances and cause fewer conflicts among buses, cars, pedestrians and bicyclists. They are recommended for use under these circumstances:

- In areas where the right-of-way allows cars to pass the bus, especially in areas where a near-side stop will impede other motorists.
- Where a route alignment requires the bus to turn left before stopping.
- At complicated intersections with multiphase signals.
- At intersections with dedicated right turn lanes where right-on-red turning is permitted.
- At intersections with high volumes of turning movement.

Near-Side Stops

Where far-side stops cannot be provided, near-side stops should be located far enough from the intersection so as not to obstruct the Vision Triangle. Near-side bus stops are recommended for use under these circumstances:

- When the bus must stop in the travel lane (because of curb-side parking), in order for the front door of the bus to access an intersection and crosswalk.
- In combination with curb extensions or bus bulbs to provide direct access from the bus to the sidewalk.

Mid-Block Stops

Mid-block stops are generally to be avoided. They are only appropriate when:

- Route alignments require a right turn and the curb radius is short.
- The distance between intersections is unusually long and major transit generators are located mid-block and cannot be served at the nearest intersection.
- A pedestrian crossing is present and accompanied by pavement markings and road lighting.
- Pedestrian roadways crossings area a frequent occurrence and there is ample overhead lighting present.

Figure 7: Mid-Block crossing; Median refuge

Special Consideration Stops

School Zones

Transit facilities near schools should have the following safety related measures:

- Near primary schools, stops should be placed in an area where they can be visually monitored by school personnel and/or crossing guards to increase security.
- Mid-block stops near schools are not recommended unless crosswalks are installed.

Roundabouts

Roundabouts should be treated similarly to conventional intersections. Bus stops should either be located far enough from roundabouts or utilize a bus bay in order to avoid impediment of traffic flow.

Paired Bus Stops

RTS seeks to pair all system bus stops in order to enhance system usability. Paired bus stops should be placed approximately 90 feet apart and positioned in such a manner that passengers are directed to cross behind the busses in order to reach the stop on the other side of the street. See Appendix A, Figure A-6.

Signalized Midblock Crossings

Pedestrians' ability to safely cross many roadways is affected as traffic volumes, speeds and congestion increase. Although numerous treatments exist at unsignalized crossings, there is growing concern about their effectiveness. On multilane arterials, with six or more lanes, there is a greater occurrence of vehicles merging, changing lanes, and a greater tendency for motorists to vary their speed, than on smaller roadways. When a stop must be located mid-block, multiple lanes of traffic must be crossed and vehicle speeds are high (greater than 35 mph), RTS will recommend the implementation of pedestrian actuated midblock crossings.

Figure 8: Signalized Midblock Crossing

Signalized midblock crossing bus stops, much like the paired bus stops mentioned above, should be placed approximately 90 feet apart and positioned in such a manner that passengers are directed to cross behind the bus on the pedestrian marked crossing in order to reach the stop on the other side of the street (See Figure 8).

Bus Bulbs

To facilitate the operation of a bus in areas where on street parking exists, bus bulbs may be used at the terminus of the parking lane. As mentioned above, bus bulbs are ideal for stops located on the near-side of an intersection. But, depending on the roadway and traffic signal networks, bus bulbs can be located at mid-block and far-side stops as well. Mid-block stops with bus bulbs have been shown to encourage jaywalking. Therefore when considering placement at a mid-block stop, RTS places a strong emphasis on securing a crosswalk, preferably a signalized crosswalk, if one is not already present.

Bus bulbs allow the buses to stay in the traffic lane, which reduces delays and the possibility of collisions with vehicles in the travel lanes associated with reentering traffic. However, the stopped buses can result in a vehicle queue behind them. For this reason, and to avoid potential collisions resulting from inattentive drivers, bus bulbs should only be located on streets with speed limits of 40 mph and below, and have regular pedestrian presence.

By increasing the raised, paved surface area, bus bulbs allow for placement of amenities such as benches and shelters that would not have otherwise been possible due to narrow sidewalks or the lack of open space behind the sidewalk. The additional waiting area provided by a bus bulb keeps waiting passengers out of the pedestrian flow

