

ADDENDUM NO. FOUR

DATE: December 10, 2013
DEPARTMENT: Miami-Dade County Transit Department
ISD PROJECT NAME: Continuous Professional Services for NW 27th Avenue
Enhanced Bus Service – Bus Stations
ISD CONTRACT NUMBER: E13-MDT-02
SUBMITTAL DATE: December 18, 2013
CONSULTANT COORDINATOR: Faith Samuels

This Addendum is issued to clarify and/or modify the previously issued Notice to Professional Consultant (NTPC), and is hereby made part of the NTPC. All requirements of the NTPC not modified herein shall remain in full force and effect as originally set forth. Please be sure to acknowledge receipt of this Addendum on the Letter of Qualifications (LOQ) - Section (I) – Project Information.

MODIFICATIONS:

1. In Section 1.8 – Schedule, delete the following:

Deadline for Receipt of Questions: December 3, 2013 at 5:00 P.M. (Local Time)

And replace with the following:

Deadline for Receipt of Questions: December 12, 2013 at 5:00 P.M. (Local Time)

QUESTIONS:

Q1. Please advise if we are permitted to include an approach/methodology in our submittal?

A1. Proposers are permitted to include an approach/methodology in their submittal.

Q2. Can MDT provide copies of the draft Categorical Exclusion and all supporting documentation that were submitted to FTA?

A2. Refer to Attachment # 4 - Draft Categorical Exclusion for NW 27th Avenue Enhanced Bus Project, Miami-Dade County, Florida.

Q3. When is FTA expected to approve the Categorical Exclusions?

A3. January 31, 2014.

Q4. Please clarify the scope of work related to right-of-way engineering and right-of-way acquisition services.

A4. See scope of services - Major tasks include (1) Finalize the R/W needs as defined by the design, (2) Parcel sketches and legal descriptions, and (3) Title search.

Q5. When will the CSC be appointed and who are its members?

A5. A Competitive Selection Committee (CSC) has not been appointed at this time. A copy of the CSC appointment memo will be posted on the web at: <http://www.miamidade.gov/internalservices/competitive-selection-committee-memo.asp>, upon receipt by the Internal Services Department.

Q6. What are the anticipated funding sources for the project?

A6. The North Corridor Enhanced Bus Service (NW 27 Ave and NW 215th ST to the MIC) includes the following funding: FTA, FDOT and Peoples' Transportation Plan

Q7. What level of interagency coordination is anticipated during the concept refinement/PE process?

A7. Coordinate with Agencies Having Jurisdictions (AHJ) and Stakeholders including, but not limited to, work restrictions and local requirements to be incorporated in the PE phase.

Q8. What level of interagency coordination is anticipated during the final design process, including approvals and permits?

A8. Whatever it takes to receive dry run permit and approvals from the Agency Having Jurisdictions (AHJ) and Stakeholders.

Q9. Has MDT developed operating and maintenance policies and design criteria for Enhanced Bus Service? If so, can these be provided?

A9. MDT is currently developing these documents prior to the NTP.

Q10. What level of public involvement does MDT anticipate will be needed in the Corridor? Are Public Workshops sufficient or is a higher level of effort anticipated?

A10. Whatever it takes to receive countywide approval of the Station concept plans for the EBS.

Q11. Will MDT consider placing a page limit on the LOR, say 10-15 pages, exclusive of resumes, forms and organizational chart?

A11. No, there is no page limit noted in the NTPC.

Q12. Is the current Planning Consultant, Kimley-Horn and Associates, Inc., precluded from pursuing the project?

A12. This is currently being reviewed. However at this time, no firm is precluded.

Q13. Can MDT provide the NW 27th Avenue Enhanced Bus Service Concepts and Environmental Plan along with the related Appendices?

A13. Yes, refer to Attachments 1, 2 and 3.

ALL OTHER PROVISIONS OF THE ORIGINAL "NOTICE TO PROFESSIONAL CONSULTANTS" REMAIN UNCHANGED.

Attachments:

- 1 – Executive Summary – NW 27 Avenue
- 2 – NW 27 Avenue Enhanced Bus Service Concepts and Environmental Plan
- 3 – NW 27 Avenue Enhanced Bus Service Concepts and Environmental Study
- 4 – Draft Categorical Exclusions for NW 27 Avenue Enhanced Bus Project

cc: Jesus Valderrama, MDT

NW 27TH AVENUE

Enhanced Bus Service Concepts and Environmental Plan

EXECUTIVE SUMMARY

Table ES-2: Station Design Concepts

Station Location	Full Station	Slim Station
NW 199 th Street	●	
NW 183 rd Street	●	
NW 175 th Street	◐	◐
NW 160 th Street	◐	◐
Sesame Street	◐	◐
NW 135 th Street	●	
NW 113 th Street/ Miami-Dade College	●	
NW 103 rd Street	◐	◐
NW 79 th Street	◐	◐
NW 62 nd Street		●
NW 54 th Street		●

Notes: Northbound=◐ Southbound=◑ Northbound and Southbound=●

ENVIRONMENTAL DOCUMENTATION

As required under the National Environmental Policy Act (NEPA) for projects receiving federal funds, an evaluation was performed of the environmental effects of the project. Documentation was prepared and submitted to the Federal Transit Administration (FTA) for determination that the project meets the criteria for a NEPA Categorical Exclusion, which is applied to projects that do not have a significant environmental effect.

The environmental documentation summarizes the project's consistency with adopted transportation and land use plans. The environmental analysis determined that the project would not negatively impact traffic, historic and cultural resources, noise and vibration, contamination, community disruption and environmental justice, and ecologically sensitive areas and endangered species. The environmental analysis also determined that adverse construction-related impacts, such as dust and vibration, will be mitigated through the implementation of best management practices and adherence to all federal, state and local regulations.

ESTIMATION OF COSTS

Conceptual capital and operations and maintenance (O&M) costs were estimated as part of the NW 27th Avenue EBS Concepts and Environmental Plan and are summarized in Table ES-3.

Capital costs for the project includes new buses, the NW 215th Street transit terminal and park-and-ride facility and bus stations, roadway infrastructure improvements, right-of-way acquisition for bus stations, and signal and infrastructure required for queue jumps and bus bulbs. The capital cost estimate also includes a contingency to account for uncertainty in the scope of the project and the current conceptual level of project definition. As the NW 27th Avenue EBS project progresses through subsequent phases of project development and is better defined, the capital cost estimate for the project will be refined.

The O&M costs account for general bus operations and maintenance. There will be additional O&M costs for the NW 27th Avenue EBS project associated with the NW 215th Street transit terminal and park-and-ride facility and the other stations along the alignment.

Table ES-3: Capital and O&M Costs

Total Capital Costs	Net Change in Total Annual O&M Costs
\$30,226,000	\$2,136,000

PROJECT IMPLEMENTATION

A majority of the funding needed for the implementation of the NW 27th Avenue EBS project is already programmed in the Miami-Dade MPO's Transportation Improvement Program (TIP). A total of \$24.1 million in local, state and federal funds is included in the 2014 TIP under four separate project components. The timeline for the advancement of the project is provided in Table ES-4.

Table ES-4: Project Schedule

Phase	Year
Preliminary Engineering and Final Design	2014–2015
ROW/Construction	2015–2017
Revenue Service	2017

NW 27TH AVENUE

Enhanced Bus Service Concepts and Environmental Plan

EXECUTIVE SUMMARY

OVERVIEW

The NW 27th Avenue Enhanced Bus Service (EBS) Concepts and Environmental Plan was developed by the Miami-Dade Metropolitan Planning Organization (MPO) in coordination with Miami-Dade Transit (MDT) and other partner agencies. The NW 27th Avenue EBS will build upon the incremental approach of improving transit service that has recently been applied to the "North Corridor" with the implementation of the Route 297 Orange MAX service. The objective of this project is to enhance transit service and increase transit ridership along the corridor, while working toward the long term goal of implementing rail transit.

The NW 27th Avenue EBS will be anchored by the Miami Intermodal Center (MIC) on the southern end of the corridor, providing connectivity among Metrorail, Metrobus, Miami International Airport (MIA), Tri-Rail, Amtrak, and Greyhound. At the northern end of the corridor, a new transit terminal and park-and-ride facility will be constructed at NW 215th Street near the Broward County Line. Enhanced transit stations will be spaced at approximately one-mile intervals along the corridor and major destinations.

The NW 27th Avenue EBS will provide rapid bus service every 10 minutes during peak periods and every 20 minutes during the off-peak. Service will be provided in new 60-foot articulated alternative fuel buses, with low-floors for faster boarding and alighting, larger seating areas with additional leg room for comfort and Wi-Fi.



EBS BRANDED BUS

The major elements of the NW 27th Avenue EBS include:

- Transit signal priority (TSP)
- Bus queue jumps at several key intersections
- Transit terminal and park-and-ride facility
- State-of-the-art bus stations
- Distinctive service branding

The NW 27th Avenue EBS Concepts and Environmental Plan also estimated capital and operations and maintenance (O&M) costs for the project, and prepared an evaluation of the environmental effects of the project.



PROJECT LOCATION MAP

NW 27TH AVENUE

Enhanced Bus Service Concepts
and Environmental Plan

EXECUTIVE SUMMARY

SERVICE CHARACTERISTICS

The NW 27th Avenue corridor experiences strong peak morning and afternoon demands and loads on existing bus routes, but the corridor also exhibits considerable demand in the mid-day and off-peak periods, suggesting support for EBS throughout the day. The NW 27th Avenue EBS improves on the existing Route 297 Orange MAX service that operates on weekdays between 5:30 AM and 8:00 PM with 15 minute headways during the peak periods and 30 minute headways during the midday. The recommended hours of operation and headways for the NW 27th Avenue EBS are presented in Table ES-1.

Table ES-1: NW 27th Avenue Service Characteristics

Time Period	Hours	Headway
Proposed NW 27th Avenue EBS		
Morning Peak	5:30 AM to 9:00 AM	10 minutes
Midday	9:00 AM to 3:00 PM	20 minutes
Afternoon Peak	3:00 PM to 6:00 PM	10 minutes
Early Evening	6:00 PM to 8:00 PM	20 minutes
Existing 297 Orange Max		
Morning Peak	5:30 AM to 9:00 AM	15 minutes
Midday	9:00 AM to 3:00 PM	30 minutes
Afternoon Peak	3:00 PM to 6:00 PM	15 minutes
Early Evening	6:00 PM to 8:00 PM	30 minutes

at an intersection, thereby providing the transit vehicles with an advanced green (“a jump”) in relation to other vehicular traffic. Queue jump operations allow the transit vehicles to bypass the regular traffic through the use of special bus signal phasing. Queue jumps can also be an effective way to provide time savings to buses in corridors where it is not possible to dedicate a full travel lane as an exclusive bus lane. An analysis was performed to determine potential intersections along NW 27th Avenue for queue jump operations, and queue jump operations are recommended at the following intersections:

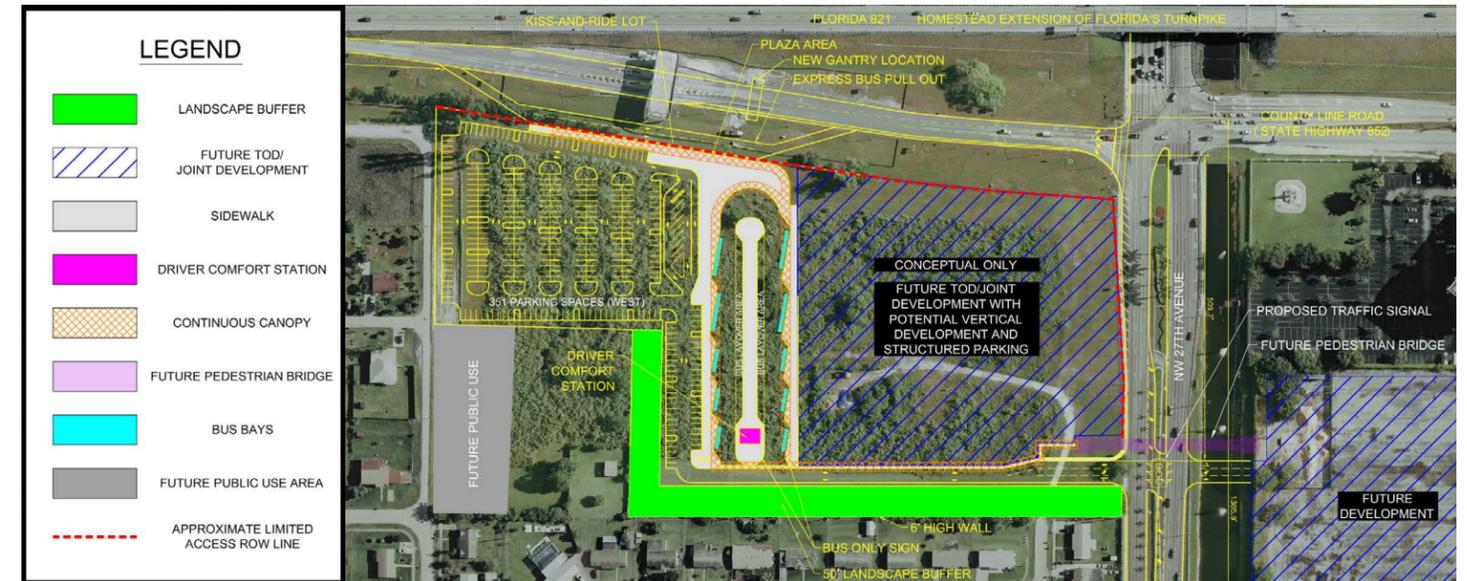
- NW 199th Street
- NW 119th Street
- NW 79th Street



QUEUE JUMP OPERATION

NW 215TH STREET TRANSIT TERMINAL AND PARK-AND-RIDE FACILITY

The NW 215th Street transit terminal and park-and-ride facility will be built on an approximately 14-acre property already owned by Miami-Dade Transit in the City of Miami Gardens. Approximately 350 park-and-ride spaces are proposed for the facility along with kiss-and-ride/short-term parking accommodations, approximately ten bus bays, passenger seating under canopies, and a bus driver comfort station. The facility will serve as a transit terminal for several MDT and Broward County Transit (BCT) bus routes and will facilitate transfers between the two systems. In addition, this facility will provide an end-of-the line layover for NW 27th Avenue EBS as well as MDT Route 27, eliminating the two-mile turnaround presently required. The property also provides long-term transit-oriented development (TOD) opportunities, and the facility will be designed in a manner to preserve space for future Metrorail station development.



CONCEPTUAL SITE PLAN FOR NW 215TH STREET TRANSIT TERMINAL AND PARK-AND-RIDE FACILITY

EBS STATION CONCEPTS

Enhanced transit stations will be spaced at approximately one-mile intervals along the NW 27th Avenue corridor. The stations will be branded and visibly recognizable as part of the NW 27th Avenue EBS, and will include the following elements.

- Enhanced shelters and seating
- Station marker or totem
- Ticket vending machines (TVMs)
- Real-time arrival traveler information displays
- Bicycle parking

Two station designs will be applied to the NW 27th Avenue EBS project:

- A full station concept that has a footprint 25 feet in length and 15 feet in width.
- A restricted right-of-way or “slim” station concept that has a footprint approximately 26 feet in length and 8 feet in width.

Full station design concepts are provided at station locations where existing right-of-way is sufficient or where a high level of boardings is anticipated. Slim station design concepts are provided at station locations where right-of-way is not sufficient

to accommodate a full station design concept and higher levels of boardings are not anticipated. Table ES-2 lists full and slim station design concept locations for the NW 27th Avenue EBS.

TRANSIT SIGNAL PRIORITY (TSP)

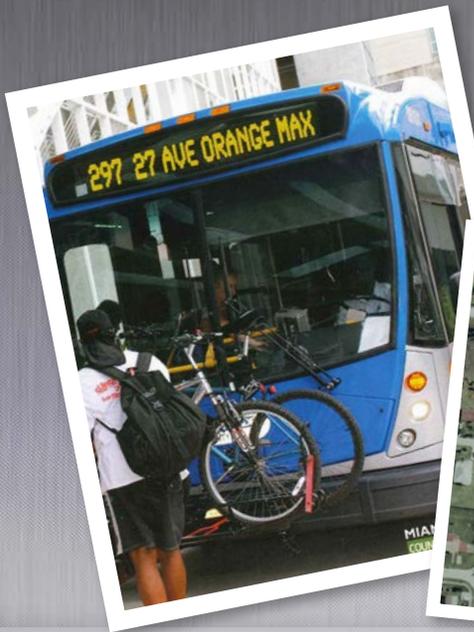
TSP changes traffic signal timing at intersections to give priority to transit vehicles and is a proven method to provide time savings and improve schedule adherence in corridors where it is not possible to dedicate an exclusive travel lane to buses. TSP for the NW 27th Avenue EBS will be based on headway logic. In headway based TSP operation, the signal priority is granted based on a pre-defined headway (spacing or frequency) between the buses. The bus transmits its TSP request to the intersection, and the priority request server manages the priority activity to maintain the desired headway between buses. Buses that arrive sooner than the defined headway will not receive priority and buses that arrive later will receive the benefit of TSP. A headway based TSP reduces “bunching” of buses along a route and thus improves system efficiency.

QUEUE JUMP/QUEUE BYPASS LANE OPERATIONS

Queue jump is a strategy where transit vehicles are provided the means to pull ahead of regular vehicular traffic that is stopped



EBS BRANDED STATION



NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan

Work Order #GPC IV-37



PREPARED FOR



PREPARED BY



Kimley-Horn and Associates, Inc.

NW 27th Avenue Enhanced Bus Service Concepts and Environmental Plan

Prepared for:



Miami-Dade County Metropolitan Planning Organization
(Miami-Dade MPO)

Prepared by:



Kimley-Horn and Associates, Inc.
Fort Lauderdale, Florida

Work Order # GPC IV-37
June 2013

“The preparation of this report has been financed in part from the U.S. Department of Transportation (USDOT) through the Federal Highway Administration (FHWA) and/or the Federal Transit Administration (FTA), the State Planning and Research Program (Section 505 of Title 23, U.S. Code) and Miami-Dade County, Florida. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.”



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APPENDICES

- Appendix A: Meeting Notes
- Appendix B: NW 215th Street Park-and-Ride Facility Alternative Access
- Appendix C: Station Location Summary
- Appendix D: Queue Jump Locations
- Appendix E: NW 215th Street Park-and-Ride Opinion of Probable Cost

INTRODUCTION AND STUDY PURPOSE

The Miami-Dade Metropolitan Planning Organization (MPO) initiated the *NW 27th Avenue Enhanced Bus Service (EBS) Concepts and Environmental Plan* to build upon prior work undertaken by Miami-Dade Transit (MDT) for the “North Corridor” and further develop strategies identified in the Near-Term Transportation Plan for Miami-Dade County (2012-2015). The Near-Term Transportation Plan for Miami-Dade County sets the stage for implementing transportation improvements along People’s Transportation Plan (PTP) corridors. The immediate step undertaken in this project is to enhance transit service and increase transit ridership with the implementation of rapid bus service, while working toward the long term goal of implementing rail transit.

The corridor for the NW 27th Avenue EBS project begins at the Miami Intermodal Center (MIC), located adjacent to Miami International Airport, and extends north along NW 27th Avenue from State (SR) 112 (Airport Expressway) to NW 215th Street at the Broward County Line. At the southern end of the project corridor, the MIC serves as an intermodal transportation terminal providing connectivity among Metrorail, Metrobus, Miami International Airport (MIA) via the MIA Mover, Tri-Rail (commuter rail), Amtrak (intercity rail), and Greyhound (intercity bus). At the northern end of the project corridor, a new transit terminal and park-and-ride facility will be constructed in the vicinity of NW 215th Street to serve as a transit terminal for the NW 27th Avenue EBS as well as local MDT Metrobus routes and Broward County Transit (BCT) routes. The long term vision includes the addition of transit-oriented development (TOD) at this terminal facility.



The Miami Intermodal Center will anchor the southern end of the NW 27th Avenue Enhanced Bus Service Route

Stations along the NW 27th Avenue EBS route will be spaced approximately every mile. The stations will provide enhanced passenger amenities including comfortable seating and protection from the elements and traveler information displays. The service will benefit from operational improvements including transit signal priority (TSP) and queue jumps at several key intersections. Frequent service is planned for the route consisting of 10-minute peak headway and 20-minute mid-day headway. Existing local bus service with more frequent stops will continue to operate along the corridor as MDT Route 27.

During the course of this project several key critical tasks were completed to develop the framework to advance the implementation of transit improvements in the NW 27th Avenue corridor including:



- Coordinating with stakeholder agencies such as Miami-Dade County Department of Regulatory and Economic Resources County Planning, Miami-Dade County Public Works and Waste Management Department (PWWMD) Traffic Signals and Signs Division (TS&S), and Florida's Turnpike Enterprise (FTE)
- Developing preliminary concepts for the NW 215th Street transit terminal and park-and-ride facility
- Developing project concepts and cost estimates for EBS stations
- Developing operating strategies for EBS service
- Preparing environmental documentation, as required under the National Environmental Policy Act (NEPA), consisting of a Documented Categorical Exclusion (23 CFR 771.117 (d)).

At the outset of the study, the Miami-Dade MPO designated a study advisory committee (SAC) whose members served as a steering panel to review study documents and assist in developing recommendations. The SAC met regularly throughout the course of the study, providing data and input. Representatives of the following agencies participated in the SAC.

- Miami-Dade MPO (Leading Agency)
- Miami-Dade Transit (MDT)
- Miami-Dade Citizen's Independent Transportation Trust (CITT)
- Miami-Dade County Public Works and Waste Management Department (PWWMD)
- City of Miami Gardens
- City of Opa-Locka
- Florida Department of Transportation (FDOT)

The following list summarizes various coordination activities conducted during the course of the project in chronological order.

- June 13, 2012: MDT strategy meeting
- July 5, 2012: Study Advisory Committee kick-off meeting
- August 1, 2012: Traffic Signals and Signs Division and MDT meeting
- October 3, 2012: Study Advisory Committee meeting #2
- October 22, 2012: FDOT and FTE meeting to discuss access to the NW 215th Street transit terminal and park-and-ride facility
- November 19, 2012: Study Advisory Committee meeting #3
- December 4, 2012: Calder Casino & Race Course meeting to discuss access to the NW 215th Street transit terminal and park-and-ride facility
- February 14, 2013: FDOT meeting to discuss access to the NW 215th Street transit terminal and park-and-ride facility.
- March 1, 2013: Study Advisory Committee meeting #4
- July 8, 2013: Miami-Dade MPO Transportation Planning Council (TPC)

Summary notes from these meetings are included in Appendix A.

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



The following sections present the project background, project description and purpose and need, station concepts, operating strategies, service plan, and capital and operations and maintenance (O&M) cost estimates for the NW 27th Avenue EBS project.

The environmental documentation for the project consisting of a Documented Categorical Exclusion, pursuant to the requirements of the National Environmental Policy Act (NEPA), is provided under separate cover.

CORRIDOR HISTORY AND BACKGROUND

The “North Corridor” area has been analyzed extensively over the last two decades with a history that includes proposals for both heavy rail (Metrorail) extension and the implementation of bus rapid transit (BRT) alternatives. A summary of the previous studies and planning efforts is provided below.

- Alternative Analysis Study, 1995
- Draft Environmental Impact Statement (DEIS), 1997
- Final Environmental Impact Statement (FEIS), 1999
- BRT Concept Evaluation Study, 2000
- Re-evaluation of the FEIS, 2002
- Supplemental Draft Environmental Impact Statement (SDEIS), 2004
- Revised FEIS, 2007
- Federal Transit Administration issued a Record of Decision (ROD) for the Metrorail extension project in April 2007 and a Finding of No Significant Impact (FONSI) was issued in November 2008
- Modal Analysis, 2009
- Near-Term Transportation Plan, 2010



In the early 1990s the Orange Line Phase II (North Corridor Metrorail Extension) was proposed. The Orange Line Phase II planned to extend the elevated heavy rail fixed guideway Metrorail service approximately nine miles in the NW 27th Avenue corridor from north of the Dr. Martin Luther King Jr. Station at NW 62nd Street to NW 215th Street at the Broward County Line.

In 1995, the Miami-Dade MPO completed the Alternatives Analysis study, which identified Metrorail/heavy rail as the Locally Preferred Alternative (LPA) for the Orange Line Phase II. FTA granted MDT approval to proceed with Preliminary Engineering for the corridor and the DEIS was completed in 1997. The DEIS was subsequently followed by the FEIS, which was completed 1999. However, the FEIS was never submitted to FTA because the one-cent sales tax referendum, intended to fund the Metrorail extension, failed.

After the failure of the one-cent sales tax referendum, the MPO and MDT began re-evaluating lower cost transit alternatives that could be financially feasible in the BRT Concept Evaluation Study (2000). As a result of this study, the LPA was revised from Metrorail to BRT. The BRT Concept Evaluation Study examined several different BRT alternatives including:

- One-lane reversible median bus lane
- Two-way busway on west side of NW 27th Avenue
- Concurrent flow northbound and southbound bus lanes
- Peak hour contra flow bus lane
- Buses in mixed traffic with TSP and queue jumps

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



The BRT Concept Evaluation Study concluded that (1) buses in mixed traffic with TSP and queue jumps and (2) concurrent flow northbound and southbound bus lanes should be evaluated further.

In 2002, the half-cent sales tax referendum passed. As a result, MDT and the Miami-Dade MPO refocused on Metrorail as the preferred alternative for the NW 27th Avenue corridor. The 1999 FEIS was reevaluated to address community concerns regarding the alignment and was submitted in 2004 as a Supplemental Draft Environmental Impact Statement (SDEIS). The SDEIS was approved by FTA in 2006 and the revised FEIS was approved by FTA in 2007. FTA issued a Record of Decision (ROD) for the project in 2007 and a Finding of No Significant Impact (FONSI) in 2008. However, the project received a New Starts rating of “medium-low” by FTA in 2008, as a budgetary funding shortfall was identified related to the financial capacity to maintain and operate the system.

The “medium-low” New Starts rating resulted in MDT again revisiting transit mode options in the 2009 Modal Analysis, which examined four transit modes.

- BRT
- BRT-Light/Enhanced Bus Service (EBS)
- Light Rail Transit (LRT)
- Heavy Rail Transit (HRT)

The 2009 Modal Analysis study concluded that the BRT options would be less costly to build, operate and maintain than the rail options.

In 2009 the Miami-Dade MPO’s Short-Term Transit Improvement Options (SSTIO) Task Force restructured the County’s bus system to focus on an incremental approach to building transit service and ridership in the County’s major corridors, including the “North Corridor.”



The limited stop Route 97 was replaced by the Route 297 Orange MAX service in 2012

In 2010, the Near Term Transportation Plan laid the groundwork for this *NW 27th Avenue Enhanced Bus Service Concepts and Environmental Plan*. The Near Term Transportation Plan outlined the modification of the existing limited-stop Route 97 to the enhanced Route 297 Orange MAX service, while also developing preliminary order of magnitude capital costs for the implementation of the next phase of the Enhanced Bus/BRT project. Subsequently, MDT received a \$1,000,000 grant from FTA’s Job Access Reverse Commute (JARC) program. This grant funding was used as operating funds for the implementation of the Route 297 Orange MAX service in 2012.

PROJECT DESCRIPTION AND PURPOSE AND NEED

Project Location

The “North Corridor” is a priority transit corridor in Miami-Dade County extending along NW 27th Avenue south from the Broward County Line at NW 215th Street to the Dr. Martin Luther King Jr. Metrorail Station near NW 62nd Street. The project limits for the NW 27th Avenue EBS project have been extended south to the Miami Intermodal Center (MIC) adjacent to Miami International Airport. The length of the study corridor is approximately 13 miles. The area is highly urbanized and major activity centers in the corridor include Miami-Dade College – North Campus (MDC), North Dade Health Center, St. Thomas University, Florida Memorial College, Miami Jobs Center, Sun Life Stadium, and Calder Casino & Race Course. See Figure 1 for a Project Location Map.

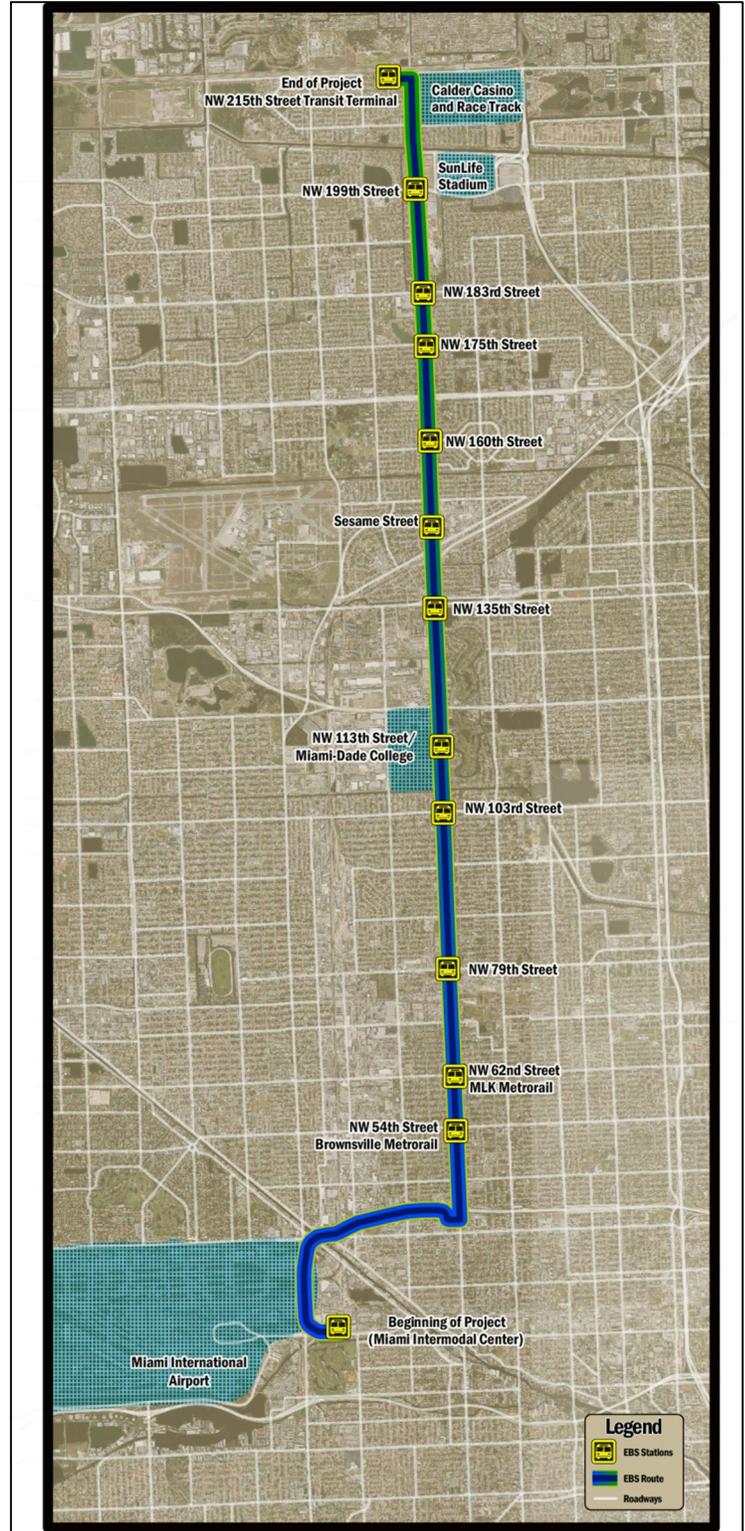


Figure 1: Project Location Map

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



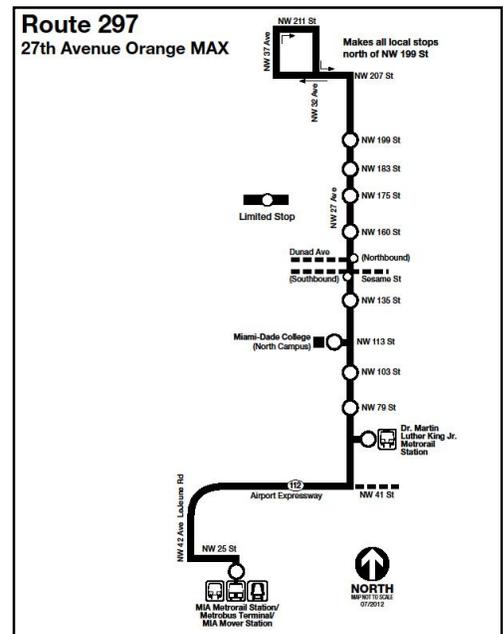
Existing Transit Service



Route 27 provides local service in the corridor and is one of the most heavily utilized routes in the MDT system

Two MDT bus routes currently serve the NW 27th Avenue corridor. Route 27 provides local bus service between NW 211th Street to the north and Coconut Grove to the south. Route 27 operates 24 hours per day with 15 minutes headway throughout the day and longer headway (generally between 30 to 60 minutes) during overnight hours. Route 27 provides about six stops per mile, which provides a high level of accessibility for riders but results in long running times, requiring approximately 105 minutes to complete a one-way trip. Thus, Route 27 is effective for short trips but its slower travel times makes the route less effective for longer distance trips. Route 27 is one of the most heavily utilized routes in the MDT system with an average ridership of approximately 10,000 daily riders.

In July 2012, MDT implemented the Route 297 Orange MAX service in the NW 27th Avenue corridor between NW 207th Street and the MIC as Phase 1 of proposed Enhanced Bus Service. This new service replaced the prior Route 97 (27th Avenue MAX) service. The Route 297 Orange MAX service operates on weekdays between 5:30 AM and 8:00 PM with 15 minutes headway during the peak periods and 30 minutes headway during the midday. Stops are spaced at approximately one-mile intervals along the limited-stop service, resulting in enhanced travel times along the route in comparison to the Route 27. In addition, the Route 297 Orange MAX service was extended south, from the prior terminus of the Route 97 at the Dr. Martin Luther King Jr. Metrorail Station, to provide residents of the corridor a one-seat ride to the MIC.



Project Description

The NW 27th Avenue EBS project will build upon the incremental approach of improving transit service that has recently been applied to the “North Corridor” with the implementation of the Route 297 Orange MAX service, which is viewed as Phase 1 of Enhanced Bus Service. The NW 27th Avenue EBS project represents Phase 2 of proposed Enhanced Bus Service in the corridor.

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



The frequency of the rapid bus service in the corridor will be improved to every 10 minutes during peak periods and every 20 minutes during the off-peak. Service will be provided in new branded 60-foot articulated diesel/electric hybrid or alternative fuel buses with low-floor design for faster boarding and alighting. The buses will be equipped with Wi-Fi and provide larger seating areas with additional leg room for comfort. The buses will utilize general purpose traffic lanes; however, the proposed NW 27th Avenue EBS will benefit from transit signal priority (TSP) for improved travel time and schedule adherence. In addition, bus queue jumps will be provided at several key intersections along the corridor.



Route 297 Orange MAX represents Phase 1 of implementation of Enhanced Bus Service

Enhanced transit stations will be spaced at approximately one-mile intervals along the corridor. Passenger amenities at the stations will include improved shelters and seating along with power, lighting, and real-time arrival traveler information displays. The stations will be branded and visibly recognizable as part of the NW 27th Avenue EBS.

An end-of-the-line transit terminal and park-and-ride facility will be constructed near the Broward County Line at NW 215th Street. The transit terminal and park-and-ride facility will be built on an approximately 14-acre property owned by Miami-Dade Transit within the political jurisdiction of the City of Miami Gardens. Approximately 350 park-and-ride spaces are proposed for the facility along with kiss-and-ride/short-term parking accommodations, approximately ten bus bays, passenger seating under canopied areas, and a bus driver comfort station. The facility will serve as a transit terminal for several MDT and BCT routes and will facilitate transfers between the two systems. In addition, this facility will provide an end-of-the line layover for NW 27th Avenue EBS as well as Route 27, eliminating the two-mile turnaround presently required. The property also provides long-term transit-oriented development opportunities, and the facility will be designed in a manner to preserve space for future Metrorail station development.



MDT owns a 14-acre site at NW 215th Street that will accommodate an end-of-the line transit terminal and park-and-ride facility at the northern terminus of the NW 27th Avenue Enhanced Bus project

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Purpose and Need

The NW 27th Avenue corridor has a relatively young and a high minority (African-American) population. The area is predominantly low-income and automobile ownership is low in the corridor. A high proportion of corridor residents are transit dependent. The NW 27th Avenue EBS project is intended to provide premium limited-stop transit service along the NW 27th Avenue corridor, from NW 215th Street at the Broward County Line to the MIC, to enhance mobility for area residents. Transit connections at the MIC via Metrorail provide access to activity and job centers including the Health District, Government Center, and Downtown Miami.



The NW 27th Avenue Enhanced Bus project will attract additional transit riders building toward future rail service in the corridor

NW 27th Avenue is one of the few continuous north-south arterials within Miami-Dade County. Travel patterns within the North Corridor tend to be in the north-south direction, since NW 27th Avenue serves as a primary gateway corridor between Broward County and central Miami-Dade County. Existing bus service operates in mixed-flow traffic lanes where buses often travel in congested traffic conditions, creating lengthy transit travel times and unreliable schedule adherence. The NW 27th Avenue EBS project's intelligent transportation systems (ITS) and operational improvements, including TSP and queue jumps/queue bypass lanes, will reduce travel time and improve schedule adherence.

This project will provide an attractive alternative transportation mode by connecting major activity centers in the corridor such as Miami-Dade College North Campus, North Dade Health Center, St. Thomas University, Sun Life Stadium, Walmart Supercenter, Calder Casino & Race Course, Miami Gardens City Hall Complex, Miami Jobs Corps Center, North Dade Regional Library, and Jackson North Specialty and Diagnostic Center. Route 27 along NW 27th Avenue is one of the most utilized routes in the MDT system with an average daily ridership of approximately 10,000. This project will provide a convenient alternative to driving and, based on travel forecast estimates included in the 2010 Near Transportation Plan, will attract an additional 1,200 daily transit riders, thus building ridership for future rail service in the corridor.

In response to Miami-Dade County policies, the NW 27th Avenue corridor needs a transportation alternative that will not contribute to additional ozone emissions to the local airshed and will help to maintain the County's federal designation as an air quality maintenance area for ozone. The use of diesel/electric hybrid or alternative fuel buses will result in improved fuel efficiency and carbon reduction, while promoting transit use to reduce vehicle miles traveled.

Development and redevelopment efforts within the corridor are hampered by the lack of good accessibility and mobility. Throughout the corridor there are opportunities for in-fill development and redevelopment with additional density. There is a need to provide transit services in the corridor to support current and future redevelopment efforts. Policies of Miami-Dade County encourage TOD at nodes around rapid transit stations. There are extensive opportunities for TOD in the corridor including within the Cities of Opa-Locka and Miami Gardens, both of which are supportive of these efforts. Thus, the project will provide an economic benefit to the businesses and residents of the corridor.

ENHANCED BUS SERVICE STATIONS

NW 215TH STREET TRANSIT TERMINAL AND PARK-AND-RIDE FACILITY

Overview

MDT owns an approximately 14-acre property at the north end of the NW 27th Avenue corridor which will accommodate an end-of-the-line transit terminal and park-and-ride facility. The site is located on the west side of NW 27th Avenue immediately south of the Homestead Extension of Florida's Turnpike (HEFT) within the political jurisdiction of the City of Miami Gardens.

The NW 215th Street transit terminal and park-and-ride facility will function as an intermodal transit terminal anchoring the northern end of the NW 27th Avenue EBS project. The facility will be designed to include approximately 350 park-and-ride spaces, ten bus bays including several bays large enough to accommodate 60-foot articulated buses, a bus driver comfort station, passenger seating under canopied areas, and circulation aspects including an area for kiss-and-ride. The facility will serve as a terminal for several MDT and BCT routes and will facilitate transfers between the two systems.

This facility will provide an end-of-the line layover and turnaround for the NW 27th Avenue EBS and Route 27. Presently, the northbound buses on these routes must deviate approximately one to two miles from NW 27th Avenue to turnaround to head back south. The elimination of this turnaround will provide operational efficiencies saving approximately ten minutes on each run along the routes.

The facility will also be designed in a manner to preserve opportunity for future transit-oriented development (TOD) on the site, accommodating whatever development associated with the transit use that is deemed of highest and best use. The TOD should provide complimentary uses that capitalize on proximity to a transit station. The TOD should focus and stimulate density around the transit terminal and promote the use of transit. The development of the transit terminal and park-and-ride facility at the site will act as a catalyst to help leverage the overall mixed-use development of the site.

The design needs to be flexible enough to evolve as transit matures in the future. The long term vision is that the NW 27th Avenue EBS project will build ridership in the corridor setting the stage for a future Metrorail extension. The design should be able to accommodate future connectivity to a Metrorail station on the east side of NW 27th Avenue and provide the opportunity to increase parking capacity through the addition of a parking structure.



The MDT owned-property at NW 215th Street is large enough to accommodate future TOD in addition to transit and park-and-ride facilities

Miami-Dade Department of Regulatory and Economic Resources – Land Use Planning and Transit Study

The Miami-Dade County Department of Regulatory and Economic Resources (RER) conducted a Land Use Planning and Transit Study for the MDT-owned property at NW 215th Street and NW 27th Avenue. Consistent with the Miami-Dade County Comprehensive Development Master Plan (CDMP) designation as a Community Urban Center (CUC), the site is envisioned to accommodate transit facilities and TOD, while serving as a gateway into the City of Miami Gardens.

Over the course of the Land Use Planning and Transit Study, extensive effort was made to coordinate with residents of the area, public agencies, the private sector, and stakeholders. Public meetings were held where a general project overview was provided and residents and stakeholders developed visions for the site. Participants generally indicated that vehicular access connectivity was not desired between the site and the surrounding residential neighborhood, transit uses should be situated as far away from the surrounding residences as possible and be adequately buffered, and development should be a mix between commercial and office with no residential development.

Several schematic design concepts were developed during the course of the Land Use Planning and Transit Study. Each of the concepts included the following.

1. Higher intensity of development than the surrounding area but sensitivity to the surrounding context
2. Mixture of uses
3. Network of streets, greenspaces, and pedestrian/bicycle paths
4. Bus bays and transit facilities situated as far away from existing homes as possible
5. Access connectivity to the adjacent residential neighborhood should be limited to pedestrian/bicycle gates



Conceptual Master Plan Option developed in the Land Use Planning & Transit Study for NW 215th Street and NW 27th Avenue

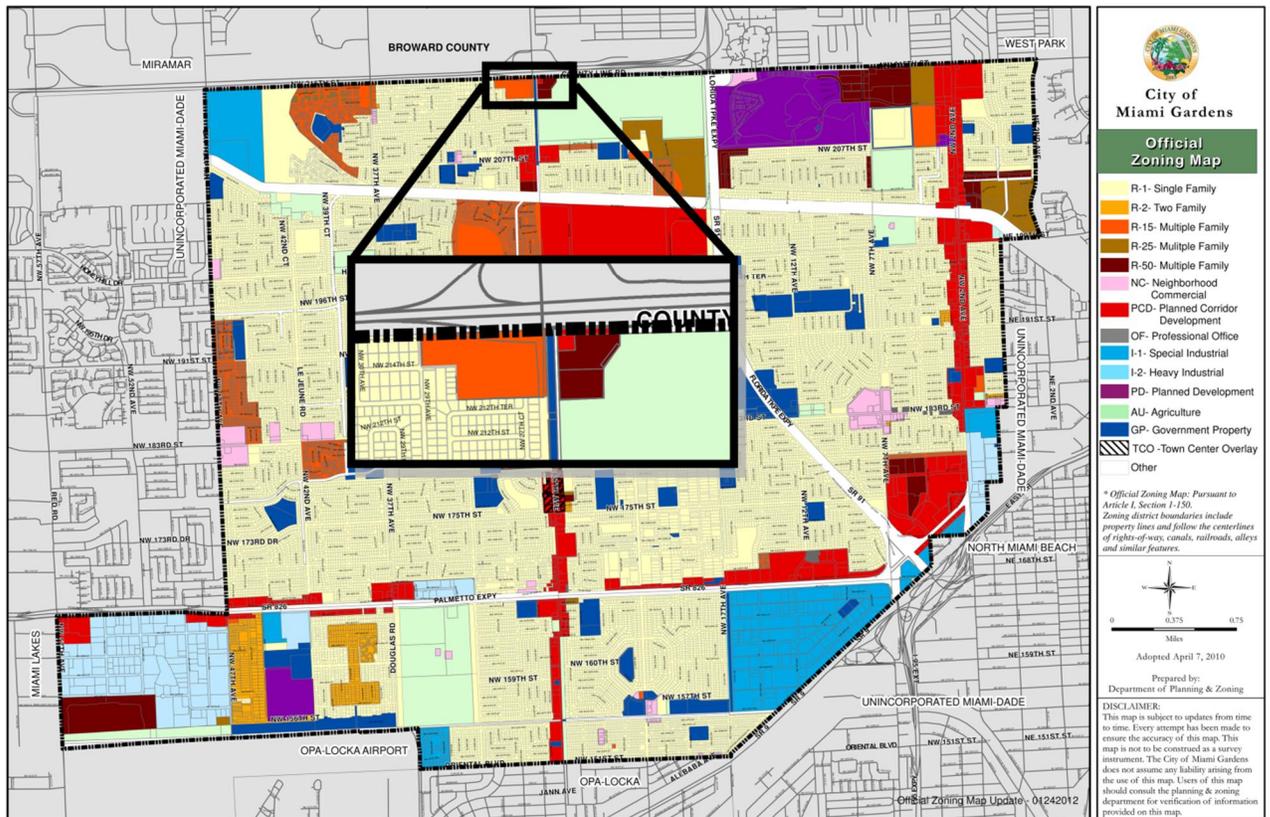
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Zoning Map and Future Land Use Map Designation

The NW 215th Street transit terminal and park-and-ride facility site is within the political jurisdiction of the City of Miami Gardens. The majority of the site is within an R-15 (Multiple Family) residential zoning district. Approximately 1 acre at the southwest corner of the site is within an R-1 (Single Family) residential zoning district. The zoning map is provided as Figure 2. The R-15 district provides for one-family attached and detached, two-family and multiple-family dwellings at low-medium densities, essential services and facilities, and select public and institutional uses. The R-1 Single-Family Dwelling Residential District provides for one-family detached dwelling units at low densities, essential services and facilities, and select public and institutional uses. Since a transit terminal and park-and-ride facility is not a use that is allowed as a matter of right in these zoning districts, City of Miami Gardens staff has indicated that the site will need to be rezoned to PCD (Planned Corridor Development).

Figure 2: City of Miami Gardens Zoning Map

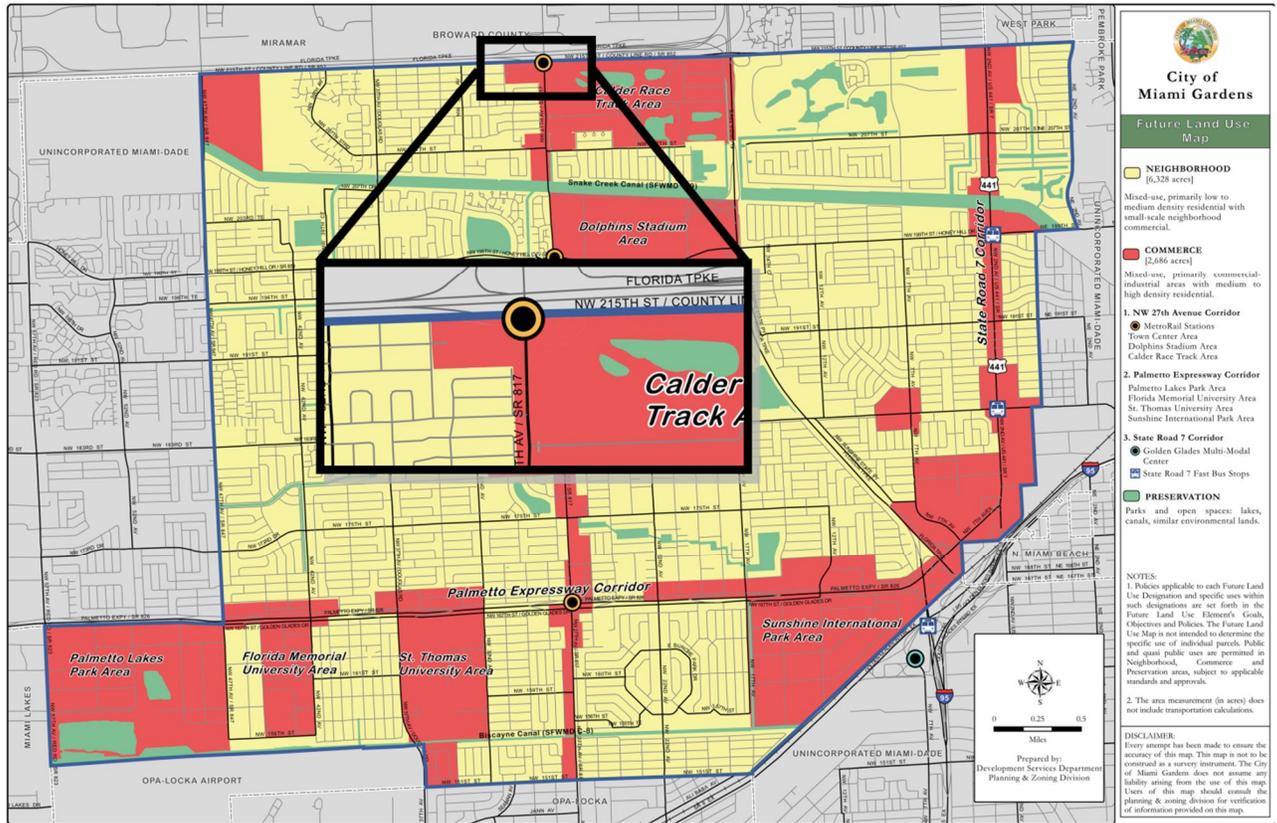


The future land use map designation of the NW 215th Street transit terminal and park-and-ride facility site is Commerce. The future land use map is provided as Figure 3. According to the City of Miami Gardens Comprehensive Development Master Plan (CDMP), the Commerce land use designation is intended for planned urban commercial, industrial, and economic hubs, and the location of Commerce areas shall emphasize access to public transportation. Developing the NW 215th Street site with a transit terminal and park-and-ride facility is consistent with and will not require an amendment to the City of Miami Gardens CDMP.

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Figure 3: City of Miami Gardens Future Land Use Map



Vehicular Access Considerations

FDOT maintains jurisdiction over NW 27th Avenue including access management, which controls the location and spacing of driveway connections, median openings, and traffic signals along the corridor. In the area of NW 215th Street, NW 27th Avenue is an Access Class 5 roadway with a posted speed limit of 45 miles per hour (mph). Table 1 provides a summary of minimum FDOT spacing criteria for various access connection types for an Access Class 5 roadway.

Table 1: FDOT Access Management Criteria for NW 27th Avenue (Access Class 5)

Access Type	Minimum FDOT Spacing
Minimum Connection Spacing (Right-in/right-out)	245 feet
Minimum Directional Median Opening Spacing (Right-in/right-out and left-in)	660 feet
Minimum Full Median Opening Spacing (Right-in/right-out and left-in/left-out)	1,320 feet
Minimum Signal Spacing	1,320 feet



Two other factors impact the location of vehicular access connections to the proposed NW 215th Street transit terminal and park-and-ride facility.

1. Community participants in the Land Use Planning and Transit Study led by the Miami-Dade County Department of Regulatory and Economic Resources County Planning generally indicated that vehicular access connectivity was not desired between the site and the surrounding residential neighborhood. Access connectivity to the adjacent residential neighborhood should be limited to pedestrian/bicycle gates.
2. A limited access right-of-way line associated with the HEFT extends south from the HEFT across much of the site's frontage along NW 27th Avenue. Staff from Florida's Turnpike Enterprise (FTE) indicated that vehicular access connections should not be designed to cross the limited access right-of-way line because there is opportunity to provide a connection between the site and NW 27th Avenue to the south of the limited access right-of-way line.

Twelve access alternatives were developed for the site and are summarized in Table 2. Implementation challenges associated with the access alternatives are also summarized in Table 2. Sketches depicting the access alternatives, along with a survey of the property that depicts the HEFT limited access right-of-way line, are provided in Appendix B.

Based on implementation challenges associated with FDOT access management criteria, community preferences, and the HEFT limited access right-of-way line, several of the access alternatives to the site were eliminated from further consideration. Alternatives 2C, 2D, 3A, 3B, 3C, and 3D were not considered to be viable because bus access to the site would be through the adjacent residential community.

Alternatives 1A, 2A, 4, and 5 appear to be the most viable vehicular access options for the site, as these alternatives do not require bus access through the adjacent residential community. However, even these alternatives require an FDOT access management variance for the vehicular access connection to NW 27th Avenue, as well as variances from FTE for the access connections to NW 27th Avenue and/or the HEFT off-ramp for northbound and eastbound buses exiting the site.

Preliminary Transit Terminal and Park-and-Ride Facility Concepts

Conceptual site plans were developed for the NW 215th Street transit terminal and park-and-ride facility. The schematic design concepts developed in the Miami-Dade County Department of Regulatory and Economic Resources County Planning's Land Use Planning and Transit Study were reviewed along with the input received from the community during the course of that study. Design criteria considered in the development of the conceptual site plans included:

1. Approximately 350 park-and-ride spaces
2. 10 bus bays including several bays large enough to accommodate 60-foot articulated buses
3. Passenger seating and waiting areas under canopies
4. Designated area for kiss-and-ride
5. Bus driver comfort station
6. Bus bays and transit facilities situated as far away from residences as possible
7. Buffer along the perimeter of the site adjacent to residences



8. FDOT access management criteria and HEFT limited access right-of-way line for vehicular access connections
9. Limiting access connections to surrounding residential neighborhood to only pedestrians and bicycles
10. Preserving space for future TOD
11. Preserving opportunity for future Metrorail station development and parking structure

Conceptual site plans were developed for Alternatives 1A, 2A, 4, and 5 for the NW 215th Street transit terminal and park-and-ride facility. All four alternatives require a combination of variances with FDOT and FTE, and three of the alternatives require collaboration with Calder Casino and Race Course. Processing an FDOT access management variance requires submittal of engineering plans for an FDOT permit and proceeding through a variance committee hearing. Conceptual site plans are contained in Appendix B for Alternatives 1A, 2A, and 4.

Figure 4 presents the conceptual site plan for Alternative 5, which is the preferred alternative. This alternative consists of relocating the existing northernmost Calder Casino and Race Course driveway on NW 27th Avenue to align with the vehicular access connection to the NW 215th Street park-and-ride facility. This new intersection would be signalized. A conceptual site plan was prepared for illustrative purposes to show how this alternative could work with the potential redevelopment of the Calder Casino and Race Course property, as well as also providing a future pedestrian overpass to connect the east and west sides of NW 27th Avenue. The new proposed full median opening and traffic signal on NW 27th Avenue would require an access management variance from FDOT. A direct connection with 95 Express buses would be provided along the HEFT off-ramp within FTE right-of-way.



Table 2: NW 215th Street Park-and-Ride Vehicular Access Alternatives

Alternative	Access Configuration	Implementation Challenges
1	Full signalized access at existing northbound left-turn/U-turn lane on NW 27 th Avenue.	<ul style="list-style-type: none"> This alternative does not meet FDOT’s access management criteria and would also require crossing the HEFT’s limited access right-of-way line. Therefore, variances will be required from FDOT and FTE.
1A	Directional access at existing left-turn lane: right-in/right-out and left-in. Northbound and eastbound buses exit facility onto HEFT off-ramp. North Calder Casino & Race Course driveway to remain open.	<ul style="list-style-type: none"> Requires FDOT variance for directional median opening spacing. Will require crossing the FTE limited access right-of-way line on NW 27th Avenue and at the HEFT off-ramp connection, thus requiring FTE variances.
2A	Directional access south of HEFT’s limited access right-of-way line: right-in/right-out and left-in. Northbound and eastbound buses exit facility onto HEFT off-ramp. North Calder Casino & Race Course driveway to remain open.	<ul style="list-style-type: none"> Requires FDOT variance for directional median opening spacing. Will require crossing the FTE limited access right-of-way line at HEFT off-ramp connection, thus requiring FTE variance.
2B	Directional access south of HEFT’s limited access line: right-in/right-out and left-in. Northbound and eastbound buses exit facility onto HEFT off-ramp. North Calder Casino & Race Course driveway to be closed.	<ul style="list-style-type: none"> Requires Calder Casino & Race Course agreement to close north driveway. May require an FDOT variance for directional median spacing. Will require crossing the FTE limited access right-of-way line at HEFT off-ramp connection, thus requiring FTE variance.
2C	Directional access south of HEFT’s limited access right-of-way line: right-in/right-out and left-in (car only). NW 27 th Court bus entering/exiting access connection.	<ul style="list-style-type: none"> Requires FDOT variance for directional median spacing. Requires improvements to the northbound left-turn lane at the intersection of NW 27th Avenue and NW 211th Street. Not consistent with community’s desire to restrict vehicular access through residential neighborhood.
2D	Directional access south of HEFT’s limited access right-of-way line: right-in/right-out and left-in (car only). NW 29 th Avenue bus entering/exiting access	<ul style="list-style-type: none"> Requires FDOT variance for directional median spacing. Requires roadway improvements to NW 29th Avenue. Requires improvements to the northbound left-turn lane at the intersection of NW 27th Avenue and NW 211th Street. Not consistent with community’s desire to restrict vehicular access through residential neighborhood.
3A	NW 27 th Avenue: right-in/right-out NW 27 th Court bus entering/exiting access	<ul style="list-style-type: none"> Requires improvements to the northbound left-turn lane at the intersection of NW 27th Avenue and NW 211th Street. Not consistent with community’s desire to restrict vehicular access through residential neighborhood.
3B	NW 27 th Avenue: right-in/right-out access NW 29 th Avenue bus entering/exiting access	<ul style="list-style-type: none"> Requires roadway improvements to NW 29th Avenue. Requires improvements to the northbound left-turn lane at the intersection of NW 27th Avenue and NW 211th Street. Not consistent with community’s desire to restrict vehicular access through residential neighborhood.
3C	NW 27 th Avenue: right-in/right-out access NW 27 th Court: bus entering access HEFT off-ramp: bus exiting access	<ul style="list-style-type: none"> Requires improvements to the northbound left-turn lane at the intersection of NW 27th Avenue and NW 211th Street. Will require crossing the FTE limited access right-of-way line at HEFT off-ramp connection, thus requiring FTE variance. Not consistent with community’s desire to restrict vehicular access through residential neighborhood.



Table 2: NW 215th Street Park-and-Ride Vehicular Access Alternatives (Continued)

Alternative	Access Configuration	Implementation Challenges
3D	NW 27 th Avenue: right-in/right-out access NW 29 th Avenue: bus entering access HEFT off-ramp: bus exiting access	<ul style="list-style-type: none"> • Requires roadway improvements to NW 29th Avenue. • Requires improvements to the northbound left-turn lane at the intersection of NW 27th Avenue and NW 211th Street. • Will require crossing the FTE limited access right-of-way line at off-ramp connection. • Not consistent with community's desire to restrict vehicular access through residential neighborhood.
4	A new signalized intersection would be created aligning with a new driveway connection to the Calder Casino & Race Course property south of HEFT's limited access right-of-way line. The existing Calder Casino & Race Course northernmost driveway would be converted from a full median opening to right-in/right-out access.	<ul style="list-style-type: none"> • This alternative requires FDOT access management variances for full median opening spacing and signal spacing.
5	Similar to Alternative 4 with space reserved for future pedestrian overpass to connect the east and west sides of NW 27 th Avenue. A direct connection with 95 Express buses would be provided along the HEFT off-ramp.	<ul style="list-style-type: none"> • This alternative requires FDOT access management variances for full median opening spacing and signal spacing. • Requires constructing a bus pullout lane in FTE right-of-way adjacent to the HEFT off-ramp.



NW 27TH AVENUE ENHANCED BUS SERVICE STATIONS

Overview

Stations along the NW 27th Avenue EBS route will be spaced approximately every mile. Passenger amenities at the stations will include improved shelters and seating along with power, lighting, ticket vending machines (TVMs), and real-time arrival traveler information displays. The stations will be branded and visibly recognizable as part of the NW 27th Avenue EBS system.

At the southern end of the project, the bus depot at the Miami Central Station (MCS) within the Miami Intermodal Center (MIC) will serve as the terminal station. Connectivity at this transportation terminal will be provided to Metrorail, Metrobus, MIA via the MIA Mover, Tri-Rail (commuter rail), Amtrak (intercity rail), and Greyhound (intercity bus).

At the northern end of the project, the new transit terminal and park-and-ride facility in the vicinity of NW 215th Street will serve as the terminal station. Connectivity at this transit terminal will be provided to local Metrobus routes, BCT routes, and 95 Express routes.

A total of 11 intermediary stations in each direction are proposed along the approximately 13-mile route between the MIC and NW 215th Street transit terminal and park-and-ride facility. NW 27th Avenue EBS stations will be constructed in the vicinity of the following cross streets:

- NW 54th Street/Brownsville Metrorail
- NW 62nd Street/Dr. Martin Luther King Jr. Metrorail
- NW 79th Street
- NW 103rd Street
- NW 113th Street/Miami-Dade College
- NW 135th Street
- Sesame Street
- NW 160th Street
- NW 175th Street
- NW 183rd Street
- NW 199th Street

Recommendations for specific station locations and station design concepts are presented next.

Station Location Determination

Station locations for the NW 27th Avenue EBS project were determined based on consideration of the following factors.

- Near-side or far-side station
 - Nearby passenger destinations
 - Lack of viable far-side location
- Distance to cross street intersection
- Station design concept (Full Station versus Slim Station)
 - Available/required right-of-way
 - Anticipated boarding levels based on existing Route 297 ridership



Several field reviews were performed during the process of identifying optimum station locations. An initial field review was performed to identify potential locations for each station. A second field review was performed with several members of the study advisory committee (SAC) to refine the viable station locations. Preliminary recommendations for station locations were then presented to the full SAC. Concerns were raised related to several of the station locations, including the preliminary recommendations for NW 183rd Street (northbound only), NW 175th Street, and NW 54th Street. A third field review was conducted to refine the recommended locations for these stations, which were subsequently endorsed by the SAC.

The following sections summarize the consideration of the factors that determined the station locations for the NW 27th Avenue EBS project.

Near-Side or Far-Side Station Locations

Stations can be located on the near-side of an intersection, on the far-side, or at mid-block. In general, far-side stations are preferable, especially when the system benefits from transit signal priority (TSP). Far-side stations facilitate the process for signal controllers to react to requests for priority and for buses to clear the intersection. Far-side stops may also lessen vehicle conflicts with right-turn vehicles that may occur at near-side stops. Finally, far-side stops also may provide gaps created by the intersection for buses to merge back into the traffic stream. On the other hand, near-side stations could result in false requests for TSP at signalized intersections when buses dwell at stations. Mid-block stations pose challenges for pedestrians trying to cross the corridor and increase walking distance for riders transferring from routes along cross streets. Based on the above factors, the SAC determined that far-side station locations were generally preferred wherever viable.

For the NW 27th Avenue EBS project, far-side locations were identified for all the stations along the southbound direction of the route. However, due to unique considerations or constraints, near-side locations are recommended for four stations along the northbound direction of the route:

- NW 135th Street – near-side station location is recommended because the closest opportunity to locate a far-side station is approximately 400 feet north of the intersection.
- NW 175th Street – near-side station location is recommended because a viable location for a far-side station could not be identified.
- NW 183rd Street – near-side station location is recommended because the closest opportunity to locate a far-side station is approximately 450 feet north of the intersection.
- NW 199th Street – near side station is recommended due to proximity to adjacent retail development anchored by Walmart, which is the major activity center in the area.

Station Distance to Cross Street Intersection

Stations should be located in close proximity to cross street intersections, so passengers transferring between routes have shorter distances to walk and are more likely to cross the corridor within the designated crosswalks at the intersections rather than at undesignated mid-block locations. The preferred location of stations is within 300 feet of the cross street intersections. Due to the presence of driveways, structures, or major activity centers, the recommended station locations exceed the 300-foot criteria for several stations along the NW 27th Avenue EBS project. However, all the recommended station locations

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



are within 450 feet of the cross street intersections. The station locations exceeding the 300-foot criteria from the adjacent intersection are listed below.

- Sesame Street – the recommended northbound station location is approximately 350 feet north of Sesame Street.
- NW 183rd Street – the recommended southbound station location is approximately 350 feet south of NW 183rd Street adjacent to the Carol-Mart retail development.
- NW 199th Street – the recommended southbound station location is approximately 440 feet south of NW 199th Street and the recommended northbound station location is approximately 350 feet south of NW 199th Street, adjacent to the retail development anchored by Walmart.



Station location impacts pedestrian safety as illustrated by pedestrians crossing NW 27th Avenue mid-block to access a station on the other side of the corridor

Preliminary Enhanced Bus BRT Station Design Concepts



Full station design concepts are appropriate for locations where high levels of boardings are anticipated, such as NW 183rd Street

Two station designs were developed for enhanced bus service in Miami-Dade County, which will be applied to the NW 27th Avenue EBS project. The station design concepts are a full station (see Figure 5) that has a footprint 25 feet in length and 15 feet in width and a restricted right-of-way or “slim” station (see Figure 6) that has a footprint approximately 26 feet in length and 8 feet in width. Both station concepts provide space to accommodate bicycle parking and a station marker or monument sign, which will clearly brand the stations as part of the premium enhanced bus system.

Full station design concepts are provided at station locations along the NW 27th Avenue EBS project where existing right-of-way is sufficient. In addition, full station design concepts are provided at station locations where a high level of boardings are anticipated, based on existing ridership information for the Route 297 demonstrating a minimum of 50 daily boardings at these locations. Table 3 lists the full station design concept locations along the NW 27th Avenue corridor.

Figure 5: Enhanced Bus Full Station (25' x 15') Design Concept



Figure 6: Enhanced Bus Slim Station (26' x 8') Design Concept

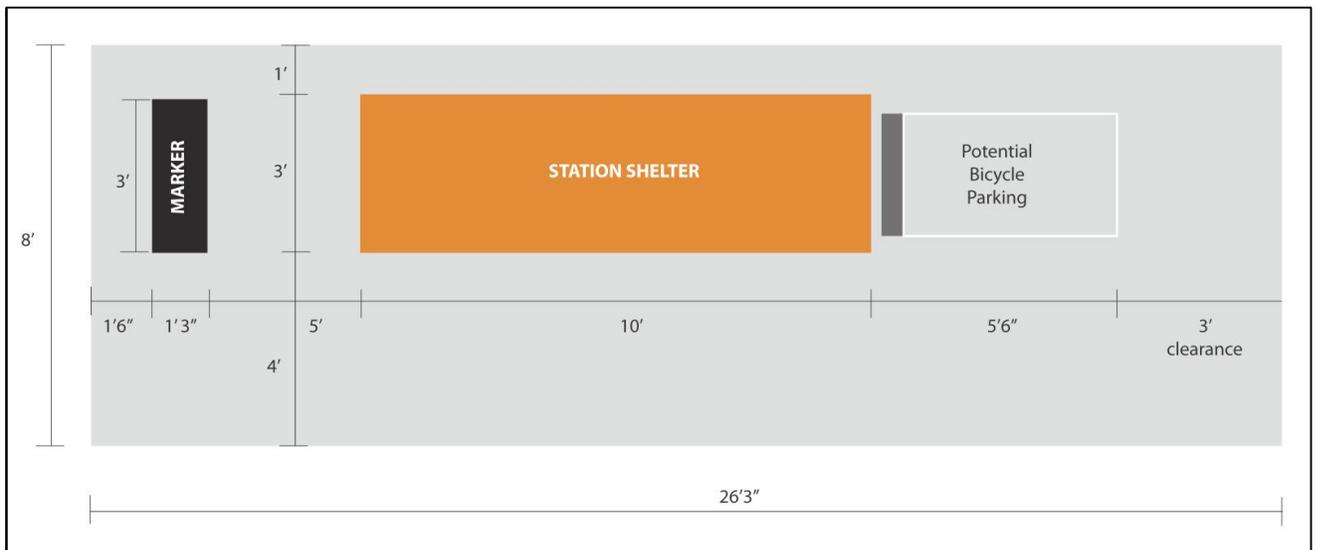




Table 3: Full Station Design Concept Locations

Station Location	Direction
NW 199 th Street	Northbound Southbound
NW 183 rd Street	Northbound Southbound
NW 175 th Street	Southbound
NW 160 th Street	Northbound
Sesame Street	Northbound
NW 113 th Street/ Miami-Dade College ⁽¹⁾	Northbound Southbound
NW 103 rd Street	Southbound
NW 79 th Street	Northbound

Note: (1) At the outset of the NW 27th Avenue EBS project, the route is anticipated to access the existing transit terminal on the campus of Miami-Dade College. Long term accommodations should be secured for stations directly adjacent to NW 27th Avenue to increase the operational efficiency of the route.

Slim station design concepts are provided at station locations where right-of-way is not sufficient to accommodate a full station design concept and high levels of boardings are not anticipated based on existing boarding levels for the Route 297 at these locations. Table 4 lists the slim station design concept locations along the NW 27th Avenue corridor.

Table 4: Slim Station Design Concept Locations

Station Location	Direction
NW 175 th Street	Northbound
NW 160 th Street	Southbound
Sesame Street	Southbound
NW 135 th Street	Northbound Southbound
NW 103 rd Street	Northbound
NW 79 th Street	Southbound
NW 62 nd Street ⁽¹⁾	Northbound Southbound
NW 54 th Street	Northbound Southbound

Note: (1) Slim station assumed under the existing MetroRail station.

The availability of right-of-way (R/W) was a factor considered in the selection of bus station locations along the corridor. If stations could not be accommodated within the R/W, locations were identified that did not

impact businesses by requiring the removal of parking spaces or closure of driveways. Minor R/W acquisition or easements are anticipated to be required for the proposed bus stations listed in Table 5.

Table 5: Bus Stations Requiring Minor Right-of-Way Acquisition or Easements

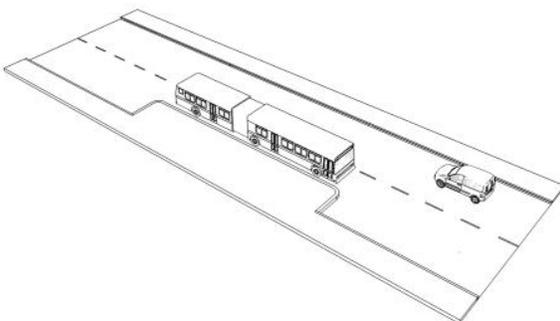
Station Location	Direction	Approximate R/W Required (Width x Length = Square-Feet)
NW 199 th Street	Southbound	10' x 25' = 250'
NW 183 rd Street	Northbound	9' x 25' = 225'
	Southbound	9' x 25' = 225'
NW 175 th Street	Northbound	2' x 26.25' = 52.50'
NW 160 th Street	Southbound	2' x 26.25' = 52.50'
Sesame Street	Southbound	2' x 26.25' = 52.50'
NW 135 th Street	Northbound	3' x 26.25' = 78.75'
	Southbound	4' x 26.25' = 105'
NW 103 rd Street	Northbound	3' x 26.25' = 78.75'
NW 79 th Street ⁽¹⁾	Southbound	3' x 26.25' = 78.75'

Note: (1) R/W required if a bus bulb/curb extension is not provided.

Bus Bulbs/Curb Extensions

Bus bulbs/curb extensions increase the width of the sidewalk while narrowing the road width. Utilizing curb extensions may facilitate the installation of a transit station without the need for acquiring additional right-of-way. In addition, buses stop in the travel lane without having to weave in and out of a bus pullout lane or the curbside parking lane.

Bus bulbs/curb extensions are proposed for three station locations: NW 79th Street for both the northbound and southbound stations and for the southbound station at NW 103rd Street. Implementing a bus bulb/curb extension for the southbound station at NW 79th Street will require converting the outer southbound through lane on the approach to NW 79th Street to an exclusive right-turn lane. Graphics illustrating the locations of proposed bus bulbs/curb extensions are provided in Appendix D.



*Sketch of a bus bulb/curb extension
Source: Buskap.de*

NW 62nd Street/Dr. Martin Luther King Jr. Metrorail Station Enhanced Bus Station



Service will need to be restored for the elevator on the west side of the Dr. Martin Luther King Jr. Metrorail

The EBS station at NW 62nd Street is proposed to be located along NW 27th Avenue in the existing right-of-way underneath the Dr. Martin Luther King Jr. Metrorail Station. Although a transit terminal is provided along the east side of the Dr. Martin Luther King Jr. Metrorail Station, accessing this transit terminal would require deviating the route from NW 27th Avenue, thus adding travel time to the route. Locating the station directly along NW 27th Avenue will increase the operational efficiency of the route. Improvements that will be required for this station include providing concrete pads connecting to the existing sidewalks, modifying the station markers to fit and be visible underneath the Metrorail station structure, and restoring service in the elevator on the west side of the Metrorail station to provide Americans with Disabilities Act (ADA) access.

Station Location Summary

Tables 6A and 6B present information for the NW 27th Avenue EBS project station locations, including distances to cross street intersections, right-of-way information, and Route 297 daily boarding data. Individual graphics illustrating the location of each station are provided in Appendix C.

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Table 6A: Southbound Station Locations Information

Cross Street	Southbound							
	Corner	Side of Intersection	Notes	Distance from Intersection	Available right-of-way from back of curb	Additional right-of-way required	Route 297 Daily Average Boardings (September 2012)	Proposed Station Design
NW 199th St	SW	Far	5' sidewalk, 13' landscape/transformer area.	440'	5'	10'	99	Full Station 15' x 25'
NW 183rd St	SW	Far	Use Carol-Mart right-of-way (R/W), move bus stop closer to intersection. Existing bus stop 400 ft away from intersection.	400'	6'	9'	151	Full Station 15' x 25'
NW 175th St	SW	Far	Use frontage road if needed. 6' sidewalk, not provided south of existing bus stop. 15' width station would require using frontage road.	150'	6' plus additional 6' of grass area behind sidewalk	3' from service road travel lane	55	Full Station 15' x 25'
NW 160th St	SW	Far	Use existing landscaped area fronting Walgreens, 6' R/W. Acquire R/W	180'	6'	2'	32	Slim Station 8' x 26.25'
Sesame St (unsignalized)	SW	Far	Acquire R/W in landscaped area of Family Dollar surface parking lot. 6' sidewalk and 13' landscaped area.	100'	6'	2'	24	Slim Station 8' x 26.25'
NW 135th St	SW	Far	Acquire R/W at Elegant Beauty Supplies/Salon. 4' sidewalk and 4' landscaped area.	200'	4'	4'	38	Slim Station 8' x 26.25'
NW 113th St/ MD College			Existing bus station on campus.			0'	81	At existing station
	SW	Far	Plan future station considering campus expansion.	150'	30'	0'		Full Station 15' x 25'
NW 103rd St	SW	Far	At existing bus stop. 17' to travel lane from back of sidewalk. Provide curb extension	300'	10' plus 7' from curb to edge of travel lane	0'	29	Full Station 15' x 25'
NW 79th St	SW	Far	Existing bus stop, acquire R/W from Family Dollar or drop southbound lane as SBRT at NW 79th Street and provide curb extension.	220'	5'	3' or drop through lane	44	Slim Station 8' x 26.25'
NW 62nd St			At existing Metrorail station (No station, stop in road under metrorail station). Elevator needs to be repaired and MetroRail station access opened.	0'	8'	0'	14	No station (Assume Slim Station for Cost Development)
NW 54th St	SW	Far	8' sidewalk.	180'	8'	0'	N/A	Slim Station 8' x 26.25'

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Table 6B: Northbound Station Locations Information

Cross Street	Northbound							
	Corner	Side of Intersection	Notes	Distance from Intersection	Available right-of-way from back of curb	Additional right-of-way required	Route 297 Daily Average Boardings (September 2012)	Proposed Station Design
NW 199th St	SE	Near	Existing bus stop, fronting Walmart. 10' sidewalk and 10' grass area	350'	20'	0'	12	Full Station 15' x 25'
NW 183rd St	SE	Near	6' sidewalk, 9' grass area. Will require pole and sign relocation	180'	6'	9'	50	Full Station 15' x 25'
NW 175th St	SE	Near	6' sidewalk, 7' grass area.	70'	6'	2'	24	Slim Station 8' x 26.25'
NW 160th St	NE	Far	Along frontage road. 6' sidewalk and 26' grass area.	135'	6' plus 26' of grass area behind sidewalk	0'	33	Full Station 15' x 25'
Sesame St (unsignalized)	NE	Far	Along frontage road. 6' sidewalk and 16' grass area.	375'	6' plus 16' of grass area behind sidewalk	0'	21 (Ali Baba Avenue)	Full Station 15' x 25'
NW 135th St	SE	Near	Acquire easement vacant parcel/property which has cross access with Auto Zone. 5' sidewalk	240'	5'	3'	37	Slim Station 8' x 26.25'
NW 113th St/ MD College			Existing bus station on campus.				109	At existing station
	NE	Far	Acquire R/W from vacant parcel north of NW 113th Street for future station considering campus expansion.	235'	5'	10'		Full Station 15' x 25'
NW 103rd St	NE	Far	At existing bus stop, acquire R/W from Marine retail store. 95' feet between driveways.	240'	5'	3'	44	Slim Station 8' x 26.25'
NW 79th St	NE	Far	In front of Burger King, no additional R/W required. 5' sidewalk, 10' to edge of travel lane. Provide curb extension.	300'	5' plus 10' to travel lane	0'	155	Full Station 15' x 25'
NW 62nd St			At existing Metrorail station (No station, stop in road under metrorail station). Will need concrete pad to connect to existing sidewalk.	0'	25'	0'	333	No station (Assume Slim Station for Cost Development)
NW 54th St	NE	Far	8' sidewalk.	325'	8'	0'	N/A	Slim Station 8' x 26.25'

ENHANCED BUS OPERATING STRATEGIES

There are several types of transit preferential treatments that can be applied to improve the operational efficiency of BRT systems that are critical for providing the inherent “rapid” service. Two specific preferential treatments proposed for the NW 27th Avenue EBS project are transit signal priority (TSP) and queue jump (QJ) operations. TSP alters traffic signal timing at intersections to give priority to transit vehicles. A QJ lane allows transit vehicles to bypass general traffic at an intersection and is often used in conjunction with signal priority. TSP and QJ operations can be an effective method to provide time savings in corridors where it is not feasible to dedicate an exclusive travel lane to buses.



Visualization of queue jump operations illustrating a bus proceeding through an intersection ahead of general traffic

In the following sections these preferential treatment operating strategies are defined and a Concept of Operations is presented to establish parameters for the application of these operating strategies.

Definition of Transit Signal Priority and Queue Jump/Queue Bypass Lane Operations

Active transit signal priority (TSP) is the process by which benefit is provided through the traffic signals to transit vehicles operating along the corridor. The benefit can be provided through the extension of green time for buses approaching an intersection or advancing green time for buses waiting at the red phase. The use of TSP can be scheduled for all-day, during peak hours, or some other defined time period of the day.

TSP can be implemented at individual intersections or throughout an entire corridor. More advanced TSP systems can be linked to the bus schedule, only providing signal priority when a bus is behind schedule. Other options include headway consistency, where signal priority is granted if buses are behind a pre-defined headway or spacing from the prior bus. Other TSP systems provide signal priority to every bus that approaches an intersection regardless of schedule considerations, which ensures that buses not only remain on schedule but also improves their overall travel times.

TSP is different from traffic signal pre-emption, where the signal progression is interrupted. TSP modifies the normal signal operation process to better accommodate transit vehicles, whereas pre-emption interrupts the normal signal operation process for a special condition by temporarily controlling the traffic signal to facilitate the bus passing through the intersection. General purpose traffic can also benefit from TSP. When the “mainline” is given an extended green phase for the bus, all the vehicles traveling through the intersection around the bus also receive benefit.

Benefits can also be provided through the coordination or retiming of traffic signals to accommodate bus travel patterns. This approach is typically done through improvements in signal timing to provide progression for the buses and account for the differences in travel speeds between cars and buses, providing preference to buses versus cars.

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Queue jump (QJ) operations allow buses to bypass general traffic at an intersection, via either an exclusive bypass lane or right-turn lane, through the use of special bus signal phasing. The buses access the bypass lane or right-turn lane and receive a special signal phase to proceed through the intersection ahead of the general traffic. Typically queue jumps from right-turn lanes are used with near-side stations and queue bypass lanes are used for far-side stations. The use of a queue jump operation can also provide a means for buses to gain an advantage over general traffic when used in conjunction with a near-side bus stop.

Goals and Objectives

Typically, a bus spends approximately 60 percent of its run time in motion, approximately 20 percent serving bus stops, and approximately 20 percent caught up in traffic signal or congestion delay. While there are a number of elements to improve the bus customer experience, the benefits of implementing priority bus treatments can include reduced bus travel times, increased schedule reliability, an enhanced public profile, operating cost savings, reduced equipment requirements, and increased transit ridership.

TSP and QJ operations can improve the person throughput of a corridor and also improve the travel time reliability for buses, thus improving their attractiveness as an alternative mode. Traditional level of service (LOS) measures do not recognize person throughput because they only account for individual vehicles. Comparing the number of people moving through a corridor rather than the number of vehicles would produce different results. Ideally, the total number of persons able to travel in a corridor will be higher with priority bus operations than without, as more people benefit from bus priority treatments than could be accommodated in cars. Implementation of TSP and QJ has resulted in significant improvements for BRT applications around the nation, while impacts to automobile traffic have been shown to be minor.



TRANSIT SIGNAL PRIORITY CONCEPT OF OPERATIONS

The purpose of this Concept of Operations (ConOps) is to define the parameters for transit signal priority (TSP) for the NW 27th Avenue EBS project. Options for TSP parameters, such as schedule adherence, maintaining consistent headways, etc. are discussed, along with options of parameters for when a request for TSP would be granted. The ConOps defines the operations of the TSP system and the control strategies that the system should be able to perform. This information defines the technical system requirements, which will in turn be used to select the most effective technological solution.

TSP System Components

TSP systems consist of three components: the priority request generator (detection device), the priority request server (signal controllers and embedded priority logic), and the support systems that allow the agencies access to data for management of the system (transit monitoring system).

There are two options for generating the priority requests: a distributed system and a centralized system. The following sections provide a general description of each option, along with a description of the option that has been selected in Miami-Dade County.

Distributed System

A distributed priority system is where the priority request is generated by the transit vehicle and is detected and served at the local traffic signal controller. This type of system is advantageous in situations where the local jurisdiction may not have their signal controllers connected to a centralized system and managed by a traffic management center (TMC). The signal controller software contains the priority logic and serves the request locally.

Centralized System

A centralized priority system is where the priority request is generated either on the transit vehicle or at the traffic signal controller. The message is transmitted to the priority request server, located within the TMC. Priority is granted to the local controller level based on direction from the TMC. This system is advantageous in situations where the local jurisdiction, such as Miami-Dade County, has their signal controllers connected to a centralized system and managed by a TMC, in real-time communication.

The central system will determine whether to request priority based on predefined conditions, such as schedule adherence, headway, conflicting calls, etc. An advantage of a centralized system is that all records of the system operation can be maintained centrally and changes can be easily implemented across all systems from the central location.

Miami-Dade County Integrated TSP CAD/AVL System

Miami-Dade County has selected a centralized priority system approach for the TSP processing. This system will be integrated with MDT's Computer Aided Dispatch/Automatic Vehicle Location (CAD/AVL) system and will be invoked from the central system at the TMC. The TSP operation calls for special logic programmed in the traffic controller installed at the signalized intersection and will be invoked when an eligible bus is detected within a defined proximity of an eligible signalized intersection.



The CAD/AVL system vendor will track the location of buses via Global Positioning System (GPS) equipment on the buses that communicate with the CAD/AVL central system software. Through this tracking feature and appropriate additional logic to be determined by MDT regarding the CAD/AVL central system software, a real-time request for TSP will be sent to the Miami-Dade County Advanced Traffic Management System (ATMS) central system software. The real-time location of the subset of buses that are requesting TSP will be updated at the transit center on a frequent basis, at least as often as once per five seconds.

Based on bus location and route definition, the CAD/AVL system will determine whether or not TSP is granted, according to rules of engagement established by the Traffic Signals and Sign (TS&S) Division of the Miami-Dade Public Works and Waste Management (PWWM) Department. When a bus is on schedule or does not meet other criteria determined by MDT, the CAD/AVL system will send a TSP cancel message to the Miami-Dade ATMS. The Miami-Dade County ATMS will then discontinue evaluating whether or not to grant TSP, as requested, along the bus's path.

TSP request related information will be sent from the CAD/AVL central system software to the Miami-Dade County ATMS central system software via a custom center-to-center (C2C) interface implemented between the two systems. The most likely implementation of this C2C interface is using National Transportation Communications for Intelligent Transportation System Protocol (NTCIP) 2306 formatting (Extensible Markup Language (XML) over web services) using Transmission Control Protocol/Internet Protocol (TCP/IP) and NTCIP 1211 data object standards. The static route, stop, and other definitions are anticipated to be communicated between the two systems using the Google transit C2C specification or a specification previously implemented by the CAD/AVL vendor for other systems. The static route and stop information will be shared between the two systems on no more frequently than a daily basis, or when this information is changed. Similar web service interfaces are preferred for sharing the static information.

TSP Logic Options

This section describes trigger options for the TSP that will be processed centrally from the Miami-Dade County ATMS system. The priority logic are the parameters defined to either grant or deny a TSP request, depending on several factors that will be discussed in this section. Advantages for each priority logic option are explored.

Headway Based

In headway based TSP operation, the priority logic is granted based on a pre-defined headway (spacing or frequency) between the buses. The headway parameter can be user defined or can be variable based on time of day, day of week or any other desired parameters. The priority logic does not utilize schedule adherence information. Instead, the bus transmits its TSP request to the intersection, and the priority request server manages the priority activity to maintain the desired headway between buses. Buses that arrive sooner than the defined headway will not receive TSP and buses that arrive later will receive the benefit of TSP.

A headway based TSP provides an advantage to buses that are behind schedule (indirectly), by maintaining a consistent headway among the bus fleet. It also tends to reduce "bunching" of buses and thus improves system efficiency. Once the first bus travels along the corridor, subsequent buses are controlled to maintain an established headway. This headway can be changed during the day based on the bus schedule.



Scheduled Based

In schedule based TSP operation, the priority logic is granted based on the actual, real-time location of the buses. Priority is granted if a bus is behind a pre-defined schedule, based on the CAD/AVL system. The CAD/AVL system must receive information from scheduling software/databases to compare the actual bus location to the bus's schedule. This function is a key component of the conditional priority system, because only late buses should receive signal priority. This system requires robust communication and an updated schedule database of the bus operations.

This approach provides efficient use of the signal priority modifications at the intersection, because priority is only granted if a bus is behind schedule.

Always On

As opposed to a conditional priority as described above for headway based and schedule based, in the "always-on" operation the priority logic is granted at all times that a bus is in operation, independent of headway or schedule. The "always on" operation can be programmed on a time of day or day of week basis. For example, TSP can always be granted during non-peak hours.

The advantage of an "always on" system is simplicity in operation and the benefit that the system can provide to the transit vehicles. This option provides maximum benefit to the buses, by providing an advantage to the bus no matter the circumstances.

TSP Signal Timing Parameters

Once priority logic has been satisfied, the controller accepts and processes the TSP priority. Typically, an "early green" or "extended green" strategy is implemented, where these strategies operate in a pair, (i.e. one or the other can be processed) depending on the time when the bus arrives at the intersection. Early green and green extension strategies are available together within TSP enhanced control environments but are not applied at the same time.

By definition a TSP capable signal controller providing an early green or green extension will not generally negatively affect signal coordination. As opposed to signal pre-emption, during a TSP operation the minimum pedestrian clearance time will not be truncated nor the minimum green times for the opposing movements will not be violated.

The following is a description of TSP signal timing parameters.

Early Green

An early green strategy shortens the green time of preceding phases to expedite the return to green (i.e., red truncation) for the movement where a TSP equipped bus has been detected and the priority logic has been satisfied. This strategy only applies when the signal is red for the approaching TSP-equipped bus. Typically, the early green interval is set at approximately 10 percent of the cycle length or a maximum of 15 seconds. Depending on the typical queue length, the amount of time for the early green may be increased to allow more vehicles to gain the advantage of the early green and clear the intersection, including the bus. Since it is desired that the traffic signal cycle return back to normal operations and be in sync for



signal coordination, the length of the early green interval must be balanced in order to minimize impact to the background cycle length.

Extension of Green

A green extension strategy extends the green time for the TSP movement when a TSP-equipped bus is approaching the intersection and the priority logic has been satisfied. This strategy only applies when the signal is green for the approaching TSP equipped bus. Green extension is one of the most effective forms of TSP since a green extension does not require additional clearance intervals, yet allows a transit vehicle to be served and significantly reduces the delay to that vehicle relative to waiting for an early green or special transit phase. Typically, the extension of green interval is set to a maximum time of approximately 10 percent of the cycle length or a maximum of 15 seconds. The extension of green is truncated, once the bus clears the intersection.

Passive Signal Timing

Passive signal timing priority provides an advantage to transit vehicles traveling along a corridor without the vehicle communicating with the signal to acquire priority. This strategy is typically accomplished through improvements in signal timing to provide progression for buses and account for the differences in travel speeds between cars and buses, providing preference to buses versus cars. Typically, signal coordination is based on either prevailing speed or speed limit. With the passive signal timing, the progression is set to better match the travel speed of the buses in the corridor, which is typically lower than the prevailing speed for cars.

Optimized Coordination Timing

Optimized signal timing is an important component of an effective corridor management strategy. With the application of TSP, the signal timing along the corridor should be optimized to incorporate the changes resulting from the TSP functions. Implementation of the TSP may alter the cycle length and the sync point (beginning of the “main-street” green) along the corridor. The early green or extension of green may affect the cycle length, as this time is taken (reduced) from the minor movements or side street splits. In addition, the early green and extension of green may impact the sync point, so that the platoon of vehicles may start earlier than anticipated. This condition is called early release. Once TSP has been implemented, the overall coordination plan should be reviewed, adjusted, and fine-tuned to achieve an optimum operation for both vehicular and transit vehicles.

Optimization Process

Signal timing optimization involves modification of several elements including cycle length, number of phases, phase sequence, phase duration, and offsets, in order to achieve these objectives:

- Minimize the number of stops
- Minimize the queue length
- Minimize the delay of vehicles
- Maximize throughput

The primary reason for the implementation of TSP is to reduce travel time and the variability in travel time for buses, which share roadways with other vehicles including passenger cars and trucks. Overall corridor or



network delays impact both buses and other vehicles, and improvements in the performance of the corridor can benefit both.

Optimization of traffic signals can involve optimization of an isolated signalized intersection, optimization of traffic signal corridors, or optimization of traffic signal networks, with an increase in complexity from an isolated signal to a corridor and subsequently to a network. Optimization develops traffic signal timing plans including cycle lengths, phase duration, phase order, offsets, etc. The primary constraints in the development of an effective signal timing plan for an isolated signalized intersection are vehicular and pedestrian demands and intersection geometry. Pedestrian movements require a minimum amount of time, especially for wide intersections with multiple lanes on different approaches, which may limit the extent to which traffic signals can be optimized.

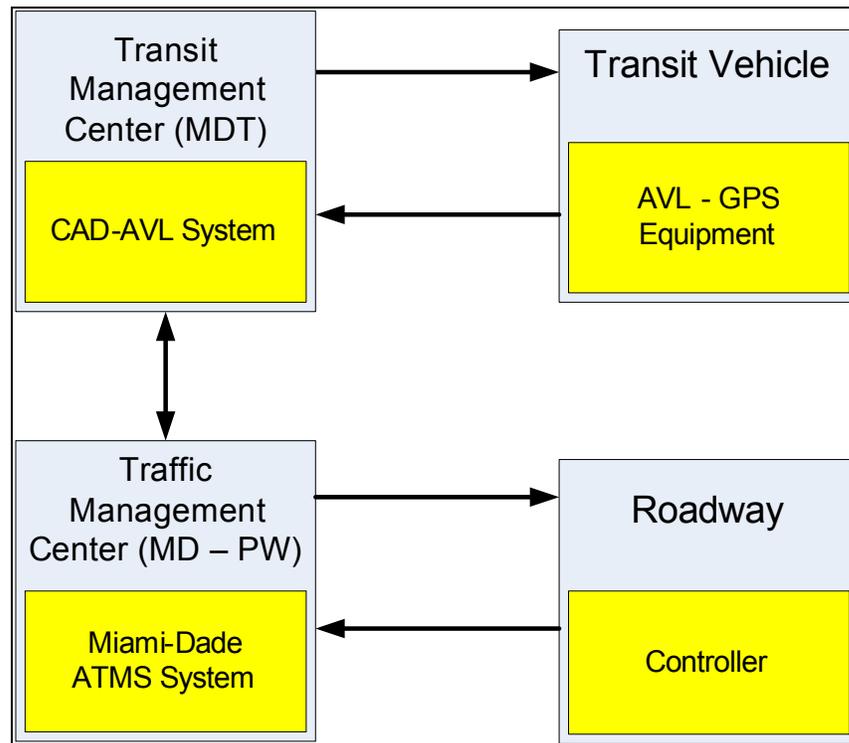
System Architecture

This section defines national ITS architecture elements that are relevant to the TSP application. To ensure that ITS deployments are coordinated and integration opportunities are maximized, the U.S. Department of Transportation (USDOT) requires the development of an ITS architecture. The ITS architecture helps identify opportunities for interagency communication to better coordinate deployment efforts and to support integration activities of multimodal transportation services. ITS architecture typically includes the following components.

- Subsystems
- Equipment packages
- Market packages
- Interconnects
- Information flows

Subsystems represent the various ITS management centers (traffic management centers), field infrastructure (signal controllers), and ITS equipment in vehicles (transit vehicle systems). Equipment packages represent discrete functional capabilities of each subsystem. Equipment packages produce, receive, or process information that supports transportation service, which are known as market packages. Market packages are comprised of multiple equipment packages and subsystems that interact to provide traffic management and other ITS services. The national ITS architecture market package that corresponds to TSP is called APTS7 - Multimodal Coordination. ITS standard development efforts for signal priority and TSP are documented in the ITS Protocol (NTCIP 1211) and Transit Communications Interface Profiles (APTA TCIP TWG 10). Figure 7 shows the TSP market package diagram.

Figure 7: APTS 7 – Multi-Modal Market Package



Operations and Maintenance

Operations

Ongoing performance monitoring and management of a TSP system requires data collection. Since the Miami-Dade ATMS is a centralized system, this function can easily be incorporated in project requirements. Ideally, the following data should be collected and maintained.

- Time the TSP call was requested
- Vehicle number (bus)
- High or low level priority request
- Specific priority routine invoked
- Range and intensity of detection signal
- When the TSP call was dropped
- Call duration period
- Priority request disposition (e.g. not granted, why not granted, when granted, etc.)

From the archived data, travel times and signal timing impacts can be calculated. There should be an agreement among the stakeholders (preferably with a memorandum of understanding or inter-agency agreement) concerning what data will be collected and how it will or will not be distributed and shared.

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Both the transit agency (MDT) and the traffic engineering offices (Miami-Dade County TS&S) will need to have procedures to ensure that:

- The TSP system is operating properly
- The priority request generator (PRG) is generating priority requests
- The priority request server (PRS) is processing the requests and communicating them to the controller
- The controller is granting the appropriate priority action for the circumstances

With respect to on-board equipment, some agencies have a test bed that each bus runs through in the morning as it leaves the garage in order to validate that the on-board TSP equipment is working.

Maintenance

TSP maintenance seems to be an insignificant issue in many cases. Both on-board and field equipment seem to be reliable, requiring little maintenance. However, agreements need to be in place for the occasions in which maintenance is required. The policy should require that MDT maintain whatever is on the bus and that Miami-Dade County TS&S maintain field equipment and the ATMS system, incorporating maintenance tasks into standard maintenance activities.

Another part of the agreement should discuss and develop appropriate TSP parameters, signal optimization parameters and provisions for evaluation and update of the TSP and signal timing parameters. This organization is another reason why it is important for traffic engineering and bus operations and maintenance to be part of the stakeholder team. As mentioned, it is useful to have agreements stating the maintenance and ongoing financial policies to avoid misunderstandings or changes in attitude in case of personnel changes. Maintenance procedures should be spelled out by the equipment supplier in the provided maintenance documents. Stakeholders will need to agree on the level of spares to be initially acquired and for the ongoing financial responsibility for acquiring additional replacement components and future upgrades.

Requirements for Project

The requirements for the project fall into the following major categories:

- Vehicle detection and communication system
- Central system computer aided dispatch (CAD)/automatic vehicle location (AVL) and advanced transportation management systems (ATMS)
- TSP and signal timing parameters

Vehicle Detection and Communication System

The following are the recommended requirements of the vehicle detection and communication system.

1. Shall utilize a global positioning system (GPS) with a single antenna on the vehicle to determine vehicle location, speed, and direction.



2. Shall be able to operate within an urban environment and maintain a minimum accuracy of +/- 3 meters.
3. Shall not result in installation of equipment that will create redundant processes.
4. Shall transmit relevant bus information to the computer aided dispatch (CAD) system.

Computer Aided Dispatch (CAD)/Automatic Vehicle Location (AVL) Equipment

The following are the recommended requirements of the CAD/AVL equipment.

1. The AVL system shall transmit the following information to the CAD system. The CAD system shall transmit the same information to the ATMS for each transit priority request:
 - Transit vehicle identification number
 - Transit vehicle location (+/- 3 meters)
 - Priority request identification number
 - Vehicle speed
 - Vehicle heading
 - Passenger loading
 - In/out of service status
 - Amount of time the bus is behind or ahead of schedule
 - Route number
 - Next stop ID (if known)
2. The ATMS shall transmit the following information to the CAD/AVL system:
 - Transit vehicle identification number
 - Priority request identification number
 - Intersection asset number
 - Basic intersection description (short names)
 - Request approval/denial decision
 - Request denial reason (if request is denied)
 - Priority implementation status and actions taken by the intersection controller (if request is approved)
 - Each subsequent intersection along the route where the CAD/AVL system will receive additional messages from the ATMS system regarding approval or denial of TSP service at those intersections
3. The ATMS system shall send the transit priority call to the controller, based on the TSP and signal timing parameters.
4. The interface shall be designed and documented in an interface control document (ICED).