Paired Bus Stop Spacing

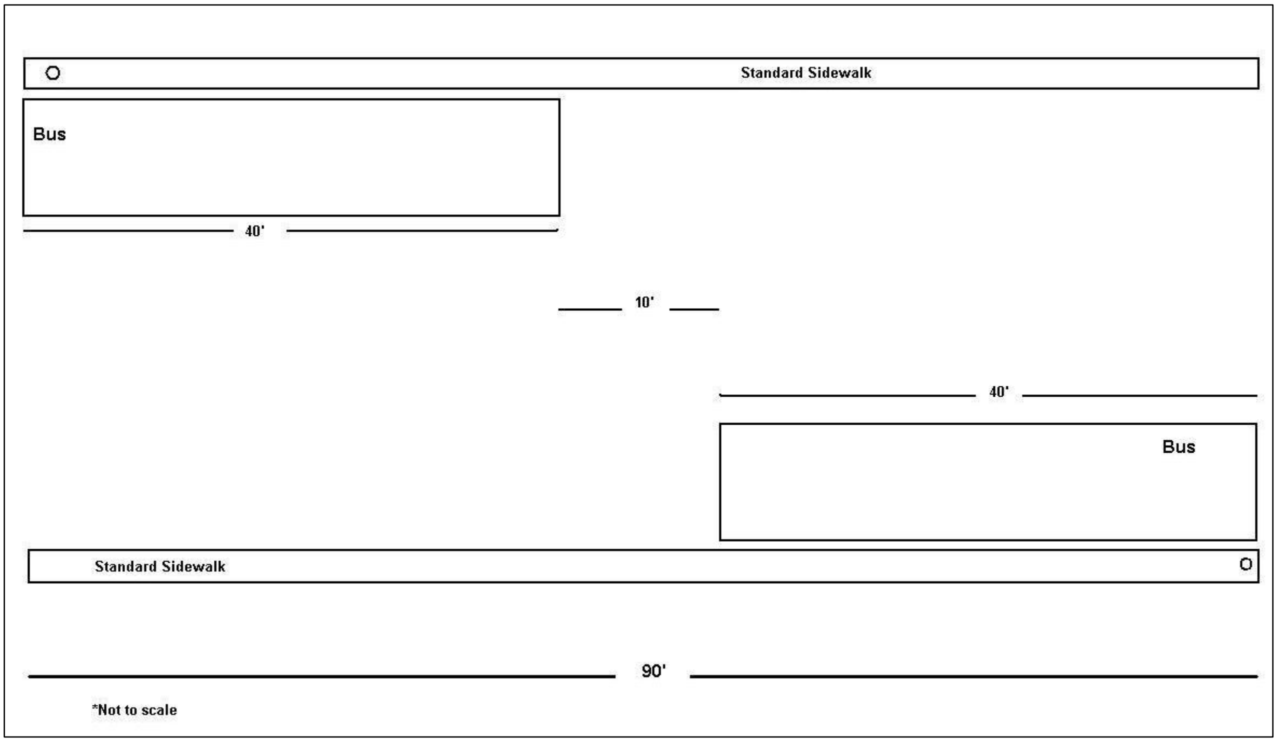


Figure A-6: Spacing Between Paired Bus Stops

Bus Bulbs

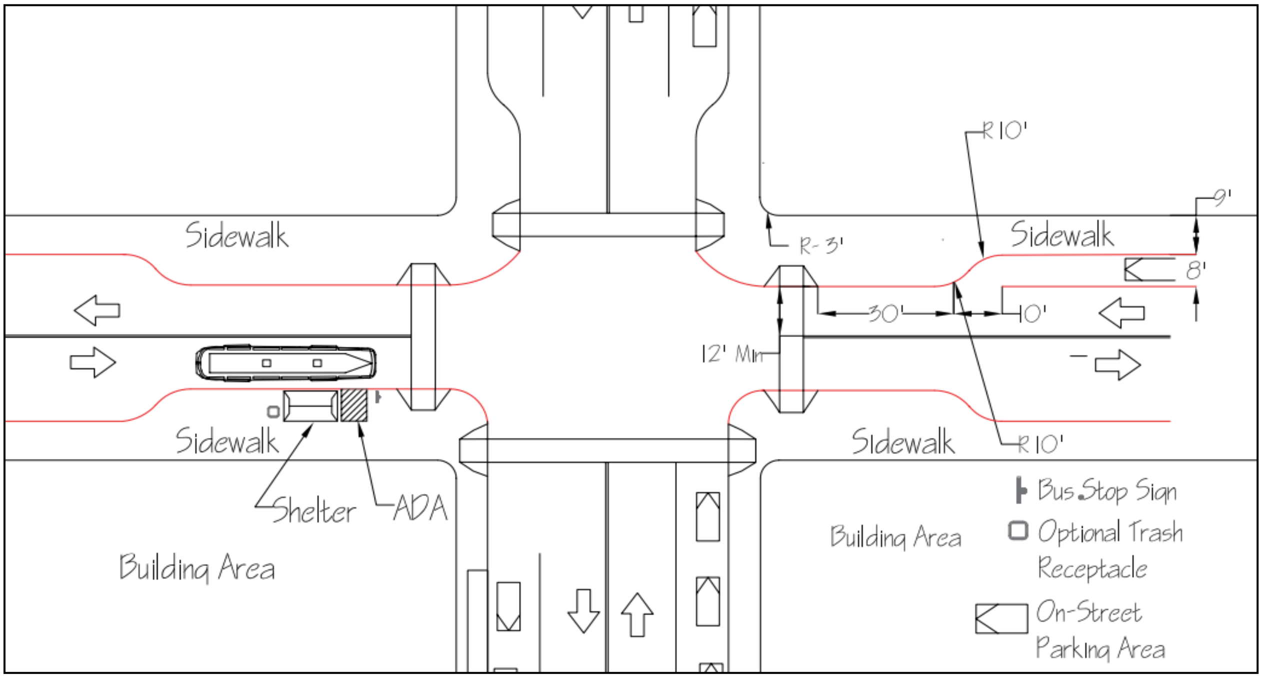
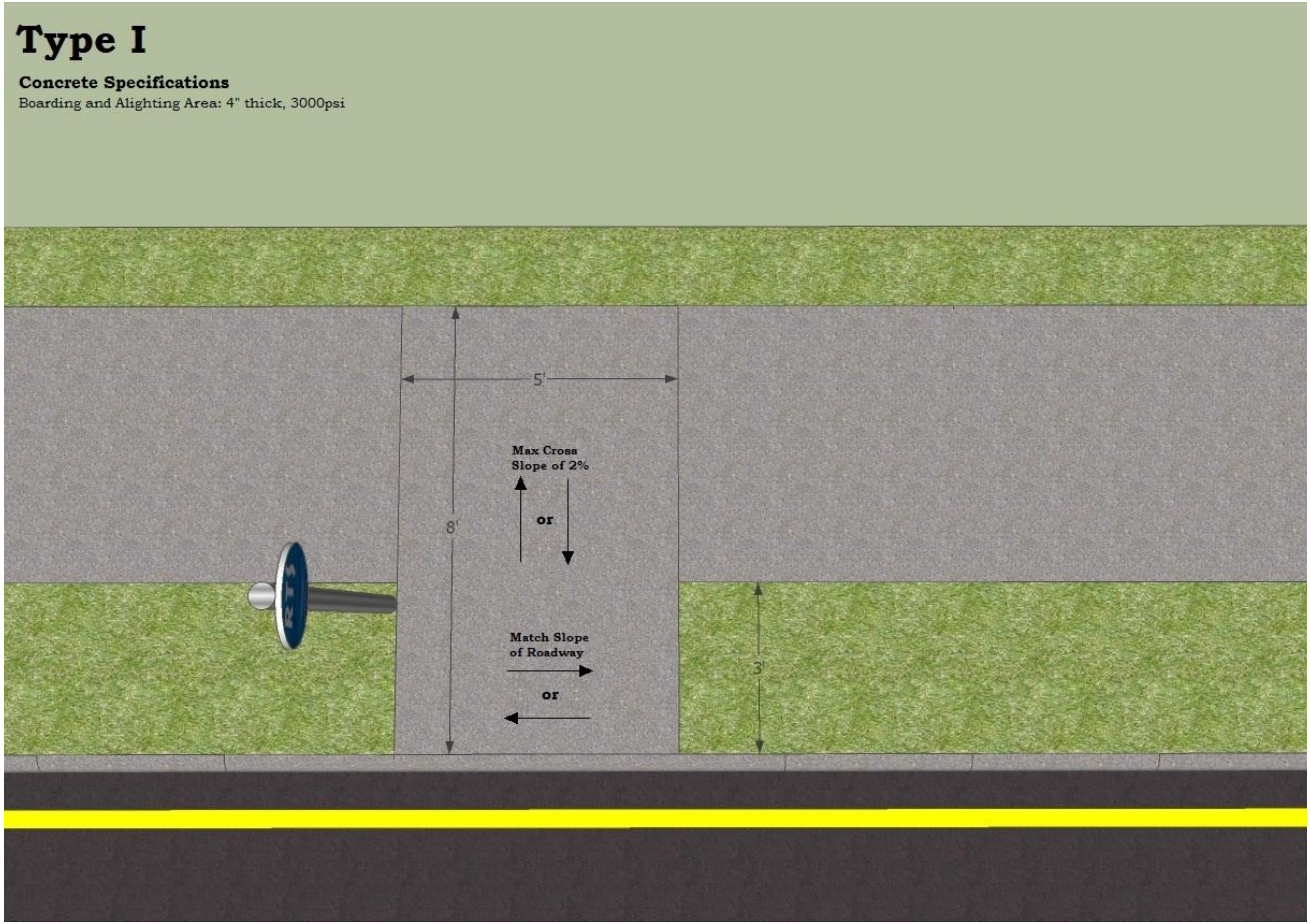