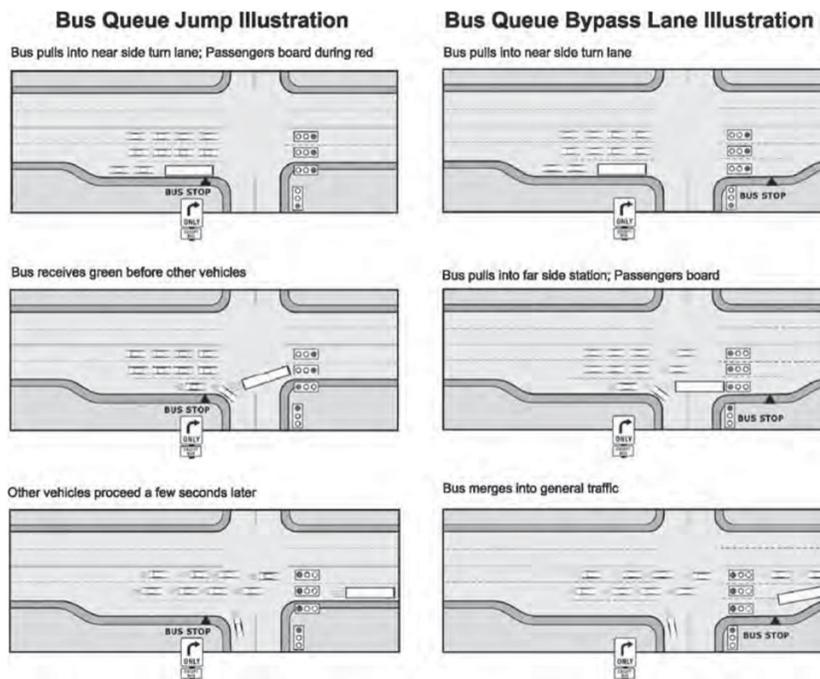
TSP and Signal Timing Parameters

The following are the general requirements for the TSP and signal timing parameters.

1. The priority logic shall be based on a headway-based system. If a transit vehicle is behind the pre-established headway by 2 minutes, a TSP shall be granted. Otherwise, the TSP shall be denied.
2. Once a priority has been granted, the traffic signal controller shall either grant an early green or extension of green, depending on the position of the bus relative to the cycle timer. If the bus is approaching the intersection during the main street red interval, then an early green shall be granted. If the bus is arriving to the intersection during the green phase and based on the speed and location of the bus will miss the green phase, a green extension shall be granted.
3. Early green shall be granted, up to 15 seconds. Extension of green shall be granted until the bus passes through the intersection or no longer than 15 seconds.
4. TSP shall not be granted back to back, (i.e. two subsequent cycles) irrespective of the directional call.
5. The controller shall reduce the green split time for subsequent phases, after the main street green, proportionally to compensate the amount of transit priority time provided to the main street. The signal shall return back to coordination, in one cycle, after the transit priority request has been granted.
6. If a QJ operation is installed, with a dedicated transit lane, then a special phase shall be inserted immediately after the active phase to serve the transit vehicle. The timing of the phase shall be appropriate to clear the bus across the intersection. A clearance interval shall be included with the phase.
7. If a QJ phase is installed in conjunction with a right-turn overlap phase, then appropriate time shall be allocated to the right-turn overlap phase to clear the queue vehicles and allow the transit vehicle to clear the intersection.

QUEUE JUMP/QUEUE BYPASS LANE OPERATIONS

Queue Jump (QJ) is a strategy where transit vehicles are provided the means to pull ahead of regular vehicular traffic that is stopped at an intersection, thereby providing the transit vehicle with an advanced green (a “jump”) in relation to other vehicular traffic. QJ operations allow the transit vehicles to bypass the regular traffic, via either a separate bypass lane or via a right-turn lane, through the use of special bus signal phasing. The bypass or right-turn lane allows the bus to proceed through the intersection, bypassing traffic, to access a far-side bus stop or to continue along the corridor. The use of a QJ treatment can provide a means for transit to gain an advantage over general traffic, especially at congested intersections, where TSP is not necessarily effective, due to the level of congestion.



*Queue Jump and Queue Bypass Operations
Source: TRCP Report 83*

QJ can also be an effective way to provide time savings to buses in corridors where it is not feasible to dedicate a full lane as an exclusive bus lane. The bus travels in mixed traffic until it reaches the queue jump and bypasses traffic before proceeding through the intersection. While not providing the level of priority an exclusive bus lane does, the queue jump provides a time savings the bus would not otherwise receive.

QJ operations can be supported by using a “special phase” or an “overlap phase,” in case of a combined bus/right-turn lane operation. With a special phase or “phase insertion,” a short green phase is injected into the cycle, typically long enough for the buses to clear the intersection, where an exclusive bus lane is provided. A normal yellow interval follows the special phase.

For an overlap phase, where a bus lane and right-turn lane is combined, the phase is initiated to allow right-turn movements to clear the intersection and allow buses to proceed through the intersection. Through movement from this right-turn lane is only allowed for buses, through a specially placed signal head and regulatory sign. The overlap phase can be combined with a non-conflicting left-turn movement, thereby mitigating impacts to the overall vehicular capacity of the intersection. The amount of time required for an

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overlap phase may range from 10 to 25 seconds, depending on traffic volumes and right-turn lane queue lengths.

Due to the benefits associated with QJ operation, it should be considered wherever there is an appropriate right-turn lane or room for an additional lane.

NW 27th Avenue Queue Jump/Queue Bypass Lane Locations

An analysis of the NW 27th Avenue corridor was performed to determine potential intersections for the implementation of queue jump operations. Factors considered in the analysis included (1) the level of congestion at the intersection and (2) whether an exclusive right-turn lane was available that could accommodate queue jump operations without the need for widening the right-of-way to provide an exclusive bus bay.

Traffic data including intersection turning movement counts were available from a corridor retiming project performed in 2006. Based on a review of historical traffic volumes in the corridor, it was determined that traffic volumes had not changed significantly over the past several years and that the 2006 intersection turning movement counts were still representative of traffic conditions in the corridor.

Based on the referenced traffic data, Table 7 presents the intersection level of service for the AM and PM peak hours for the NW 27th Avenue corridor. The intersection levels of service were determined with the *Synchro* traffic software program, which applied methodologies outlined in the *Highway Capacity Manual*. Intersections exhibiting operations below level of service (LOS) D were identified as candidates for queue jump operations based on existing levels of congestion that could negatively impact bus operations. The analysis indicated that the following intersections exhibit operations below LOS D.

- NW 199th Street
- NW 183rd Street
- SR 826 (Palmetto Expressway) Westbound Off-Ramp
- SR 826 (Palmetto Expressway) Eastbound Off-Ramp
- NW 119th Street
- NW 103rd Street
- NW 62nd Street

These intersections were examined to determine if exclusive right-turn lanes are available to accommodate queue jump operations without the need for additional right-of-way. Based on the availability of exclusive right-turn lanes, queue jump operations may be viable at the following intersections which exhibited existing levels of operations below LOS D.

- NW 199th Street, northbound direction (see Appendix D for illustration of concept)
- NW 119th Street, northbound direction (see Appendix D for illustration of concept)

Although the intersection level of service at NW 79th Street is LOS D, queue bypass lane operation should be considered in the northbound direction at this intersection. The queue bypass lane operation in the

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northbound direction at this intersection is facilitated by an existing northbound right-turn lane of considerable length and a through travel receiving lane. A concept illustration provided in Appendix D depicts the potential queue bypass lane operation at NW 79th Street.

Table 7: Queue Jump/Queue Bypass Lane Feasibility Analysis

Cross Street	NB Right-Turn Lane Provided?	SB Right-Turn Lane Provided?	Intersection LOS AM(PM)	Provide Queue Jump/Bypass?
NW 211th Street	No	No	B(B)	No
Calder Race Track	No	No	A(A)	No
NW 207th Street	No	No	C(C)	No
NW 203rd Street	No	No	A(A)	No
NW 199th Street	Yes	No	D(E)	Potential Jump
NW 191st Street	Yes	No	B(B)	No
NW 183rd Street	No	No	D(F)	No
NW 175th Street	No	No	D(C)	No
SR 826 WB Off-Ramp	No	No	E(F)	No
SR 826 EB Off-Ramp	No	No	F(F)	No
NW 160th Street	No	No	A(A)	No
NW 151st Street	No	No	D(D)	No
Ali Baba Avenue	No	No	B(B)	No
Burlington Street	No	No	B(B)	No
NW 138th/NW 139th Street (Mid-Block Ped)	No	No	A(A)	No
NW 137th Street	No	No	B(C)	No
Opa-Locka Boulevard	No	No	B(A)	No
NW 135th Street	No	No	B(C)	No
NW 132nd Street	No	No	A(A)	No
NW 119th Street	Yes	No	F(F)	Potential Jump
NW 115th Street	No	Yes	A(A)	No
NW 113th Street	No	No	A(A)	No
NW 110th Street	No	No	A(A)	No
NW 105th/NW 106th Streets (Mid-Block Ped)	No	No	A(A)	No
NW 103rd Street	No	Yes	E(D)	No ⁽¹⁾
NW 95th Street WB	Yes	No	B(B)	No
NW 95th Street EB	Yes	No	A(B)	No
NW 87th Street	Yes	No	B(B)	No
NW 84th Street	No	No	A(B)	No
NW 79th Street	Yes	No	D(D)	Potential Bypass
NW 75th Street	No	No	B(A)	No
NW 71st Street	No	No	A(A)	No
NW 65th Street	No	No	A(A)	No
NW 62nd Street	No	No	F(C)	No
NW 60th Street	No	No	A(A)	No
NW 54th Street	No	No	C(C)	No

Note: (1) Since a far-side station will be located within 300 feet of intersection, a queue jump/queue bypass will not be provided.



SERVICE PLAN

EXISTING SERVICE CHARACTERISTICS

The NW 27th Avenue corridor is currently served by two Miami-Dade Transit (MDT) transit bus routes: Route 27 (Coconut Grove-Calder) and Route 297 Orange MAX. Route 27 provides all day (24 hours) local service and Route 297 Orange MAX provides daytime limited-stop service. The existing routes in the NW 27th Avenue corridor account for some of highest ridership and are among the most productive bus routes in the MDT system.

Route 27 provides local bus service between the Coconut Grove Metrorail Station in the south and NW 207th Street terminus in the north with approximately 110 stops in each direction. Route 27 operates in combination with a variation Route 27A, which provides service to NW 37th Avenue between NW 183rd Street and NW 207th Street at the north end of the route. Route 27/27A combined provides 15-minute headway throughout the day and longer headway (generally between 30 and 60 minutes) during overnight hours.

Route 297 Orange MAX provides limited stop service along the NW 27th Avenue corridor with 11 stops spaced at approximately one-mile intervals between the Miami Intermodal Center (MIC) and NW 199th Street. To the north of NW 199th Street, Route 297 makes all local stops along the approximately two-mile turnaround required for buses to head back in the southbound direction. Route 297 Orange MAX provides 15-minute headway during peak periods and 30-minutes headway during the off-peak.

Table 8 presents route characteristics for Route 27 and Route 297 Orange MAX. Between SR 112 (Airport Expressway) and NW 183rd Street, Routes 27 and 297 Orange MAX currently combine to provide 7.5 minute headway in the NW 27th Avenue corridor during peak periods.

Table 8: Existing Routes 27 and 297 Characteristics

Route Number	Route Miles	Run Time (Minutes)	Max. Number of Stops per Direction	Headway Peak/Off-Peak	Span of Service	Passengers per Revenue Mile	Passengers per Revenue Hour
Route 27	39.3	210 ⁽¹⁾	105	30/30	5:17 AM - 12:08 AM	4.1 ⁽¹⁾	48.3 ⁽¹⁾
Route 27A	40.3	210 ⁽¹⁾	113	30/30	24 hours	4.1 ⁽¹⁾	48.3 ⁽¹⁾
Route 297 Orange MAX	32.5	120	25 ⁽²⁾	15/30	5:30 AM -8:06 PM	1.4	22.1

Notes:

- (1) Running time and productivity data is combined for Route 27 and 27A
- (2) Route 297 Orange MAX makes all local stops north of NW 199th Street

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Major Stop Activity Locations

Routes 27 and 297 Orange MAX serve approximately 10,000 and 1,700 average weekday total daily boardings, respectively, based upon MDT's January 2013 Ridership Technical Report. The 27th Avenue transit corridor serves trips originating within walking distance as well as connecting trips transferring from BCT in the north, other MDT routes at intersections with major east-west arterial roadways, at Miami-Dade College and Metrorail stations. Automatic Passenger Counts (APC) data reveal that the heaviest bus stop activity along the NW 27th Avenue corridor is experienced at the following locations.

- NW 207th Street
- NW 183rd Street
- Miami-Dade College North Campus
- NW 79th Street
- Martin Luther King Metrorail Station
- Brownsville Metrorail Station (for Route 27 only)
- MIA Metrorail Station (for Route 297 Orange MAX only)

These stops account for a substantial percentage of the daily boardings and alightings along the NW 27th Avenue corridor. In particular, the six stops listed above served by Route 297 Orange MAX account for nearly 75 percent of the route's stop activity.

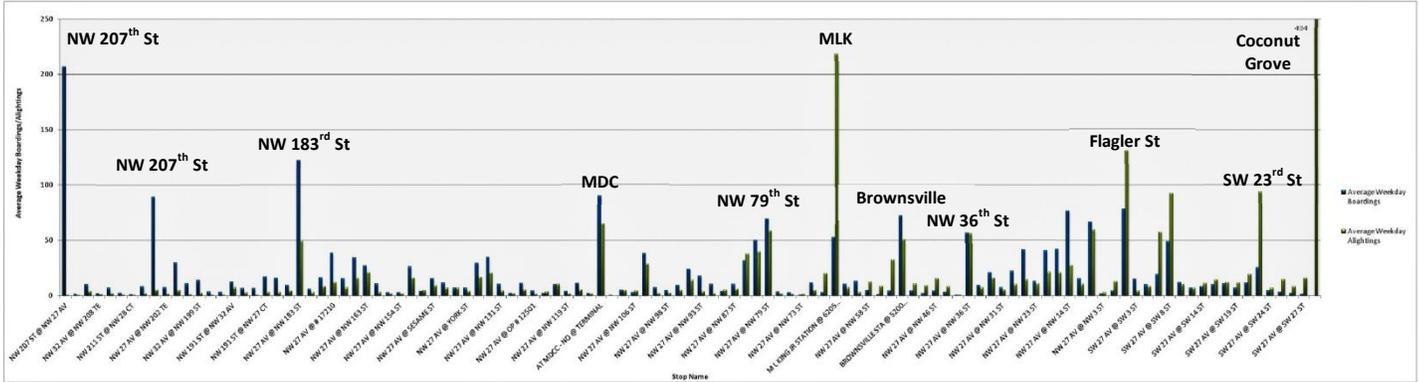
Figure 8 illustrates the daily stop activity in the southbound and northbound directions, respectively, for Route 27.

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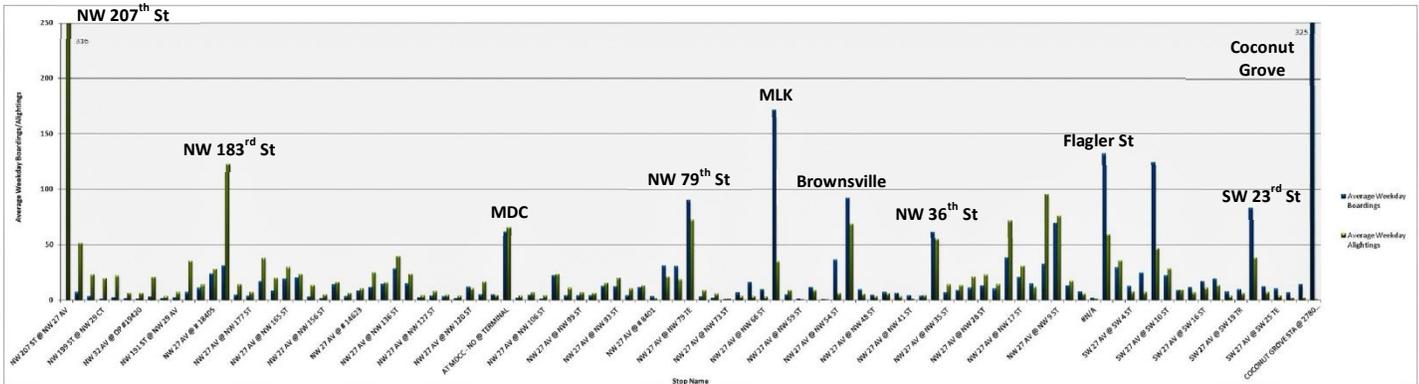


Figure 8: Route 27 Daily Stop Activity

Southbound - Average Daily Ridership



Northbound - Average Daily Ridership



Ridership on Route 297 Orange MAX illustrates a directional trip pattern. In the southbound direction there are a greater number of boardings at stops located in the north end and a greater number of alightings at stops located in the south end of the route. Conversely, for trips in the northbound direction, there are greater number of boardings at stops located in the south end and a greater number of alightings at stops located in the north end of the route. The stop serving Miami-Dade College is the exception to the typical pattern, as this stop serves as a major destination for alightings and location for boardings in both directions.

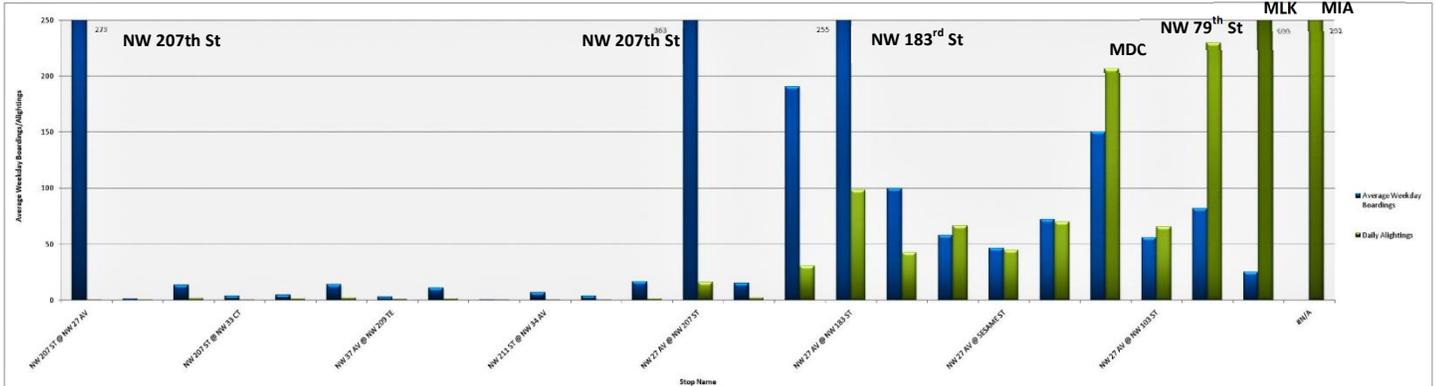
Figure 9 illustrates the daily stop activity in the southbound and northbound directions, respectively, for Route 297 Orange MAX.

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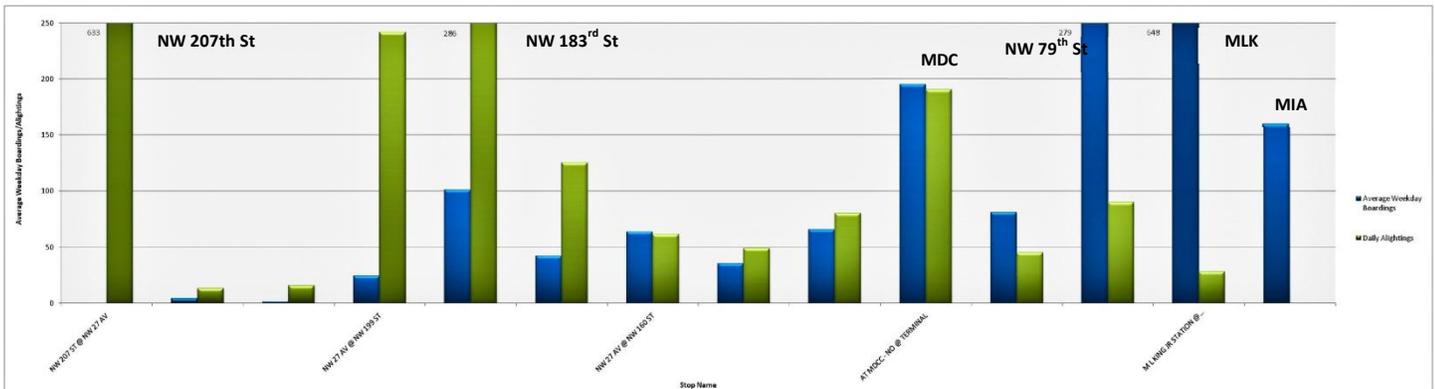


Figure 9: Route 297 Orange MAX Daily Stop Activity

Southbound - Average Daily Ridership



Northbound - Average Daily Ridership



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Passenger Loads

NW 27th Avenue experiences significant ridership demand throughout the day with over 11,000 daily weekday boardings for Routes 27 and 297 Orange MAX combined.

Route 27 experiences maximum load points just north of Dr. Martin Luther King Jr. Metrorail Station for buses traveling in the southbound direction and around NW 87th Street for buses traveling in the northbound direction. Load patterns are generally balanced in the northbound and southbound directions; however, the load factors are often greater during peak periods with instances where seating capacity is exceeded. Figure 10 presents average weekday load factors for Route 27.

Route 297 Orange MAX experiences lower average load factors than Route 27 throughout the service day. In particular, Route 297 Orange MAX load factors are considerably lower along the two-mile turnaround loop required for buses to head back in the southbound direction at the northern end of the route. The maximum load points for Route 297 Orange MAX are located between and NW 175th Street and Miami-Dade College North Campus for buses traveling in the southbound direction and around NW 103rd Street for buses traveling in the northbound direction. Figure 11 presents average weekday load factors for Route 297 Orange MAX.

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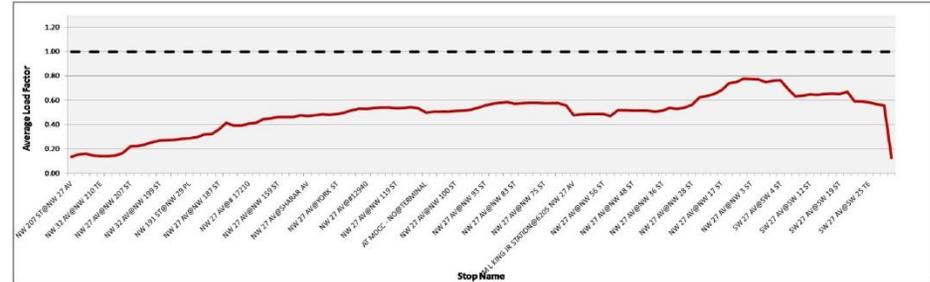


Figure 10: Route 27 Load Factors

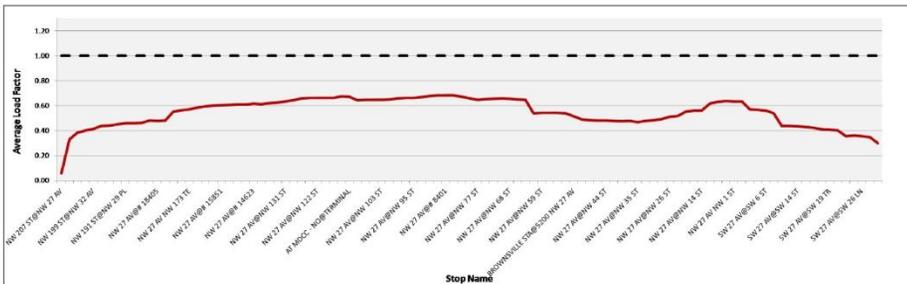
Northbound - Average AM Peak Load Factor



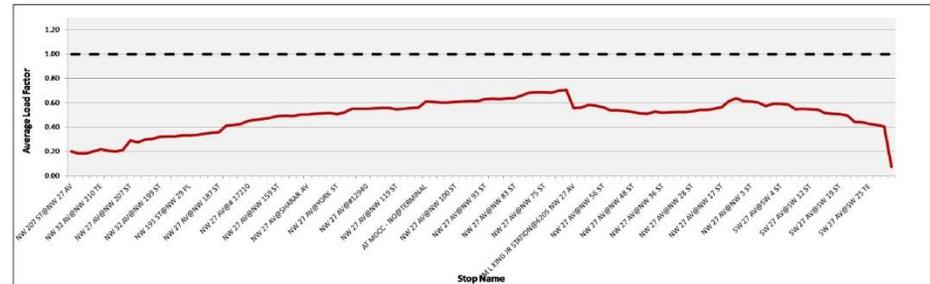
Southbound - Average AM Peak Load Factor



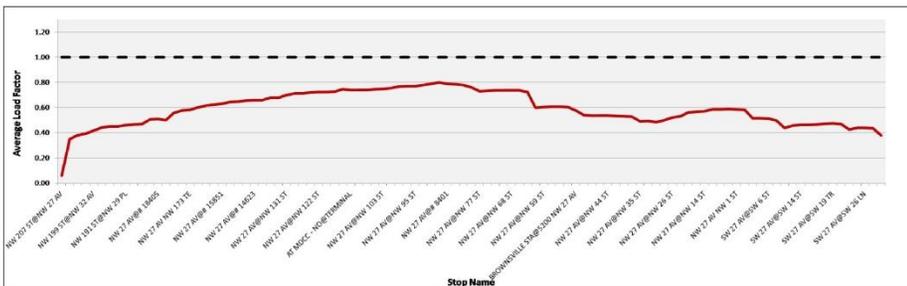
Northbound - Average Midday Peak Load Factor



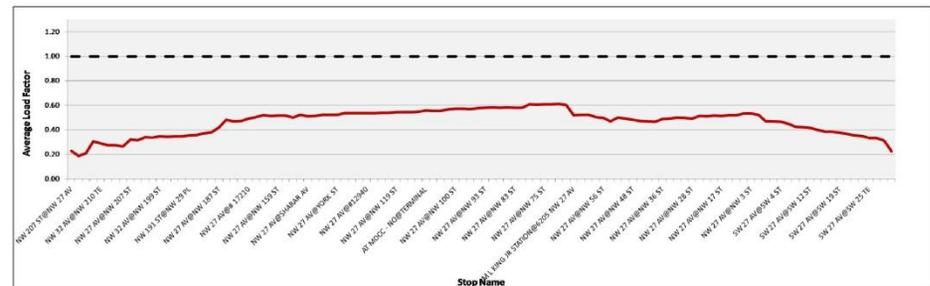
Southbound - Average Midday Peak Load Factor



Northbound - Average PM Peak Load Factor



Southbound - Average PM Peak Load Factor

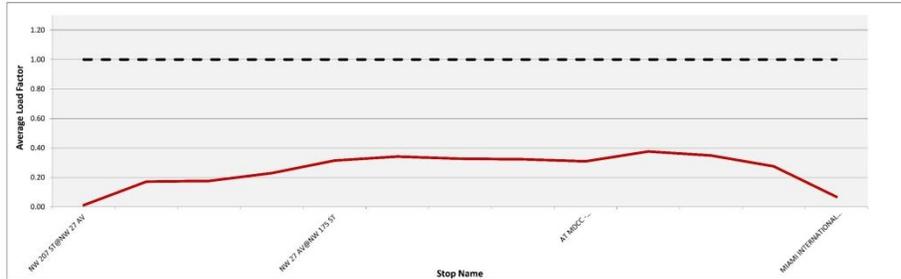


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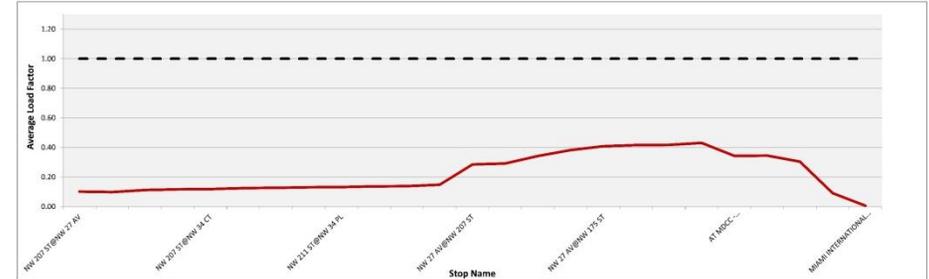


Figure 11: Route 297 Orange MAX Load Factors

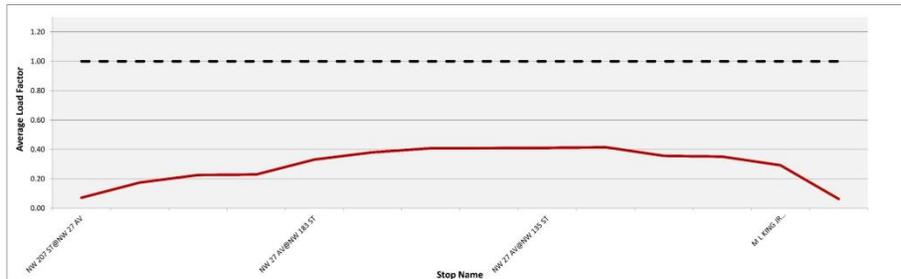
Northbound - Average AM Peak Load Factor



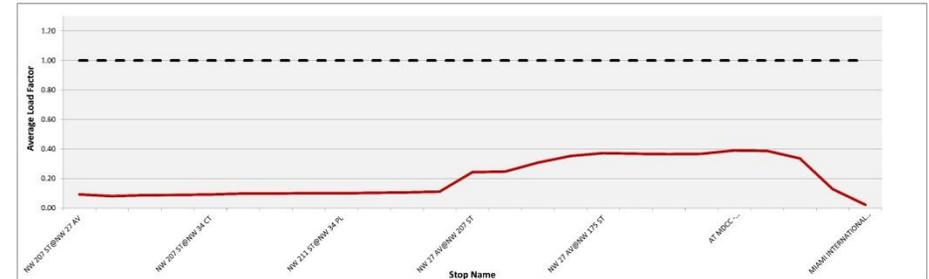
Southbound - Average AM Peak Load Factor



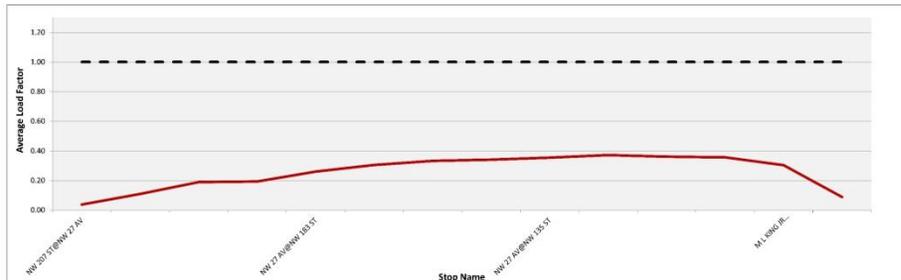
Northbound - Average Midday Peak Load Factor



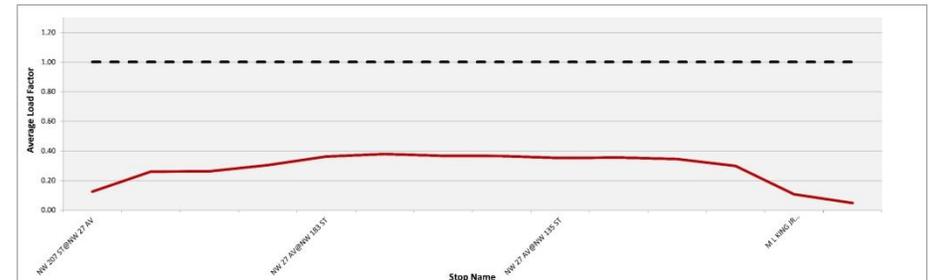
Southbound - Average Midday Peak Load Factor



Northbound - Average PM Peak Load Factor



Southbound - Average PM Peak Load Factor





EXISTING RIDERSHIP CHARACTERISTICS

Based on the Miami-Dade MPO Origin-Destination Surveys for Local Bus Service (2012) findings, the NW 27th Avenue corridor can be characterized as having a substantial proportion of passengers that use transit as their primary means of transportation. The survey findings for Route 97 – 27th Avenue MAX are representative of its successor, the new Route 297 Orange MAX.

Results of the origin-destination surveys indicate that a significant proportion of riders in the NW 27th Avenue corridor depend on transit for their daily mobility needs. Transit trips in the corridor serve travel to work, college and learning institutions, medical facilities, and shopping destinations. The lengths of one-way transit trips are spread among shorter (less than 30 minutes), moderate (30 to 60 minutes), and longer (over 60 minutes) trips. Passengers tend to prefer the limited stop service (Route 97 or its successor Route 297 Orange MAX) for more time sensitive work-based and longer distance trips, as well as for the capacity to reduce travel time.

Figures 12 through 17 present origin-destination survey findings for the NW 27th Avenue corridor.

Figure 12: Transit Dependency in NW 27th Avenue Corridor

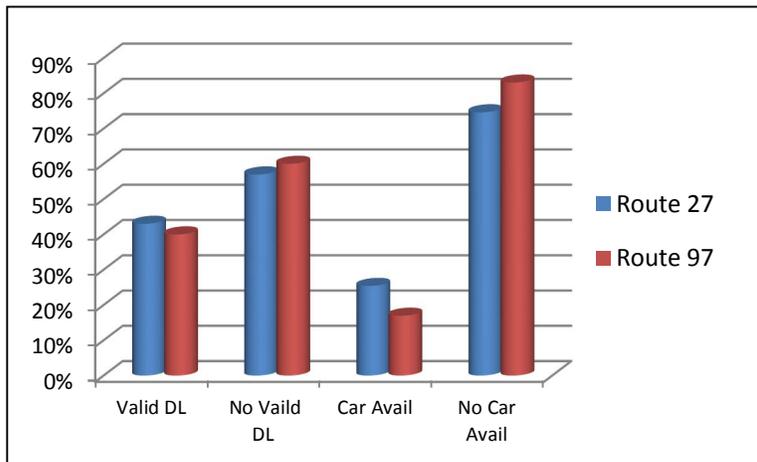
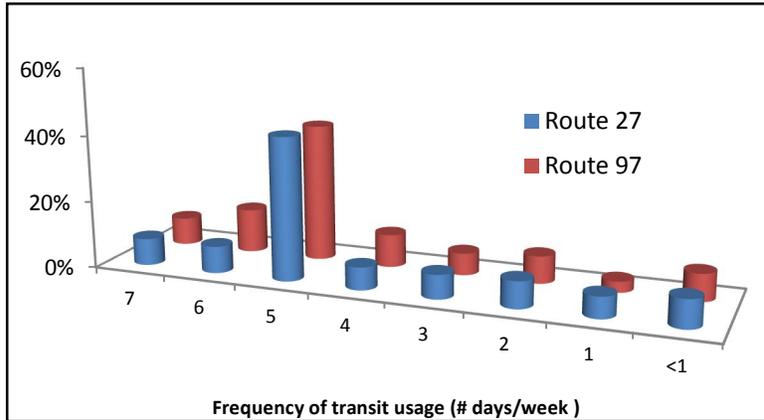


Figure 14 demonstrates that there is a high level of transit dependency among existing riders in the NW 27th Avenue corridor. Over half the riders in the NW 27th Avenue corridor do not possess a valid driver's license and over three-quarters of the riders do not have a vehicle available to meet their transportation needs.

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Figure 13: Frequency of Transit Usage in NW 27th Avenue Corridor



As illustrated in Figure 13, about 60 percent of NW 27th Avenue corridor transit riders use transit for their regular weekly (five or more times) transportation needs. An additional one-fifth of passengers use transit nearly every day of the week for their travel needs.

Figure 14: Means of Transit Access in NW 27th Avenue Corridor

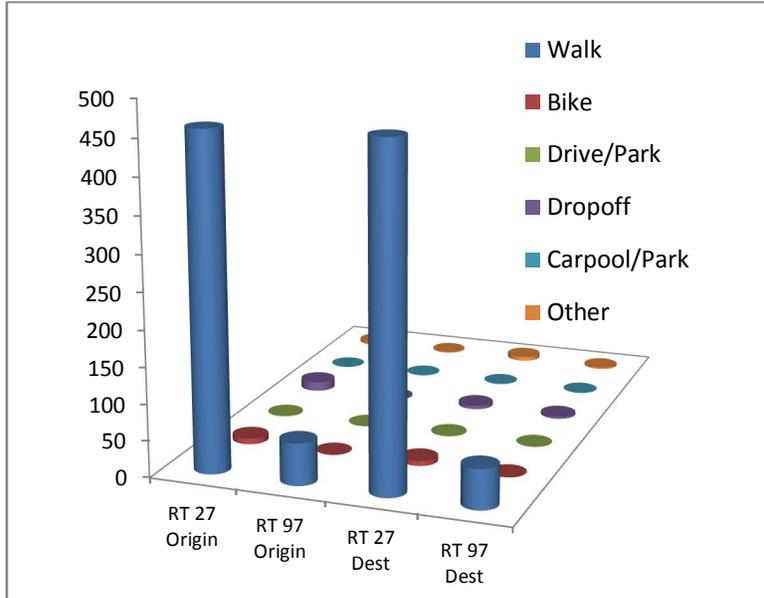


Figure 14 illustrates that most riders walk to access transit service in the NW 27th Avenue corridor.

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Figure 15: Walking Distance to Transit in the NW 27th Avenue Corridor

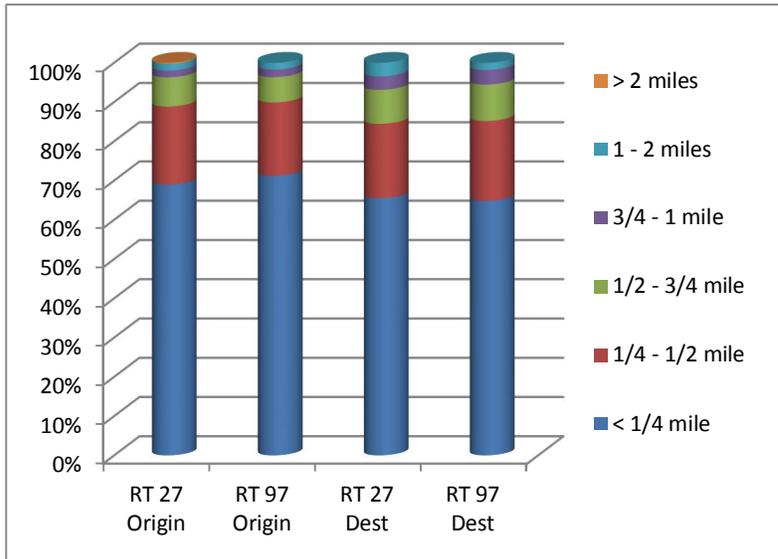
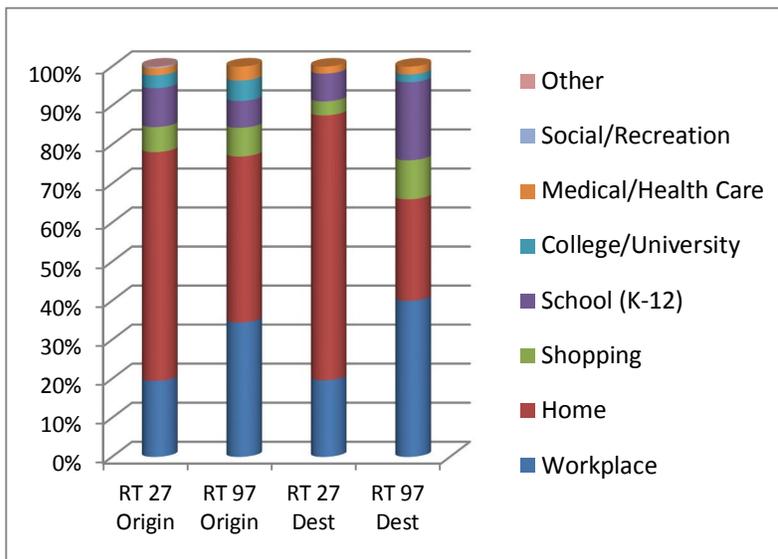


Figure 15 illustrates that nearly two-thirds of transit riders in the NW 27th Avenue corridor, who access transit by walking, walk less than a quarter-mile. Over four-fifths of the riders walk less than a half mile.

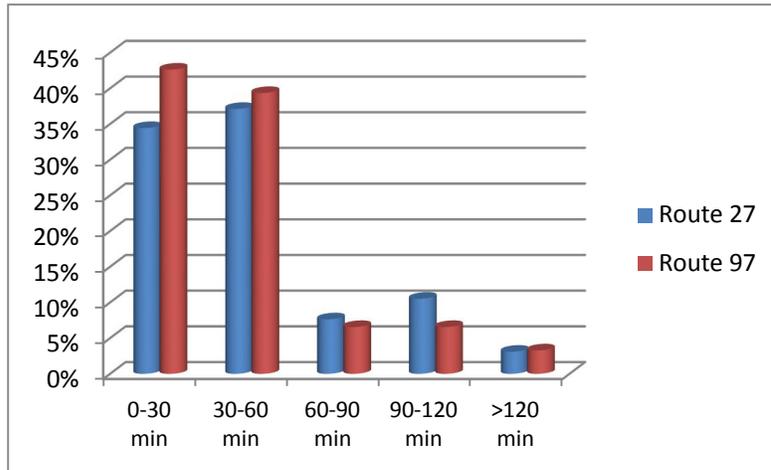
Figure 16: Transit Trip Purpose in the NW 27th Avenue Corridor



The origin-destination survey data summarized in Figure 16 reveal that the Route 97 limited-stop service accommodated a higher proportion of work trips than the local bus service provided by Route 27. Route 97 also served a larger proportion of student trips at the Miami-Dade College North Campus than Route 27.



Figure 17: Transit Trip Length in the NW 27th Avenue Corridor



As demonstrated in Figure 17, the majority of one-way transit trips in the NW 27th Avenue corridor require less than an hour. A higher proportion of the Route 97 trips require less than an hour than the Route 27, which may be reflective of the reduced travel time provided by the limited-stop service.



SERVICE CHARACTERISTICS FOR NW 27TH AVENUE ENHANCED BUS SERVICE

Transit service in the NW 27th Avenue corridor accommodates commuter needs associated with longer distance work trips, Miami-Dade College North Campus access, transfers to Metrorail, and transfers from Broward County. Additional transportation needs are also accommodated in the corridor associated with shorter distance trips for shopping, school, and health care. The heavy ridership in the NW 27th Avenue corridor and high productivity of the local Route 27, as well as the growing demand and productivity of the Route 297 Orange MAX limited-stop service demonstrates the support for additional service improvements.

Span of Service

The Route 297 Orange MAX currently operates between 5:30 AM and 8:00 PM on weekdays only. This span of service is also recommended for the NW 27th Avenue EBS. The recommended hours of operation for the NW 27th Avenue EBS are presented in Table 9.

Headways

Route 297 Orange MAX currently provides 15-minute headway during peak periods and 30-minutes headway during the off-peak periods. The NW 27th Avenue corridor experiences peak morning and afternoon demands and loads, but the corridor also exhibits strong demand in the mid-day and off-peak periods, suggesting support for service improvements throughout the day. The recommended hours of operation for the NW 27th Avenue EBS are presented in Table 9.

Table 9: NW 27th Avenue EBS Service Characteristics

Time Period	Hours	Headway
Morning Peak Period	5:30 AM to 9:00 AM	10 minutes
Midday Period	9:00 AM to 3:00 PM	20 minutes
Afternoon Peak Period	3:00 PM to 6:00 PM	10 minutes
Evening Peak Period	6:00 PM to 8:00 PM	20 minutes

Branding

The Biscayne Boulevard EBS project developed specific branding elements including vehicle and station branding. The objective of the branding plan is to provide a clear distinction for passengers between the EBS service and other transit services.

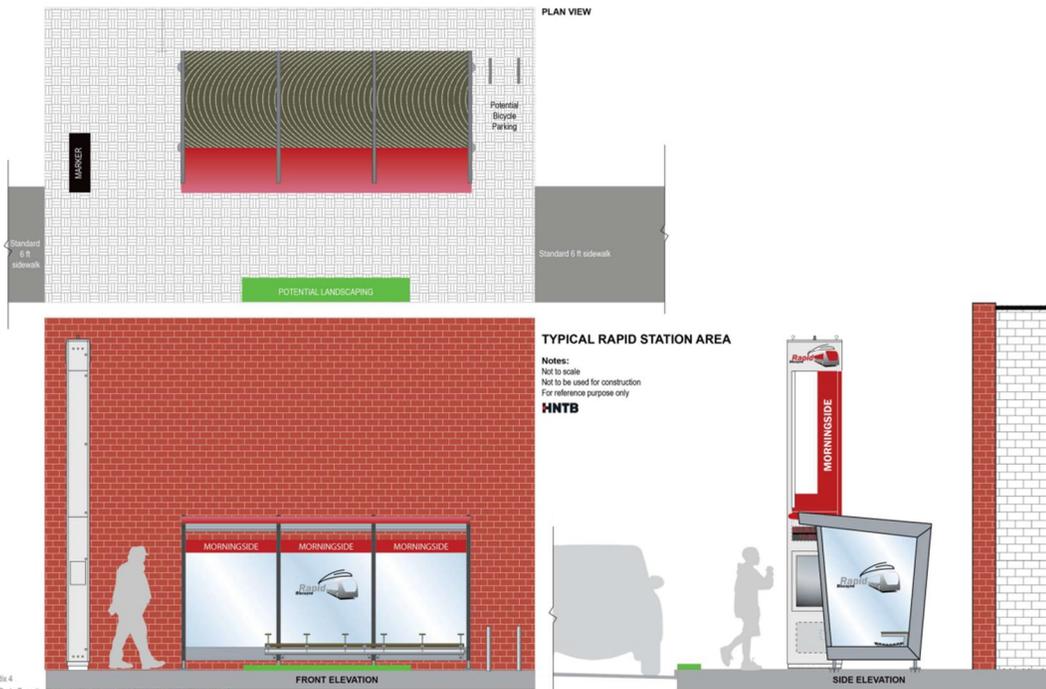
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Appendix 4
Miami-Dade Transit – Enhanced Bus Service VISUAL IDENTITY GUIDELINES

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Miami-Dade Transit's EBS Bus Branding



Appendix 4
Miami-Dade Transit – Enhanced Bus Service VISUAL IDENTITY GUIDELINES

Miami-Dade Transit's EBS Station Branding



COSTS

CAPITAL COSTS

Capital costs were developed for the NW 27th Avenue EBS project. Capital costs will consist of the expenditures required to implement the project including the acquisition of new buses, construction of the NW 215th Street transit terminal and park-and-ride facility and intermediary bus stations, roadway infrastructure improvements, right-of-way acquisition for intermediary bus stations, deployment of transit signal priority (TSP) throughout the NW 27th Avenue corridor, and implementation of queue jumps. Costs required for preliminary engineering, design, permitting and construction engineering and inspection (CEI) are factored into the estimate. The capital cost estimate also includes a contingency to account for uncertainty in the scope of the project and the current conceptual level of project definition. As the NW 27th Avenue EBS project progresses through subsequent phases of project development and is better defined, the capital cost estimate for the project will be refined.

Table 10 presents the order of magnitude capital costs required for the NW 27th Avenue EBS project, which at this time are anticipated to be approximately \$30.2 million. A description of the costs anticipated for various elements of the project is provided below.

Table 10: NW 27th Avenue EBS Capital Costs

Item	Units	Unit Cost	Total
60-foot articulated buses	11	\$1,000,000	\$11,000,000
NW 215 th Street Transit Terminal and Park-and-Ride ^(1,2)	1	\$4,160,000	\$4,160,000
Roadway Infrastructure Improvements at NW 215 th Street Transit Terminal and Park-and-Ride ⁽²⁾	1	\$2,975,000	\$2,975,000
Stations			
Full Station ⁽³⁾	11	\$417,500	\$4,592,500
Slim Station ⁽³⁾	11	\$333,500	\$3,668,500
ROW Acquisition ⁽⁴⁾	22	\$140,000	\$3,080,000
Queue Jumps	3	\$200,000	\$600,000
Bus Bulbs	3	\$50,000	\$150,000
Total ⁽⁵⁾			\$30,226,000

Notes:

- (1) Cost estimate does not include cost associated with prior purchase of 14-acre site in 2010 for \$5,025,000.
- (2) An opinion of probable cost is provided in Appendix E.
- (3) Cost estimates based on *Implementation Plan for Enhanced Bus Service along Biscayne Boulevard*.
- (4) Cost estimates based on *Near Term Transportation Plan (2010)*.
- (5) Capital cost estimate for the project will be refined in subsequent phases of project development.

Service for the NW 27th Avenue EBS will be provided in new branded 60-foot articulated diesel/electric hybrid or alternative fuel buses with low-floor design for faster boarding and alighting. The buses will be equipped with Wi-Fi and will provide larger seating areas with additional leg room for comfort. Based on the anticipated service plan, consisting of weekday service from 5:30 AM to 8:00 PM with 10-minute

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headway during peak periods and 20-minute headway during off-peak periods, 11 buses will be required for the NW 27th Avenue EBS. The anticipated cost per bus is \$1 million for buses equipped with TSP hardware, based on a recent MDT purchase of articulated buses, resulting in a cost estimate of \$11 million for the project for new buses.