Figure A-7: Bus Bulb Dimensions



Project:
Local Stop

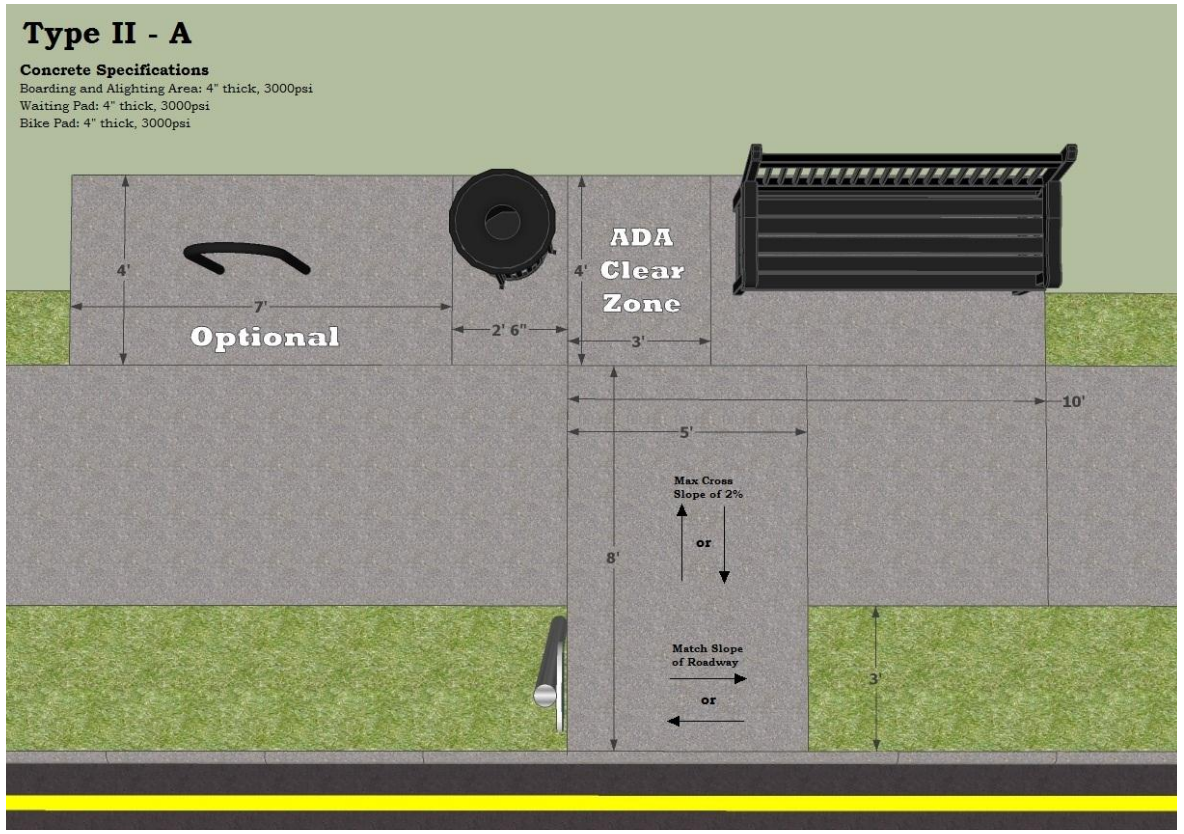
Stop Type:
I

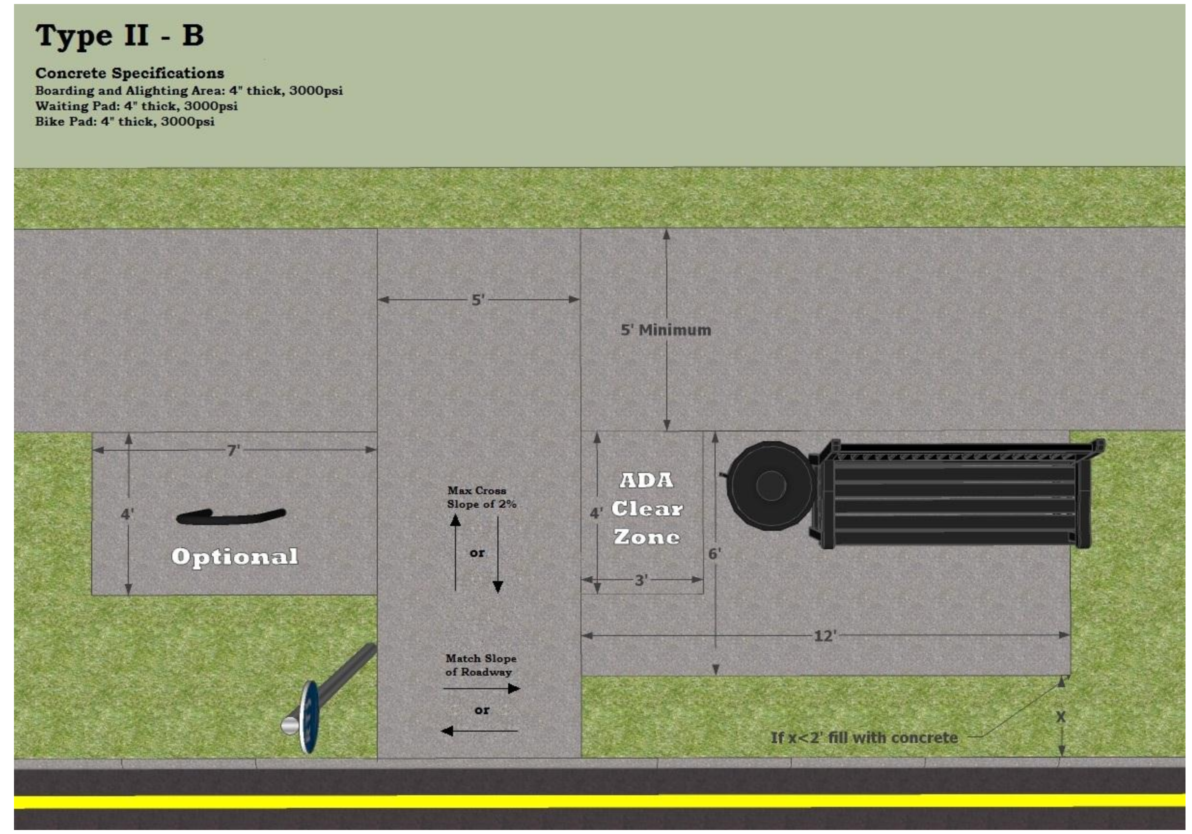
Description:
- Less than 15 boardings per day
- Low-density residential land use