In 2010 MDT purchased the 14-acre site proposed to accommodate the NW 215th Street transit terminal and park-and-ride facility for \$5.025 million using funds generated by the County's half-cent transit surtax. Approximately 350 park-and-ride spaces are proposed for this facility along with kiss-and-ride/short-term parking accommodations, approximately ten bus bays, passenger seating under canopied areas, and a bus driver comfort station. The preliminary opinion of probable costs for the construction of the NW 215th Street transit terminal and park-and-ride facility is approximately \$4.16 million, which includes a 30 percent contingency factor to cover items requiring further scope definition such as environmental remediation. Roadway infrastructure improvements required for accessing the NW 215th Street transit terminal and park-and-ride facility include a new traffic signal, turn lane improvements, and a new bridge providing a connection to the Calder Casino and Race Course. The preliminary opinion of probable costs for the roadway infrastructure improvements is approximately \$2.98 million. The Engineer's Opinion of Probable Construction Cost for the NW 215th Street transit terminal and park-and-ride facility is provided in Appendix E.

A total of 11 intermediary stations in each direction (22 stations total) are proposed along the approximately 13-mile route between the MIC and NW 215th Street transit terminal and park-and-ride facility. Two station design concepts will be implemented for the NW 27th Avenue EBS project: a full station and a restricted right-of-way or "slim" station. Both station concepts provide bicycle parking and a station marker or monument sign. Cost estimates for the two station concepts developed in the *Implementation Plan for Enhanced Bus Service along Biscayne Boulevard* will also be applied to the NW 27th Avenue EBS stations. The cost estimate for the full station concept is \$417,500 and the cost estimate for the slim station concept is \$333,500 including allowances for contingency and design, permitting and CEI. Full stations have been identified for 11 stations and slim stations have been identified for 11 stations. The corresponding cost estimate for the construction of stations is \$8.3 million.

Minor right-of-way (ROW) acquisition or easements will be required for several stations. Specific cost estimates for ROW acquisition were not developed as part of this study; however, the unit cost for ROW acquisition for stations was estimated at \$140,000 per station in the *Near Term Transportation Plan (2010)*. Based on this unit cost, the estimate for ROW acquisition for the stations is approximately \$3.1 million.

The NW 27th Avenue EBS will benefit from the deployment of transit signal priority (TSP) throughout the corridor for improved travel time and schedule adherence. Miami-Dade County has initiated the implementation of TSP in priority transit corridors as part of a separate project. The TSP system will be integrated with MDT's new Computer Aided Dispatch/Automatic Vehicle Location (CAD/AVL) system. Since the cost estimate for the project's buses includes TSP hardware and TSP communication system and central system software are being implemented as a separate project, no additional capital costs were assigned to the project for TSP.

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Queue jump/queue bypass are proposed for the NW 27th Avenue EBS project at three locations along the NW 27th Avenue corridor. The queue jump operations will be accommodated within existing right-turn lanes at these locations and right-of-way acquisition is not anticipated. The estimated unit cost per queue jump location is approximately \$200,000 to cover costs associated with signalization improvements, signage, and pavement markings, which corresponds to a total cost of \$600,000 for the project.

Bus bulbs/curb extensions are proposed for three station locations for the NW 27th Avenue EBS project. The estimate unit cost per bus bulb/curb extension is approximately \$50,000 which corresponds to a total cost of \$150,000 for the project.

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



OPERATIONS AND MAINTENANCE COSTS

Operations and maintenance (O&M) costs were developed for the NW 27th Avenue EBS project. The O&M cost estimates account for general bus operations and maintenance. Service variables that impact O&M costs for bus operations include vehicle costs for fuel and maintenance, the number of peak vehicles required in service, labor costs, and other related costs. There will be additional O&M costs for the NW 27th Avenue EBS project associated with the NW 215th Street transit terminal and park-and-ride facility and the other stations along the alignment.

The NW 27th Avenue EBS route will replace the existing Route 297 Orange MAX. The NW 27th Avenue EBS will provide an increased service level in the corridor with reduced headway in both the peak and off-peak periods. The O&M costs for bus operations were estimated for the existing Route 297 Orange MAX and the NW 27th Avenue EBS route based on gross allocated cost factors. MDT's gross allocated cost for bus service as of February 2013 is \$125.75 per revenue hour. Table 11 presents the annual O&M costs for bus operations for the existing Route 297 Orange MAX and the NW 27th Avenue EBS route. The incremental increase in O&M costs resulting for the implementation of the NW 27th Avenue EBS project is approximately \$1.118 million annually.

Table 11: O&M Costs for Bus Operations

Route	Daily One-Way Trips	Roundtrip Mileage ⁽¹⁾	Speed (mph) ⁽²⁾	Cycle Time (Minutes)	Daily Vehicle Revenue Hours	Annual Vehicle Revenue Hours ⁽³⁾	Cost per Vehicle Revenue Hour ⁽⁴⁾	Annual Cost for Bus Operations	Buses Required
297 Orange MAX	79	32.5	18.2	120	82	20,828	\$125.75	\$2,619,121	8
NW 27 th Avenue EBS	117	30.5	20.0	120	117	29,718	\$125.75	\$3,737,039	12
Net Change								\$1,117,918	

Notes:

- (1) NW 215th Street transit terminal and park-and-ride facility eliminates two-mile turnaround currently required for Route 297 Orange MAX.
- (2) Assumed 10 percent increase in travel speed for NW 27th Avenue EBS route with implementation of TSP and queue jumps along with low floor vehicles and ticket vending machines at stations for faster boarding and alighting.
- (3) Assumes weekday-only service operating 254 days per year.
- (4) Based on MDT's February 2013 gross allocated cost.

Consistent with the *Implementation Plan for Enhanced Bus Service along Biscayne Boulevard*, annual station O&M costs for the NW 27th Avenue EBS project were assumed to be 10 percent of their construction cost not including design, permitting and CEI. The annual O&M costs for the NW 215th Street transit terminal and park-and-ride facility are estimated to be approximately \$300,000. The annual O&M costs for the 22 intermediary bus stations are estimate to be approximately \$718,000.

MDT's incremental O&M costs resulting for the implementation of the NW 27th Avenue EBS project are presented in Table 12. The annual incremental increase in O&M costs associated with the NW 27th Avenue EBS project is expected to be approximately \$2.136 million.

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Table 12: Incremental Increase in O&M Costs for NW 27th Avenue EBS Project

Item	Annual O&M Costs
Net Change in O&M for Bus Operations	\$1,118,000
NW 215 th Street Transit terminal and Park-and-Ride ⁽¹⁾	\$300,000
Bus Stations ⁽¹⁾	\$718,000
Total	\$2,136,000

Notes:

- (1) Annual O&M costs assumed to be 10 percent of construction cost not including design, permitting and CEI.



NEXT STEPS

There are several issues that will be to be further refined and finalized during the preliminary engineering phase of the project, including:

- Processing a zoning application with the City of Miami Gardens for the NW 215th Street transit terminal and park-and-ride facility site to rezone the site to Planned Corridor Development (PCD).
- Coordinating with FDOT District Six for the access permit required for the NW 215th Street transit terminal and park-and-ride facility site's vehicular connection to NW 27th Avenue and the proposed new traffic signal at this location.
- Coordinating with the FTE's ongoing PD&E study for the HEFT from NW 57th Avenue to the Turnpike Mainline (Work Program #423373-1), regarding the proposed bus pullout lane for 95 Express buses along the HEFT off-ramp adjacent to the NW 215th Street transit terminal and park-and-ride facility site.
- Working with Miami-Dade County RER to complete an environmental Site Assessment Report NW 215th Street transit terminal and park-and-ride facility site and to comply with the site assessment directive.
- Finalizing the identification of right-of-way acquisition and/or easements required for the construction of bus stations.
- Coordinating with FDOT District Six for the approval of the bus bulbs/curb extensions identified for three of the bus stations.
- Integrating the headway based TSP operation recommended for the corridor with MDT's CAD/AVL system.
- Performing traffic operations analyses to demonstrate the effectiveness of the queue jump/queue bypass lane operations proposed for the project at three locations along the corridor.

APPENDIX A: Meeting Notes

NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study
Miami-Dade Transit (MDT) Kick-off Meeting
June 13, 2012

The MDT kick-off meeting for *NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study* was held on Wednesday, June 13, 2012, at the MDT offices at the Overtown Transit Village. The attendees of the meeting were:

- Wilson Fernandez – Miami-Dade MPO
- Monica Cejas – MDT
- Bob Pearsall – MDT
- Derrick Gordon – MDT
- Joel Perez – MDT
- Hector Garnica – MDT-IT
- Karla Damian – MDT
- Greg Kyle – Kimley-Horn and Associates, Inc. (KHA)
- K.K. Saxena – KHA
- Jill Capelli – KHA
- Adrian Dabkowski – KHA

Kimley-Horn distributed several handouts during the course of the meeting including an agenda, origin-destination survey results for Bus Routes 27 and 97, iSurvey results for Bus Routes 27 and 97, and a project schedule. The following describes the pertinent discussion topics during the meeting.

- Overview of project and discussion of previous work.
 - Scope of work
 - Park-n-Ride concept plans
 - Exact station locations
 - Station footprint and right-of-way needs
 - National Environmental Policy Act (NEPA) Categorical Exclusion (CAT Ex) document
 - Previous work
 - MPO's 2010 Near-Term Implementation Plan
 - Final Environmental Impact Statement (FEIS) for 27th Avenue
 - Kittelson & Associates BRT Concept Evaluation
- MDT will provide APC information to Kimley-Horn (KHA).
 - KHA staff will visit MDT to obtain data.
 - KHA to coordinate with Bob Pearsall.
 - KHA will review bus survey information for Routes 27 and 97 to determine transit dependency riders versus choice riders.

- MDT stated that Bus Route 97 will be replaced by Route 297 (27th Avenue Orange Max)
 - The route will provide 15-minute peak period headways and 30-minute mid-day headways.
 - The new route will be extended to MIC with a new stop at the Brownsville station.
 - Some stops may be removed along the route.

- Park-n-Ride Lots
 - NW 215th Street Location
 - County's Planning and Zoning Department prepared a Highest and Best Use Study
 - Interest in hotel land use and transit oriented development (TOD).
 - Area residents not interested in more residential development.
 - Request for Proposal (RFP) circulating internally at MDT for developing parcel
 - Transit amenities are required.
 - Florida Department of Transportation (FDOT) funding available, approximately \$5 million for a transit terminal. Initial RFP called for the following features.
 - 350 parking spaces
 - Eight (8) bus bays: four (4) for articulated buses and four (4) for standard buses
 - Two (2) bus bays for layovers
 - Comfort station for operators
 - Canopy over passenger waiting area
 - Potential local bus circulator access and 95 Express interim stop.
 - An area yet to be determined needs to be reserved for future extension of rail service.
 - Since 27th Avenue is under FDOT jurisdiction, coordination with FDOT will be required for access to the site, including driveway locations, median openings, and signalization.
 - NW 95th Street Location
 - MDT owns a three (3) acre parcel on the northwest quadrant of NW 95th Street and 27th Avenue.
 - An on-site library occupies approximately 1-acre of the parcel.
 - No funding has been identified for developing a park-n-ride lot at this location.
 - NW 119th Street Location
 - FDOT owns several parcels on the northeast quadrant of NW 119th Street and NW 27th Avenue.
 - The abandoned golf course on the north and south sides of NW 119th Street will be redeveloped. The developer will provide bus bays and space for bus shelters on NW 119th Street.

- NW 183rd Street Location
 - Potential Leasing opportunity at the Carol Mart.
- MDT has specific design criteria for Park-n-Ride lots and transit stations including
 - Passenger vehicle parking requirements, both short-term and long-term
 - Bicycle parking requirements
 - Motorcycle/scooter parking requirements
 - Kiss-n-Ride design
- Stations
 - The Biscayne Boulevard station design will be utilized, which is currently under development.
 - Station dimensions: 20 feet by 45 feet desirable to accommodate articulated buses.
 - Electrification will be provided for various amenities such as lighting, real-time passenger information, and ticket vending machines (TVM).
- Public Involvement
 - Corridor located within County Commission Districts 1, 2, and 3.
 - Coordination will be required with Cities of Opa-Locka and Miami Gardens.
 - MPO stated that two (2) meetings would be held with each, Opa-Locka and Miami Gardens. The first meeting would be an introduction to the project with the second meeting towards the end of the project, before the MPO Board.
 - The Miami Gardens Planning and Zoning Committee stated that the City wanted to be involved in the NW 215th Street TOD.
 - The project would be heard at the MPO Board as an action item.
 - The project may also be presented at Transportation Planning Council (TPC), Citizens Transportation Advisory Committee (CTAC), and Citizen's Independent Transportation Trust (CITT).
 - The Study Advisory Committee (SAC) would consist of the following agencies
 - MPO
 - Miami Dade County Public Works and Waste Management Department
 - FDOT
 - MDT
 - City of Opa-Locka
 - City of Miami Gardens
 - Broward County Transit (BCT) – as needed
 - Miami-Dade College – as needed
 - Miami International Airport (MIA) – as needed
- Technology
 - Background information
 - The countywide Advanced Traffic Management System (ATMS) is now complete.

- KHA to set direction for Transit Signal Priority (TSP).
 - MDT currently focused on implementing TSP on 6-7 corridors.
- The Computer Aided Dispatch/Automated Vehicle Locator (CAD/AVL) project has received bids and is in the selection process.
 - 2-year implementation process
- On board bus modems provide WiFi and real time location information that can be provided at stations, website, or mobile apps.
- Predicted arrival sign – real-time passenger information to be provided on standalone upright assembly.
- Kiosks have funding in place for seven (7) stations system wide.
 - Kiosks won't be provided at most stations along the NW 27th Avenue corridor
 - Potential location at NW 215th Street park-n-ride lot/terminal station
- Security for TVMs needs to be considered, such as at the Golden Glades Tri-Rail station.
- A Comfort Center similar to the facility at Kendall Drive and SW 162nd Avenue in the Kendall TownCenter, should be considered.

Next Steps/Action Items

- KHA to coordinate acquiring APC data with Bob Pearsall.
- KHA to review transit dependent ridership versus choice riders on NW 27th Avenue bus routes.
- MDT to provide KHA with parcel surveys of NW 215th Street and NW 95th Street parcels.
- MDT to provide Transit Design Criteria to KHA.

NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study
Study Advisory Committee (SAC) Kick-off Meeting
July 5, 2012

The SAC kick-off meeting for *NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study* was held on Wednesday, June 13, 2012, at the MDT offices at the Overtown Transit Village. The attendees of the meeting were:

- Wilson Fernandez – Miami-Dade MPO
- Larry Foutz – Miami-Dade MPO
- Monica Cejas – Miami-Dade Transit (MDT)
- Bob Pearsall – MDT
- Rolando Jimenez – Miami-Dade Public Works and Waste Management Department
- Adrian Dabkowski – Kimley-Horn and Associates, Inc. (KHA)
- Odalys Delgado – HNTB
- Jitender Ramchandani – HNTB

Kimley-Horn distributed several handouts during the course of the meeting including an agenda, origin-destination survey results for Bus Routes 27 and 97, iSurvey results for Bus Routes 27 and 97, and a project schedule. The following describes the pertinent discussion topics during the meeting.

- Overview of project and discussion of previous work.
 - Scope of work
 - Park-n-Ride concept plans
 - Exact station locations
 - Station footprint and right-of-way needs
 - National Environmental Policy Act (NEPA) Categorical Exclusion (CAT Ex) document
 - Previous work
 - MPO's 2010 Near-Term Implementation Plan
 - Final Environmental Impact Statement (FEIS) for 27th Avenue
 - Kittelson & Associates BRT Concept Evaluation
- MDT will provide APC information to Kimley-Horn (KHA).
 - KHA staff will visit MDT to obtain data.
 - KHA to coordinate with Bob Pearsall.
 - KHA will review bus survey information for Routes 27 and 97 to determine transit dependency riders versus choice riders.
- MDT stated that Bus Route 97 will be replaced by Route 297 (27th Avenue Orange Max)

- The route will provide 15-minute peak period headways and 30-minute mid-day headways.
- The new route will be extended to MIC with a new stop at the Brownsville station.
- Some stops may be removed along the route.

- Park-n-Ride Lots
 - NW 215th Street Location
 - County's Planning and Zoning Department prepared a Highest and Best Use Study
 - Interest in hotel land use and transit oriented development (TOD).
 - Area residents not interested in more residential development.
 - Request for Proposal (RFP) circulating internally at MDT for developing parcel
 - Transit amenities are required.
 - Florida Department of Transportation (FDOT) funding available, approximately \$5 million for a transit terminal. Initial RFP called for the following features.
 - 350 parking spaces
 - Eight (8) bus bays: four (4) for articulated buses and four (4) for standard buses
 - Two (2) bus bays for layovers
 - Comfort station for operators
 - Canopy over passenger waiting area
 - Potential local bus circulator access and 95 Express interim stop.
 - An area yet to be determined needs to be reserved for future extension of rail service.
 - Since 27th Avenue is under FDOT jurisdiction, coordination with FDOT will be required for access to the site, including driveway locations, median openings, and signalization.
 - NW 95th Street Location
 - MDT owns a three (3) acre parcel on the northwest quadrant of NW 95th Street and 27th Avenue.
 - An on-site library occupies approximately 1-acre of the parcel.
 - No funding has been identified for developing a park-n-ride lot at this location.
 - NW 119th Street Location
 - FDOT owns several parcels on the northeast quadrant of NW 119th Street and NW 27th Avenue.
 - The abandoned golf course on the north and south sides of NW 119th Street will be redeveloped. The developer will provide bus bays and space for bus shelters on NW 119th Street.
 - NW 183rd Street Location
 - Potential Leasing opportunity at the Carol Mart.

- MDT has specific design criteria for Park-n-Ride lots and transit stations including
 - Passenger vehicle parking requirements, both short-term and long-term
 - Bicycle parking requirements
 - Motorcycle/scooter parking requirements
 - Kiss-n-Ride design
- Stations
 - The Biscayne Boulevard station design will be utilized, which is currently under development.
 - Station dimensions: 20 feet by 45 feet desirable to accommodate articulated buses.
 - Electrification will be provided for various amenities such as lighting, real-time passenger information, and ticket vending machines (TVM).
- Public Involvement
 - Corridor located within County Commission Districts 1, 2, and 3.
 - Coordination will be required with Cities of Opa-Locka and Miami Gardens.
 - MPO stated that two (2) meetings would be held with each, Opa-Locka and Miami Gardens. The first meeting would be an introduction to the project with the second meeting towards the end of the project, before the MPO Board.
 - The Miami Gardens Planning and Zoning Committee stated that the City wanted to be involved in the NW 215th Street TOD.
 - The project would be heard at the MPO Board as an action item.
 - The project may also be presented at Transportation Planning Council (TPC), Citizens Transportation Advisory Committee (CTAC), and Citizen's Independent Transportation Trust (CITT).
 - The Study Advisory Committee (SAC) would consist of the following agencies
 - MPO
 - Miami Dade County Public Works and Waste Management Department
 - FDOT
 - MDT
 - City of Opa-Locka
 - City of Miami Gardens
 - Broward County Transit (BCT) – as needed
 - Miami-Dade College – as needed
 - Miami International Airport (MIA) – as needed

Next Steps/Action Items

- KHA to review transit dependent ridership versus choice riders on NW 27th Avenue bus routes.
- MDT to provide KHA with parcel surveys of NW 215th Street and NW 95th Street parcels.
- MDT to provide Transit Design Criteria to KHA.

NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study
Transit Signal Priority (TSP) Discussion Meeting
August 1, 2012

A meeting was held on Wednesday, August 1, 2012 at the MPO office to discuss TSP at a County wide level, as well as along the Biscayne Boulevard and NW 27th Avenue corridors. The attendees included:

- Wilson Fernandez – Miami-Dade MPO
- Larry Foutz – Miami-Dade MPO
- Monica Cejas – MDT
- Frank Aira – Traffic Signals and Signs Division (TS&S)
- Hiram Hernandez – TS&S
- Nelson Berthin – TS&S
- Eloy Lee – TS&S
- Dave Osborne – Kimley-Horn and Associates, Inc. (KHA)
- Adrian Dabkowski – KHA
- Odalys Delgado – HNTB
- Jitender Ramchandani – HNTB

The following describes the pertinent discussion topics during the meeting.

- All new buses will have wireless local area network (Wi-Fi) communication capabilities.
- The implementation of the Computer Aided Dispatch (CAD)/Automatic Vehicle Location (AVL) system is ongoing. General intersection communication framework is in place County-wide and consists of:
 - Bus→MDT Central→ATMS Central→Intersection Controller
 - The required firmware is installed at all intersections.
- The Kendall Drive corridor and South-Dade Busway were discussed.
 - It was discussed that the Kendall Drive corridor is an EMS preemption system and not TSP system.
 - It was also discussed that the Busway is not a TSP system but runs within the “green-time” bands of Dixie Highway/US 1.
- TSP general parameters were discussed including:
 - Schedule maintenance vs. headway maintenance
 - Which buses will be allowed TSP, all buses vs. express buses
 - Operation methodology
 - Early green, extended green, and delay based TSP
 - Near-side versus far-side bus station location

- It was discussed that locating the bus station on the near-side could result in false requests for priority when buses dwell at stations.
 - It was discussed that general system-wide parameters/rules needed to be established with specific parameters/rules varying corridor to corridor and intersection to intersection.
 - TSP corridor priorities were discussed, which included the following ranking
 1. Kendall Drive
 2. NW 27th Avenue
 3. Biscayne Boulevard
 - It was also discussed that the CAD/AVL needed to be in place in order to implement TSP. The contract should be awarded in October/November 2012 and the project should be completed by the end of 2013.
 - The group in general agreed to the following:
 - The Miami-Dade County TSP system should be based on headway maintenance and only available to express buses. However, the underlying CAD/AVL technology should be designed in a flexible manner to permit global changes in order to accommodate policy changes. Furthermore, the technology should allow for flexibility to incorporate early green, green extension, and delayed green. However, policy will determine which parameter will be incorporated.

Next Steps/Action Items

- KHA will coordinate with MDT's IT Department to determine general communication delay.
- KHA will prepare a white paper discussing TSP CON-OPS including general and detailed parameters to guide parameter selection/determination.

NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study
Florida Department of Transportation (FDOT)
NW 215th Street Park and Ride Facility Access Meeting
October 22, 2012

On Monday, October 22, 2012, a meeting was held with FDOT to discuss access to the NW 215th Street Park and Ride Facility for the *NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study* at the FDOT District Six offices. The attendees of the meeting were:

- Monica Cejas – Miami-Dade Transit (MDT)
- Kelly Cooper – Miami-Dade Citizen's Independent Transportation Trust (CITT)
- Kerry Glasgow – Miami-Dade CITT
- Jose Quintana – Florida Turnpike Enterprises (FTE)
- John Easterling – FTE
- Chris Dube – FDOT
- Ali Khalilahmadi – FDOT
- Rudy Garcia – FDOT
- Omar Meitin – FDOT
- Evelin Legcevic – FDOT
- Leefang Chow – FDOT
- Ramon Sierra – FDOT
- Greg Kyle – Kimley-Horn and Associates, Inc. (KHA)
- Adrian Dabkowski – KHA

Kimley-Horn presented a conceptual site plan for the NW 215th Street park and ride facility along with proposed access. The following describes the pertinent discussion topics during the meeting.

- MDT and KHA provided an overview of the bus rapid transit project and discussion of previous transit projects in the area.
 - MDT's purchase of the NW 215th Street parcel for purposes of a park and ride facility to serve as the northern terminus was discussed.
- NW 215th Street Park and Ride Facility
 - It was discussed that MDT desired to utilize the existing northbound u-turn/left-turn lane for access into the site. The turn lane has already been constructed and bisects the site into two nearly equal parcels, which is desirable for site plan development. However, FTE's limited access right-of-way line currently extends further south along NW 27th Avenue and would prohibit access at this location.
 - A full access median opening was also discussed at this location. FDOT stated that the minimum full access median spacing was 1320 feet and

- only 330 feet is provided to the intersection to the north and 440 feet is provided to the intersection to the south.
 - FDOT stated that in order for a directional access (right-in/right-out and left-in), the driveway to the south (north Calder driveway) would need to be closed, to help satisfy the minimum 660 foot directional median spacing requirement.
 - FTE's stated the agency has a process for moving the limited access right-of-way line, and that the only way this could be accomplished is if other access options are determined not to be viable.
 - FTE stated that a potential viable option exists with relocating access south of the limited access right-of-way line along NW 27th Avenue.
 - FTE stated concerns about the northbound traffic at the intersection of NW 27th Avenue and County Line Road extending south beyond a full access connection at the park and ride facility.
 - FDOT discussed an option for buses to enter the site on NW 27th Court via the signalized intersection at NW 211th Street and NW 27th Avenue. Southbound buses would exit the site via a right-in/right-out driveway along NW 27th Avenue. Northbound and eastbound buses would exit via a direct connection to the Homestead Extension of Florida's Turnpike (HEFT) northbound/eastbound off-ramp and utilize the signalized intersection at the HEFT northbound/eastbound off-ramp and NW 27th Avenue. Automobile access would be provided by a right-in/right-out along NW 27th Avenue.
 - This concept was later refined to provide both vehicle and bus access along NW 27th Avenue. A directional median opening with right-in/right-out and left-in south of FTE's limited access right-of-way line along NW 27th Avenue and to subsequently close the north Calder driveway.
 - Another FDOT option discussed buses performing u-turn movements at the nearest signalized intersections to the north and south of the site from the outer or right-turn lanes with dedicated bus phases, similar to operations along Collins Avenue (SR A1A) on Miami Beach.

Next Steps/Action Items

- FDOT to provide KHA with FDOT median closure procedure. MDT/MPO would need to initiate the process of closing the north Calder driveway.
- KHA to develop a conceptual plan for the option of closing the north Calder driveway and providing directional access to the park and ride facility (right-in/right-out and left-in) along NE 27th Avenue. A direct connection to the HEFT northbound/eastbound off-ramp will also be provided for northbound and eastbound buses.
- KHA will develop a second alternative for buses from the south to access the park and ride facility via NW 27th Court or NW 29th Avenue, with a right-in/right-out connection to NW 27th Avenue.

NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study
Study Advisory Committee (SAC) Meeting
November 19, 2012

On Monday, November 19, 2012, a SAC meeting was held for *NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study* at the MPO offices at Government Center. The attendees of the meeting were:

- Wilson Fernandez – Miami-Dade MPO
- Larry Foutz – Miami-Dade MPO
- Jay Marder – City of Miami Gardens
- Monica Cejas – Miami-Dade Transit (MDT)
- Kerry Glasgow – Miami-Dade Citizen's Independent Transportation Trust (CITT)
- Joshua Rak – Miami-Dade County Regulatory and Economic Resources (MDCRER)
- Helen Brown – MDCRER
- Rolando Jimenez – Miami-Dade Public Works and Waste Management Department
- Edward Schumann – Florida Department of Transportation (FDOT)
- Jeannine Gaslonde – FDOT
- John Garzia – FDOT
- Greg Kyle – Kimley-Horn and Associates, Inc. (KHA)
- Dave Osborne – KHA
- Adrian Dabkowski – Kimley-Horn and Associates, Inc. (KHA)

KHA distributed NW 215th Street park-and-ride access alternatives and NW 27th Avenue bus station locations. The following describes the pertinent discussion topics during the meeting.

- Concept of Operations (Con Ops)/Transit Signal Priority (TSP) and Queue Jumper
 - A brief overview the Con Ops was provided. It was also discussed that in a previous meeting with the County Traffic Signals and Signs (TS&S) Division, the group in general agreed that a headway maintenance system that is only available to express buses should be used.
 - Final determination and system specifics would be finalized in the design phase once the countywide Computer Aided Dispatch (CAD)/Automatic Vehicle Location (AVL) is deployed by the end of 2013.
 - Potential locations for queue jumpers were discussed and include
 - NW 199th Street northbound (from right-turn lane)
 - NW 119th Street northbound (from right-turn lane)
 - NW 103rd Street southbound (from right-turn lane)
 - NW 79th Street northbound (from right-turn lane) and southbound (convert outer lane to a right-turn lane to accommodate queue jump)
 - Additional analyses in design phase will be require for FDOT approval

- NW 215th Street Park-and-Ride Facility Access Alternatives
 - Nine (9) access alternatives were discussed. Attached is the access alternative matrix.
 - It was decided that Alternative 2B was the preferred alternative and that Alternative 2A is the back-up alternative.
- Finalizing Bus Station Locations
 - The bus station locations were discussed. Attached is the bus station matrix which notes the right-of-way required for implementation.

Next Steps/Action Items

- 215th Street Park-and-Ride Access Alternatives
 1. City of Miami Gardens to schedule meeting with Calder Casino and Race Course to discuss access options and potentially limit north Calder driveway to right-in-right-out access.
 2. KHA to coordinate meeting with FDOT and FTE to finalize access alternatives.
 3. KHA to work on preparing conceptual plan for Access Alternative 2B for MDT's meeting with the Florida Turnpike Enterprise on December 11.
- KHA to finalize report sections for TSP and bus station locations and send to MPO for review.
- Next SAC will include the Flagler Street corridor EBS kick-off meeting.

NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study
Calder Casino and Race Track
NW 215th Street Park and Ride Facility Access Meeting
December 4, 2012

On Tuesday, December 4, 2012, a meeting was held with Calder Casino & Race Track at the Calder Casino & Race Track administrative offices to discuss access to the NW 215th Street Park and Ride Facility for the *NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study*. The attendees of the meeting were:

- Wilson Fernandez – Miami-Dade Metropolitan Planning Organization (MPO)
- Kelly Cooper – Miami-Dade Citizen’s Independent Transportation Trust (CITT)
- Jay Marder – City of Miami Gardens
- Austin Miller – Calder Casino & Race Track
- Greg Kyle – Kimley-Horn and Associates, Inc. (KHA)
- Adrian Dabkowski – KHA

Kimley-Horn presented a conceptual site plan for the NW 215th Street park and ride facility with proposed access. The following describes the pertinent discussion topics during the meeting.

- MPO, CITT, and KHA provided an overview of the bus rapid transit project and discussion of previous transit projects in the area.
 - MDT’s purchase of the NW 215th Street parcel for purposes of a park and ride facility to serve as the northern terminus was discussed.
- NW 215th Street Park and Ride Facility
 - It was discussed that MDT desired to utilize the existing northbound u-turn/left-turn lane for access into the site (see Sheet Number 1, attached). The turn lane has already been constructed and bisects the site into two nearly equal parcels, which is desirable for site plan development. From a regulatory standpoint it was discussed that Florida Turnpike Enterprise’s (FTE’s) limited access right-of-way line currently extends further south along NW 27th Avenue and would prohibit access at this location. Additionally, it was discussed that a full access median opening would not meet Florida Department of Transportation (FDOT) access management criteria as only 330 feet is provided to the intersection to the north and 440 feet is provided to the intersection to the south, while the standard is 1,320 feet, and that neither FDOT nor FTE supported this alternative.
 - The preferred alternative (see Sheet Number A, attached) was presented to Calder Casino & Race Track. This alternative converts the north Calder driveway from an existing full access driveway to a right-in/right-out driveway.

- Calder Casino & Race Track stated that removal of full access driveway would limit future development on their property and is not viable to Calder.
 - Calder was made aware that if they proposed future development on their property that they would have to complete a FDOT Significant Change determination assessment and would most likely have to re-permit the existing driveways. Calder was also made aware that the north full access driveway would most likely be required to be reconfigured as a limited access driveway, to either a right-in/right-out driveway or left-in, right-in/right-out driveway.
- Calder suggested exploring the option of integrating the park and ride facility with the Calder property. An option that could be explored would be to assess the feasibility of relocating a portion of the park and ride facility to the Calder frontage along NW 27th Avenue and including a portion of the Calder property in the RFP for joint development of the park and ride facility.
- An additional access alternative was discussed where the north Calder driveway would be relocated to align as the east leg of a new signalized intersection serving both the Calder development and the NW 215th Street park-and-ride facility. The meeting attendees were made aware that this proposed access configuration required a 50 to 70 percent FDOT access management variance and that the plan would be subject to FDOT variance committee hearing. The meeting attendees were also made aware that a variance committee hearing would only occur once engineering plans were submitted for permit and the process could last from 6 to 12 months before final determination was made.

Next Steps/Action Items

- KHA to develop a conceptual plan for the realignment of the north Calder driveway to serve as the east leg of a new signalized intersection serving both the Calder development and the NW 215th Street park-and-ride facility. The conceptual plan would be provided to Calder for review and comments.
- If Calder found the plan acceptable, a follow-up meeting with FDOT and FTE would be scheduled to discuss the plan feasibility.



No.	REVISIONS	DATE	BY


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NW 215th Street Park and Ride Lot

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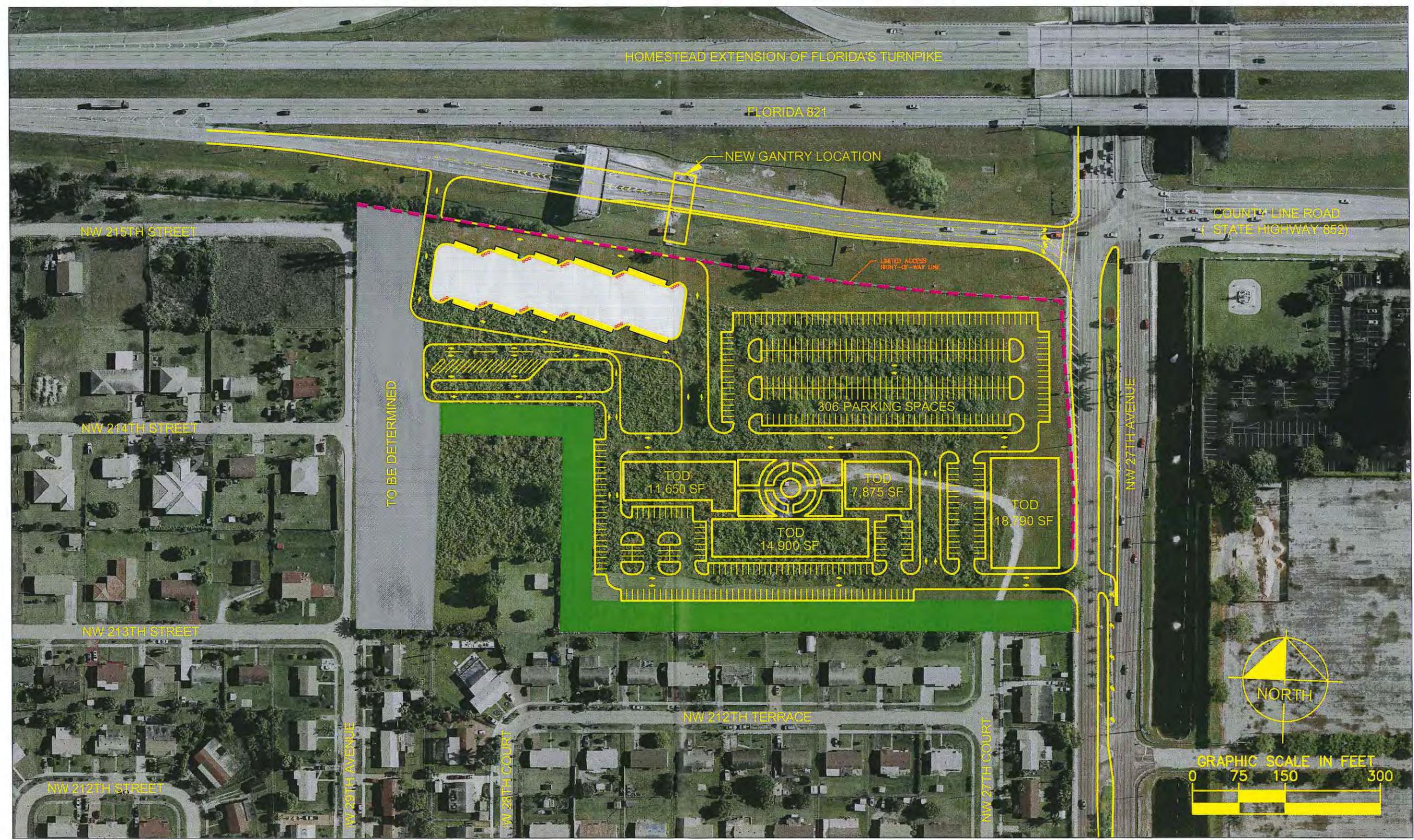
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PARK AND RIDE TRANSIT TERMINAL
NW 215TH STREET AND NW 27TH AVENUE

CONCEPTUAL SITE PLAN

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NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study
NW 215th Street Park and Ride Facility Conceptual Site Plan Conference Call
January 22, 2013

On Tuesday, January 22, 2013, a conference call was held to discuss conceptual site plan alternatives for the access to the NW 215th Street park-and-ride Facility for the *NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study*. The call attendees were:

- Jay Marder – City of Miami Gardens
- Kelly Cooper – Miami-Dade Citizen’s Independent Transportation Trust (CITT)
- Monica Cejas – Miami Dade Transit (MDT)
- Nilia Cartaya - MDT
- Austin Miller – Calder Casino & Race Track
- Greg Kyle – Kimley-Horn and Associates, Inc. (KHA)
- Adrian Dabkowski – KHA

The following describes the pertinent discussion topics during the conference call.

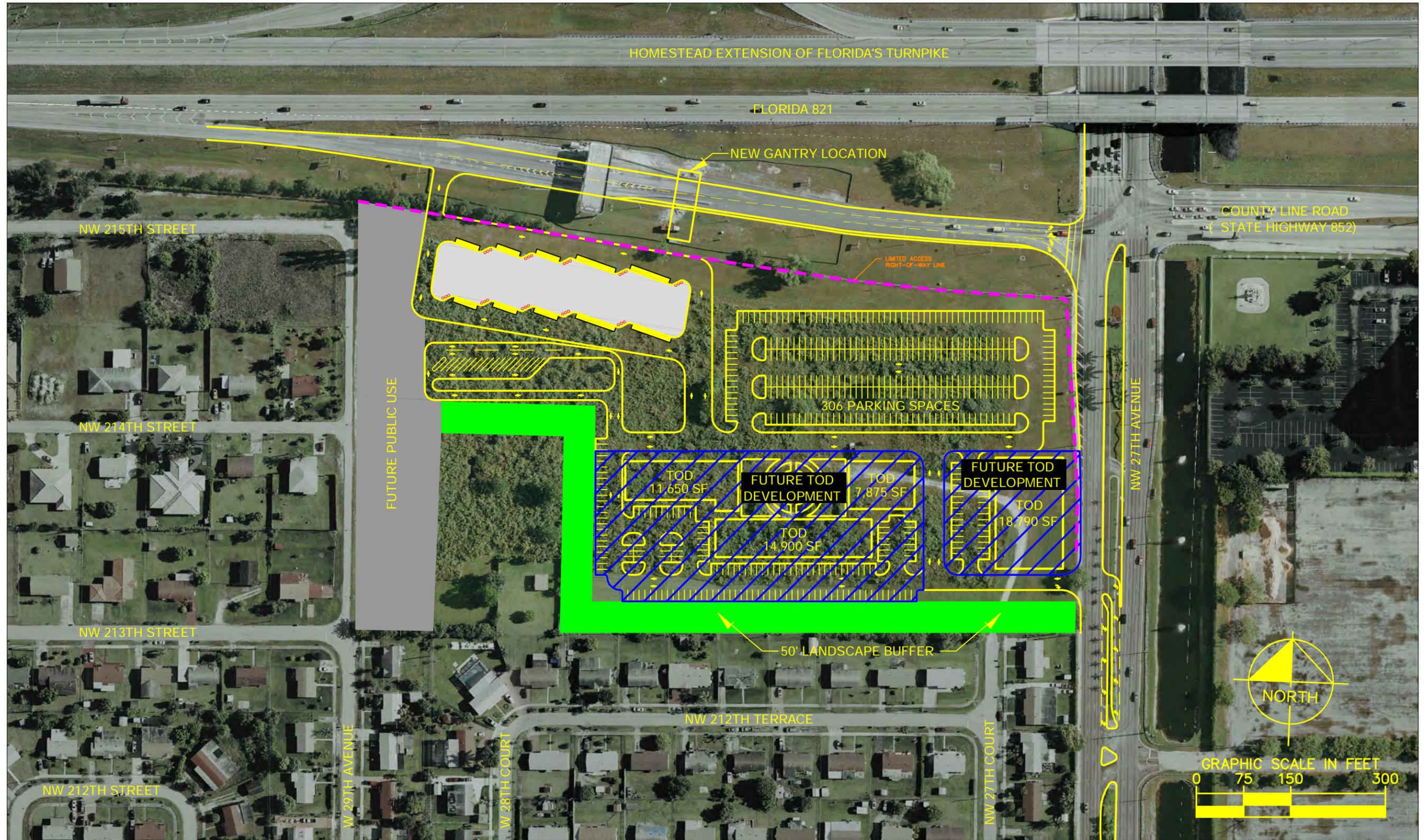
- Kimley-Horn provided a brief summary of the previous access alternatives that were developed and the two (2) additional alternatives developed as a result of the December 4, 2012 meeting with Calder Casino & Race Track.
 - The two (2) additional alternatives, option 2A and option 4 are attached.
 - Option 2A provides directional access: right-in/right-out and left-in to the park-and-ride facility and maintains a full access Calder north driveway. Northbound and eastbound buses exit the park-and-ride facility onto the Homestead Extension of Florida’s Turnpike (HEFT) eastbound off-ramp. This alternative requires a Florida Department of Transportation (FDOT) variance for the directional median opening spacing. Extensive coordination with Florida’s Turnpike Enterprise (FTE) will also be required for crossing the FTE limited access right-of-way line at the HEFT off-ramp connection.
 - Option 4 creates a signalized intersection at the park-and-ride facility driveway and constructs a new driveway for the Calder facility to serve as the east leg of a new signalized intersection. This configuration serves both the Calder development and the NW 215th Street park-and-ride facility. This proposed access configuration requires a 50 to 70 percent FDOT access management variance and the driveway connection would be subject to FDOT variance committee hearing. The conference call participants were also made aware that a variance committee hearing would typically only occur once engineering plans were submitted for permit and the process could last from 6 to 12 months before final determination was made. As FTE’s limited access right-of-way line is not crossed in this alternative, limited coordination with FTE will be required.
 - Calder stated that the cost of the new bridge to their site was a concern.

- Calder will share the Option 4 concept with their design consultant.
- Project timeline was discussed. It was also discussed that the timeline did not include rezoning of the property which will be required and is approximately a 60 to 90 day process. It was also discussed that a public hearing would be necessary as part of the rezoning process.
 - Miami Gardens City Council would need to approve the site plan concept.
- A request for proposal (RPF) will be issued by MDT for joint development of the NW 215th Street park-and-ride facility and transit oriented development (TOD).
 - MDT has funds to construct the bus terminal and parking as a standalone project, if no interest is found for developing the TOD.
 - The RPF will include coordination with FDOT for permitting site access connections.
 - MDT will need to resolve access issues during the design phase of the project.
 - The project design phase is scheduled for fiscal year 2014.
 - The project requires FTA approval of the Categorical Exclusion (Cat Ex) to comply with National Environmental Policy Act (NEPA) requirements.

Next Steps/Action Items

- City of Miami Gardens to provide zoning application to MDT.
- MDT to revise project schedule to include rezoning at beginning of Design task.
- KHA to schedule follow-up meeting with FDOT.
- KHA to prepare preliminary costs of bridge to Calder site at proposed signalized intersection.

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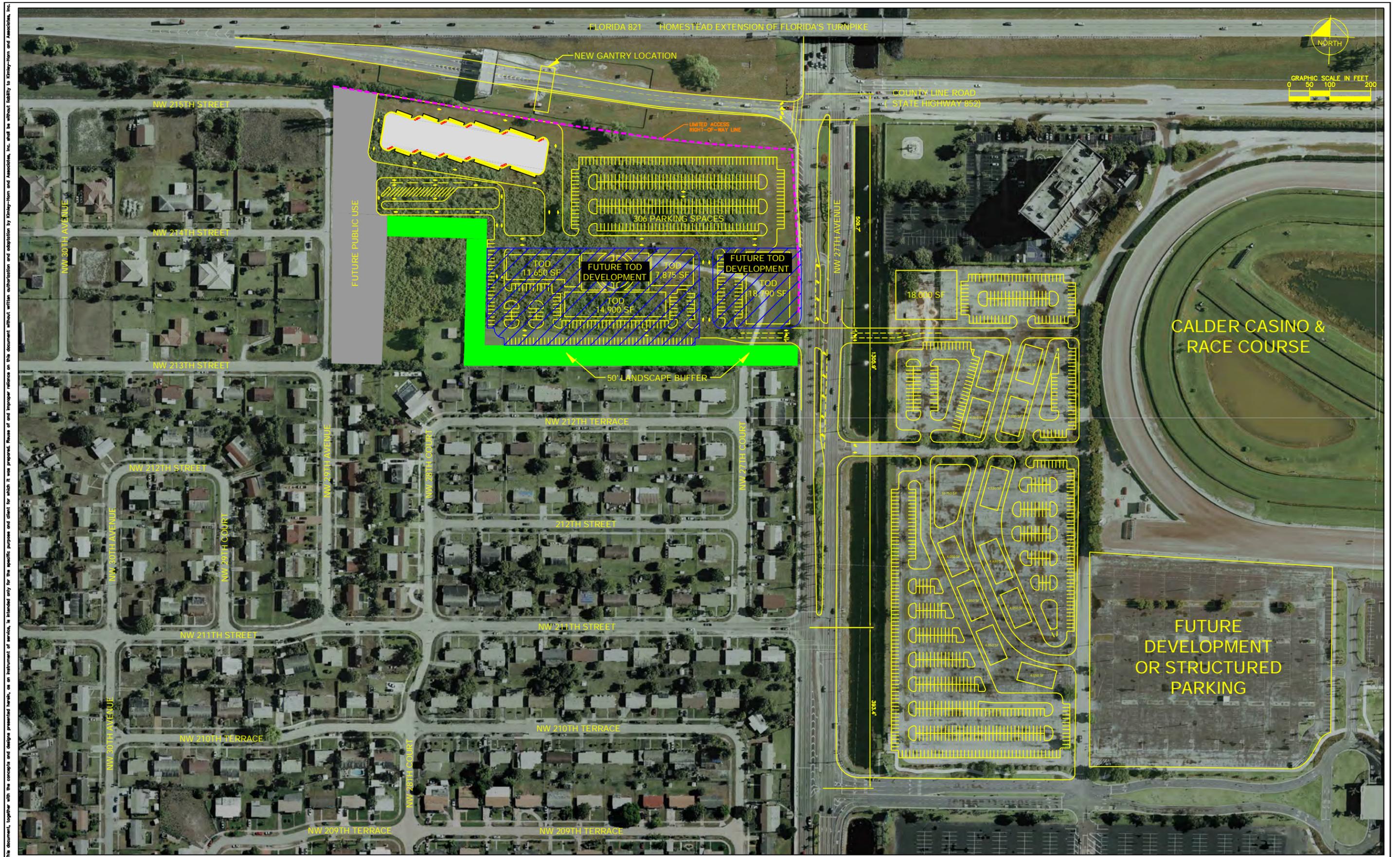
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PARK AND RIDE TRANSIT TERMINAL
 NW 215TH STREET AND NW 27TH AVENUE

CONCEPTUAL SITE PLAN
 OPTION 2A

SHEET NUMBER

2A-1



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PARK AND RIDE TRANSIT TERMINAL
NW 215TH STREET AND NW 27TH AVENUE

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CONCEPTUAL SITE PLAN
OPTION 4

SHEET NUMBER
4-1

NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study
Florida Department of Transportation (FDOT)
NW 215th Street Park-and-Ride Facility Access Meeting
February 14, 2013

On Thursday, February 14, 2013, a meeting was held with FDOT to discuss access to the NW 215th Street park-and-ride facility for the *NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study* at the FDOT District Six offices. The attendees of the meeting were:

- Wilson Fernandez – Miami-Dade MPO
- Monica Cejas – Miami-Dade Transit (MDT)
- Omar Meitin – FDOT
- Ali Al-Said – FDOT
- Ali Khalilahmadi – FDOT
- Lisa Colmenares – FDOT
- Jay Marder – City of Miami Gardens
- Austin Miller – Calder Casino & Race Track
- John Easterling (via phone) – Florida Turnpike Enterprises (FTE)
- Greg Kyle – Kimley-Horn and Associates, Inc. (KHA)
- Adrian Dabkowski – KHA

At the outset of the meeting, Kimley-Horn provided an overview of the enhanced bus service project along NW 27th Avenue. The following describes the pertinent discussion topics during the meeting.

- The NW 215th Street park-and-ride facility will serve as the end-of-the-line station for the NW 27th Avenue Enhanced Bus Service. MDT purchased the 14-acre parcel for the park-and-ride facility with Citizen's Independent Transportation Trust (CITT) funding. The NW 27th Avenue Enhanced Bus Service project is funded by local, state, and federal funding.
- Coordination with Calder Casino & Race Track was discussed. Calder Casino & Race Track is not receptive to the idea of closing the median opening at it's north driveway along NW 27th Avenue, as this driveway is actively used and is important to future development opportunities on the Calder property. A new access alternative for the NW 215th Street park-and-ride facility, Option 4, was developed as a result of coordinating with Calder Casino & Race Track.
- NW 215th Street Park-and-Ride Facility
 - At the previous October meeting with FDOT and FTE, Option 1, which develops a new full access intersection that aligns with the existing northbound left-turn lane to create a full access intersection, is the ideal access configuration for MDT. The northbound left-turn lane has already been constructed and it bisects the site into

two nearly equal parcels. However, FTE's limited access right-of-way line currently extends further south along NW 27th Avenue than the proposed driveway connection, which prohibits access at this location. FTE would prefer to relocate the driveway connection and the left-turn lane further south beyond the limited access right-of-way line.

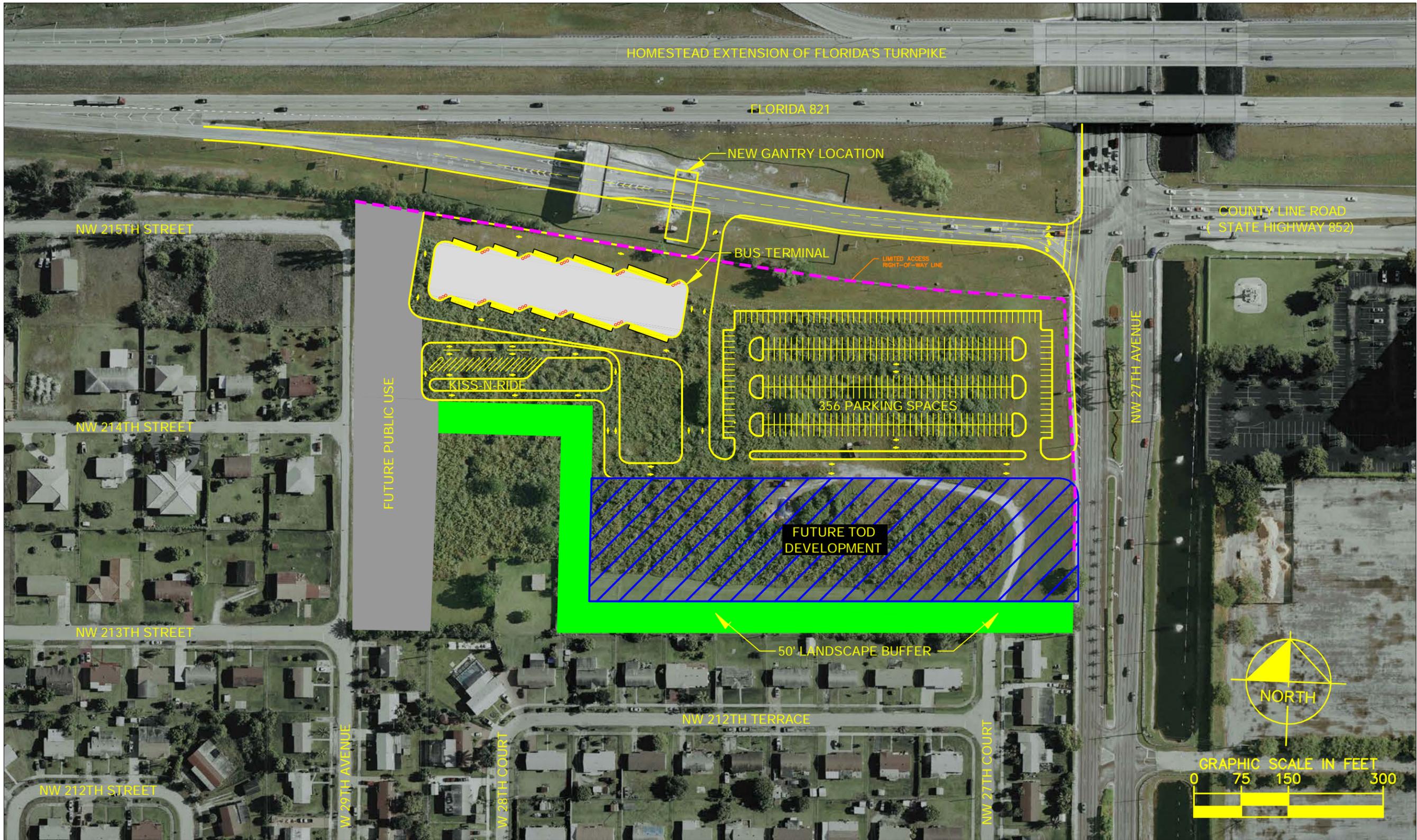
- Two (2) access alternatives, Option 2A and Option 4, were presented. These alternatives are attached.
 - Option 2A provides directional right-in/right-out and left-in access to the park-and-ride facility and maintains the full access Calder north driveway. Northbound and eastbound buses exit the park-and-ride facility onto the Homestead Extension of Florida's Turnpike (HEFT) eastbound off-ramp. This alternative requires an FDOT access management variance for the directional median opening spacing and potentially a design variance for the left-turn lane accessing the site. Coordination and a permit with FTE will also be required to cross the FTE limited access right-of-way line at the proposed HEFT off-ramp connection.
 - FDOT stated concerns over the sub-standard left-turn lane, noting that queues could potentially extend and block through lanes on NW 27th Avenue.
 - Option 4 creates a signalized intersection at the park-and-ride facility driveway and constructs a new driveway for the Calder facility to serve as the east leg of a new signalized intersection. This configuration serves both the Calder development and the NW 215th Street park-and-ride facility. This proposed access configuration requires a 50 to 70 percent FDOT access management variance and the driveway connection would be subject to FDOT variance committee hearing. Since FTE's limited access right-of-way line is not crossed in this alternative, FTE permits are not required.
- FDOT stated that a modified Option 1, where directional (right-in/right-out and left-in) access is provided on NW 27th Avenue and a right-out onto the HEFT ramp for eastbound and northbound buses and passenger cars should be considered in place of Option 2A. Option 1 is attached.
- FDOT stated that a traffic study and signal warrant analysis would be required for final determination. It was explained that a traffic study and signal warrant analysis would be prepared as part of the design phase of the NW 27th Avenue Enhanced Bus Service project.

- Funding was discussed towards the end of the meeting. FDOT stated that if the project is funded by FDOT, the project may be permitted through the Local Agency Program (LAP).

Next Steps/Action Items

- Final access determination for the NW 215th Street park-and-ride facility will be made in the design phase of the project.

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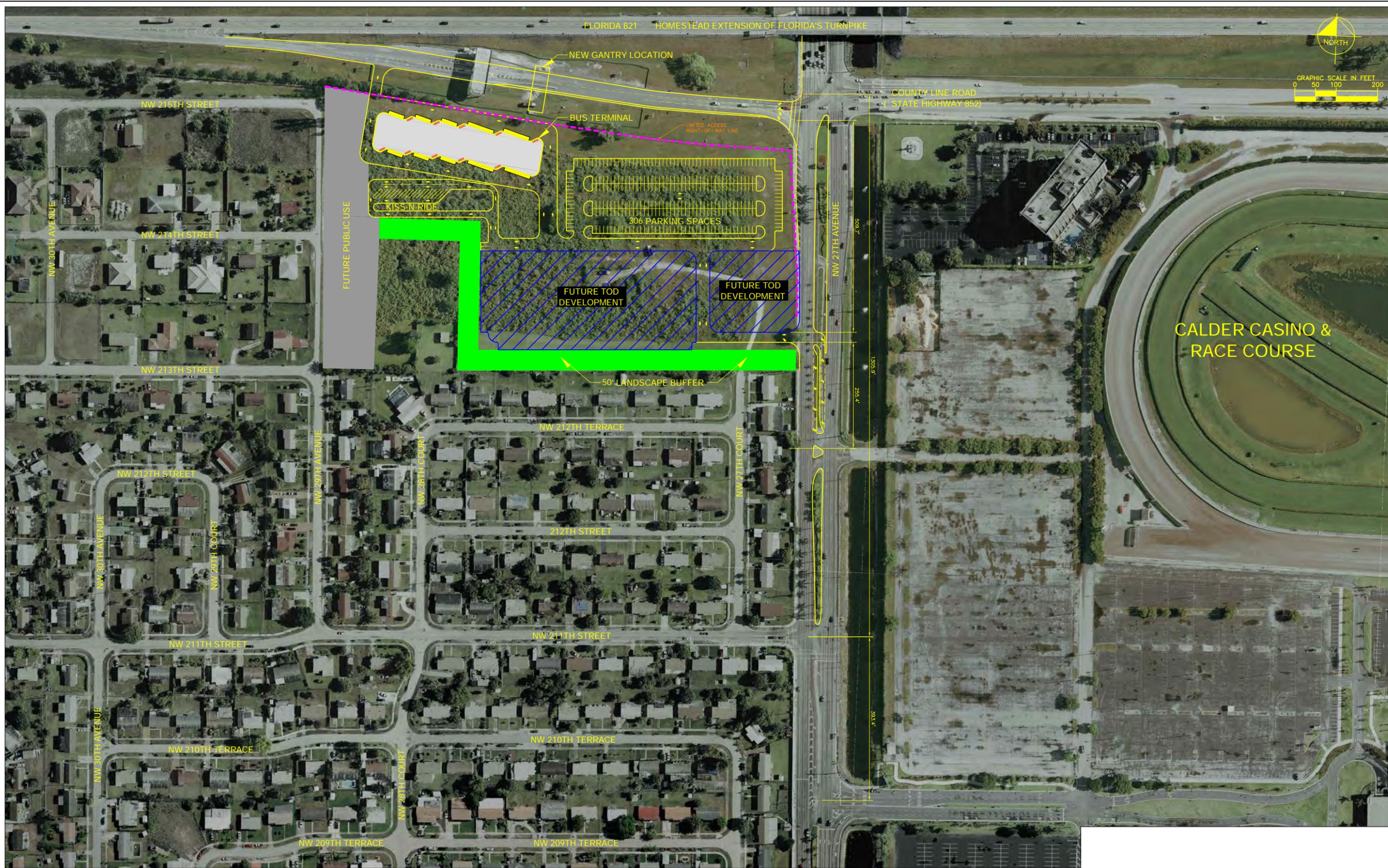
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PARK AND RIDE TRANSIT TERMINAL NW 215TH STREET AND NW 27TH AVENUE

CONCEPTUAL SITE PLAN OPTION 1

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NW 215TH STREET AND NW 27TH AVENUE

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CONCEPTUAL SITE PLAN
OPTION 2A

SHEET NUMBER
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PARK AND RIDE TRANSIT TERMINAL
NW 215TH STREET AND NW 27TH AVENUE

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CONCEPTUAL SITE PLAN
OPTION 4

SHEET NUMBER
4-1

NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study
Study Advisory Committee (SAC) Meeting
March 1, 2013

On Friday, March 1, 2013, the final SAC meeting was held for *NW 27th Avenue Enhanced Bus Service Concepts and Environmental Study* at the MPO offices at Government Center. The attendees of the meeting were:

- Wilson Fernandez – Miami-Dade MPO
- Jesus Guerra – Miami-Dade MPO
- Jay Marder – City of Miami Gardens
- Arshad Viqar – City of Opa Locka
- Kelly Cooper – Miami-Dade Citizen's Independent Transportation Trust (CITT)
- Monica Cejas – Miami-Dade Transit (MDT)
- Eric Zahn – MDT
- Rolando Jimenez – Miami-Dade Public Works and Waste Management Department
- John Lafferty – Parsons Brinckerhoff
- Jitender Ramchandani – HNTB
- Greg Kyle – Kimley-Horn and Associates, Inc. (KHA)
- Adrian Dabkowski – Kimley-Horn and Associates, Inc. (KHA)

The following describes the pertinent discussion topics during the meeting.

- NW 215th Street Park-and-Ride Facility Access Alternatives
 - Three (3) access alternatives will be considered further in the design phase. The access alternatives are attached. These alternatives will require coordination with Florida Department of Transportation (FDOT) and Florida Turnpike Enterprise (FTE).
 - Option 1A provides directional right-in/right-out and left-in access at the existing northbound left-turn at the site and maintains the full access Calder north driveway. Northbound and eastbound bus traffic exits the park-and-ride facility onto the Homestead Extension of Florida's Turnpike (HEFT) eastbound off-ramp. This alternative requires an FDOT access management variance for the directional median opening on NW 27th Avenue. Coordination and a permit with FTE will also be required to cross the FTE limited access right-of-way line at the proposed HEFT off-ramp connection for buses.
 - A dedicated queue jump lane for buses at the intersection of the HEFT off-ramp and NW 27th Avenue was also discussed.
 - Option 2A provides directional right-in/right-out and left-in access to the park-and-ride facility and maintains the full access Calder north driveway.

Northbound and eastbound buses exit the park-and-ride facility onto the Homestead Extension of Florida's Turnpike (HEFT) eastbound off-ramp. This alternative requires an FDOT access management variance for the directional median opening on NW 27th Avenue and potentially a design variance for the left-turn lane accessing the site. Coordination and a permit with FTE will also be required to cross the FTE limited access right-of-way line at the proposed HEFT off-ramp connection for buses.

- Option 4 creates a signalized intersection at the park-and-ride facility driveway and constructs a new driveway for the Calder facility to serve as the east leg of a new signalized intersection. This configuration serves both the Calder development and the NW 215th Street park-and-ride facility. This proposed access configuration on NW 27th Avenue requires a 50 to 70 percent FDOT access management variance and the driveway connection would be subject to FDOT variance committee hearing. Since FTE's limited access right-of-way line is not crossed in this alternative, FTE permits are not required.
- Finalizing Bus Station Locations
 - The locations of full station (25 feet x 15 feet), slim station (26.25 feet x 8 feet), and required right-of-way square-footage was discussed.
 - Stations will be implemented in a phased approach. A minimal approach will be used. Therefore, the first phase will include only essential items while the second phase will include additional components.
- Enhanced Operating Strategies Concept of Operations (Con Ops)/Transit Signal Priority (TSP) and Queue Jumper
 - A brief overview of the Con Ops objectives was provided. It was also discussed that in a previous meeting with the County Traffic Signals and Signs (TS&S) Division, the group in general agreed that a headway based logic system that is only available to express buses should be used.
 - Final determination and system specifics would be completed in the design phase once the countywide Computer Aided Dispatch (CAD)/Automatic Vehicle Location (AVL) is deployed by the end of 2013.
 - Potential locations for queue jumps was discussed and include
 - NW 199th Street northbound (from right-turn lane)
 - NW 119th Street northbound (from right-turn lane)
 - NW 103rd Street southbound (from right-turn lane)
 - NW 79th Street northbound (from right-turn lane) and southbound (convert outer lane to a right-turn lane to accommodate queue jump)
 - Additional analyses in design phase will be required for FDOT approval.

- Environmental Documentation Summary – National Environmental Protection Act (NEPA)
 - It was discussed that a Categorical Exclusion (Cat Ex) applies to this project as the project consists of Intelligent Transportation System (ITS) deployment, buses utilizing existing facilities, and implementation of bus transfer stations.
 - The Cat Ex identified two (2) issues associated with the NW 215th Street Bus Terminal and Park-and-Ride facility:
 - Vibration during construction
 - Noise and vibration study required per FTA criteria due to proximity of single-family residences.
 - The study determined that the operation of the facility would not result in noise or vibration impacts.
 - During construction noise levels will not result in a significant impact. However, vibration levels will be above annoyance threshold but below the damage threshold.
 - Contractor will be required to implement a Vibration Control Plan to reduce construction vibration.
 - Contamination
 - Seven (7) potential contamination sites
 - Six (6) near proposed bus stations
 - Minimal ground disturbance required for station construction not expected to present significant risk.
 - NW 215th Street Park-and-Ride Facility
 - Phase 1/Limited Phase 2 ESA completed in 2010
 - Soil and groundwater contaminated with arsenic above cleanup target levels.
 - Previous owner required to submit Site Assessment Report (SAR) by County's Regulatory and Economic Resources (RER) Department.
 - Open file on site at RER.
- Minimum rapid bus service/enhanced bus service criteria were discussed. The following provides a summary of the agreed minimums.
 - Bus headway: 15 minutes for Phase 1 deployment. 10 minutes for Phase 2 deployment.
 - TSP: headway based logic to avoid bunching of buses, provided throughout a corridor at all signalized intersections.
 - Queue Jump: Phase 2 implementation
 - Buses: articulated buses will be used. These buses will be wrapped and branded with rapid logos and only be used for specific enhanced bus routes.
 - Branding: red buses and wireless internet (Wi-Fi)
 - Station Design

- Pad provided for full or slim station design in Phase 1. Minimal station shelter provided in Phase 1. Full or slim station will be provided as part of Phase 2.
- Real-time passenger information: provided as Phase 1.
- Station spacing: One (1) mile average.
- Off-Board Fare: cashless system. Ticket vending machine provided in station marker.
- Fare: \$2.35 premium rapid
- Park-and-Ride facility: Phase 2 implementation
- Terminal: Phase 2 implementation, provided at a minimum of one end.

Remaining Steps

- Complete Draft Documented Cat Ex
 1. Comments to be provided by MDT and MPO
 2. Revise Cat Ex document
 3. Submit Cat Ex to Federal Transit Administration (FTA)
 4. Address FTA comments and resubmit for approval
- Finalize project report

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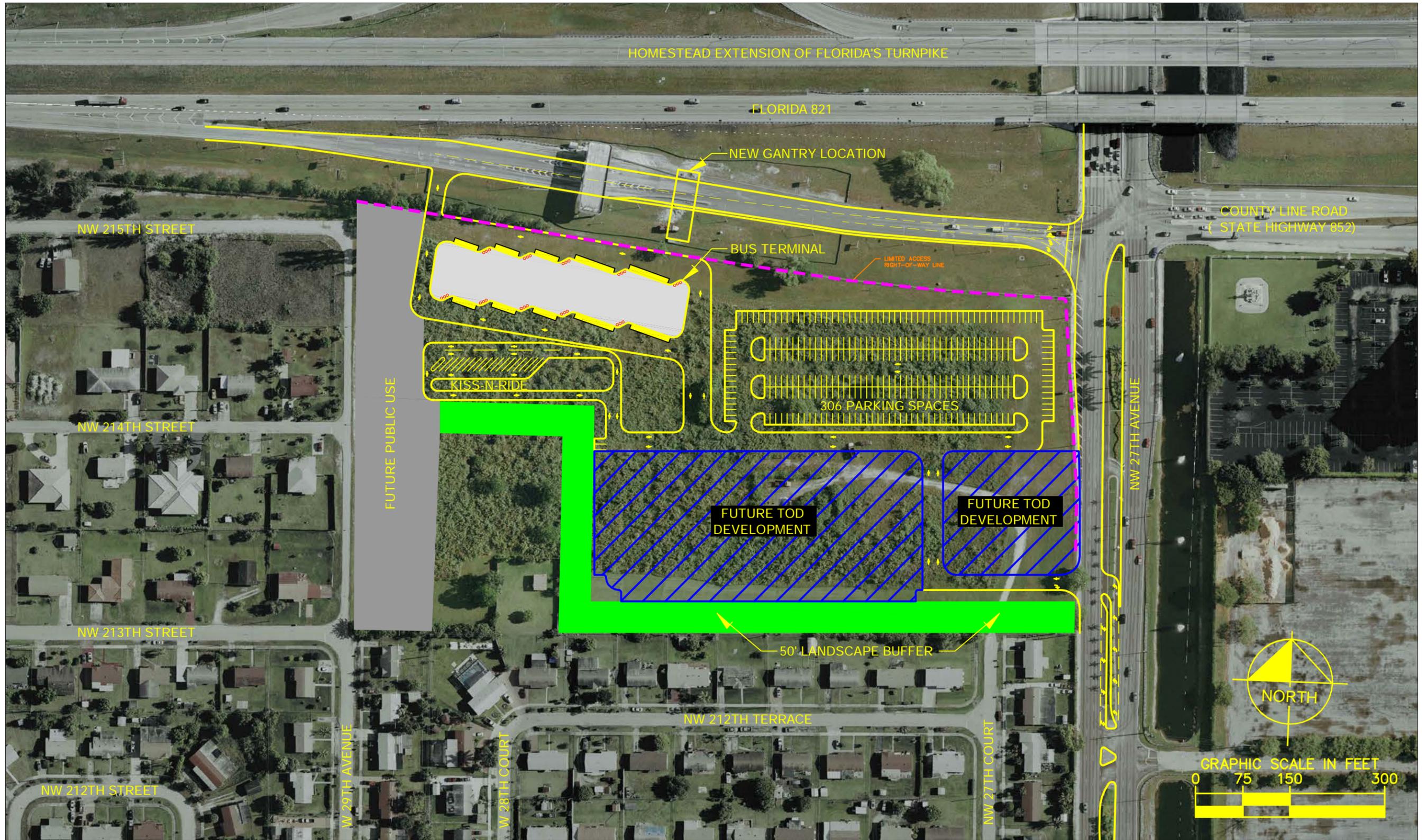
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PARK AND RIDE TRANSIT TERMINAL NW 215TH STREET AND NW 27TH AVENUE

CONCEPTUAL SITE PLAN OPTION 1A

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PARK AND RIDE TRANSIT TERMINAL
NW 215TH STREET AND NW 27TH AVENUE

CONCEPTUAL SITE PLAN
OPTION 2A

SHEET NUMBER

2A-1

APPENDIX B:
NW 215th Street Park-and-Ride
Facility Alternative Access

Access Alternatives

NW 27TH AVENUE Enhanced Bus Service Concepts



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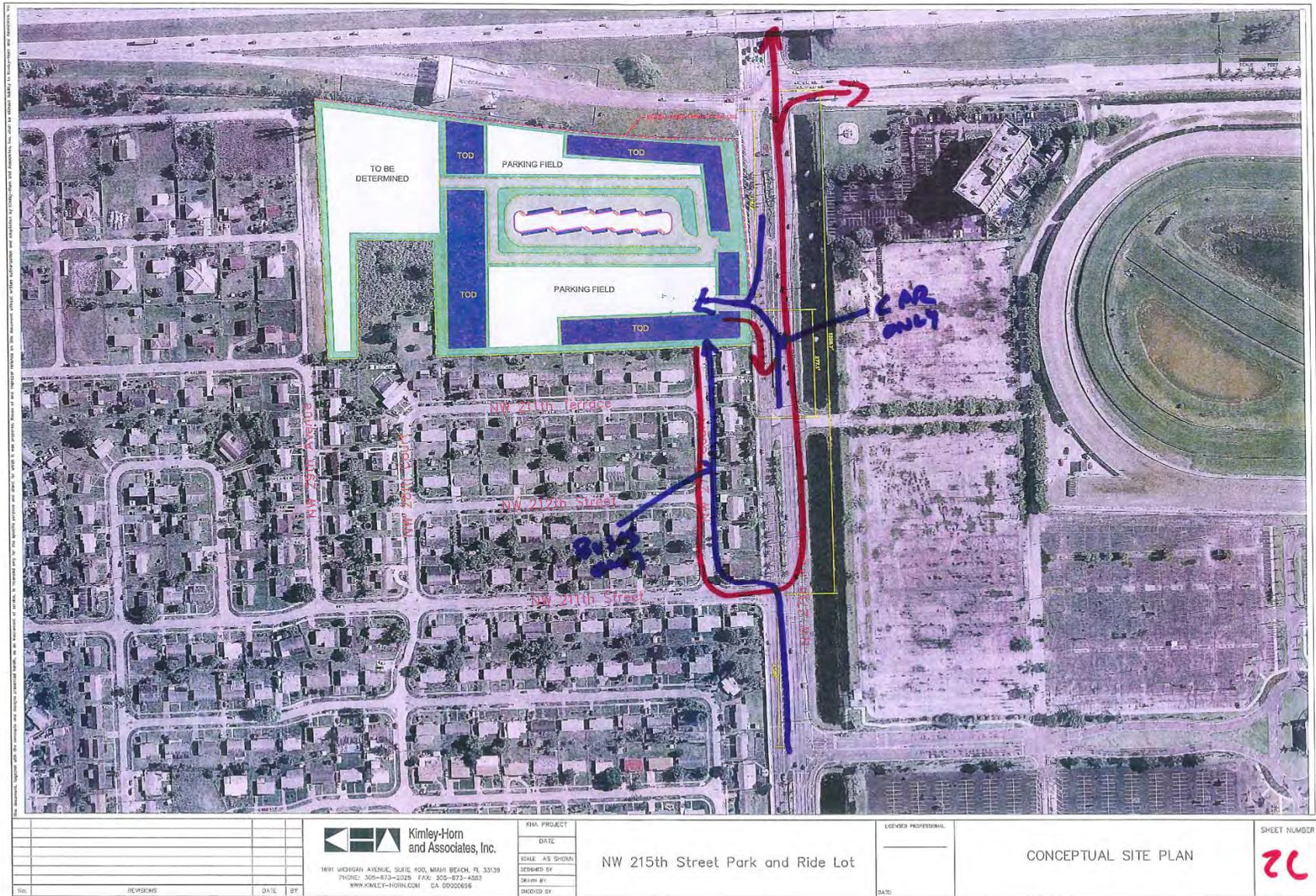
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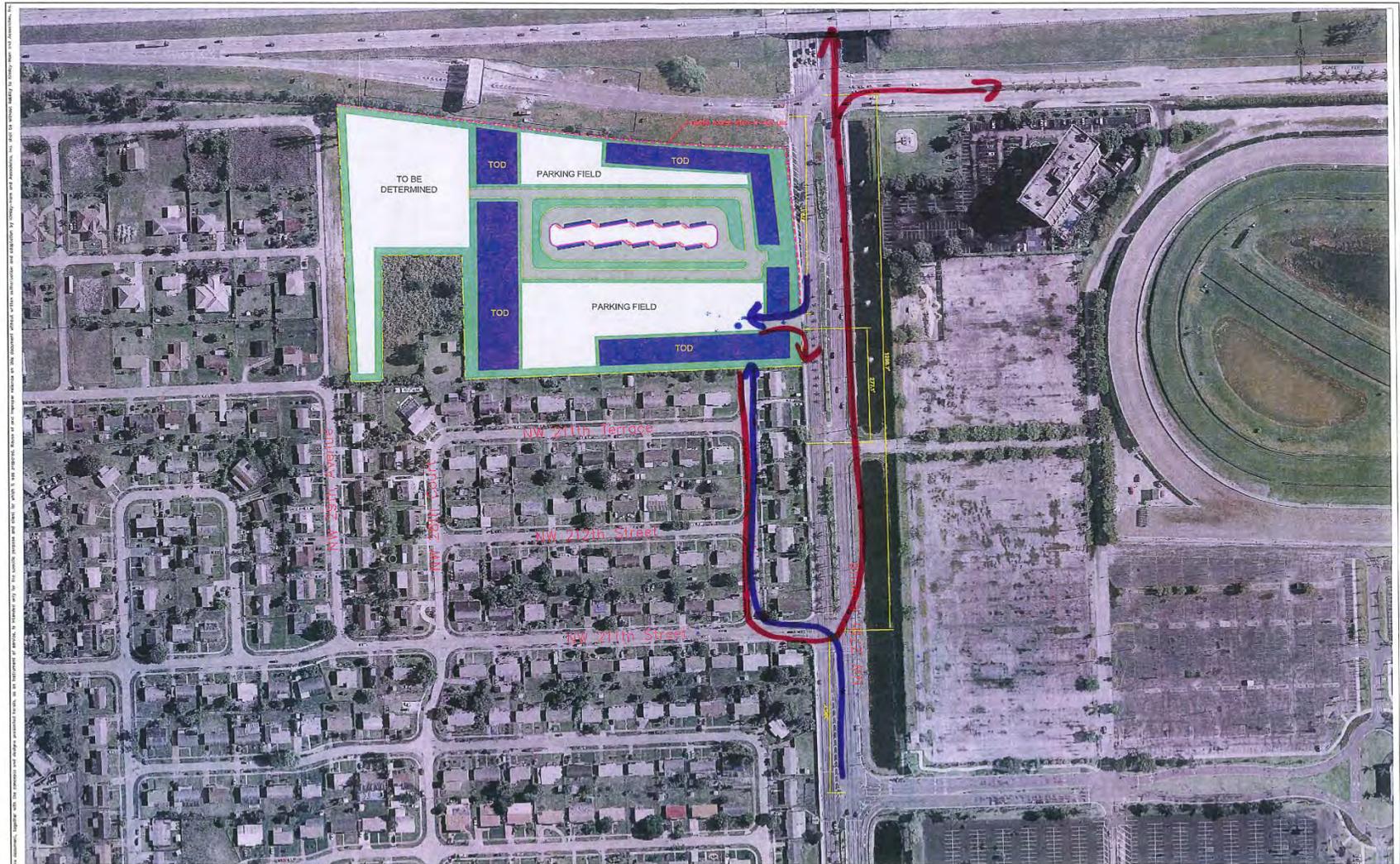
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CONCEPTUAL SITE PLAN

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NW 27TH AVENUE Enhanced Bus Service Concepts



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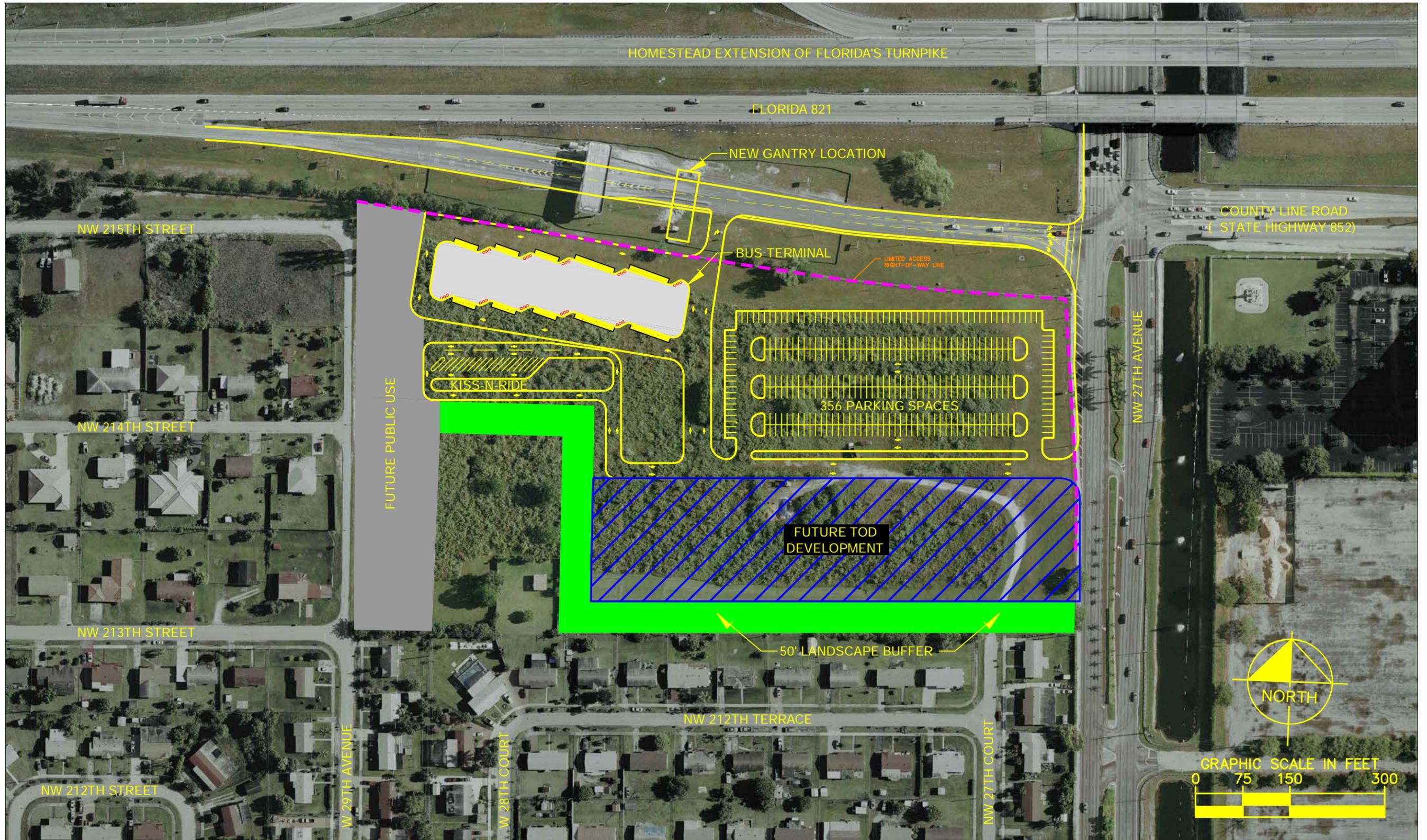
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NW 27TH AVENUE Enhanced Bus Service Concepts



Conceptual Site Plans

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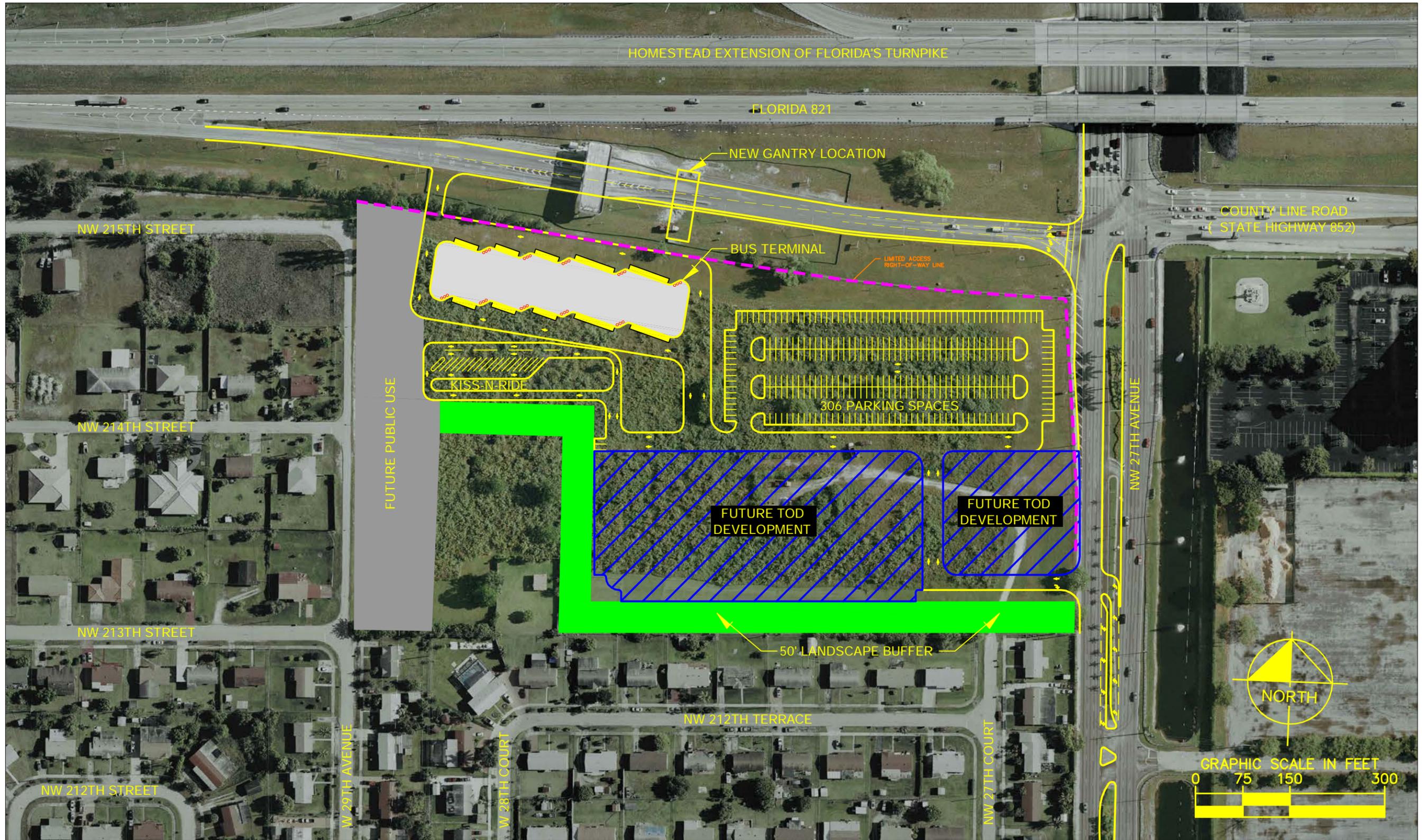
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1221 BRICKELL AVENUE, SUITE 400, MIAMI, FL 33131
PHONE: 305-673-2025 FAX: 305-535-7760
WWW.KIMLEY-HORN.COM CA 00000696

PARK AND RIDE TRANSIT TERMINAL NW 215TH STREET AND NW 27TH AVENUE

CONCEPTUAL SITE PLAN OPTION 1A

SHEET NUMBER

Plotted By: Pasken, Ken Sheet Set: Kha Layout: Layout1 February 13, 2013 05:59:05pm M:\TEMP\WILA\BCT Bus Bay Standards\2013.02.13_Site Plan_2A.dwg
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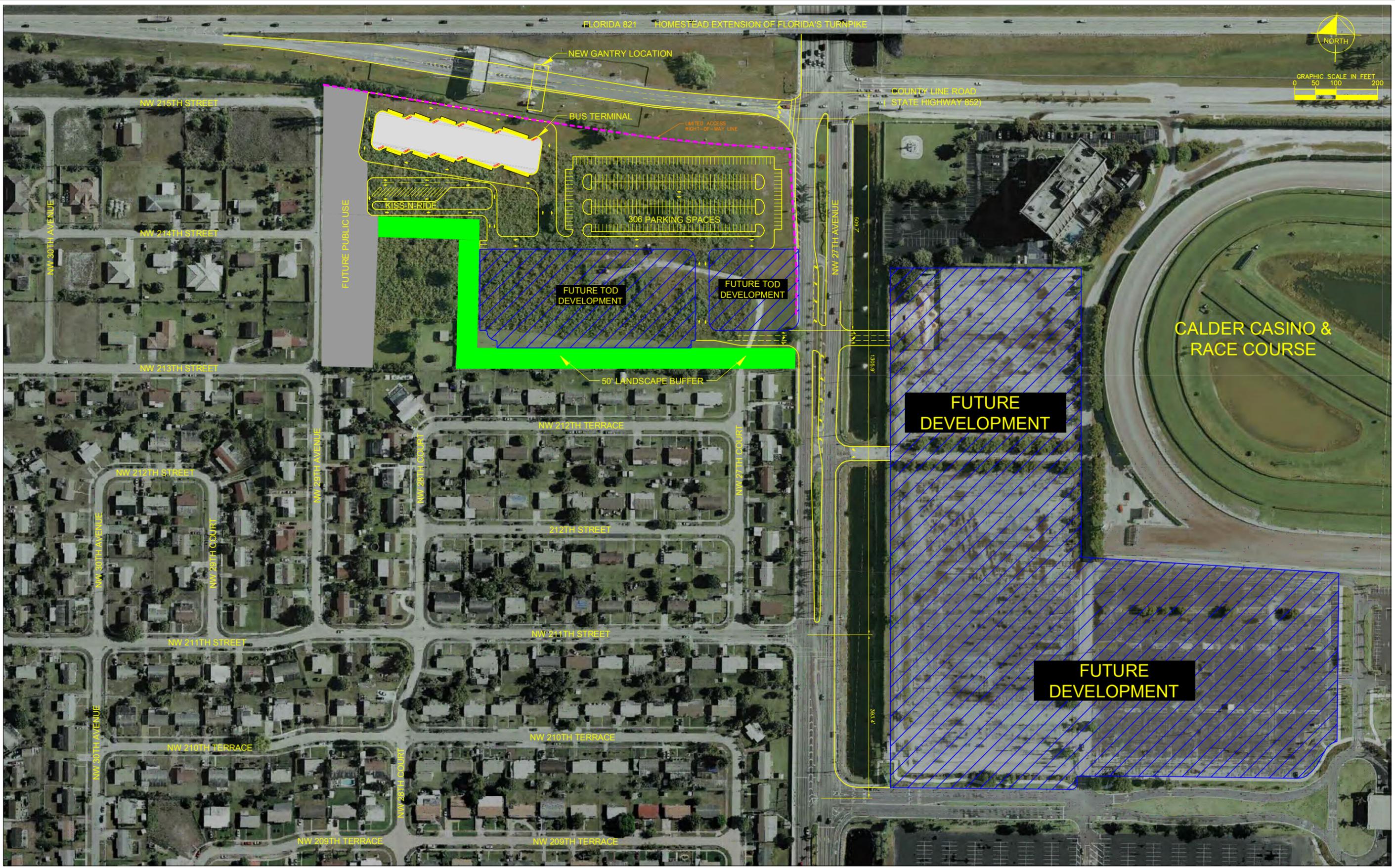
PARK AND RIDE TRANSIT TERMINAL
NW 215TH STREET AND NW 27TH AVENUE

CONCEPTUAL SITE PLAN
OPTION 2A

SHEET NUMBER

2A-1

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No.	REVISIONS	DATE	BY


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 WWW.KIMLEY-HORN.COM CA 0000696

KHA PROJECT	
DATE	
SCALE AS SHOWN	
DESIGNED BY	
DRAWN BY	
CHECKED BY	

PARK AND RIDE TRANSIT TERMINAL
NW 215TH STREET AND NW 27TH AVENUE

LICENSED PROFESSIONAL _____
 DATE: _____

CONCEPTUAL SITE PLAN
OPTION 4

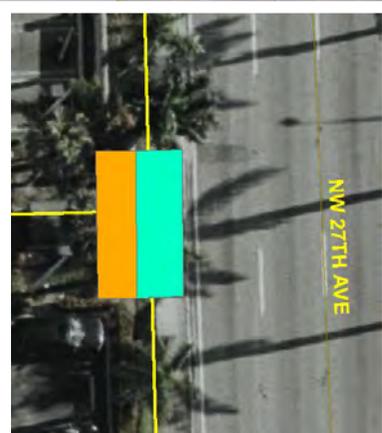
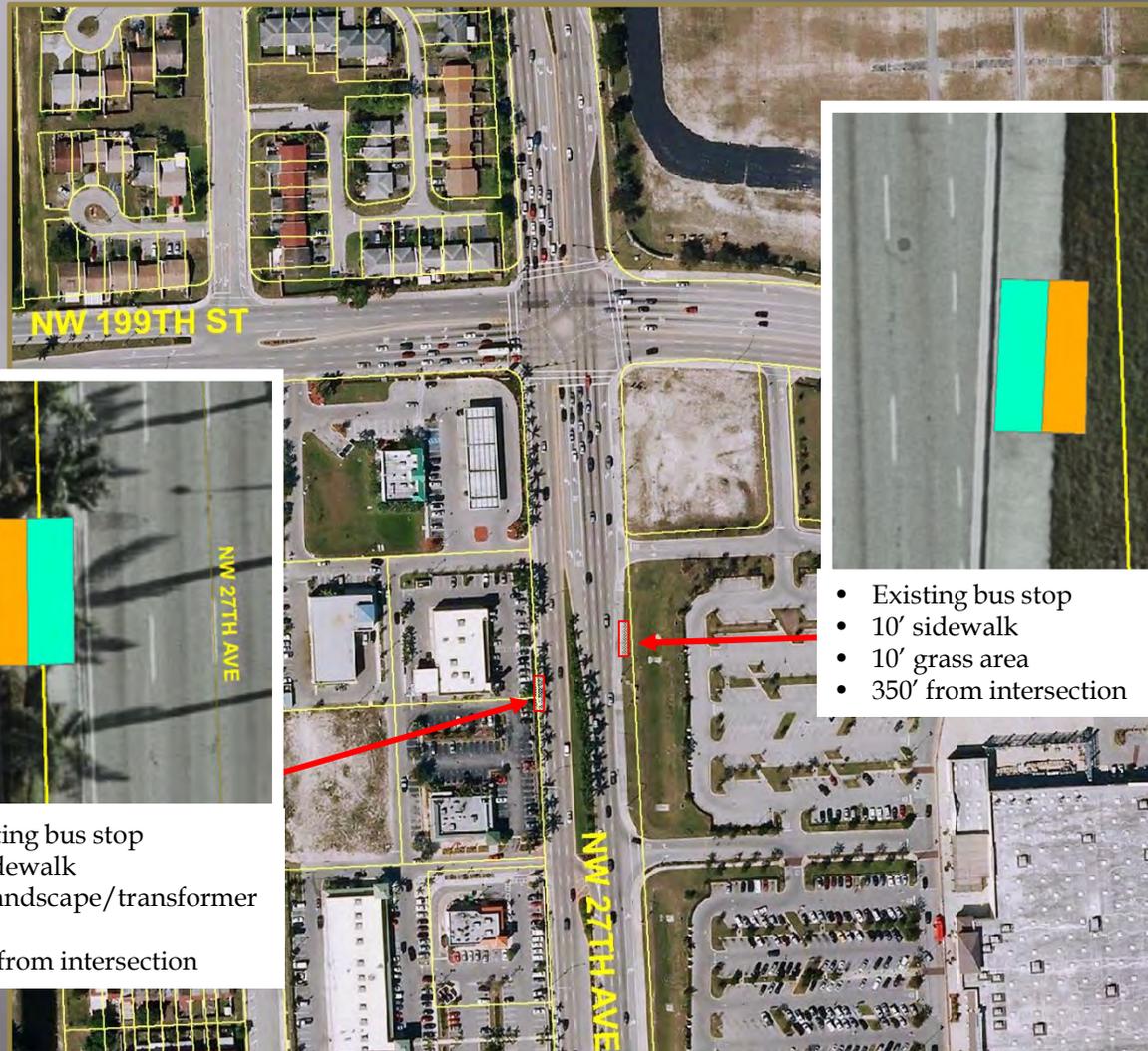
SHEET NUMBER
6

APPENDIX C:
Station Location Summary

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NORTH
MAP NOT TO SCALE



- Existing bus stop
- 5' sidewalk
- 13' landscape/transformer area
- 440' from intersection



- Existing bus stop
- 10' sidewalk
- 10' grass area
- 350' from intersection

Legend:

-  8' x 25' Station
-  15' x 25' Station

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NW 215 Street



NW 199 Street

NORTH
MAP NOT TO SCALE

NW 183 Street

NW 175 Street

NW 160 Street

Sesame Street

Ali Baba Avenue

NW 135 Street

NW 113 Street/MDC

NW 103 Street

NW 95 Street

NW 79 Street

NW 62 Street/
MLK Station

NW 54 Street/
Brownsville Station

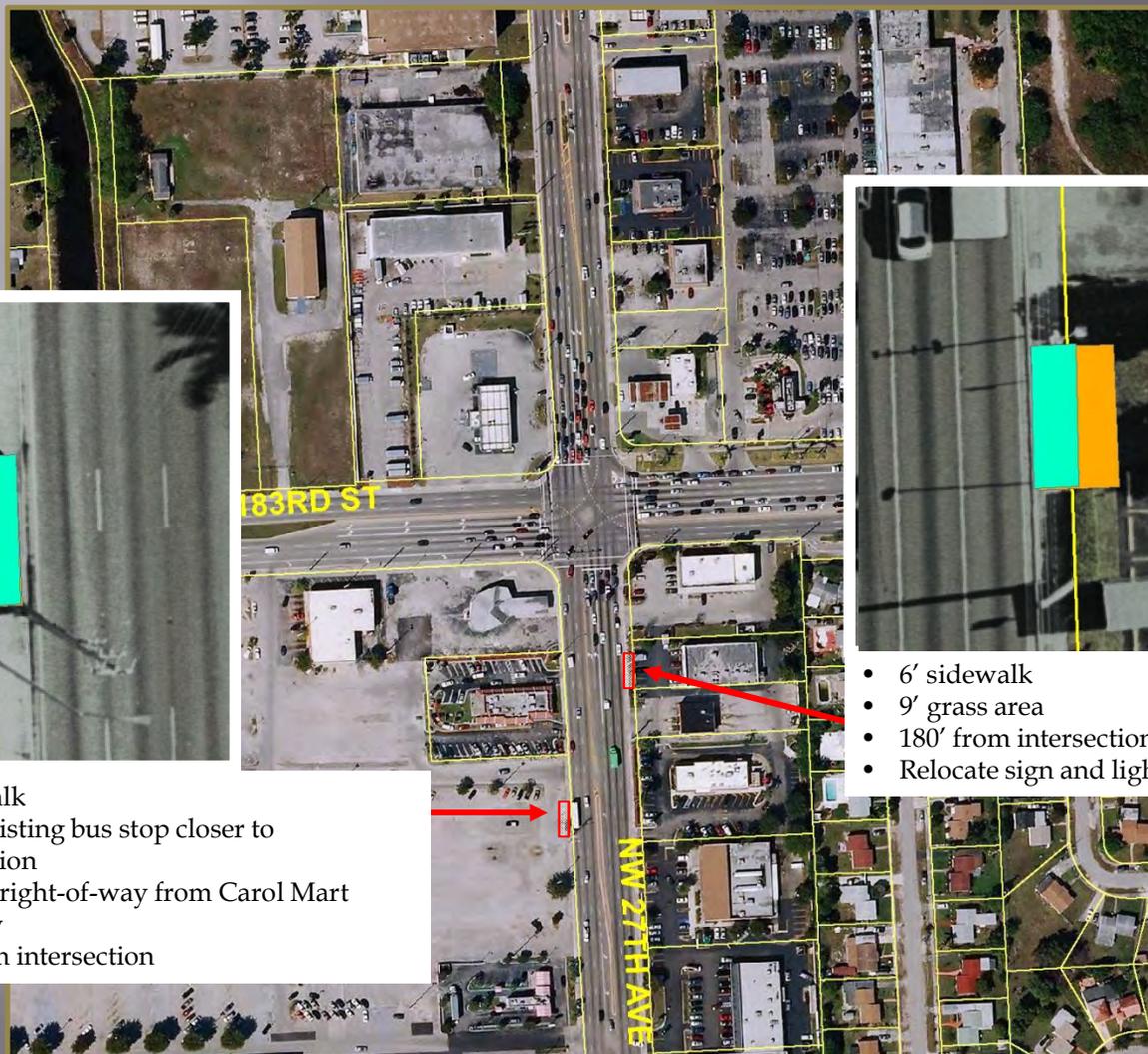


Southbound Bus Station (Far Side)