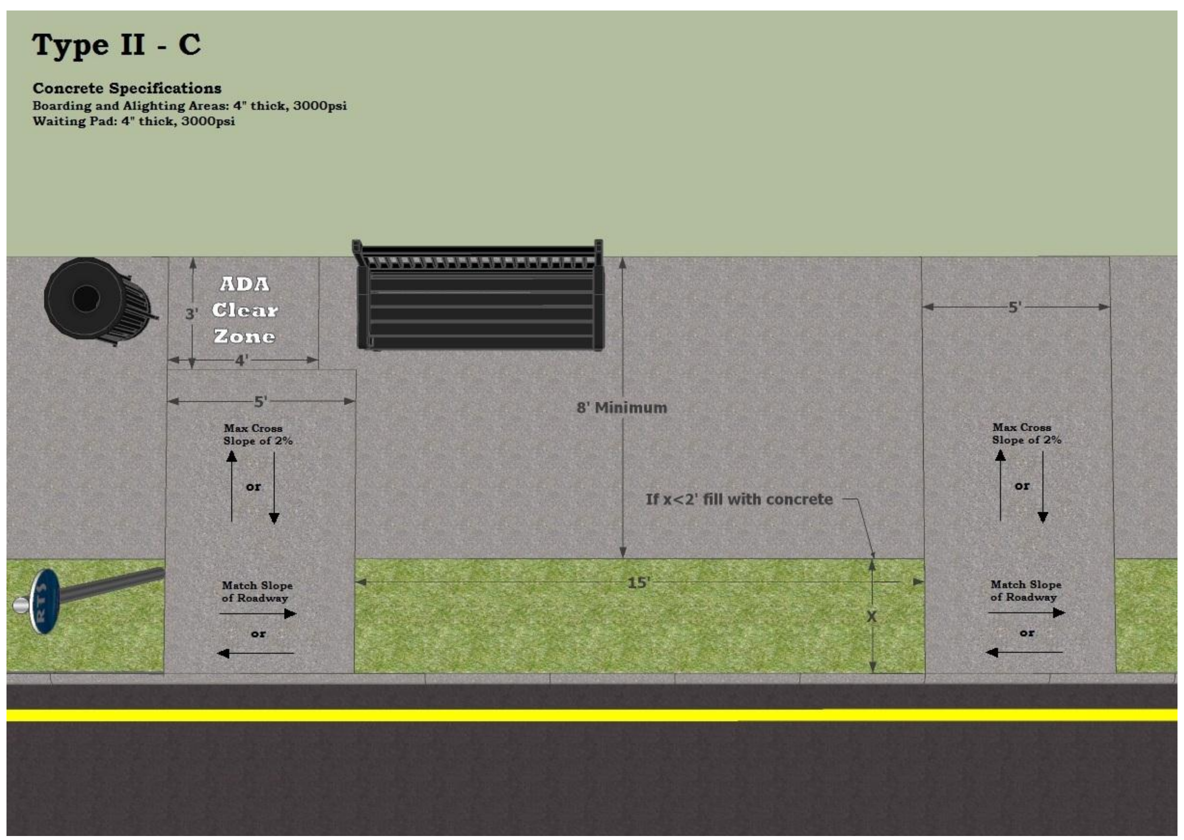
Amenities:

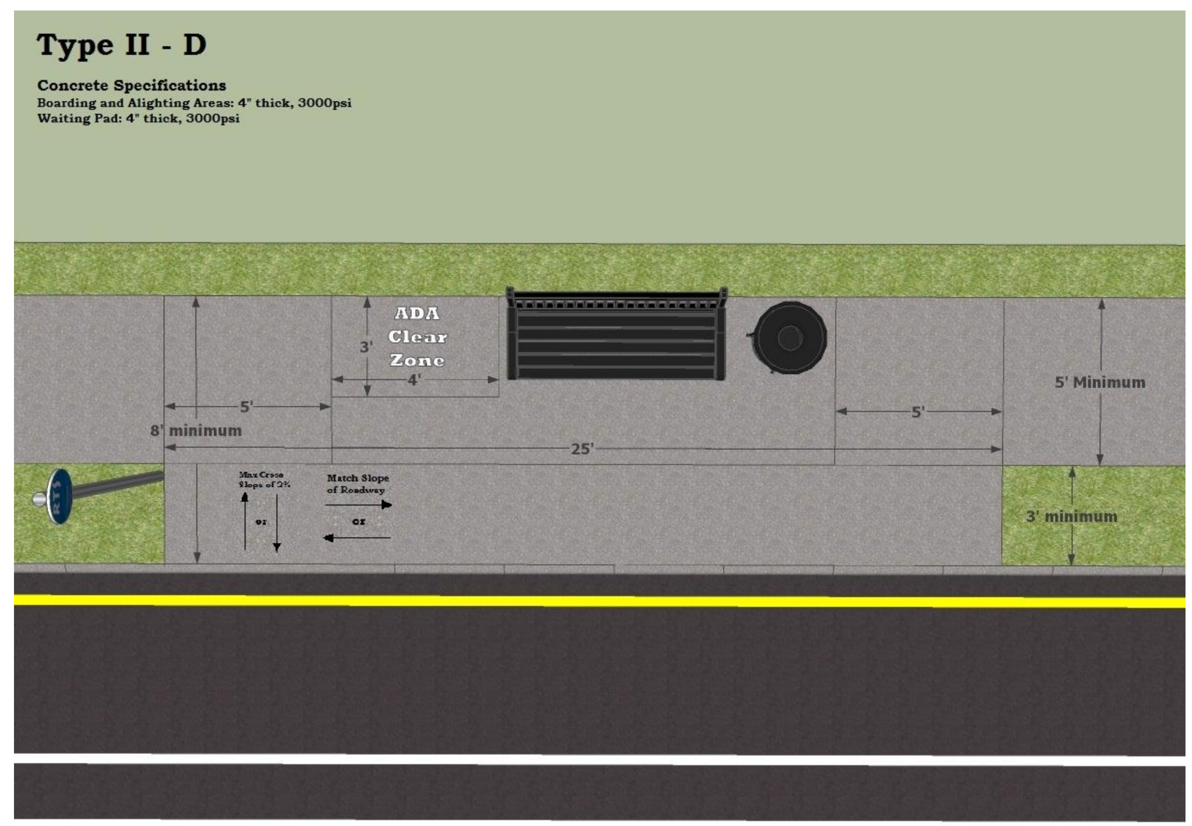
Essential
- Transit Sign
- ADA compliance