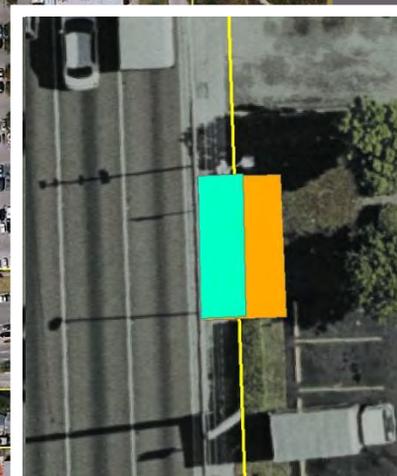
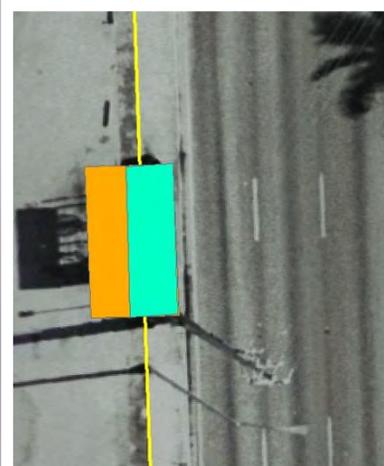


Northbound Bus Station (Near Side)

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NORTH
MAP NOT TO SCALE



- 6' sidewalk
- 9' grass area
- 180' from intersection
- Relocate sign and light pole

- 6' sidewalk
- Move existing bus stop closer to intersection
- Acquire right-of-way from Carol Mart Property
- 350' from intersection

Legend:

- 8' x 25' Station
- 15' x 25' Station

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Southbound Bus Station (Far Side)



Northbound Bus Station (Near Side)



NORTH
MAP NOT TO SCALE

NW 215 Street

NW 199 Street

NW 183 Street

NW 175 Street

NW 160 Street

Sesame Street

Ali Baba Avenue

NW 135 Street

NW 113 Street/MDC

NW 103 Street

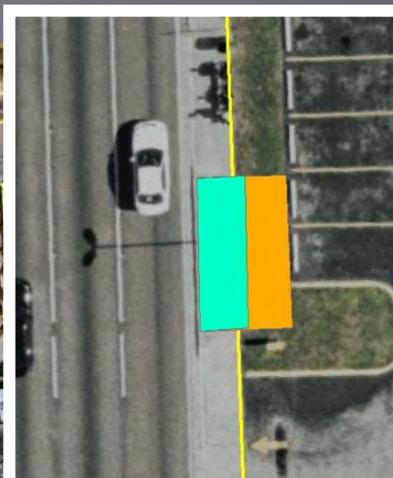
NW 95 Street

NW 79 Street

NW 62 Street/
MLK Station

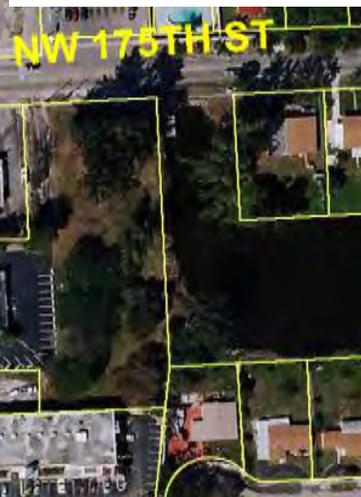
NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



- 6' sidewalk
- Sidewalk not provided south of existing bus stop
- Use frontage road if needed
- 15' width station would required using frontage road
- 150' from intersection

- 6' sidewalk
- 7' grass area
- 150' from intersection



NORTH
MAP NOT TO SCALE

NW 215 Street

NW 199 Street

NW 183 Street

NW 175 Street

NW 160 Street

Sesame Street

Ali Baba Avenue

NW 135 Street

NW 113 Street/MDC

NW 103 Street

NW 95 Street

NW 79 Street

NW 62 Street/
MLK Station

NW 54 Street/
Brownsville Station

Legend:

-  8' x 25' Station
-  15' x 25' Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NW 215 Street



NW 199 Street

NORTH
MAP NOT TO SCALE

NW 183 Street

NW 175 Street

NW 160 Street

Sesame Street

Ali Baba Avenue

NW 135 Street

NW 113 Street/MDC

NW 103 Street

NW 95 Street

NW 79 Street

NW 62 Street/
MLK Station

NW 54 Street/
Brownsville Station

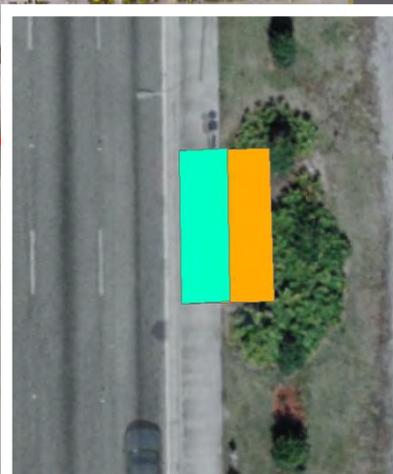
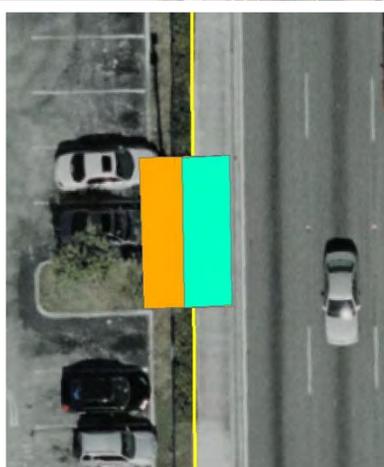
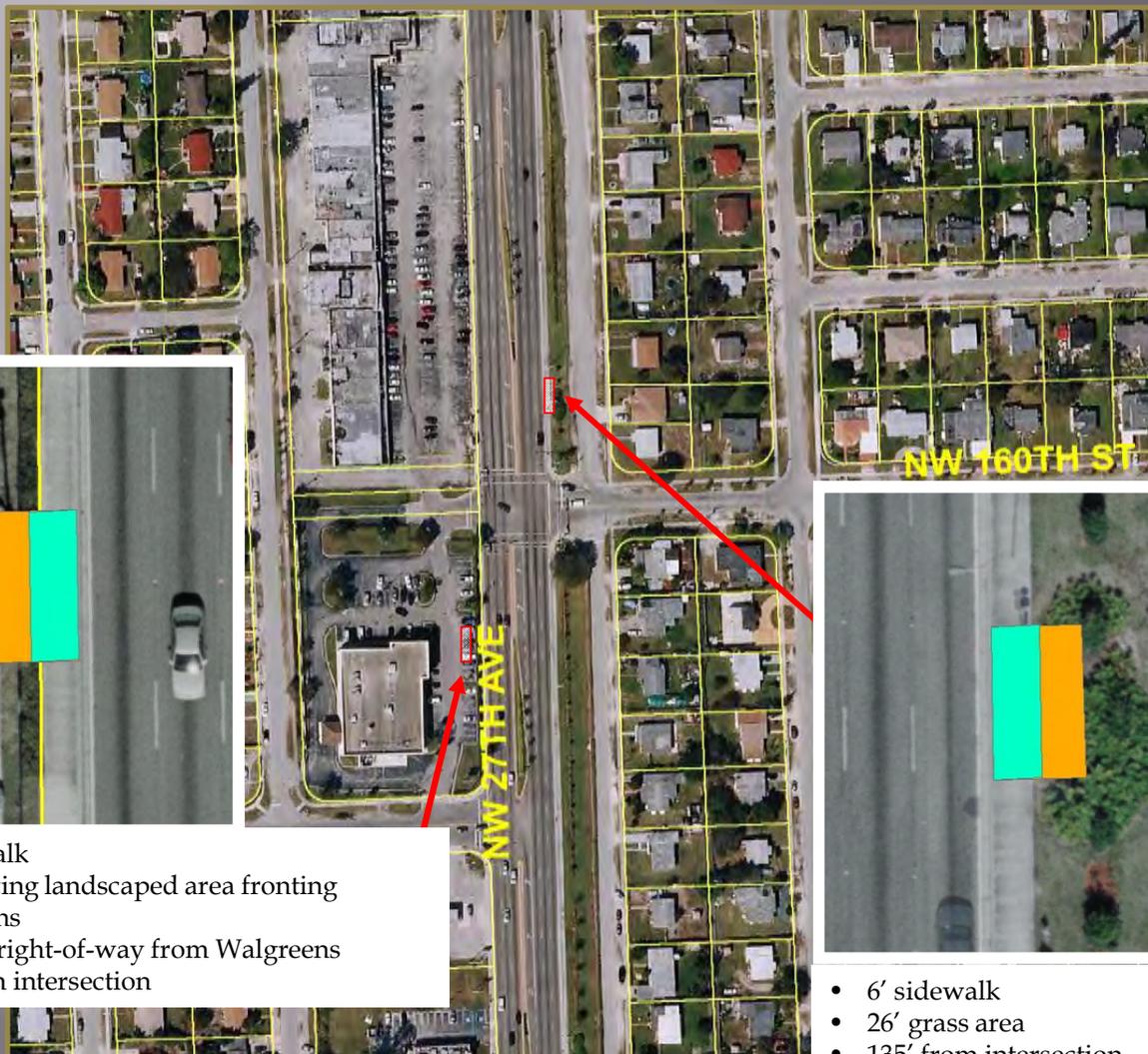


Southbound Bus Station (Far Side)



Northbound Bus Station (Near Side)

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



- 6' sidewalk
- Use existing landscaped area fronting Walgreens
- Acquire right-of-way from Walgreens
- 180' from intersection

- 6' sidewalk
- 26' grass area
- 135' from intersection

Legend:

- 8' x 25' Station
- 15' x 25' Station



NORTH
MAP NOT TO SCALE

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Southbound Bus Station (Far Side)



Northbound Bus Station (Far Side)

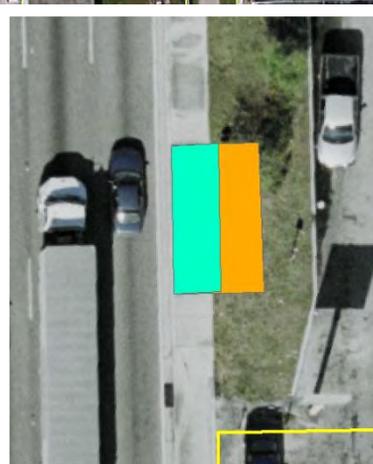
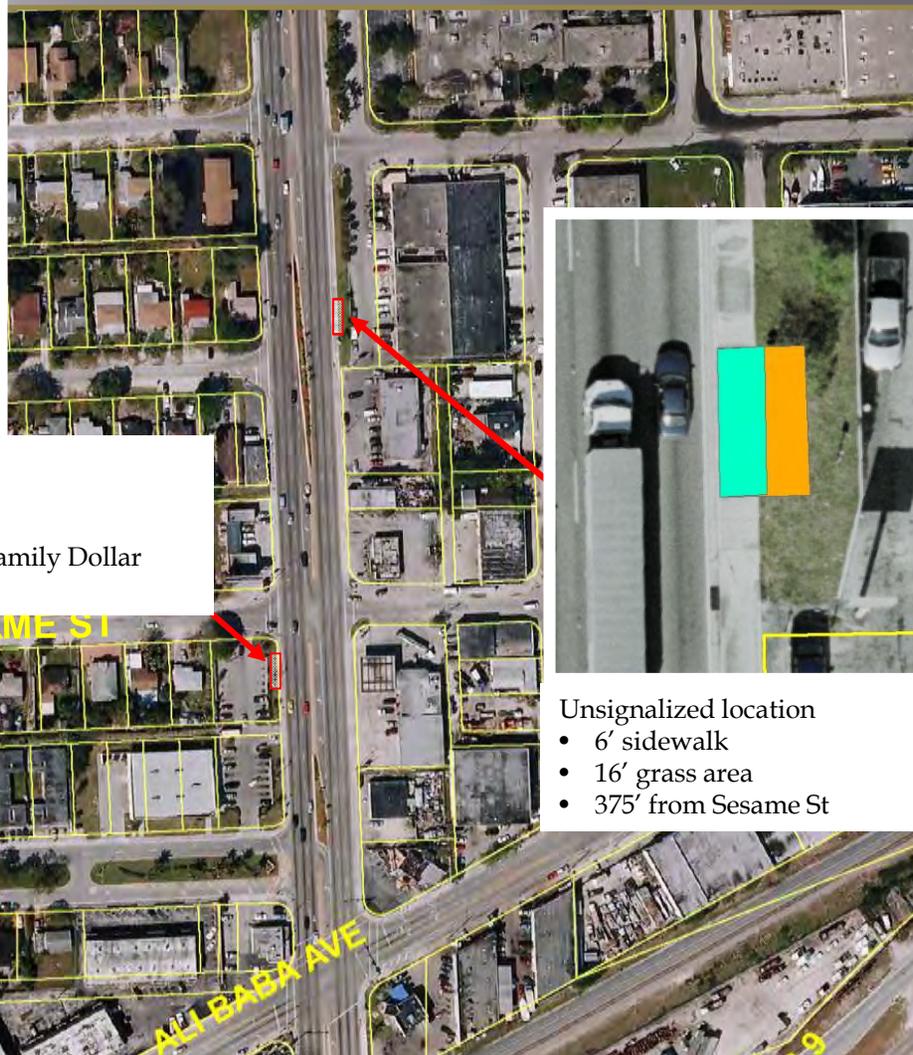
- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Unsignalized location

- 6' sidewalk
- 13' landscaped area
- Acquire right-of-way from Family Dollar
- 100' from intersection



Unsignalized location

- 6' sidewalk
- 16' grass area
- 375' from Sesame St

Legend:

- 8' x 25' Station
- 15' x 25' Station



NORTH
MAP NOT TO SCALE

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NW 215 Street



NW 199 Street

NORTH
MAP NOT TO SCALE

NW 183 Street

NW 175 Street

NW 160 Street

Sesame Street

Ali Baba Avenue

NW 135 Street

NW 113 Street/MDC

NW 103 Street

NW 95 Street

NW 79 Street

NW 62 Street/
MLK Station

NW 54 Street/
Brownsville Station



Southbound Bus Station (Far Side)



Northbound Bus Station (Far Side)

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NORTH
MAP NOT TO SCALE

- 4' sidewalk
- 4' landscaped area
- Acquire right-of-way from Elegant Beauty
- 200' from intersection

- 5' sidewalk
- Acquire right-of-way from vacant parcel adjacent to Auto Zone
- 240' from intersection

Legend:

- 8' x 25' Station
- 15' x 25' Station

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NW 215 Street

NW 199 Street

NW 183 Street

NW 175 Street

NW 160 Street

Sesame Street

Ali Baba Avenue

NW 135 Street

NW 113 Street/MDC

NW 103 Street

NW 95 Street

NW 79 Street

NW 62 Street/
MLK Station

NW 54 Street/
Brownsville Station



NORTH
MAP NOT TO SCALE

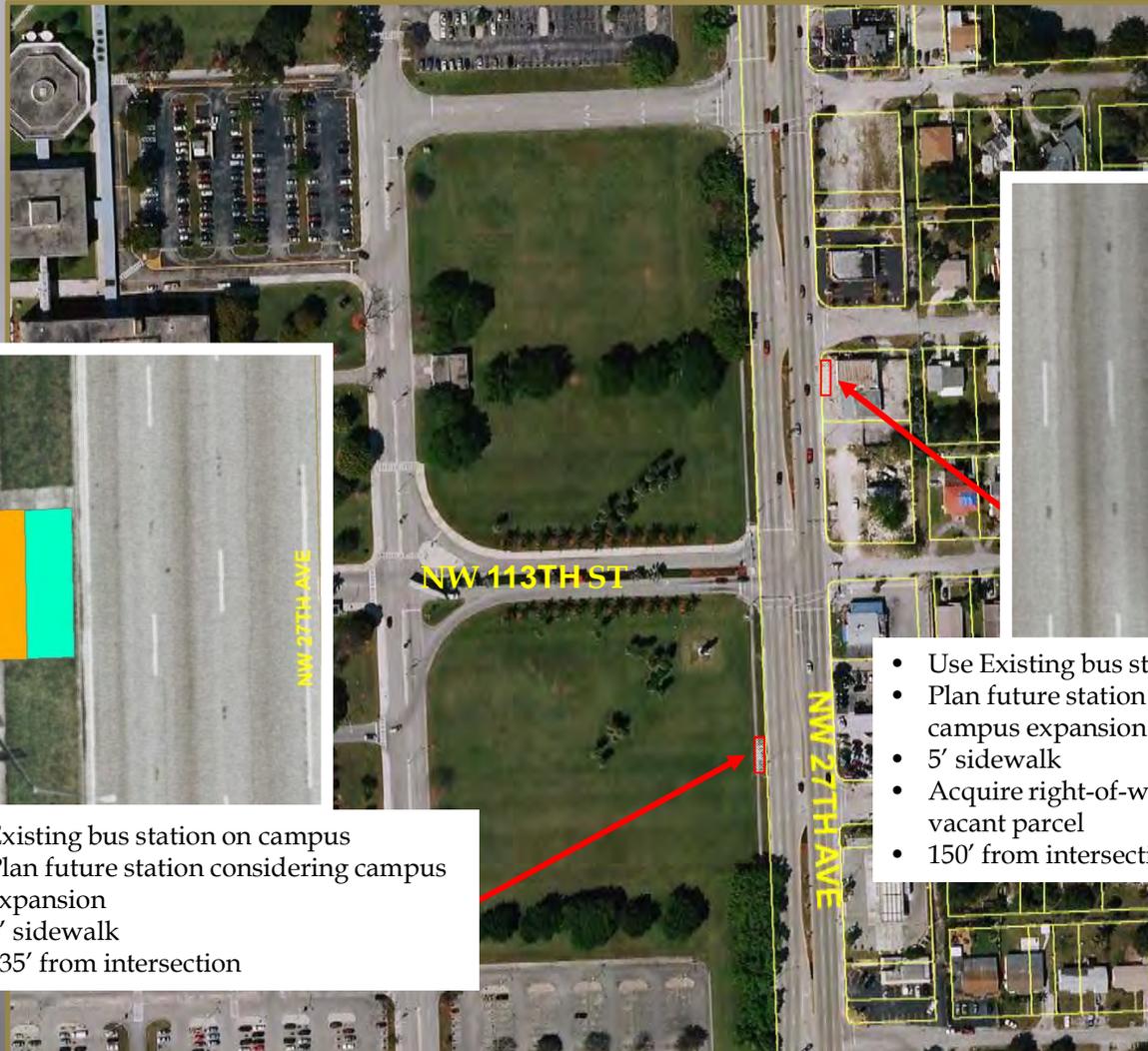


Southbound Bus Station (Far Side)



Northbound Bus Station (Near Side)

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NORTH
MAP NOT TO SCALE



- Existing bus station on campus
- Plan future station considering campus expansion
- 5' sidewalk
- 235' from intersection



- Use Existing bus station on campus
- Plan future station considering campus expansion
- 5' sidewalk
- Acquire right-of-way from adjacent vacant parcel
- 150' from intersection

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

Legend:

- 8' x 25' Station
- 15' x 25' Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



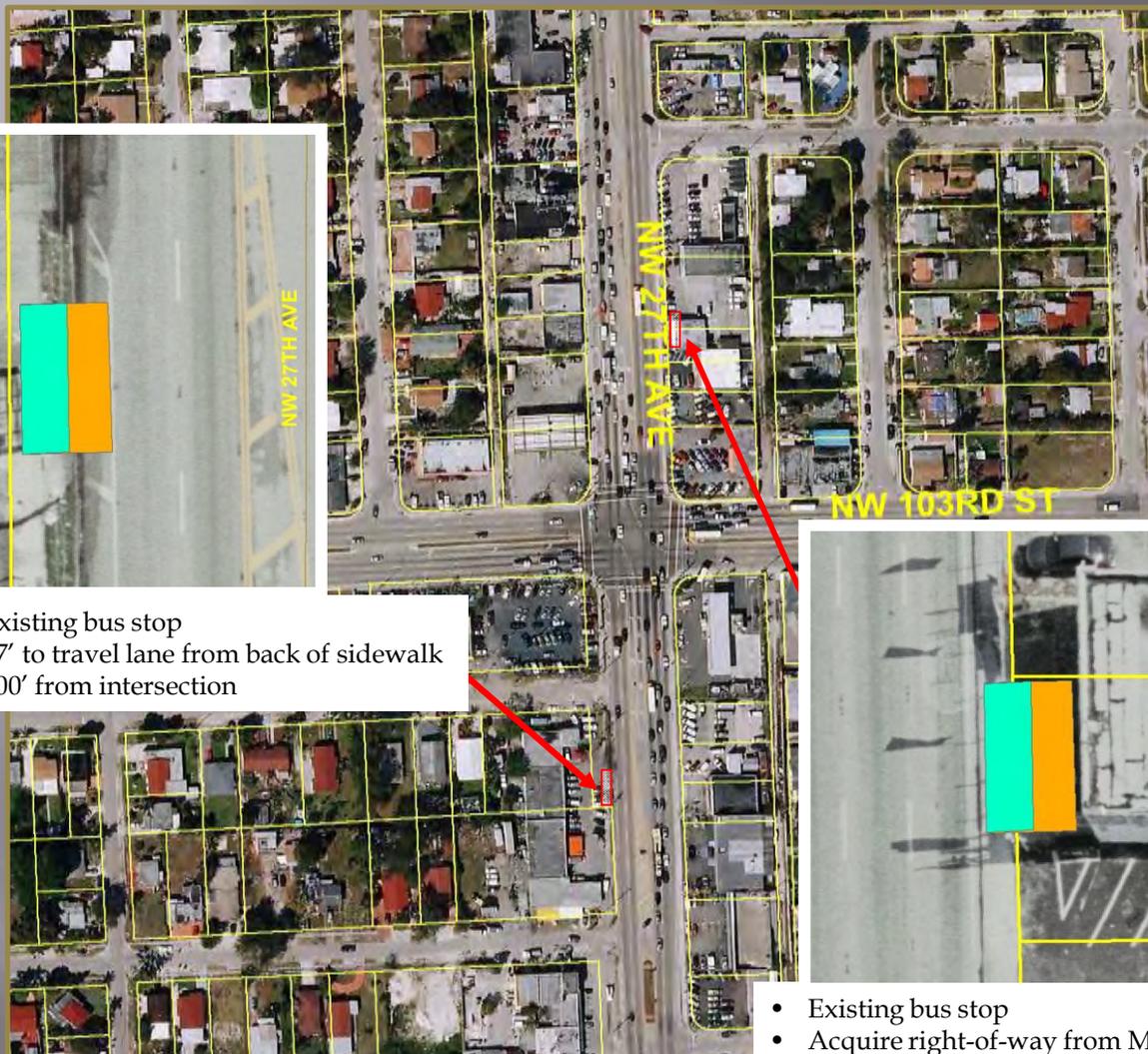
Southbound Bus Station (Far Side)



Northbound Bus Station (Far Side)

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



- Existing bus stop
- 17' to travel lane from back of sidewalk
- 300' from intersection

- Existing bus stop
- Acquire right-of-way from Marine retail store
- 95' between driveways
- 240' from intersection

Legend:

- 8' x 25' Station
- 15' x 25' Station



NORTH
MAP NOT TO SCALE

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NW 215 Street

NW 199 Street

NW 183 Street

NW 175 Street

NW 160 Street

Sesame Street

Ali Baba Avenue

NW 135 Street

NW 113 Street/MDC

NW 103 Street

NW 95 Street

NW 79 Street

NW 62 Street/
MLK Station

NW 54 Street/
Brownsville Station



NORTH
MAP NOT TO SCALE

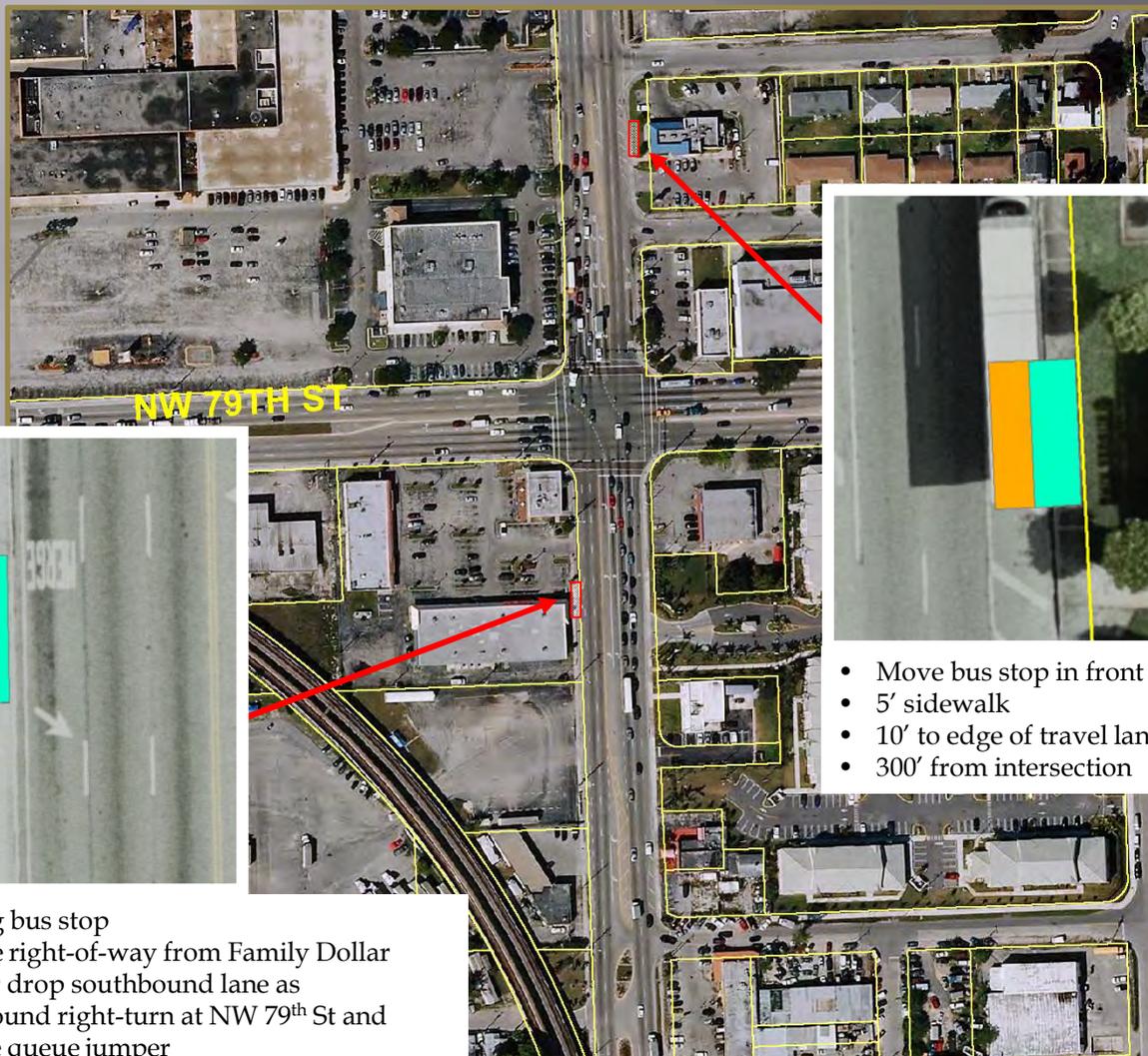


Southbound Bus Station (Far Side)



Northbound Bus Station (Far Side)

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NORTH
MAP NOT TO SCALE

- Existing bus stop
- Acquire right-of-way from Family Dollar Store or drop southbound lane as southbound right-turn at NW 79th St and provide queue jumper
- 220' from intersection

- Move bus stop in front of Burger King
- 5' sidewalk
- 10' to edge of travel lane
- 300' from intersection

Legend:

- 8' x 25' Station
- 15' x 25' Station

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NW 215 Street

NW 199 Street

NW 183 Street

NW 175 Street

NW 160 Street

Sesame Street

Ali Baba Avenue

NW 135 Street

NW 113 Street/MDC

NW 103 Street

NW 95 Street

NW 79 Street

NW 62 Street/
MLK Station

NW 54 Street/
Brownsville Station



NORTH
MAP NOT TO SCALE



Southbound Bus Station (Far Side)



Northbound Bus Station (Far Side)

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NORTH
MAP NOT TO SCALE

- No station. Stop in roadway under Metrorail Station.
 - Elevator will need to be repaired and access to station opened.
- Option for bus to pull into station

- No station. Stop in roadway under Metrorail Station.
- Need to construct pad to connect to sidewalk
- Option for bus to pull into station

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Southbound Bus Station



Northbound Bus Station

NW 215 Street

NW 199 Street

NW 183 Street

NW 175 Street

NW 160 Street

Sesame Street

Ali Baba Avenue

NW 135 Street

NW 113 Street/MDC

NW 103 Street

NW 95 Street

NW 79 Street

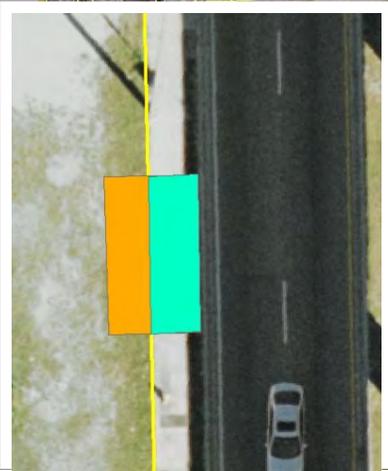
NW 62 Street/
MLK Station

NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NORTH
MAP NOT TO SCALE



- 8' sidewalk.
- Option for bus to pull into station



- 8' sidewalk.
- Option for bus to pull into station

Legend:

- 8' x 25' Station
- 15' x 25' Station

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



NW 215 Street



NW 199 Street

NORTH
MAP NOT TO SCALE

NW 183 Street

NW 175 Street

NW 160 Street

Sesame Street

Ali Baba Avenue

NW 135 Street

NW 113 Street/MDC

NW 103 Street

NW 95 Street

NW 79 Street

NW 62 Street/
MLK Station

NW 54 Street/
Brownsville Station



Southbound Bus Station



Northbound Bus Station

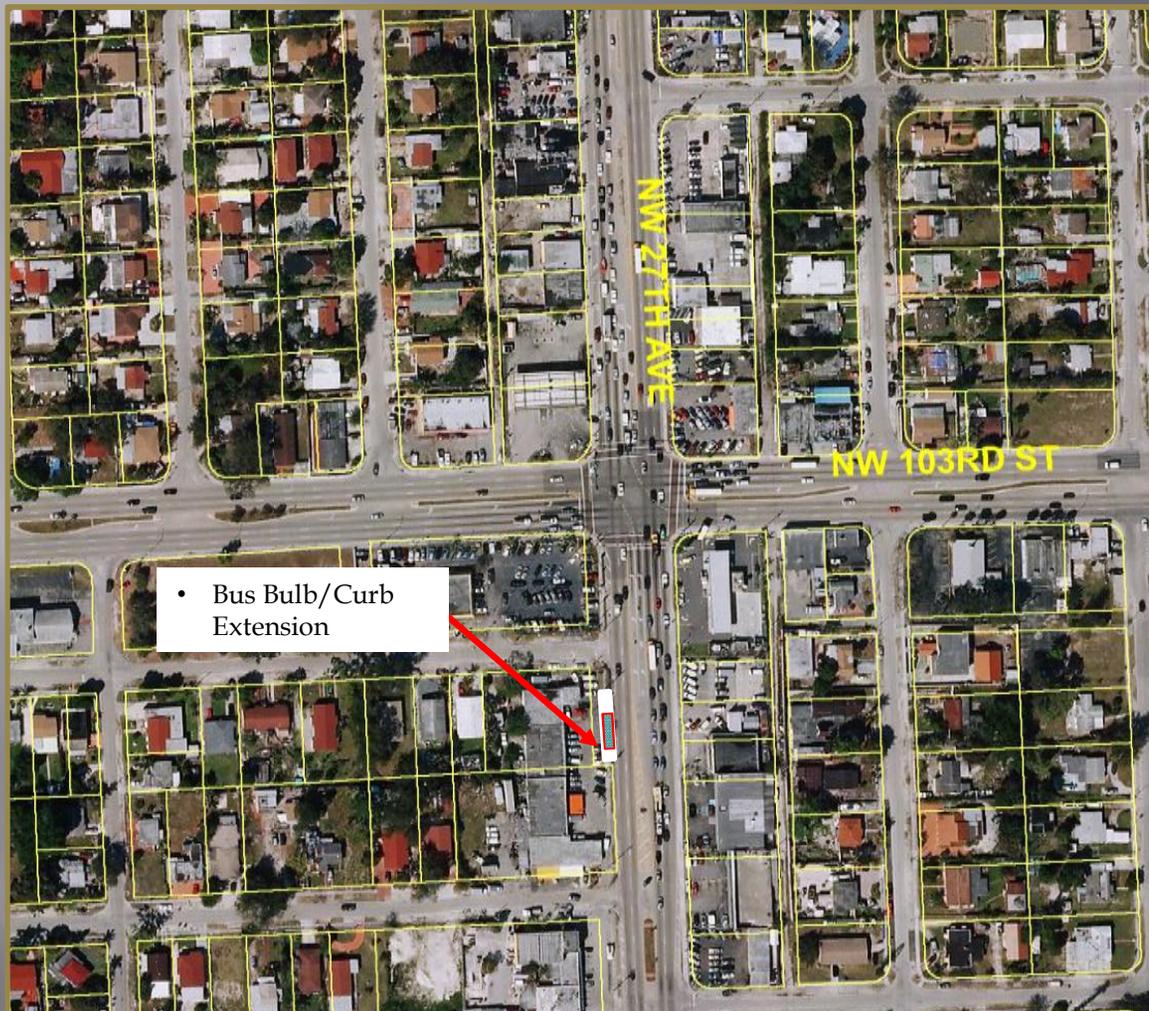
**APPENDIX D:
Bus Bulb/Curb Extension and
Queue Jump/Queue Bypass
Locations**

Bus Bulb/Curb Extension Locations

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Potential Bus Bulb/Curb Extension Locations



• Bus Bulb/Curb Extension

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

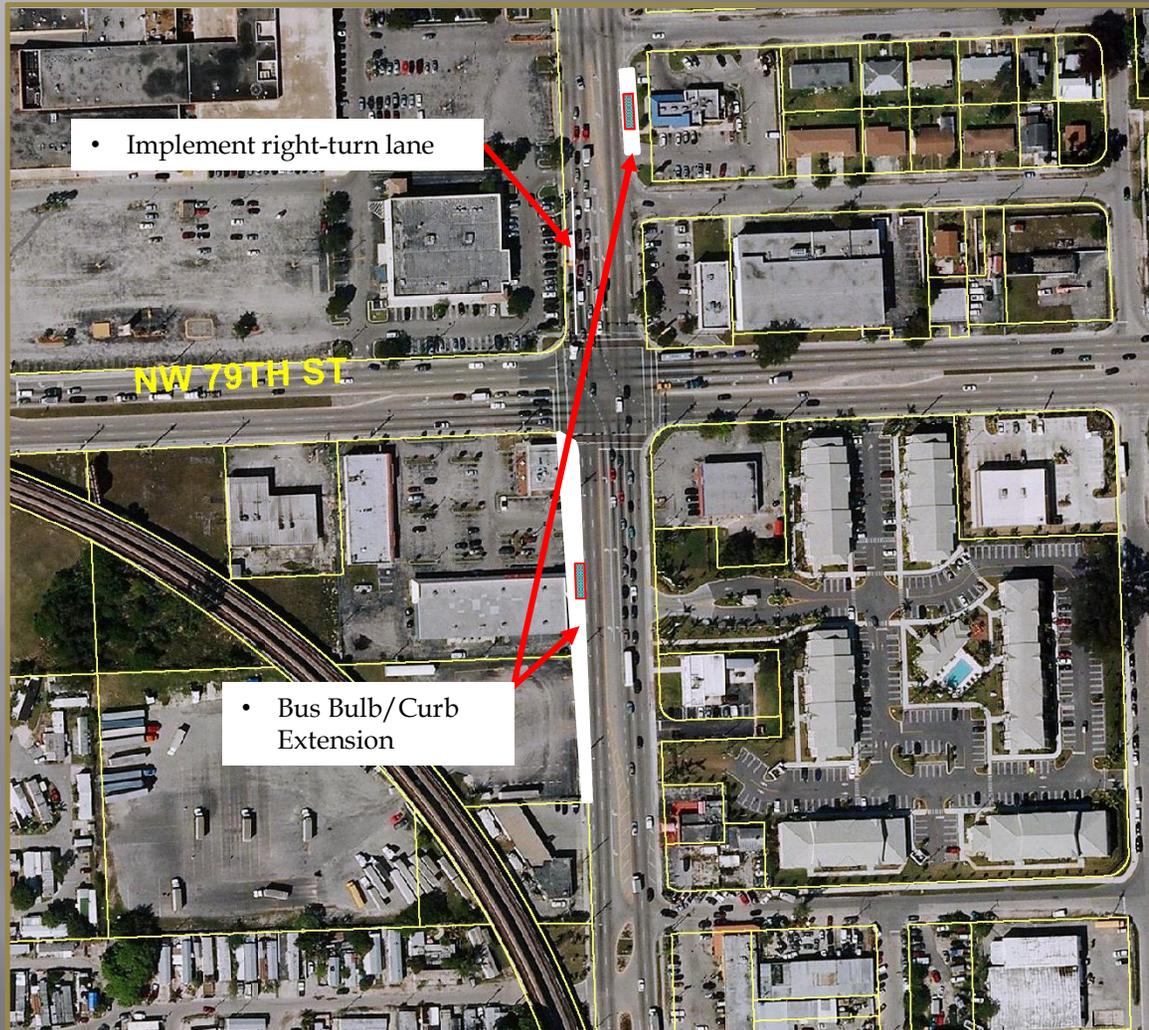


NORTH
MAP NOT TO SCALE

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Potential Bus Bulb/Curb Extension Locations



- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station



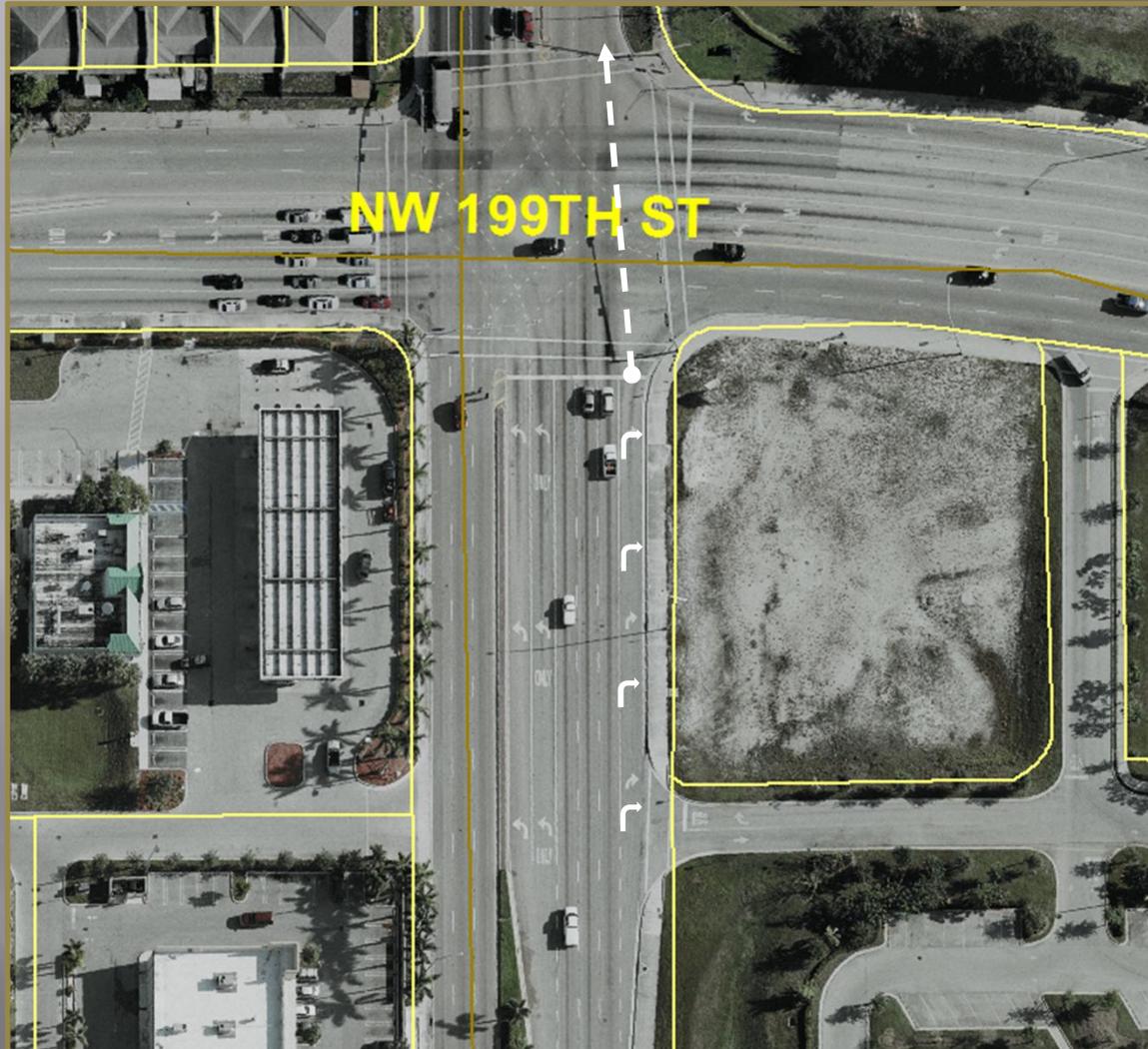
NORTH
MAP NOT TO SCALE

Queue Jump/Queue Bypass Locations

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Potential Queue Jumper Location



NORTH
MAP NOT TO SCALE

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Potential Queue Jumper Location



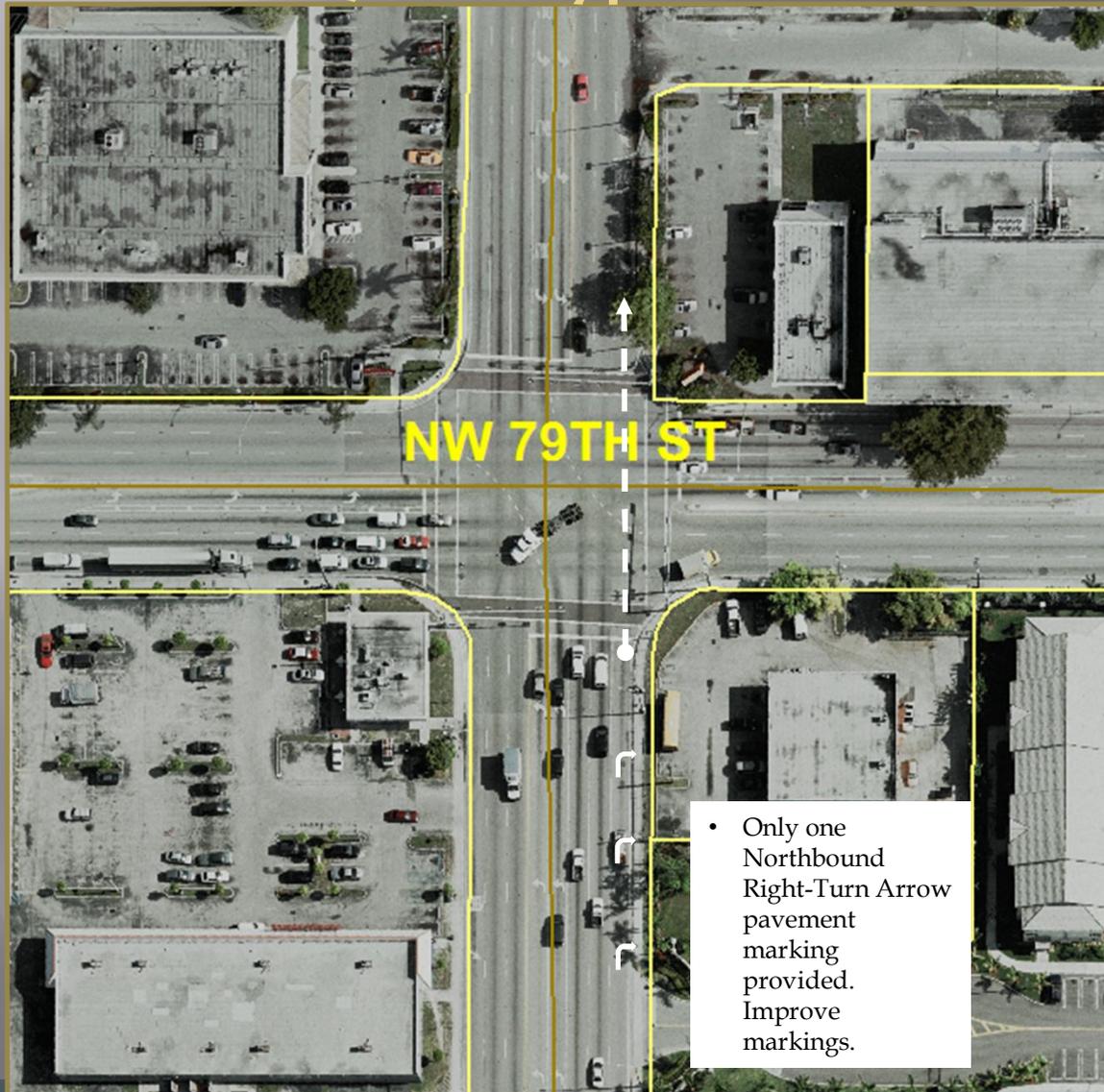
NORTH
MAP NOT TO SCALE

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 119 Street
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

NW 27TH AVENUE Enhanced Bus Service Concepts and Environmental Plan



Potential Queue Bypass Location



NORTH
MAP NOT TO SCALE

- NW 215 Street
- NW 199 Street
- NW 183 Street
- NW 175 Street
- NW 160 Street
- Sesame Street
- Ali Baba Avenue
- NW 135 Street
- NW 113 Street/MDC
- NW 103 Street
- NW 95 Street
- NW 79 Street
- NW 62 Street/
MLK Station
- NW 54 Street/
Brownsville Station

**APPENDIX E:
NW 215th Street Park-and-Ride
Opinion of Probable Cost**

June 2013

Park and Ride Transit Terminal

**NW 215th Street & NW 27th Avenue
Miami Gardens, Florida**

Engineer's Opinion of Probable Construction Cost

(Conceptual)

Prepared by:
Kimley-Horn and Associates, Inc.
1221 Brickell Avenue, Suite 400
Miami, Florida 33131



SUMMARY

NO.	DESCRIPTION	AMOUNT
1	SITE ¹	\$ 1,560,150.00
2	ARCHITECTURAL ¹	\$ 86,687.20
3	BUILDING ¹	\$ 445,867.70
4	SITE LIGHTING / SITE ELECTRICAL ¹	\$ 85,000.00
5	LANDSCAPING/ IRRIGATION ¹	\$ 25,000.00
6	WATER / SEWER ¹	\$ 123,400.00
7	SIGNAGE ¹	\$ 8,000.00
8	VEHICLE BRIDGE OVER CANAL ²	\$ 1,914,151.00
9	SOUTHBOUND LEFT TURN LANE AT TRANSIT TERMINAL DRIVEWAY ²	\$ 75,000.00
10	SIGNALIZATION ²	\$ 300,000.00
11	MISCELLANEOUS ¹	\$ 864,700.00
12	CONTINGENCY (30%)	\$ 1,646,386.77
TOTAL		\$ 7,134,342.67

SITE COST: \$ 3,198,804.90
SITE COST WITH CONTINGENCY: \$ 4,158,446.37
ROADWAY COST: \$ 2,289,151.00
ROADWAY COST WITH CONTINGENCY: \$ 2,975,896.30

NOTE: The Consultant has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Consultant at this time and represent only the Consultant's judgment as a design professional familiar with the construction industry. The Consultant cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

1 - INCLUDED AS SITE COST.
 2 - INCLUDED AS ROADWAY COST.



SITE³

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
1.1	SITE DEMOLITION	LS	1	\$ 25,000.00	\$ 25,000.00
1.2	EROSION AND SEDIMENT CONTROL	LS	1	\$ 25,000.00	\$ 25,000.00
1.3	6' HIGH WALL	LF	1,200	\$ 75.00	\$ 90,000.00
1.4	CONCRETE SIDEWALK (4" - 6" THICK, INCL. LIMEROCK BASE)	SY	5,390	\$ 35.00	\$ 188,650.00
1.5	6" CONCRETE CURB AND GUTTER TYPE "D"	LF	10,500	\$ 20.00	\$ 210,000.00
1.6	ASPHALT PAVEMENT	SY	21,000	\$ 5.00	\$ 105,000.00
1.7	8" LIMEROCK BASE	SY	21,000	\$ 10.50	\$ 220,500.00
1.8	TYPE B STABILIZATION 12"	SY	21,000	\$ 5.00	\$ 105,000.00
1.9	MODIFICATION TO EXIST. LANEAGE, CURB AND GUTTER, AND MEDIANS ⁴	LS	1	\$ 50,000.00	\$ 50,000.00
1.10	PAVEMENT MARKINGS	LS	1	\$ 6,000.00	\$ 6,000.00
1.11	SITE FILL ⁴	CY	32,000	\$ 6.00	\$ 192,000.00
1.12	EROSION AND SEDIMENT CONTROL	LS	1	\$ 25,000.00	\$ 25,000.00
1.13	EXFILTRATION TRENCH	LF	1,900	\$ 120.00	\$ 228,000.00
1.14	DRAINAGE STRUCTURES	EA	20	\$ 4,500.00	\$ 90,000.00
				TOTAL	\$ 1,560,150.00

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3 - COST OF ENVIRONMENTAL REMEDIATION, IF NEEDED, IS NOT INCLUDED.