Optional
- Bench
- Bicycle Storage
- Route map/schedule









Project:
Primary Local Stop

Stop Type:
II

Description:

- 16 to 35 boardings per day
- Mixed land use; Higher intensity of use than local stops

Amenities:

Essential

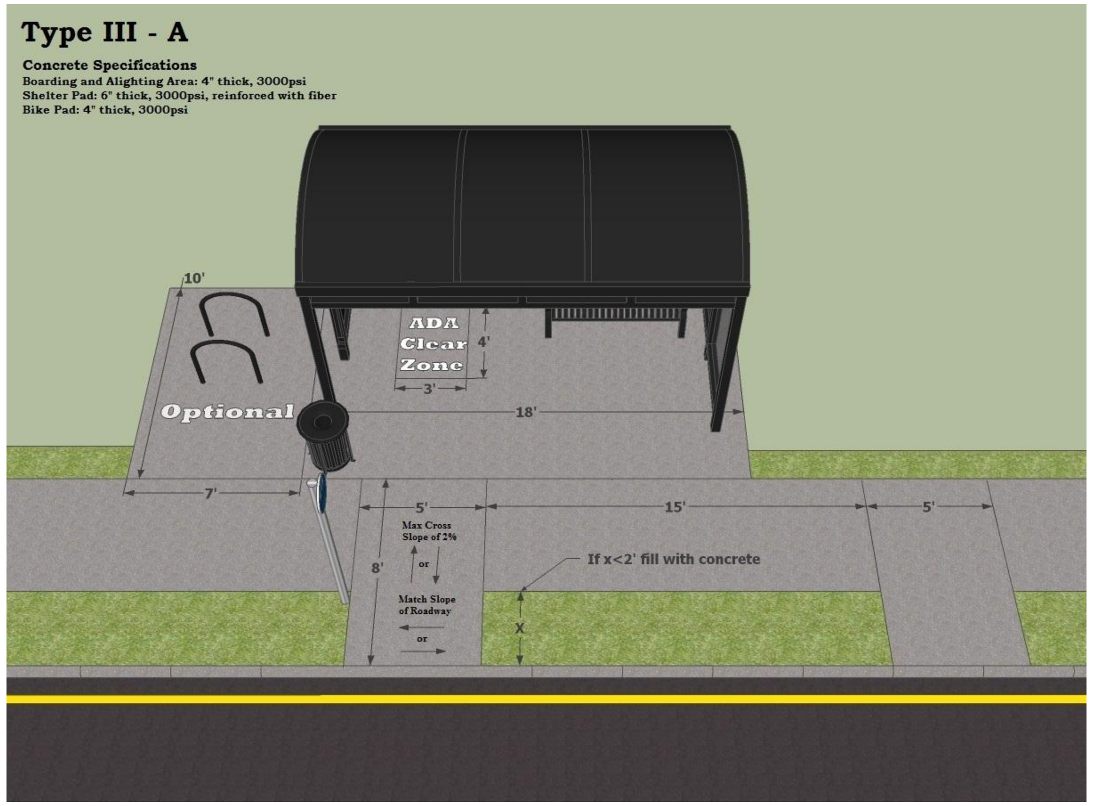
- Transit Sign
- ADA compliance
- Bench
- Trash Receptacle
- Stop Lighting