4 - BASED ON THE USGS TOPOGRAPHIC MAP, APPROXIMATING SITE ELEVATION AT 6 FT, NGVD. BY FEMA FLOOD CRITERIA, FINISHED FLOOR ELEVATION MUST BE 8 FT. AN AVERAGE FILL OF 1.5 FT WAS USED FOR CALCULATION PURPOSES ON THIS OPC.



ARCHITECTURAL⁵

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
2.1	GLASS BLOCK				\$ 8,549.20
2.2	WINDOWS				\$ 900.00
2.3	DOORS				\$ 1,250.00
2.4	ROOF WATER PROOFING				\$ 2,380.00
2.5	HVAC				\$ 10,000.00
2.6	PLUMBING				\$ 6,108.00
2.7	ELECTRICAL				\$ 30,000.00
2.8	INTERIOR FINISHES				\$ 27,500.00
				TOTAL	\$ 86,687.20

5 - THESE VALUES ARE BASED ON THE 344TH STREET P-N-R FACILITY.



BUILDING⁶

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
3.1	REGULAR EXCAVATION	CY	101	\$ 7.10	\$ 717.10
3.2	CONCRETE- SLAB ON GRADE. (f _c = 4000psi)	CY	225	\$ 225.00	\$ 50,625.00
3.3	CONCRETE- FOOTINGS. (f _c = 4000psi)	CY	35	\$ 375.00	\$ 13,125.00
3.4	CONCRETE- COLUMNS & CONC. WALLS. (f _c = 4000psi)	CY	71	\$ 1,550.00	\$ 110,050.00
3.5	CONCRETE- BUS SHELTER ROOF SLAB. (f _c = 4000psi)	CY	169	\$ 755.00	\$ 127,595.00
3.6	CONCRETE- SLAB & BEAMS. (f _c = 4000psi)	CY	36	\$ 975.00	\$ 35,100.00
3.7	STEEL- FOOTINGS	LB	5,196	\$ 1.30	\$ 6,754.80
3.8	STEEL- COLUMNS, WALL, SLAB	LB	45,358	\$ 1.40	\$ 63,501.20
3.9	WELDED WIRE FABRIC 6x6- W-1.4xW1.4	LB	136	\$ 1.20	\$ 163.20
3.10	PREMOLDED EXPANSION JOINT	LF	339	\$ 42.00	\$ 14,238.00
3.11	MASONRY	SF	684	\$ 9.60	\$ 6,566.40
3.12	6 MIL POLYETHYLENE VAPOR BARRIER	SY	72	\$ 6.00	\$ 432.00
3.13	PREFABRICATED GUARD BOOTH	EA	1	\$ 17,000.00	\$ 17,000.00
				TOTAL	\$ 445,867.70

6 - THESE VALUES ARE BASED ON THE 344TH STREET P-N-R FACILITY.



SITE LIGHTING / SITE ELECTRICAL

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
4.1	ELECTRICAL SERVICE (INCL. PAD-MOUNTED TRANSFORMER) ⁷	LS	1	\$ 10,000.00	\$ 10,000.00
4.2	LIGHTING POLE	EA	10	\$ 5,000.00	\$ 50,000.00
4.3	ONSITE CONDUIT	LS	1	\$ 10,000.00	\$ 10,000.00
4.4	COMMUNICATION SERVICE TO SITE	LS	1	\$ 15,000.00	\$ 15,000.00
				TOTAL	\$ 85,000.00

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7 - THIS ASSUMES THAT THERE IS EXISTING ELECTRICAL SERVICE AT THE PROPERTY LINE THAT CAN BE UTILIZED FOR THIS PROJECT.



LANDSCAPING/IRRIGATION

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
5.1	LANDSCAPING	LS	1	\$ 15,000.00	\$ 15,000.00
5.2	IRRIGATION	LS	1	\$ 10,000.00	\$ 10,000.00
TOTAL				\$	25,000.00

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WATER / SEWER⁸

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
6.1	WATER SERVICE (INCL. TAP, PIPE, AND METER BOX)	LS	1	\$ 3,000.00	\$ 3,000.00
6.2	SANITARY SEWER SERVICE (INCL. TAP AND 25' LENGTH OF PIPE)	LS	1	\$ 4,500.00	\$ 4,500.00
6.3	ON-SITE WATER MAIN ⁹	LF	700	\$ 15.00	\$ 10,500.00
6.4	ON-SITE SEWER MAIN ^{9,10}	LF	700	\$ 22.00	\$ 15,400.00
6.5	FIRE HYDRANTS	EA	2	\$ 45,000.00	\$ 90,000.00
				TOTAL	\$ 123,400.00

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8 - THESE LINE ITEMS HAVE BEEN INCLUDED FOR INFORMATIONAL PURPOSES. NO COST CAN BE REASONABLY ASSIGNED DUE TO LACK OF KNOWLEDGE OF EXISTING UTILITIES IN THE VICINITY OF THE PROPERTY.

WATER & SEWER ASSUMPTIONS:

9 - OFFSITE WATER AND SEWER SERVICES ARE AVAILABLE ALONG ADJACENT ROADWAYS AND OFFSITE WATER AND SEWER UPGRADES WILL NOT BE REQUIRED.

10 - THE EXISTING LIFT STATION SERVING THIS PROPERTY HAS CAPACITY TO SERVE THIS PROJECT. UPGRADES TO THE EXISTING LIFT STATION WILL NOT BE REQUIRED, THERE IS SUFFICIENT DEPTH TO INSTALL GRAVITY SEWER.



SIGNAGE

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
7.1	SIGNAGE	LS	1	\$ 8,000.00	\$ 8,000.00
				TOTAL	\$ 8,000.00

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VEHICLE BRIDGE OVER CANAL

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
8.1	THREE SECTION BRIDGE	LS	1		\$ 1,914,151.00
				TOTAL	\$ 1,914,151.00

**Signalized Intersection Cost for NW 215th Street Park-and-Ride Facility Driveway and New North Calder Driveway
Planning Level Project Cost Estimates**

Proposed Project	FY 2012 Bridge Cost (per square-foot) ⁽¹⁾	FY 2013 Inflation Factor ⁽²⁾	FY 2013 Bridge Cost (per square-foot) ⁽¹⁾	Bridge Cross Section Width (Feet)	Bridge Length (Feet)	Bridge Square-Footage	Bridge Cost	Intersection Signalization Total	Calder Intersection Signalization Contribution	Mobilization (10%)	SubTotal	Scope Contingency/Project Unkown (10%)	Total Construction Cost	PE Design (10%)	CEI (10%)	Total Project Cost (Present Day \$\$)
Calder New North Driveway										25%						
3-Lane Bridge Alternative	\$145	1.033	\$149.79	52	145	7,540	\$1,129,379	\$350,000	\$87,500	\$121,688	\$1,338,567	\$133,857	\$1,472,423	\$220,864	\$220,864	\$1,914,151

Note: (1) Based on FDOT Generic Cost Per Mile Models 2/1/11.

(2) Based on FDOT Bridge Costs 3/4/11, Concrete Deck/Pre-stressed Girder - Continuous Span.

(2) Based on FDOT FY 2013 Inflation Factor.

(3) Does not include environmental mitigation costs.



FLORIDA DEPARTMENT OF TRANSPORTATION

Transportation Costs Report

Bridge Costs

A highway bridge is defined as any span of 20 feet or more in length. Not all bridges go over bodies of water. Overpasses and ramps that are part of highway interchanges are bridges too. A large proportion of the statewide highway construction budget, usually in excess of 20%, is devoted to bridge construction. Typically, the FDOT completes between 100 and 200 bridges each year. As a rule of thumb, bridges from 20 to 45 feet in length are short span bridges. Bridges from 45 to 150 feet are medium span bridges, and those extending over 150 feet are long span bridges.

Bridge construction costs increased rapidly in the mid-2000s. As with other categories of construction, costs per square foot have tended to decline or stabilize over the last few years.

New Construction (Cost per Square Foot)

Bridge Type	Low	High
Short Span Bridges:		
Reinforced Concrete Flat Slab Simple Span*	\$112	\$160
Pre-cast Concrete Slab Simple Span*	\$80	\$150
Reinforced Concrete Flat Slab Continuous Span*	NA	NA
Medium and Long Span Bridges:		
Concrete Deck/ Steel Girder - Simple Span*	\$100	\$138
Concrete Deck/ Steel Girder - Continuous Span*	\$125	\$173
Concrete Deck/ Pre-stressed Girder - Simple Span	\$67	\$140
Concrete Deck/ Pre-stressed Girder - Continuous Span	\$85	\$145
Concrete Deck/ Steel Box Girder – Span Range from 150' to 280' (for curvature, add a 15% premium)	\$110	\$160
Segmental Concrete Box Girders - Cantilever Construction, Span Range from 150' to 280'	\$145	\$175
Movable Bridge - Bascule Spans and Piers	\$1,450	\$2,000
* Increase the cost by twenty percent for phased construction.		



SOUTHBOUND LEFT TURN LANE AT TRANSIT TERMINAL DRIVEWAY

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
9.1	SOUTHBOUND LEFT TURN LANE	LS	1		\$ 75,000.00
				TOTAL	\$ 75,000.00



SIGNALIZATION

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
10.1	SIGNALIZATION	LS	1		\$ 300,000.00
				TOTAL	\$ 300,000.00



MISCELLANEOUS

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE AVERAGE	AMOUNT
11.1	MAINTENANCE OF TRAFFIC, MOBILIZATION	10.00%	1	\$ 180,200.00	\$ 180,200.00
11.2	PERFORMANCE AND PAYMENT BOND	2.00%	1	\$ 36,000.00	\$ 36,000.00
11.3	DESIGN AND PERMITTING	15.00%	1	\$ 270,200.00	\$ 270,200.00
11.4	CONSTRUCTION, ENGINEERING, INSPECTION	15.00%	1	\$ 270,200.00	\$ 270,200.00
11.5	PROVIDING UNIFORMED OFF-DUTY POLICE OFFICER	6.00%	1	\$ 108,100.00	\$ 108,100.00
				TOTAL	\$ 864,700.00

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DRAFT CATEGORICAL EXCLUSION

for

NW 27th Avenue Enhanced Bus Project Miami-Dade County, Florida

**Prepared for:
Miami-Dade Transit
701 NW 1st Court
Suite 1500
Miami, FL 33136**



**In Association with:
Miami-Dade County MPO
Steven P. Clark Center
111 NW First Street
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Miami, FL 33128**



Prepared by:



AUGUST 2013

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FIGURE 1: PROJECT LOCATION MAP

FIGURE 2: AERIAL MAP

FIGURE 3: POTENTIAL CONTAMINATION SITES MAP

FIGURE 4: 2010 CENSUS ETHNICITY MAP

FIGURE 5: 2010 CENSUS INCOME MAP

APPENDIX A: CONCEPTUAL SITE PLAN FOR NW 215th STREET TRANSIT TERMINAL
AND PARK AND RIDE FACILITY

APPENDIX B: MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION
TRANSPORTATION IMPROVEMENT PROGRAM

APPENDIX C: FLORIDA MASTER SITE FILE DATA

APPENDIX D: NOISE AND VIBRATION ANALYSIS

INFORMATION REQUIRED FOR PROBABLE CATEGORICAL EXCLUSION (Section 771.118(c)).

Pursuant to the 23 Code of Federal Regulations (CFR), Part 771, Section 118(c)(5)(7)(9), the proposed project can be classified as:

- (5) Action promoting safety, security, accessibility and effective communication such as the deployment of Intelligent Transportation Systems and components.
- (7) Acquisition, maintenance of vehicles/equipment including buses that can be accommodated by existing facilities or by new facilities that qualify for a Categorical Exclusion.
- (9) Assembly or construction of facilities such as bus transfer stations or intermodal terminals and parking facilities.

As such, the project meets the Federal criteria for a Categorical Exclusion.

A. DETAILED PROJECT DESCRIPTION AND PURPOSE AND NEED

Project Description

The NW 27th Avenue Enhanced Bus Service (EBS) project will build upon the incremental approach of improving rapid transit service that has recently been applied to the corridor with the implementation of the Route 297 Orange MAX service (Phase 1 of Enhanced Bus Service). The NW 27th Avenue EBS project represents Phase 2 of the proposed rapid service in the corridor.

The frequency of the rapid bus service in the corridor will be improved to every 10 minutes during peak periods and every 20 minutes during the off-peak. Service will be provided with new branded 60-foot articulated diesel/electric hybrid or alternative fuel buses with low-floor design for faster boarding and alighting. The buses will be equipped with Wi-Fi and provide larger seating areas with additional leg room for comfort. The buses will utilize general purpose traffic lanes; however, the proposed NW 27th Avenue EBS will benefit from transit signal priority (TSP) along the corridor for improved travel time and schedule adherence. In addition, bus queue jumps will be provided at several key intersections along the corridor.

The proposed project includes enhanced bus stations that will be spaced at approximately one-mile intervals along the corridor. Passenger amenities at the stations will include improved shelters and seating along with power, lighting, and real-time arrival traveler information displays. The stations will be branded and visibly recognizable as part of the NW 27th Avenue EBS.

An end-of-the-line transit terminal and park-and-ride facility will be constructed near the Broward County Line at NW 27th Avenue and NW 215th Street. The transit terminal and park-and-ride facility will be built on an approximately 14-acre property owned by Miami-Dade Transit within the political jurisdiction of the City of Miami-Gardens. Approximately 350 park-and-ride spaces are proposed for the facility along with kiss-and-ride/short-term parking accommodations, approximately ten bus bays, passenger seating under canopied areas, and a bus driver comfort station. The facility will serve as a hub for several Miami Dade Transit (MDT) and Broward County Transit (BCT) routes and will facilitate transfers between the

two systems. In addition, this facility will provide an end-of-the line layover for NW 27th Avenue EBS as well as Route 27, eliminating the two-mile turnaround presently required. The property also provides long-term transit-oriented development (TOD) opportunities, and the facility will be designed in a manner to preserve space for future Metrorail station development.

Though the final site plan configuration for the transit terminal and park-and-ride facility at NW 215th Street has not been determined, a conceptual site plan has been prepared and is included in **Appendix A**. The Miami-Dade County Department of Regulatory and Economic Resources (RER) conducted a Land Use Planning and Transit Study for the subject property. Consistent with the Miami-Dade County Comprehensive Development Master Plan (CDMP) designation as a Community Urban Center (CUC), the site is envisioned to accommodate transit facilities and TOD, while serving as a gateway into the City of Miami Gardens.

Purpose and Need

The NW 27th Avenue corridor has a relatively young and a high minority (African-American) population. The area is predominantly low-income and automobile ownership is low in the corridor. A high proportion of corridor residents are transit dependent. The NW 27th Avenue EBS project is intended to provide premium limited-stop transit service along the NW 27th Avenue corridor, from NW 215th Street at the Broward County Line to the Miami Intermodal Center (MIC), to enhance mobility for area residents. Transit connections at the MIC via Metrorail provide access to activity and job centers including the Health District, Government Center, and Downtown Miami.

NW 27th Avenue is one of the few continuous north-south arterials within Miami-Dade County. Travel patterns within the corridor tend to be in the north-south direction, as NW 27th Avenue serves as a primary gateway corridor between Broward County and central Miami-Dade County. Existing bus service operates in mixed-flow traffic lanes where buses often travel in congested traffic conditions, creating lengthy transit travel times and unreliable schedule adherence. The Intelligent Transportation Systems (ITS) and operational improvements for the NW 27th Avenue EBS include TSP and queue jumps to reduce travel time and improve schedule adherence.

This project will provide an attractive alternative transportation mode by connecting major activity centers in the corridor such as Miami-Dade College North Campus, North Dade Health Center, St. Thomas University, Sun Life Stadium, Wal-Mart Supercenter, Calder Casino & Race Course, Miami Gardens City Hall Complex, Miami Jobs Corps Center, North Dade Regional Library, and Jackson North Specialty and Diagnostic Center. Route 27 along NW 27th Avenue is one of the most utilized routes in the MDT system with approximately 10,000 daily riders. This project will attract additional transit riders in the corridor.

The project will provide a transportation alternative that will not contribute to additional ozone emissions and will help to maintain the County's federal designation as an air quality maintenance area for ozone. The use of diesel/electric hybrid or alternative fuel buses will result in improved fuel efficiency and carbon reduction, while promoting transit use to reduce vehicle miles traveled.

Development and redevelopment efforts within the corridor are hampered by the lack of good accessibility and mobility. Throughout the corridor there are opportunities for in-fill development and redevelopment with additional density. There is a need to provide transit services in the corridor to support current and future redevelopment efforts. Policies of Miami-Dade County encourage TOD at nodes around rapid transit stations. There are opportunities for TOD in the corridor including within the Cities of Opa-Locka and Miami Gardens, both of which are supportive of these efforts. Thus, the project will provide an economic benefit to the businesses and residents of the corridor.

B. LOCATION

Attach a site map or diagram, which identifies the land uses and resources on the site and the adjacent or nearby land uses and resources. This is used to determine the probability of impact on sensitive receptors (such as schools, hospitals, residences) and on protected resources.

The NW 27th Avenue corridor is a priority transit corridor in Miami-Dade County extending south from the Broward County Line at NW 215th Street to the Dr. Martin Luther King Jr. Metrorail Station near NW 62nd Street. The project limits for the NW 27th Avenue EBS have been extended south to the MIC adjacent to Miami International Airport. The length of the study corridor is approximately 13 miles. The project will also include the construction of an end-of-the-line transit terminal and park-and-ride facility near NW 215th Street. **Figure 1** provides a Project Location Map and **Figure 2** provides an Aerial Map of the project corridor. A conceptual site plan for the transit terminal and park-and-ride facility is attached as **Appendix A**.

C. METROPOLITAN PLANNING AND AIR QUALITY CONFORMITY

Is the proposed project “included” in the current adopted MPO plan, either explicitly or in a grouping of projects or activities? What is the conformity status of that plan? Is the proposed project, or are appropriate phases of the project included in the TIP? What is the conformity status of the TIP?

The proposed project is included in the Miami-Dade County Metropolitan Planning Organization’s (MPO’s) adopted Transportation Improvement Program (TIP) for Fiscal Years 2012/2013 – 2016/2017 (see **Appendix B** for the TIP listing – MPO Project Numbers TA4280111, TA4280112, TA4280113, and TA4280114). The TIP has been developed consistent with federal and state requirements, and has been adopted by the Miami-Dade MPO.

D. ZONING

Description of zoning, if applicable, and consistency with proposed use.

Miami-Dade County’s Comprehensive Development Master Plan (CDMP) includes growth policy that calls for the concentration and intensification of future development centered on a network of high-intensity urban centers well connected by multimodal transportation facilities. The CDMP requires all new development and redevelopment in existing and planned transit corridors and urban centers to be planned and designed to promote TOD with a mix of land uses and activities in nodes around rapid transit stations. The CDMP designates the NW 27th Avenue corridor as a Future Rapid Transit corridor and designates Urban Centers in the vicinity of NW 54th Street, NW 62nd Street, NW 79th Street, NW 119th

Street, Ali Baba Avenue, State Road (SR) 826/Palmetto Expressway, NW 183rd Street, NW 199th Street, and NW 215th Street. Proposed station locations for the NW 27th Avenue EBS project are consistent with the locations designated as Urban Centers along the corridor.

The North Central Urban Area District (NCUAD) zoning and land development regulations were adopted in 2011 for the portion of the NW 27th Avenue corridor located in unincorporated Miami-Dade County between NW 62nd Street and NW 135th Street. The zoning and land development regulations promote a compact urban form that is pedestrian friendly and promotes the use of mass transit.

The NW 215th Street transit terminal and park-and-ride facility site is within the political jurisdiction of the City of Miami Gardens. The majority of the 14-acre site is within an R-15 (Multiple Family) residential zoning district. Approximately 1 acre at the southwest corner of the site is within an R-1 (Single Family) residential zoning district. Because a transit terminal and park-and-ride facility is not a use that is allowed as a matter of right in these zoning districts, City of Miami Gardens staff has indicated that the site will need to be rezoned to PCD (Planned Corridor Development).

The Miami-Dade County RER led a Land Use Planning and Transit Study for the NW 215th Street transit terminal and park-and-ride facility site. Public meetings were held where a general project overview was provided and residents and stakeholders developed visions for the site, including the potential for future TOD. Participants were supportive of the project and provided input that vehicular access connectivity was not desired between the site and the surrounding residential neighborhood and that transit uses should be situated as far away from the surrounding residences as possible and be adequately buffered.

E. TRAFFIC IMPACTS

Describe potential traffic impacts, including whether the existing roadways have adequate capacity to handle increased bus and other vehicular traffic.

The project will improve the frequency of rapid bus service in the corridor from 15 to 10 minutes headway during the morning and afternoon peaks and from 30 to 20 minutes headway during the midday. The nominal increase in the number of buses in the corridor is not expected to result in adverse traffic impacts.

The project will include ITS and operational improvements, such as TSP and queue jumps, which will benefit the travel time and schedule adherence for the rapid bus service in the corridor. TSP alters traffic signal timing at intersections to give priority to transit vehicles. A queue jump lane allows transit vehicles to bypass general traffic at an intersection. TSP and queue jump operations can be an effective method to provide time savings in corridors where it is not feasible to dedicate an exclusive travel lane to buses. Implementation of TSP and queue jumps has resulted in significant improvements of bus operations around the nation, while impacts to automobile traffic have proven to be minor.

Enhanced bus stations will be installed at approximately one-mile intervals for the rapid bus service. Parking will not be provided at the intermediary bus stations along the corridor; the majority of transit riders using the system will access the stations as pedestrians or transfers from other bus routes. Therefore, traffic impacts are not anticipated in the vicinity of the intermediary bus stations.

The NW 215th Street transit terminal and park-and-ride facility will function as an intermodal hub anchoring the northern end of the project. The facility will be designed to include approximately 350 park-and-ride spaces, ten bus bays, and an area for kiss-and-ride.

The potential traffic impacts were estimated for the NW 215th Street transit terminal and park-and-ride facility. Existing bus traffic traveling along the corridor that will access the terminal will consist of MDT NW 27th Avenue EBS, MDT Route 27, MDT Route 99, BCT Route 2, BCT Route University Breeze, and BCT 95 Express routes. In the future, community shuttles operated by the Cities of Miami Gardens and Miramar may also access the terminal, as well as the future MDT Route 295 Express Bus. Based on the service frequency of these routes, approximately 35 buses per hour are expected to access the facility during peak periods. In addition to the bus traffic, passenger vehicles will access the site to use the park-and-ride and kiss-and-ride facilities. Based on an assumption that the approximately 350 park-and-ride spaces would become occupied over a three-hour period in the morning and would empty over a three-hour period in the afternoon, approximately 120 passenger vehicles per hour are expected to access the facility for park-and-ride during peak periods. A few additional passenger vehicles may access the facility during peak periods for kiss-and-ride. NW 27th Avenue currently operates at Level of Service (LOS) D during the peak hour, which is above the City of Miami Gardens standard of LOS E, and has available capacity to accommodate additional traffic associated with the activities at the transit terminal and park-and-ride facility.

F. CO HOT SPOTS

If there are serious traffic impacts at any affected intersection, and if the area is non-attainment for CO, demonstrate that CO hot spots will not result.

There are no adverse traffic impacts associated with the project and the project is not located in a non-attainment area for CO.

G. HISTORIC RESOURCES

Describe any cultural, historic, or archaeological resource that is located in the immediate vicinity of the proposed project and the impact of the project on the resource.

Based on a review of the Florida Master Site File (FMSF), there are no previously recorded archeological sites identified by the State Historic Preservation Officer (SHPO) that would be affected by the proposed project. There are three potentially eligible cultural resources, three National Register of Historic Places (*National Register*) listed structures, and two NRHP eligible structures documented within the vicinity of the project corridor. The *National Register* listed and eligible structures are listed in **Table 1**.

Table 1: Eligible National Register of Historic Places Structures

Structure	Address	Date listed
Helm Stores & Apartments	1217 Sharazad Boulevard	8/17/1987
Higgins Duplex	1210-1212 Sesame Street	8/17/1987
Taber Duplex	1214-1216 Sesame Street	8/17/1987
Westview Country Club	2601 NW 119 th Street	N/A
Al's Auto Service	17501 NW 27 th AVE	N/A

See **Appendix C** for the Florida Master Site File letter outlining historic resources in the vicinity of the project corridor. The project will not require right-of-way (R/W) or affect the access or parking for the *National Register* listed and eligible structures. Thus, the project is not expected to impact cultural resources listed or eligible for listing on the *National Register*.

H. NOISE

Compare the distance between the center of the proposed project and the nearest noise receptor to the screening distance for this type of project in FTA’s guidelines. If the screening distance is not achieved, attach a “General Noise Assessment” with conclusions.

Bus Service

The existing Route 297 Orange Max is a limited-stop express service that operates from 5:30 AM to 7:30 PM. The proposed NW 27th Avenue EBS will be increased by approximately 2 buses in each direction during the peak hours and 1 bus in each direction during the off-peak hours. Existing peak hour vehicular traffic volumes in the corridor range from approximately 2,500 to 4,200 vehicles. Using acoustical calculations, the additional NW 27th Avenue EBS buses were estimated to generate a negligible noise increase of approximately 0.1 dBA at any location along the project alignment, including locations near the bus stops. Sound level variations of less than 3.0 dBA are not detectable by the human ear. It is concluded that no impacts would occur as a result of the increase in service frequency.

Bus Stations

Passenger amenities at the bus stations will include improved shelters and seating along with power, lighting, and real-time arrival traveler information displays. The bus stations will not include any features or improvements that would result in higher noise emissions.

NW 215th Street Transit Terminal and Park-and-Ride Facility

A Noise and Vibration Analysis Report was prepared for the NW 215th Street transit terminal and park-and-ride facility to assess potential noise and vibration impacts. This study estimated existing noise conditions in the project area, identified noise-sensitive locations, and predicted future project noise and vibration levels. The noise analysis was prepared to satisfy National Environmental Policy Act (NEPA) requirements, using *Federal Transit Administration (FTA) Noise and Vibration Impact Assessment* [FTA 2006] criteria. A copy of the assessment is included in **Appendix D**.

Noise- and vibration-sensitive land uses potentially impacted by the project consist of single-family residences adjacent on the south and west. Existing noise levels at the residences range from approximately 61 dBA Ldn to 67 dBA Ldn. The following is a summary of the results of the analysis.

- Operation of the project would generate noise levels up to approximately 58 dBA Ldn at the residences, resulting in No Impact under FTA criteria.
- Operation of the project would generate negligible vibration levels. This impact is considered less than significant.
- Construction of the project would generate noise levels up to approximately 77 dBA Leq at the residences. These noise levels are less than the FTA daytime construction noise threshold. This impact is considered less than significant.
- Construction of the project would generate vibration levels up to approximately 76 VdB. This vibration level is below the FTA damage threshold but is higher than the FTA annoyance threshold. This is considered a temporary adverse impact. Implementation of a Vibration Control Plan and other measures could reduce construction vibration levels.

I. VIBRATION

If the proposed project involves new or relocated steel tracks, compare the distance between the center of the proposed project and the nearest vibration receptor to the screening distance for this type of project in FTA’s guidelines. If the screening distance is not achieved, attach a “General Vibration Assessment” with conclusions.

Not applicable.

J. ACQUISITION & RELOCATIONS REQUIRED

Describe land acquisitions and displacements of residences and businesses.

The project will not result in any displacements of residences or businesses.

Miami-Dade Transit (MDT) owns the vacant 14-acre parcel near the Broward County Line at NW 215th Street proposed for end-of-the-line transit terminal and park-and-ride facility. The property was acquired by Miami-Dade County in 2010 for the purpose of accommodating a park-and-ride facility. Therefore, R/W acquisition for this facility is not required.

The availability of R/W was a factor considered in the selection of bus station locations along the corridor. If stations could not be accommodated within the R/W, locations were identified that did not impact businesses by requiring the removal of parking spaces or closure of driveways. Minor R/W acquisition or easements are anticipated to be required for the proposed bus stations listed in **Table 2**.

Table 2: Bus Stations Requiring Minor Right-of-Way Acquisition or Easements

Station Location	Direction	Approximate R/W Required (Width x Length = Square-Feet)
NW 199 th Street	Southbound	10' x 25' = 250'
NW 183 rd Street	Northbound	9' x 25' = 225'
	Southbound	9' x 25' = 225'
NW 175 th Street	Northbound	2' x 26.25' = 52.50'
NW 160 th Street	Southbound	2' x 26.25' = 52.50'
Sesame Street	Southbound	2' x 26.25' = 52.50'
NW 135 th Street	Northbound	3' x 26.25' = 78.75'
	Southbound	4' x 26.25' = 105'
NW 103 rd Street	Northbound	3' x 26.25' = 78.75'

K. HAZARDOUS MATERIALS

If real property is to be acquired, has a Phase I site assessment for contaminated soil and groundwater been performed? If a Phase II site assessment is recommended, has it been performed? What steps will be taken to ensure that the community in which the project is located is protected from contamination during construction and operation of the project? State the results of consultation with the cognizant State agency regarding the proposed remediation.

To determine if potentially contaminated sites are located within the project corridor near proposed bus stations and the NW 215th Street transit terminal and park-and-ride facility, field reconnaissance was conducted and data was obtained and reviewed from the Miami-Dade RER and the Florida Department of Environmental Protection (FDEP) OCULUS on-line databases. The Miami-Dade County data revealed seven sites (listed below) in proximity to the proposed bus stations and the NW 215th Street transit terminal and park-and-ride facility site that are potentially contaminated. These sites are listed in **Table 3** and a map of potentially contaminated sites is provided as **Figure 3**.

Table 3: Potential Contamination Sites in Proximity to Proposed Bus Stations

Site Number	Site	Address	Facility Identification
1	MDT – Future Transit Terminal and Park-and-Ride Facility	Southwest corner of NW 27 th Avenue and NW 215 th Street	Folio: 3411330030010
2	Americlean	2760 NW 183 rd Street	139502409
3	Former Shell – Miami Best	2700 NW 183rd Street	8505389
4	Former H&V One Hour Cleaners	15978 NW 27 th Avenue	Folio: 3421160120030
5	Westview U-gas	13475 NW 27 th Avenue	8842260
6	Elegant Beauty Supplies/Salon (former Fina Gas Station)	2710 NW 135 th Street	8840811
7	Sunshine #212	10300 NW 27 th Avenue	8505598

The general construction of bus stations and improvements to existing bus stations will require minimal ground disturbance and is anticipated to be a low contamination risk, although there is potential for some ground disturbance to occur during the installation of underground utilities associated with the real-time travel displays for the passenger information system and for the construction of the NW 215th Street transit terminal and park-and-ride facility. Due to the limited amount of construction and site disturbance associated with the proposed bus stations, Potential Contamination Sites 2-7 are not expected to present significant contamination risk.

An overview of the potential contamination sites in proximity to proposed bus stations is provided below.

Site 1 – MDT – Future Transit terminal and Park & Ride Facility

This site is currently vacant land located at the southwest corner of NW 27th Avenue and NW 215th Street. This site was identified in the geographic information system (GIS) database as a potential contamination site. A monitoring well was located during site reconnaissance conducted on December 4, 2012. Review of documents in the Miami-Dade County RER database identified a Phase 1/Limited Phase 2 Environmental Site Assessment (ESA) was completed in October 2010, in which soil and groundwater contaminated with arsenic above FDEP cleanup target levels was found. Additional soil and groundwater assessment was recommended by RER and the previous owner was directed to submit a Site Assessment Report (SAR). MDT is currently coordinating with RER to complete the required site evaluation and to comply with the site assessment directive.

Site 2 – Americlean

This site is an active drycleaner located in the shopping plaza approximately 600 feet southwest of the proposed southbound bus station near the intersection of NW 27th Avenue and NW 183rd Street. According to RER, the site is within the assessment phase and requires the submittal of a SAR. However, dry cleaning solvent cleanup program risk assessment documents on the OCULUS database do not indicate that contaminants were detected.

Site 3 – Former Shell – Miami Best

This site was a former retail gas station located approximately 330 feet north of the proposed southbound bus station near the intersection of NW 27th Avenue and NW 183rd Street. Three unleaded gasoline underground storage tanks and piping were reportedly removed and discharges were documented. Voluntary assessment activities were initiated due to benzene concentrations in one of the monitoring wells exhibiting concentrations above groundwater cleanup target levels (GCTLs) and adsorbed phase hydrocarbon levels being above the residential exposure limit. According to RER, this site is still in the assessment phase and requires a SAR.

Site 4 – Former H&V One Hour Cleaners

This site is a former drycleaner that was located approximately 240 feet west of the proposed northbound bus station near the intersection of NW 27th Avenue and NW 160th Street. Evidence of soil contamination on the site was reported in the RER database as part of the North Corridor Metrorail Extension Phase I and II Site Assessments in March 2006 and July 2007, respectively. These documents reported that the site was eligible for remediation funding under the Dry Cleaner Solvent Cleanup Program. No additional documentation pertaining to this drycleaner was available on the RER database. There were no records available on the FDEP OCULUS database during the time of this review.

Site 5 – Westview U-gas

This site is an active retail gas station and convenience store located on an adjacent property north of the proposed northbound bus station near the intersection of NW 27th Avenue and NW 135th Street. According to the FDEP OCULUS database, two 12,000 gallon unleaded gasoline and one 12,000 gallon vehicular diesel underground storage tanks were installed in February 1988. Two discharges were reported, one on April 15, 1988, and one on August 12, 1999, which require cleanup, with the latter being eligible for state funding. The tanks were relined on April 19, 2010; however, according to OCULUS documents dated November 7, 2011, contamination onsite required further assessment. On January 31, 2012, in a Storage Tank Facility Annual Compliance Site Inspection Report, FDEP reported the site and facility to be in compliance.

RER documents indicate that the site has completed the assessment phase and is now required to submit a Remedial Action Plan (RAP) to address documented contamination. According to discussions with Jackie Llano of RER on January 31, 2013, a Source Removal Report and a Contamination Assessment Report (CAR) were filed in 2001 and a Limited CAR was filed in 2002. The RAP has not been filed. This site is being addressed by RER.

Site 6 – Elegant Beauty Supplies/Salon (Former Fina Gas Station)

This site was a former retail gas station and is now a retail store located adjacent to the proposed southbound bus station near the intersection of NW 27th Avenue and NW 135th Street. Five 6,000 gallon underground storage tanks were installed in June 1986 and were removed during initial remedial action on July 17, 1997. Contaminated soils were also removed on July 17, 1997. A Limited Scope SAR was filed in December 1998 in which groundwater contamination was documented. Based on groundwater flow determinations reported in the Limited Scope SAR, the groundwater flow on the site is to the northeast. Thus, any contamination plume present on the site would likely migrate to the northeast with

the groundwater flow. Because the proposed southbound bus station is located on the far eastern border of the site, it may not be affected by the contamination plume.

Site 7 – Sunshine #212

This site is currently a retail gas station located approximately 130 feet west of the proposed northbound bus station near the intersection of NW 27th Avenue and NW 103rd Street. Two 10,000 gallon underground storage tanks and two 5,000 gallon underground storage tanks were installed in December 1976 and were removed in 1985. Three 10,000 gallon underground storage tanks were installed in December 1985. An unknown discharge of approximately 5 gallons was reported on May 18, 1993. On February 9, 1996, a Site Rehabilitation Completion Report was filed and it was determined to be complete by FDEP on April 30, 1996. On June 26, 2003, a vehicle collided with a pump onsite that required the replacement of the pump and associated piping. Following the repair, soil and water samples were collected and were found to be below target levels and a No Further Action was requested. According to RER correspondence (email) dated November 12, 2003, a Source Removal Report was received for the above incident, no discharges were documented, and groundwater and soils tested below cleanup target levels for petroleum chemicals. Therefore, RER placed the document on file without generating paper correspondence and no further assessment was necessary.

L. COMMUNITY DISRUPTION AND ENVIRONMENTAL JUSTICE

Provide a socio-economic profile of the affected community. Describe the impacts of the proposed project on the community. Identify any community resources that would be affected and the nature of the effect.

In accordance with Executive Order 12898, consideration has been given to the possible environmental effects on minority and low-income communities. To determine the socio-economic profile, field reconnaissance was conducted in the corridor and in the vicinity of the proposed transit terminal and park-and-ride facility at NW 215th Street, and Census data was obtained and reviewed.

The majority of the residential development occurring in the area is located behind the commercial development that is immediately adjacent to NW 27th Avenue corridor. The prevalent land uses near the proposed transit terminal and park-and-ride facility at NW 215th Street are single and multi-family residential, commercial, and sports and entertainment facilities.

The project corridor is located within Census Tracts 4.02, 4.03, 4.04, 4.12, 5.01, 5.03, 5.04, 9.01, 9.02, 9.03, 10.03, 10.04, 15.02, 17.01, 17.02, 18.01, 18.03, 94, 95.03, 99.03, 99.04, 100.01, 100.11, and 100.12. According to the 2010 Census, minority populations for all those Census Blocks are greater than 95 percent; thus the areas within the vicinity of the project corridor and the proposed transit terminal and park-and-ride facility at NW 215th Street are considered minority populations. 2010 Census Ethnicity and 2010 Census Income Maps for the project corridor are provided as **Figure 4** and **Figure 5**, respectively.

The proposed project will not affect, separate or isolate any neighborhoods, ethnic groups, or minority and/or low-income populations. The project is intended to enhance accessibility and connectivity to the transit system and to provide amenities for users to increase their comfort and convenience. The project will benefit the surrounding community by providing premium transit service in the corridor that will

provide access to activity and job centers. The project will benefit the surrounding community by providing enhancements to the transit service within a corridor with a high level of transit dependency. Thus, disproportionate adverse impacts to minority or low-income populations are not expected.

M. USE OF PUBLIC PARKLAND AND RECREATION AREAS

Indicate parks and recreational areas on the site map. If the activities and purposes of these resources will be affected by the proposed project, state how.

Not applicable.

N. IMPACTS ON WETLANDS

Show potential wetlands on the site map. Describe the project’s impact on on-site and adjacent wetlands.

Not applicable.

O. FLOODPLAIN IMPACTS

Is the proposed project located within the 100-year floodplain? If so, address possible flooding of the proposed project site and flooding induced by the proposed project due to its taking of floodplain capacity.

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Panel Number 12011C0120F was reviewed for the presence of floodplains. The project site for the proposed transit terminal and park-and-ride facility at NW 215th Street is located within FEMA Flood Zones AE, X and X500, which are areas subject to 100-year flood, areas outside the 500-year floodplain, and areas between the limits of the 100-year and 500-year flood, respectively. However, the proposed project will not: 1) affect flood heights or base floodplain limits, 2) result in increased or new adverse environmental impacts, 3) increase flood risks or damage, or 4) significantly change the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, this project does not encroach upon the base floodplain.

P. IMPACTS ON WATER QUALITY, NAVIGABLE WATERWAYS & COASTAL ZONES

If any of these are implicated, provide detailed analysis.

Not applicable.

Q. IMPACTS ON ECOLOGICALLY-SENSITIVE AREAS AND ENDANGERED SPECIES

Describe any natural areas (woodlands, prairies, wetlands, rivers, lakes, streams, designated wildlife or waterfowl refuges, and geological formations) on or near the proposed project area. If present, state the results of consultation with the state department of natural resources on the impacts to these natural areas and on threatened and endangered fauna and flora that may be affected.

Based on a field assessment of habitat availability, site observation and review of available database information from Florida Natural Areas Inventory (FNAI), Florida Fish and Wildlife Conservation Commission (FWC) and US Fish and Wildlife Service (USFWS), state and federally listed species, their habitats and natural areas do not occur along the NW 27th Avenue corridor or on the proposed NW 215th Street transit terminal and park-and-ride facility site. Thus, impacts to endangered and threatened species are not anticipated.

R. IMPACTS ON SAFETY AND SECURITY

Describe the measures that would need to be taken to provide for the safe and secure operation of the project after its construction.

Security will be provided to protect the public and transit users from crime and vandals at the proposed facilities. MDT currently contracts with a private security company to provide security service at stations and parking facilities, including the use of assigned personnel and roving patrols. This security will be extended to the new NW 215th Street transit terminal and park-and-ride facility and intermediary bus stations upon completion of the project.

S. IMPACTS CAUSED BY CONSTRUCTION

Describe the construction plan and identify impacts due to construction noise, utility disruption, debris and spoil disposal, air and water quality, safety and security, and disruptions of traffic and access to property.

All construction-related impacts related to the new NW 215th Street transit terminal and park-and-ride facility and intermediary bus stations will be temporary in nature. Best management practices in accordance with local, state and federal regulations will be implemented during project construction to minimize effects. Construction activities will cause minor short-term air quality impacts in the form of dust from earthwork and unpaved roads. These temporary construction impacts will be minimized by adherence to all federal, state and local regulations. These regulations include, but are not limited to, the Environmental Protection Agency (EPA) National Pollution Discharge Elimination System (NPDES), which is administered by the FDEP. As per the NPDES standards, typical construction best management practices may include construction fencing with wind screens, silt fences and erosion/inlet protection.

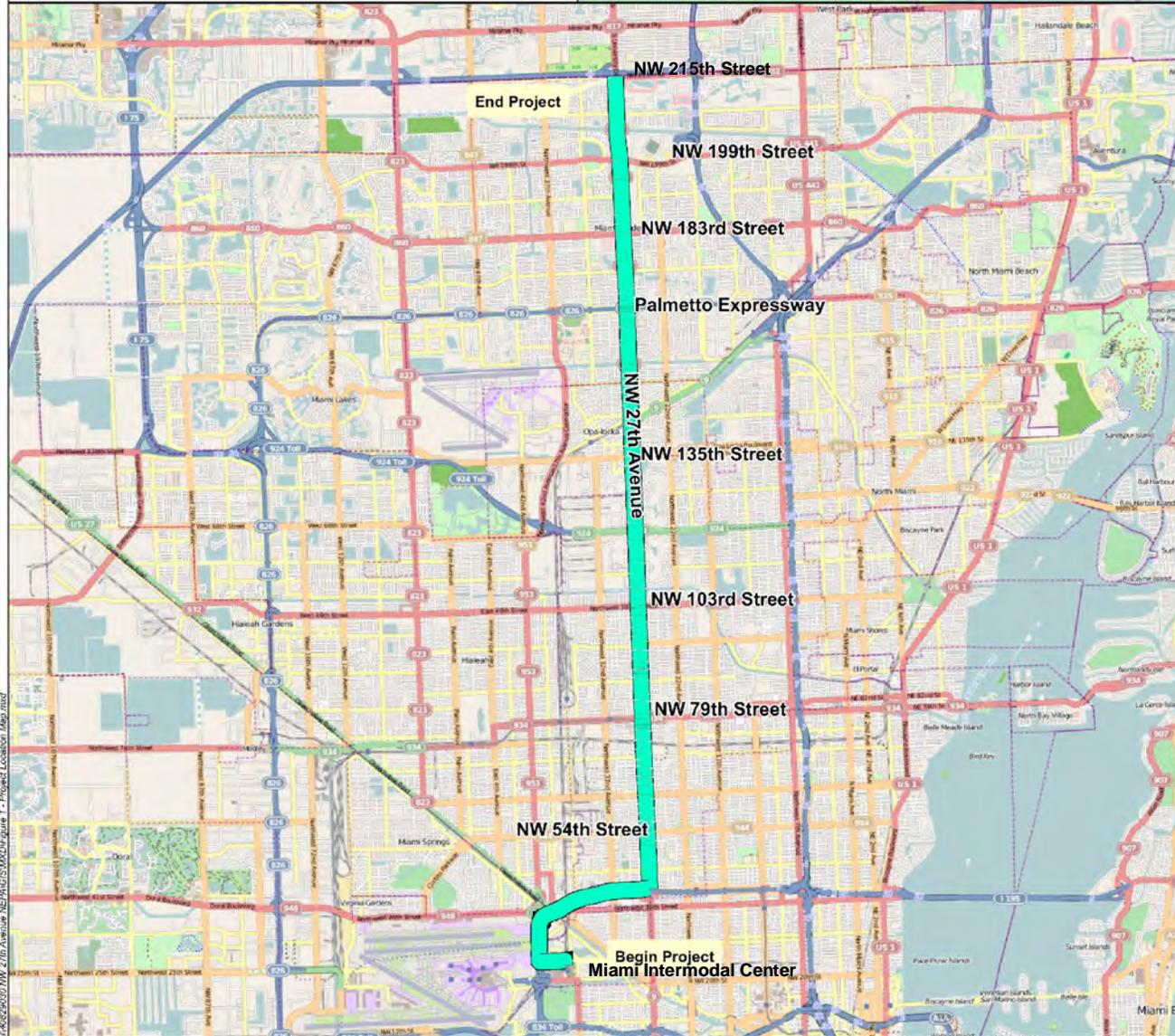
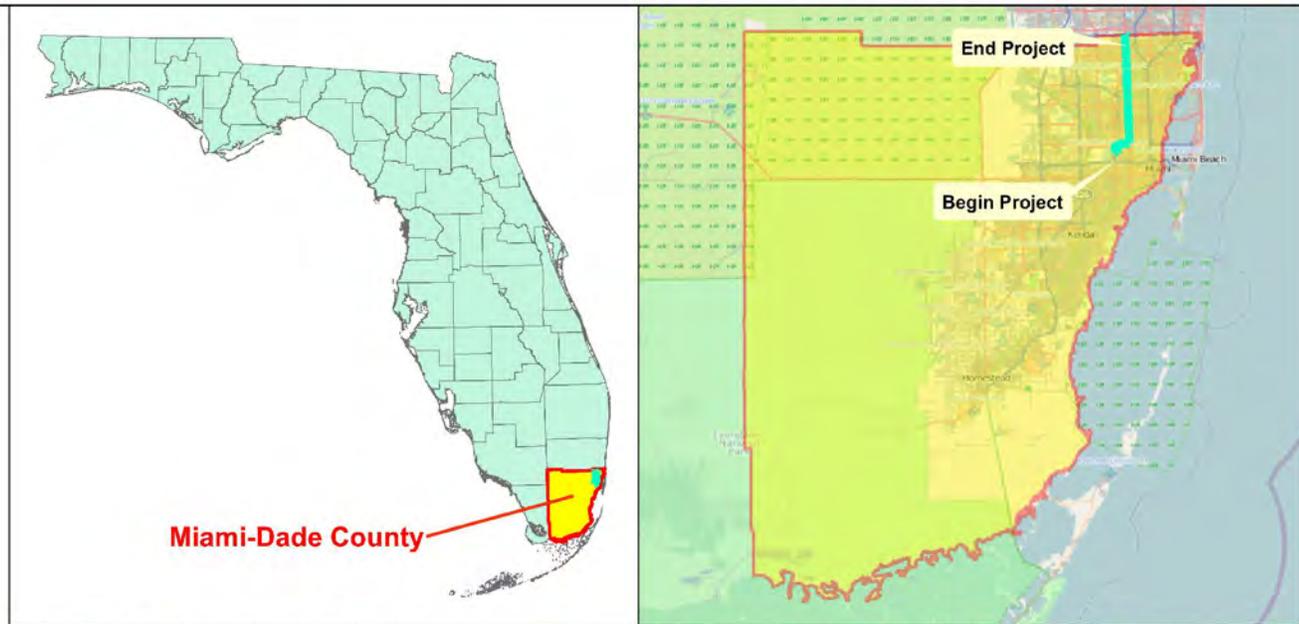
The action described above meets the criteria for a NEPA categorical exclusion (CE) in accordance with 23 CFR Part 771.118(c)(5)(7)(9).