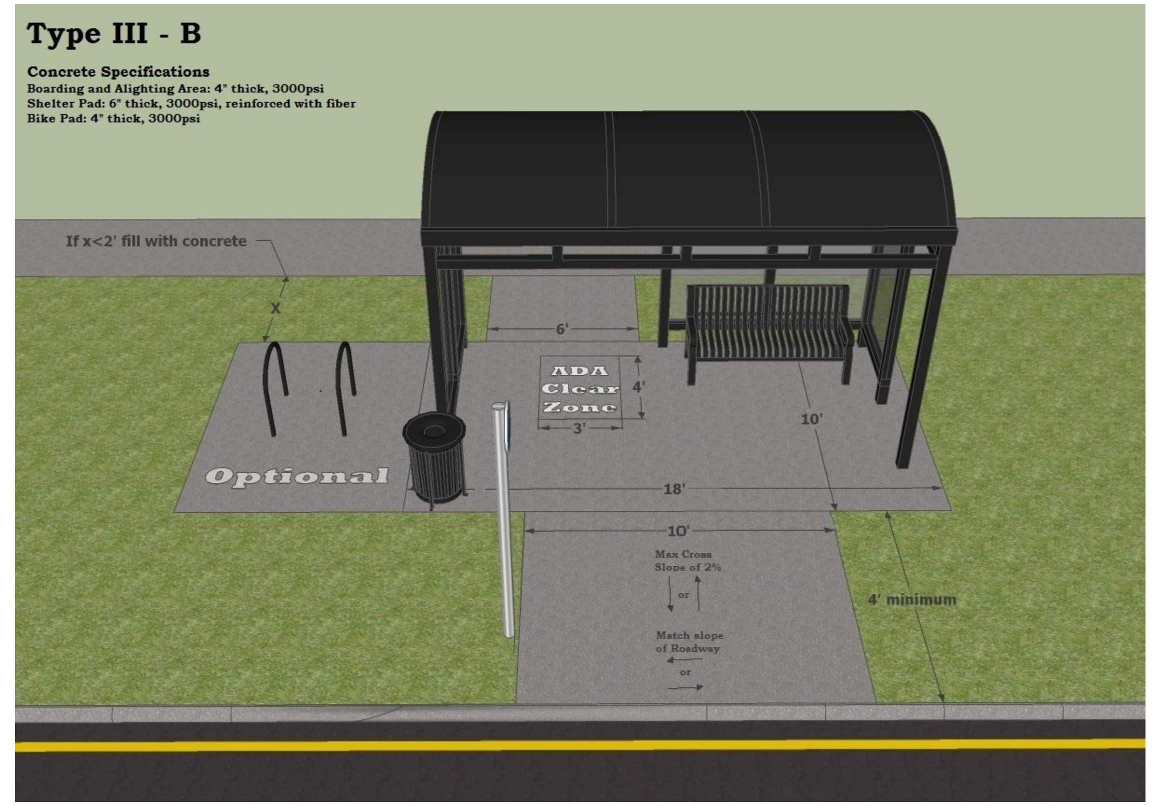
Beneficial

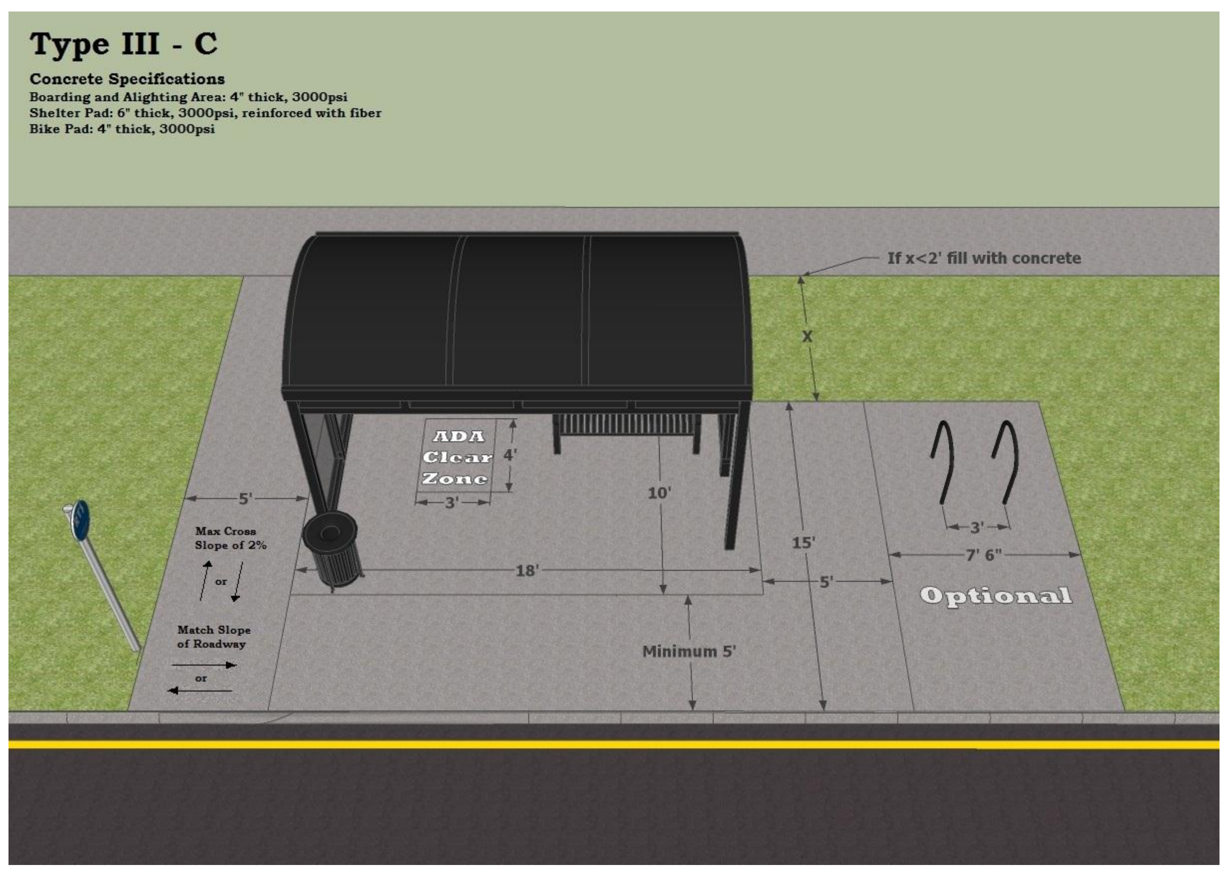
- Bicycle Storage
- Route map/schedule
- Leaning Rail

Optional

- Bus Shelter
- System map







Project:
Super Stop

Stop Type:
III

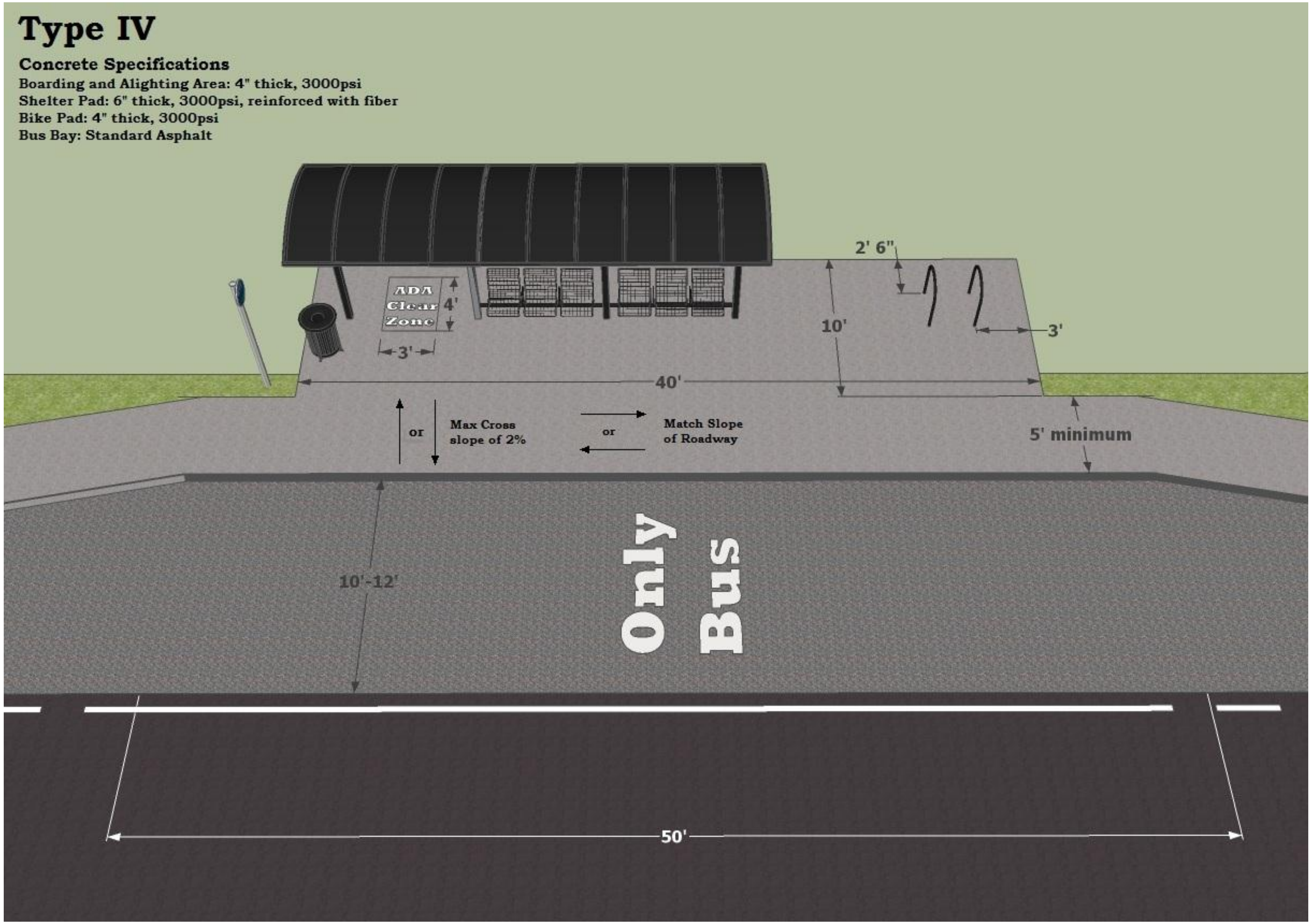
Description:
- 36 to 80 boardings per day
- High density mixed-use land use
- Neighborhood focal points, community centers, parks, schools

Amenities:

Essential
- Transit Sign
- ADA compliance
- Bench
- Trash Receptacle
- Stop Lighting
- Shelter
- Route map/schedule
- Landscaping

Beneficial
- Bicycle Storage
- System map
- Leaning Rail
- Bus Bays

Optional
- Emergency telephone
- Retail kiosk



Project:
Primary Super Stop

Stop Type:
IV

Description:
- More than 80 boardings per day
- High density mixed-use land use
- Major trip generators

Amenities:

Essential
- Transit Sign
- ADA compliance
- Bench
- Trash Receptacle
- Stop Lighting
- Bicycle Storage
- Shelter
- Bus Bay
- Route map/schedule
- Landscaping

Beneficial
- System map
- Leaning rail
- Newspaper stand
- Emergency telephone

Optional
- Retail kiosk