Applicant's Environmental Reviewer

Date

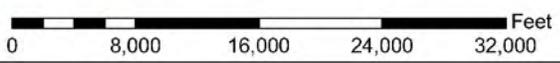
FTA Grant Representative

**FIGURE 1:
SITE LOCATION MAP**



Legend

 Project Corridor



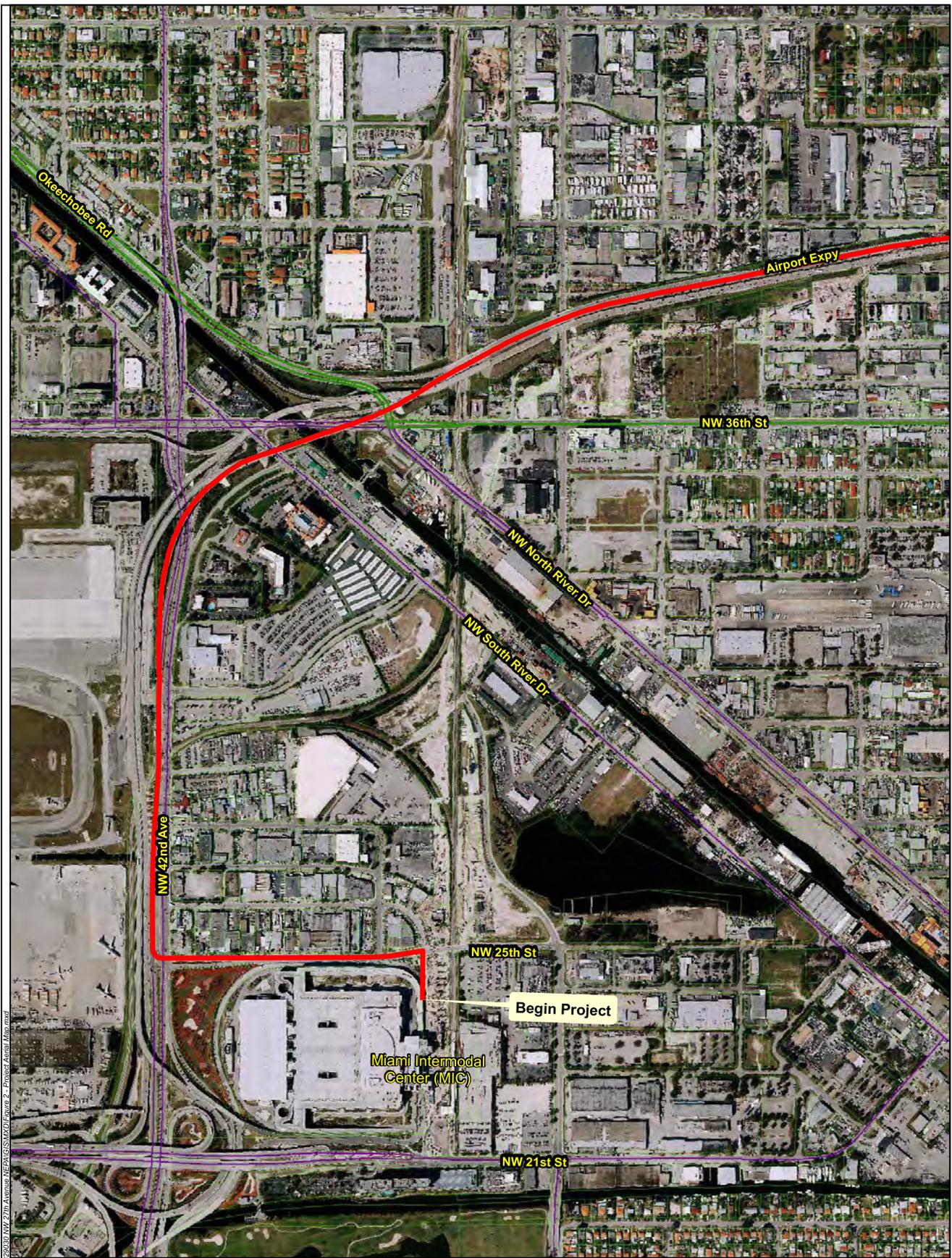
K:\VIB - Environmental\40629030\NW 27th Avenue NE\FIG1\Aerial\Figure 1 - Project Location Map.mxd
 Source: Aerial Express, Inc. 2012

PROJECT AERIAL MAP

**NW 27TH AVENUE ENHANCED BUS PROJECT
 FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
 MIAMI-DADE COUNTY, FLORIDA**



**FIGURE 2:
AERIAL MAP**



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 Sources: Aerials Express, Inc. 2010

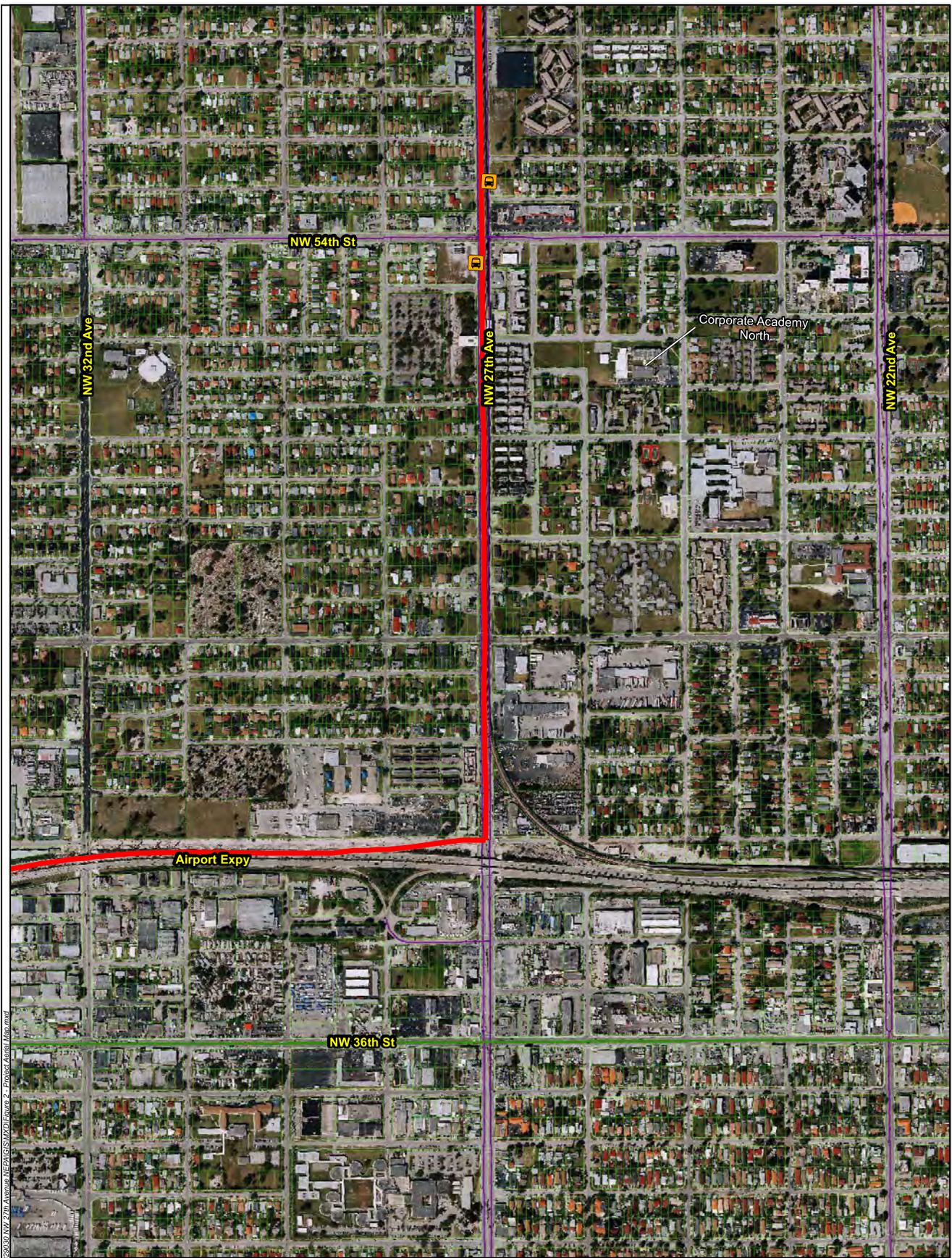
Legend

- Bus stations
- Project Corridor
- Parcels



Project Aerial Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





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Sources: Aerials Express, Inc. 2010

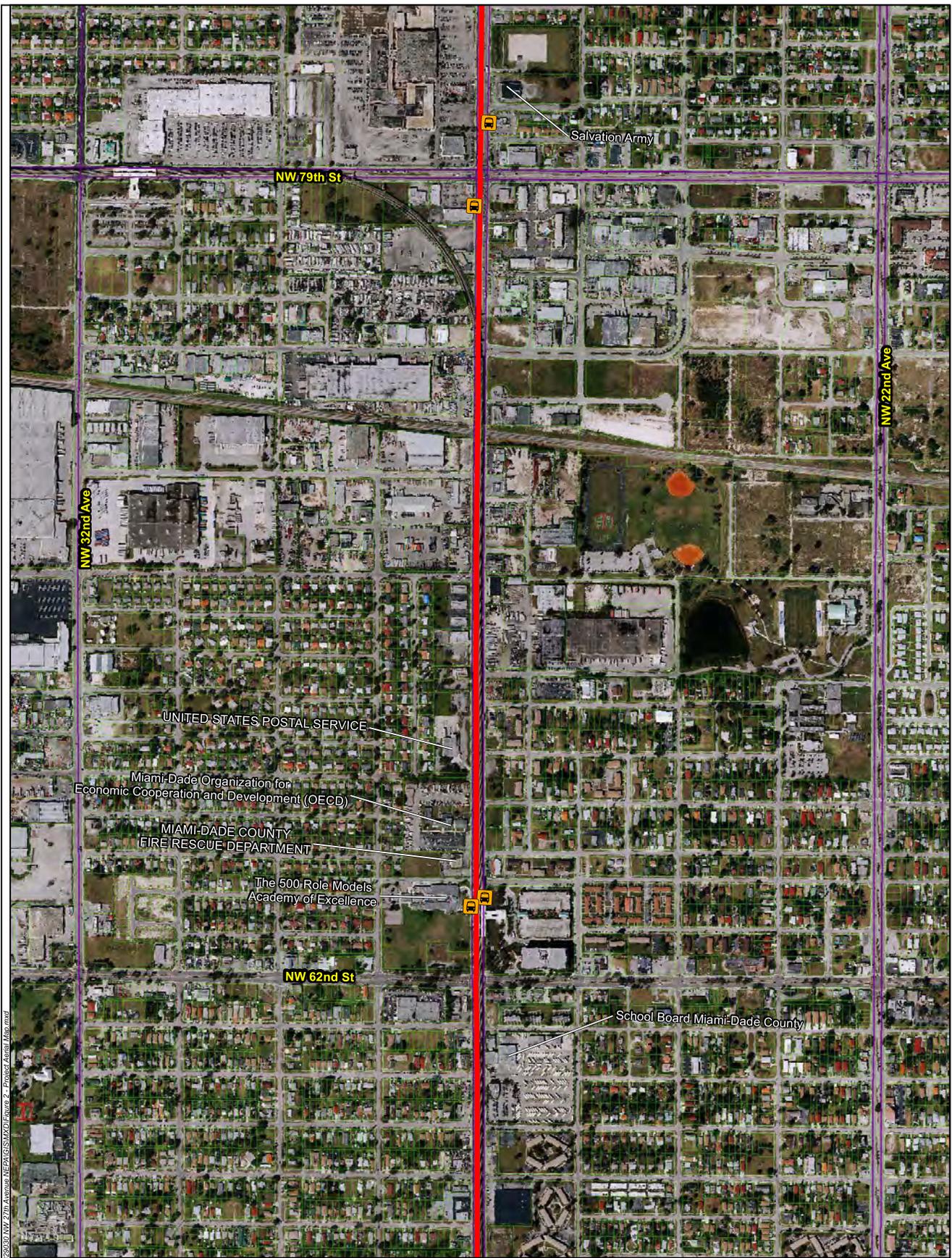
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- Bus stations
- Project Corridor
- Parcels



Project Aerial Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





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Sources: Aerials Express, Inc. 2010

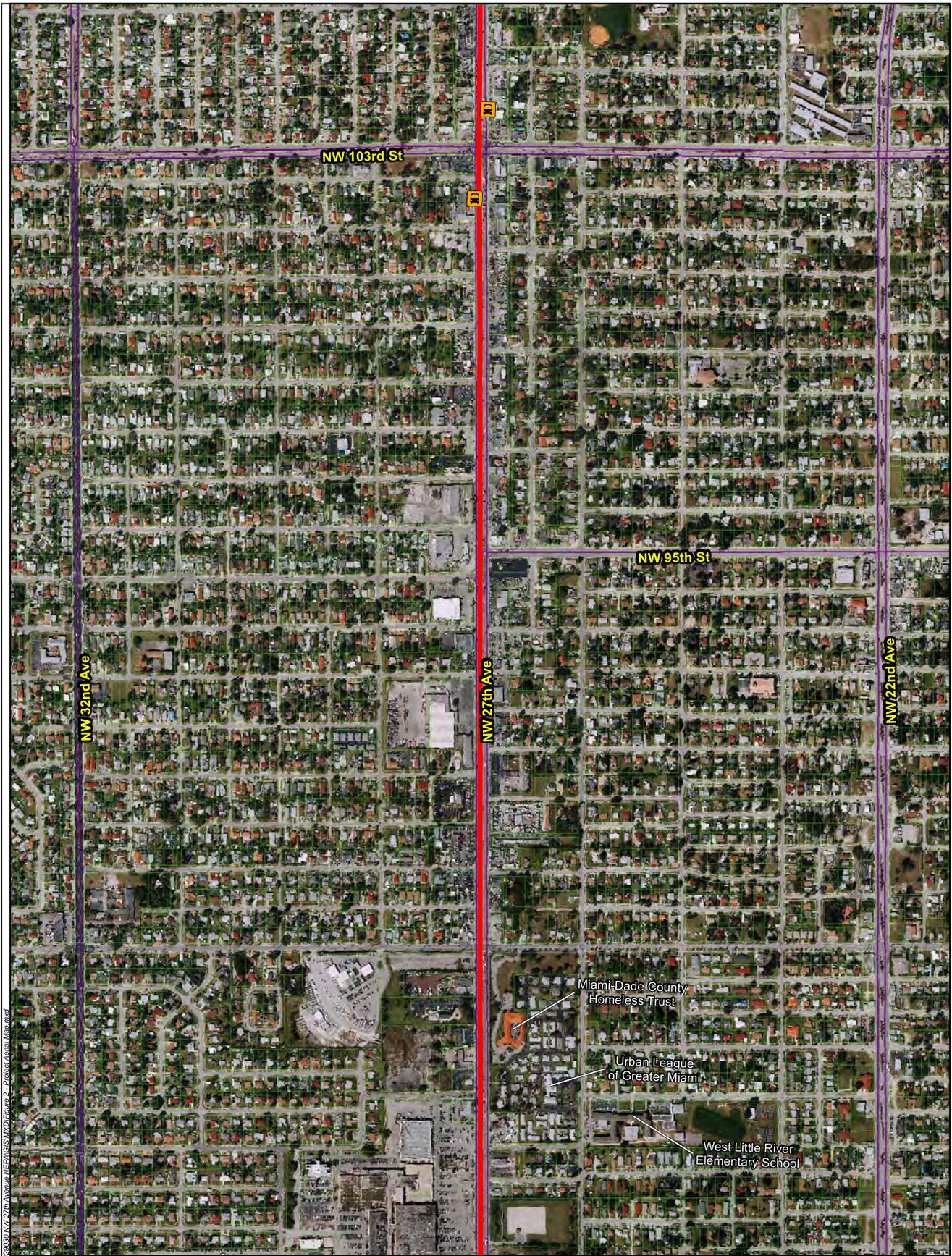
Legend

- Bus stations
- Project Corridor
- Parcels



Project Aerial Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





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Sources: Aerials Express, Inc. 2010

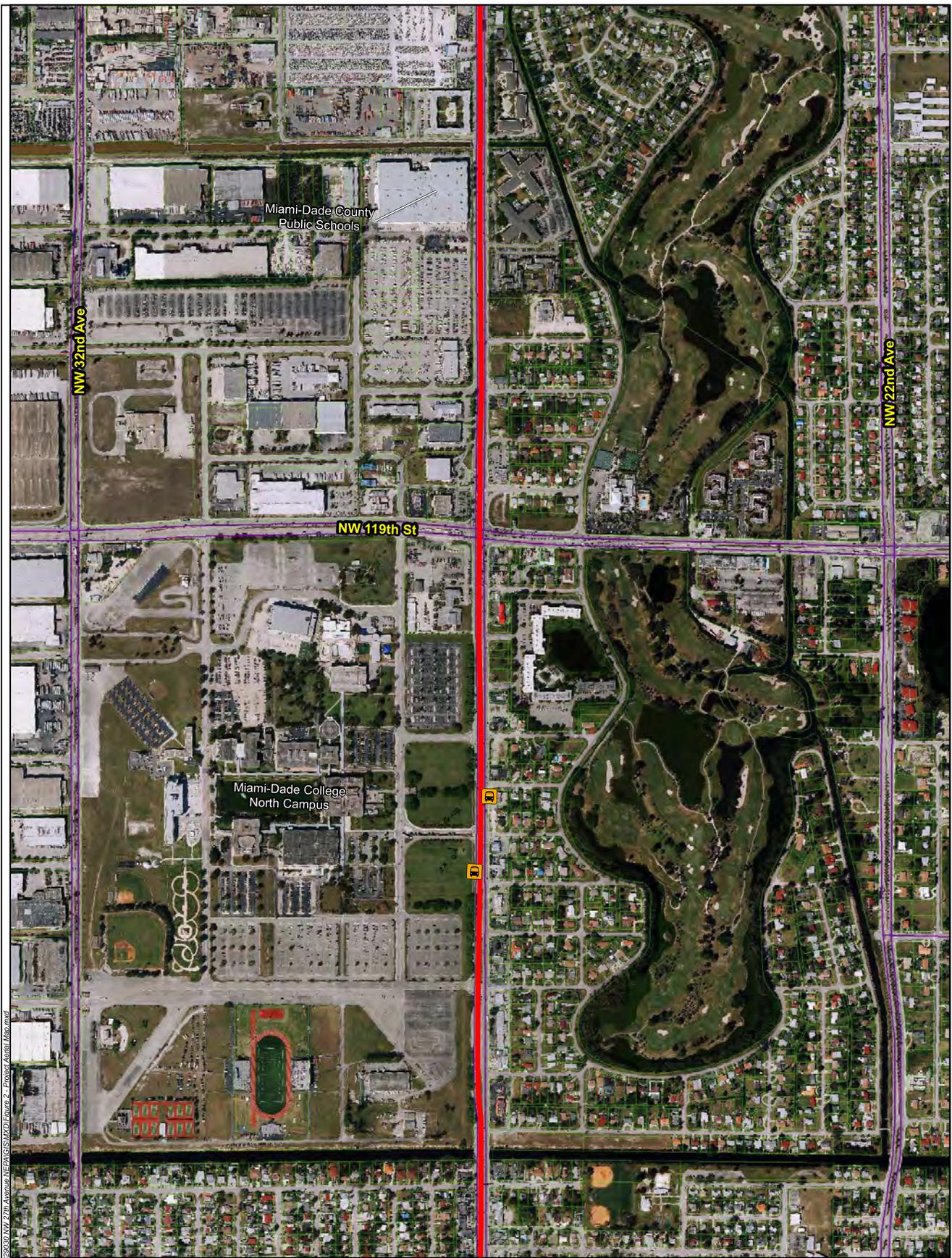
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- Bus stations
- Project Corridor
- Parcels



Project Aerial Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





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Sources: Aerials Express, Inc. 2010

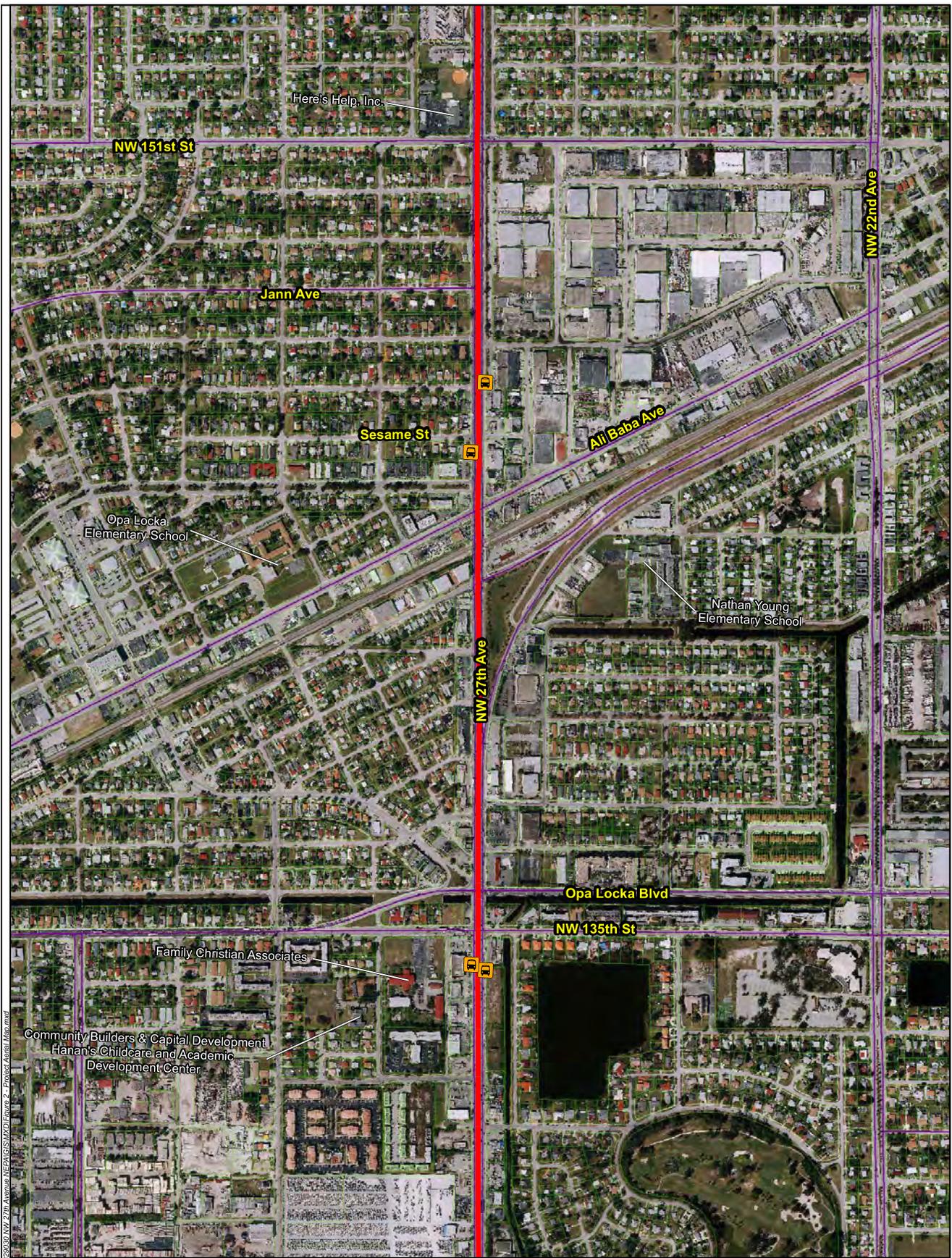
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- Bus stations
- Project Corridor
- Parcels



Project Aerial Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





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 Sources: Aerials Express, Inc. 2010

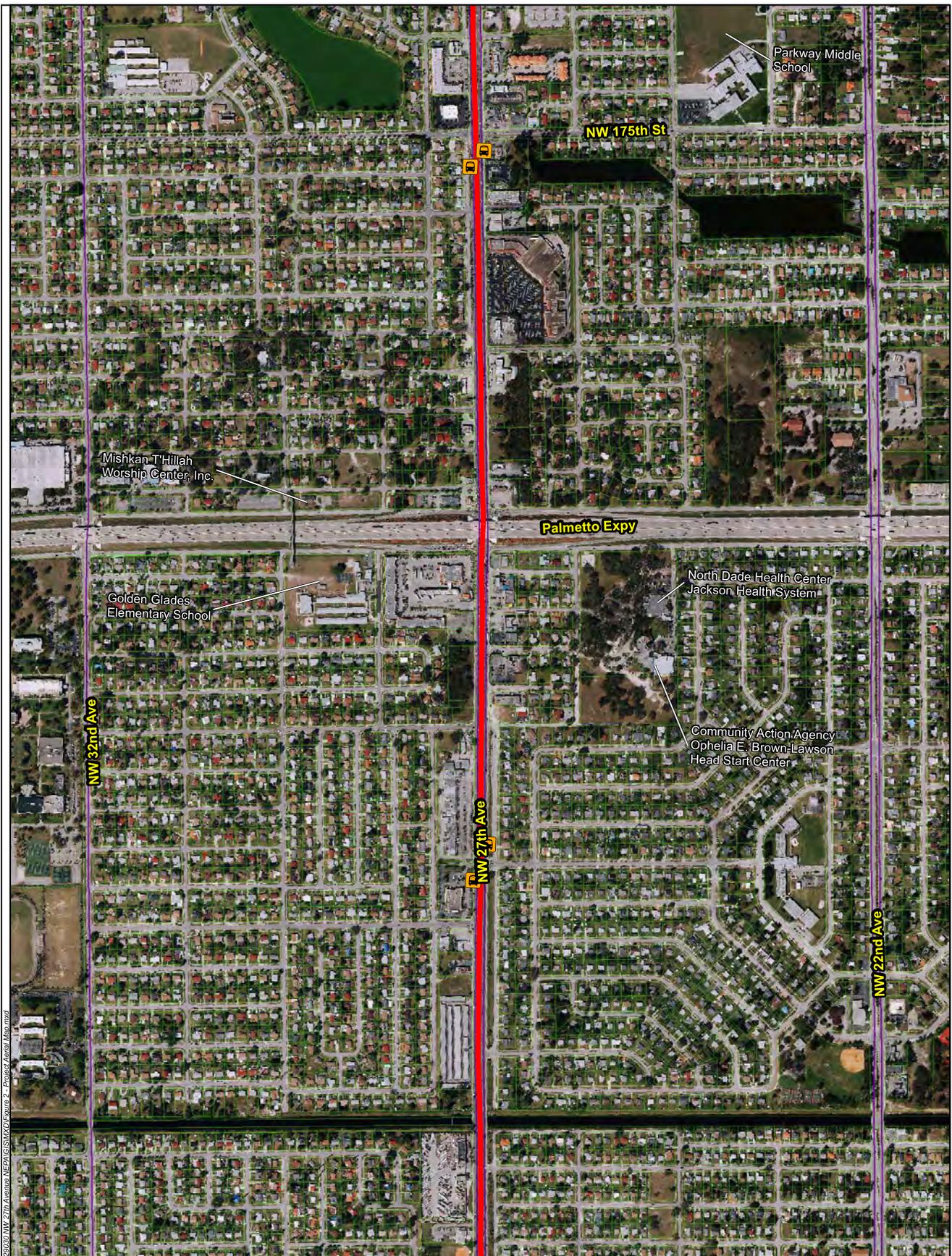
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- Bus stations
- Project Corridor
- Parcels



Project Aerial Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





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Sources: Aerials Express, Inc. 2010

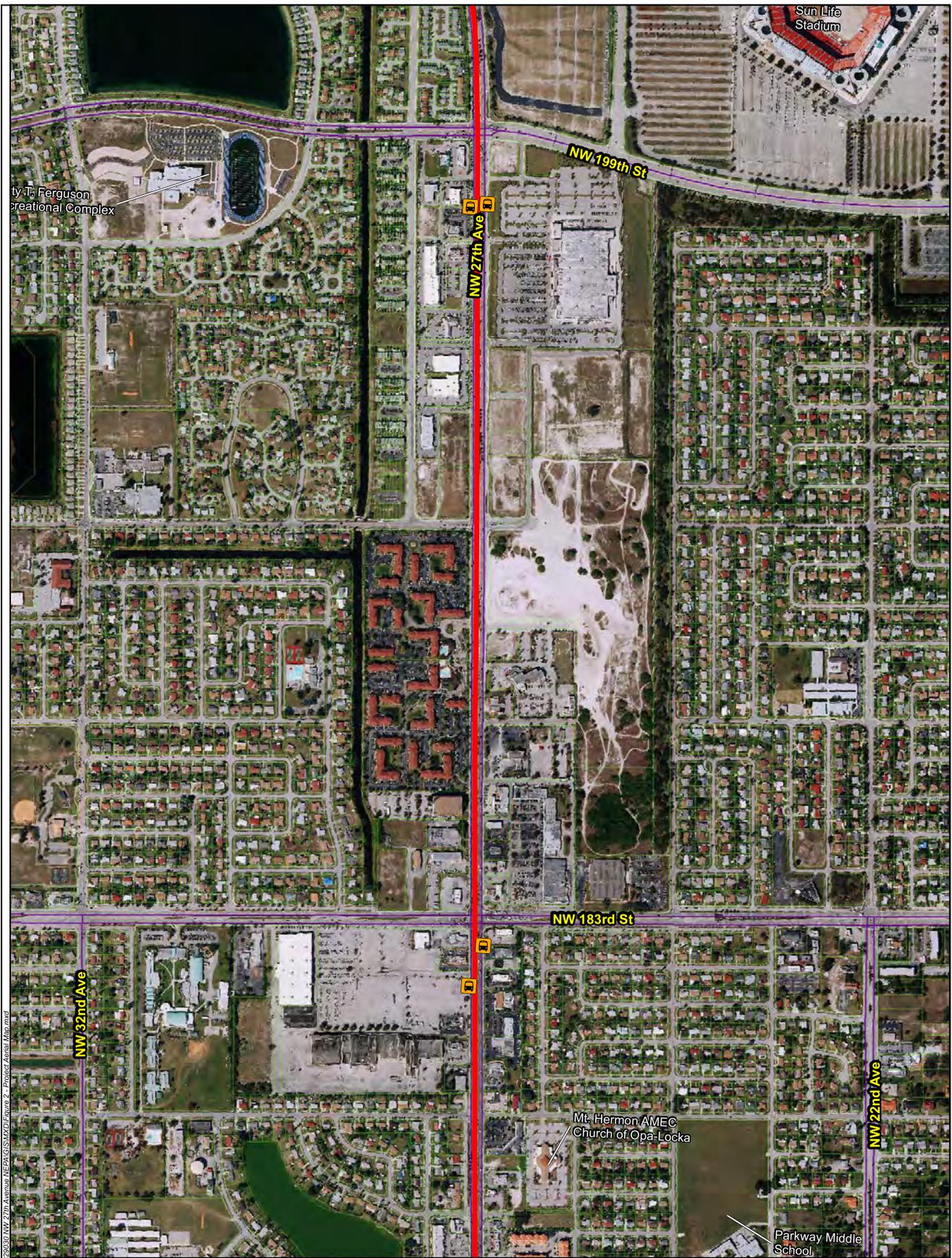
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- Bus stations
- Project Corridor
- Parcels



Project Aerial Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





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Sources: Aerials Express, Inc. 2010

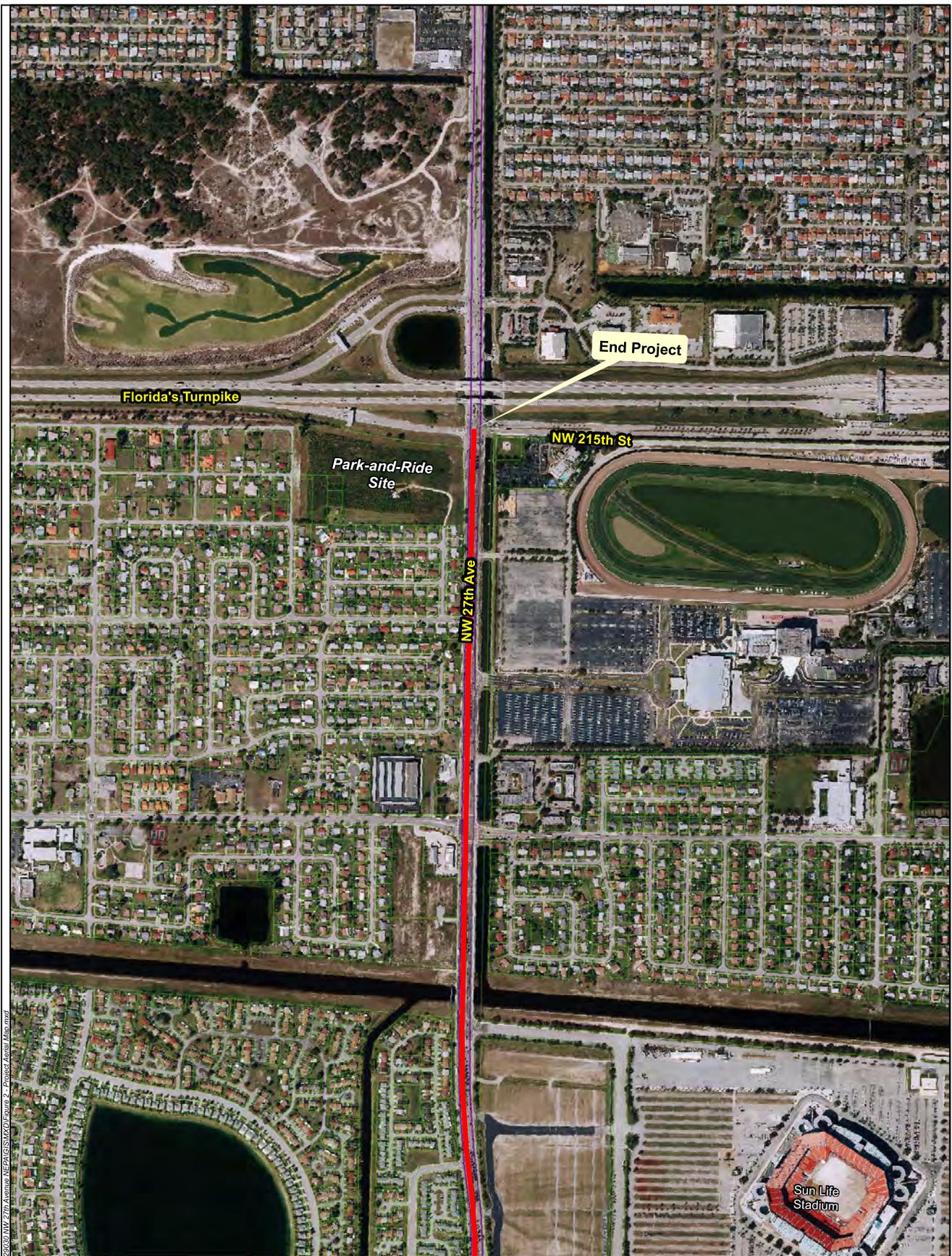
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- Bus stations
- Project Corridor
- Parcels



Project Aerial Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA

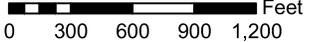




K:\VSB_Environmental\20120509\NW 27th Avenue NEPA\GIS\XKP\Figure 2 - Project Aerial Map.mxd

Legend

- Bus stations
- Project Corridor
- Parcels



Sources: Aerials Express, Inc. 2010

Project Aerial Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA



**FIGURE 3:
POTENTIAL CONTAMINATION SITES MAP**



K:\VSB_Environmental\20130303\NW 27th Avenue NEPA\GIS\XDO\Figure 3 - Potentially Contaminated Site Map.mxd

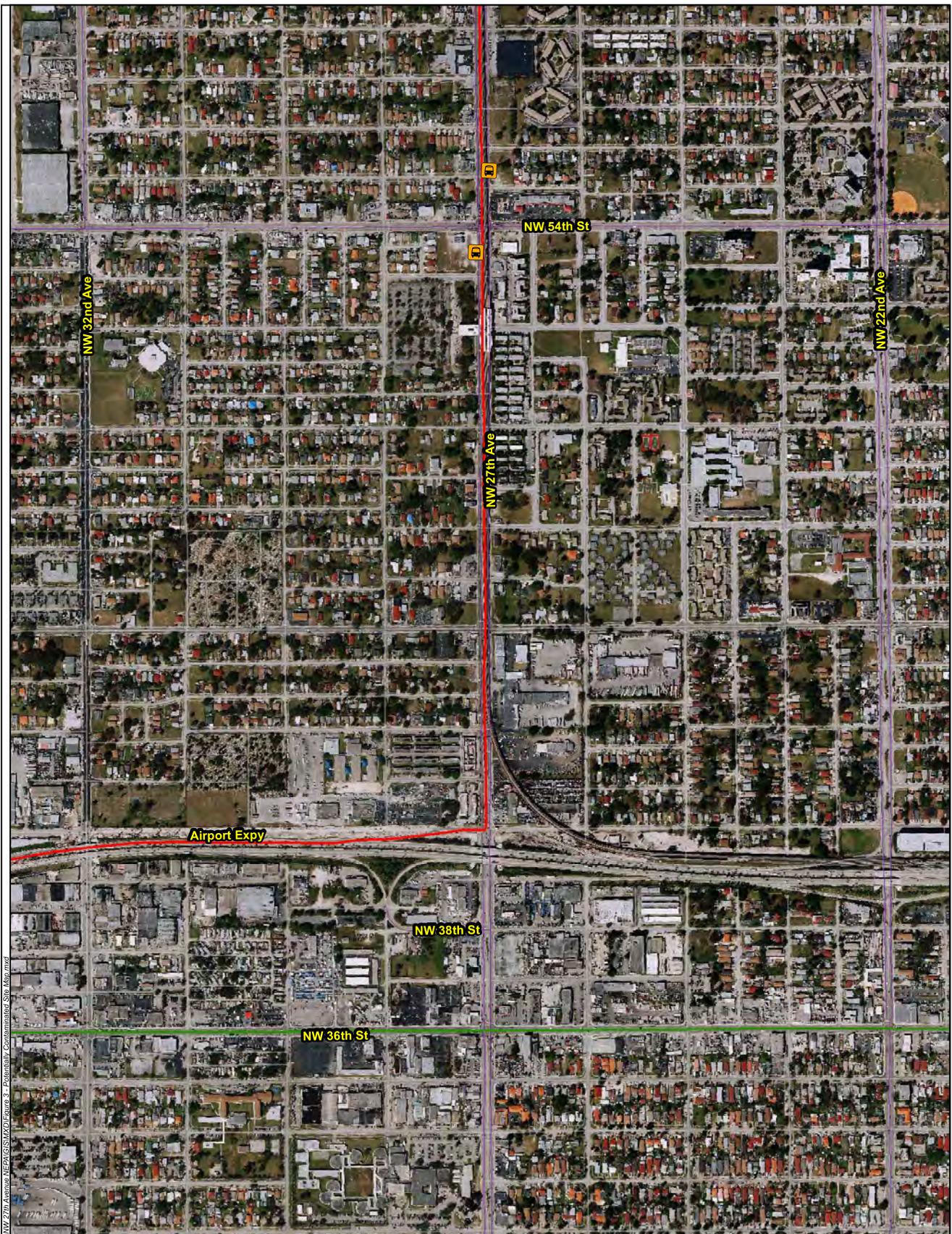
Legend

- Potential Contamination Site in Proximity to Proposed Bus Station
- Project Corridor
- Bus stations



Potentially Contaminated Sites Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





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Sources: Aerials Express, Inc. 2010

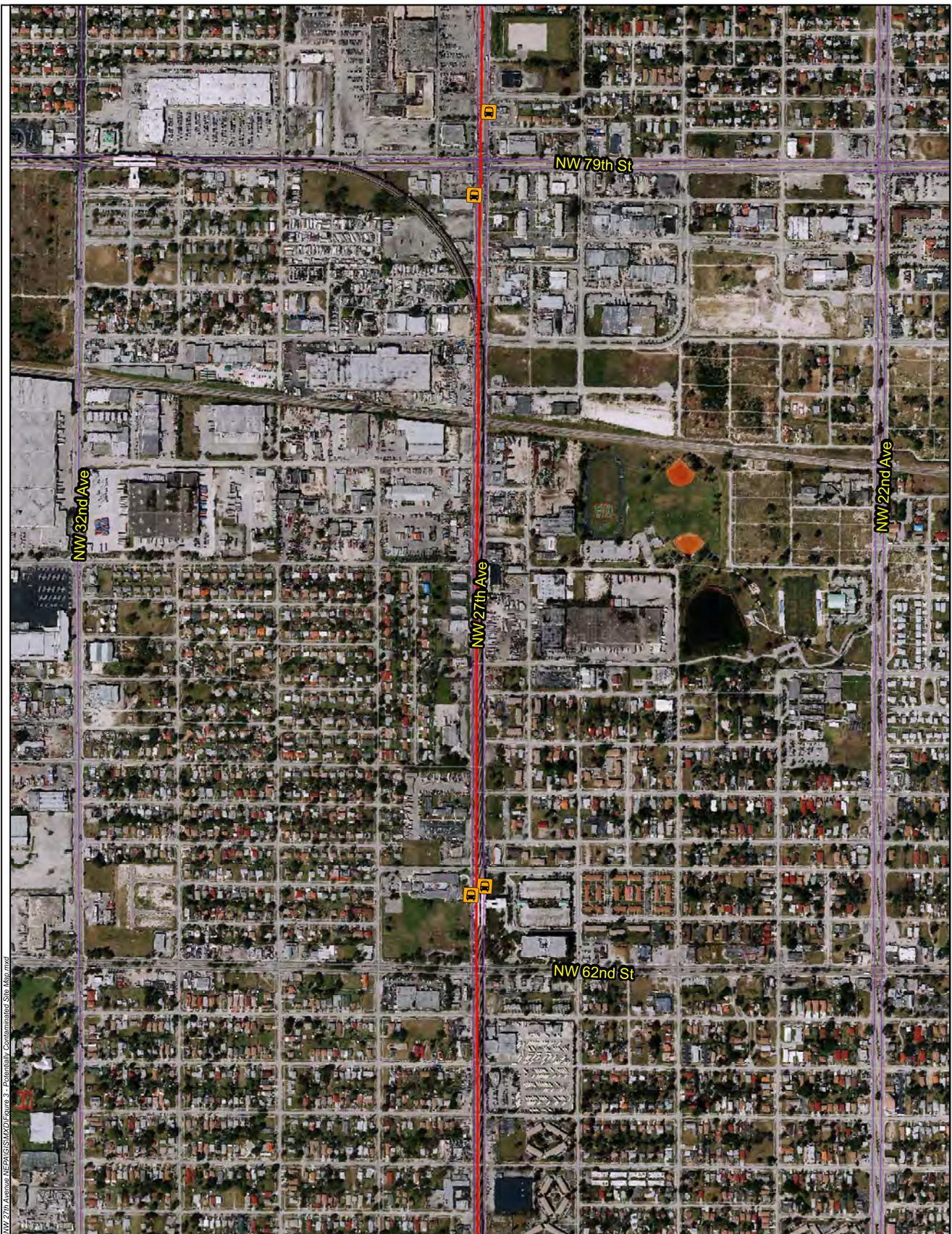
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- Potential Contamination Site in Proximity to Proposed Bus Station
- Project Corridor
- B Bus stations



Potentially Contaminated Sites Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





K:\VSB_Environmental\42829030\NW 27th Avenue NEPA\GIS\XK01\Figure 3 - Potential Contamination Site Map.mxd
Sources: Aerials Express, Inc. 2010

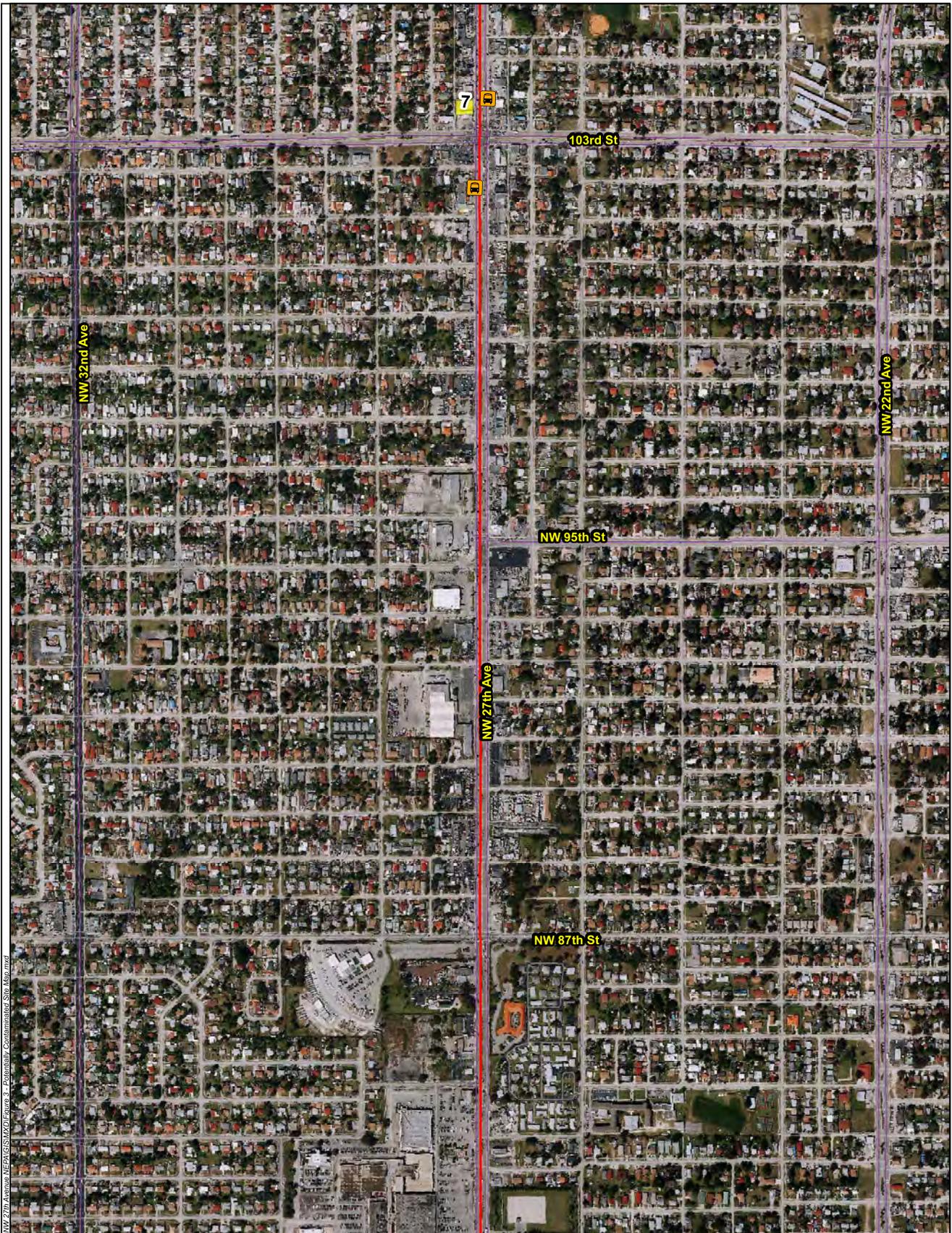
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- Potential Contamination Site in Proximity to Proposed Bus Station
- Project Corridor
- B Bus stations



Potentially Contaminated Sites Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





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Sources: Aerials Express, Inc. 2010

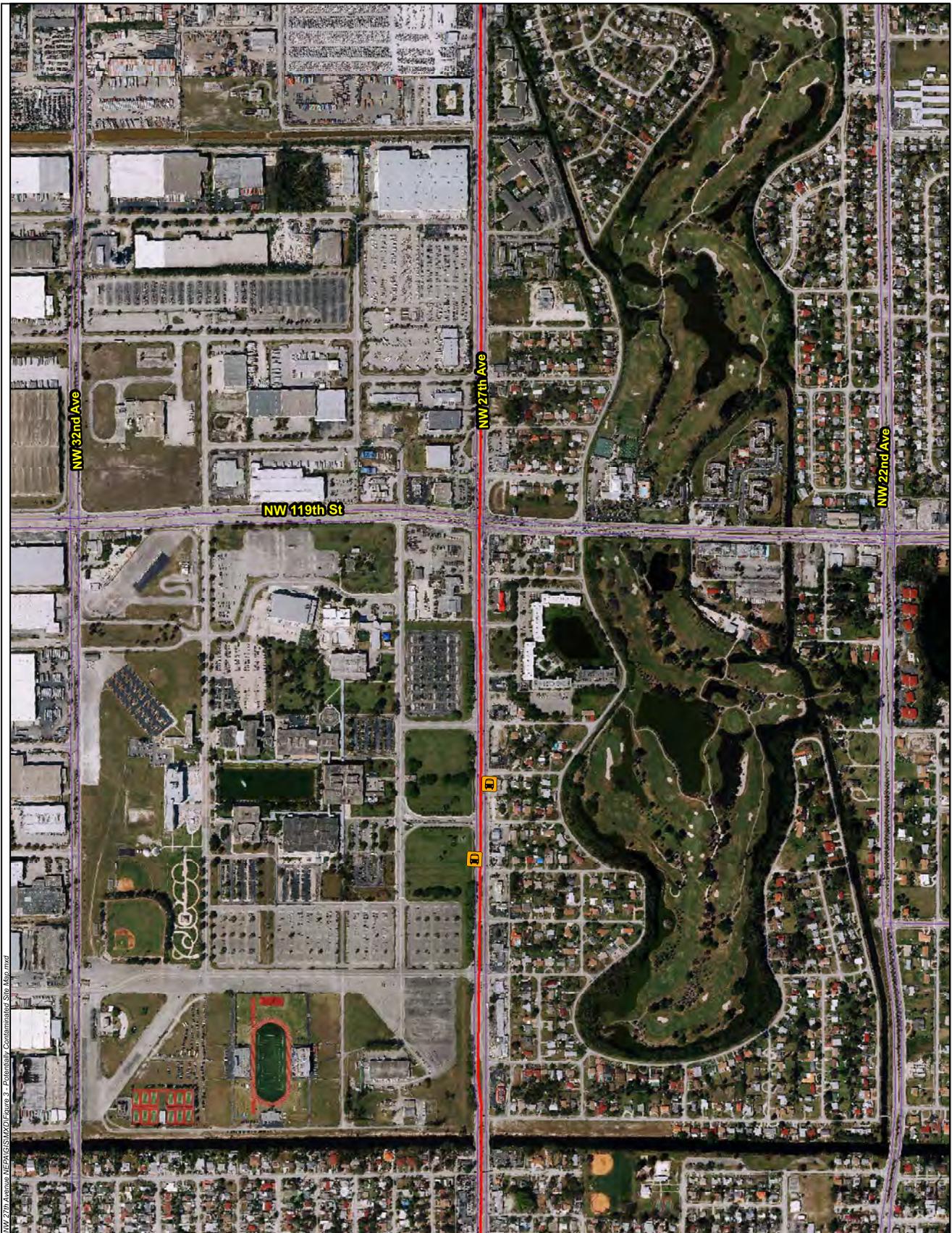
Legend

- Potential Contamination Site in Proximity to Proposed Bus Station
- Project Corridor
- 7 Bus stations



Potentially Contaminated Sites Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





K:\VSB_Environmental\42829030\NW 27th Avenue NEPA\GIS\1201\Figure 3 - Potentially Contaminated Sites Map.mxd

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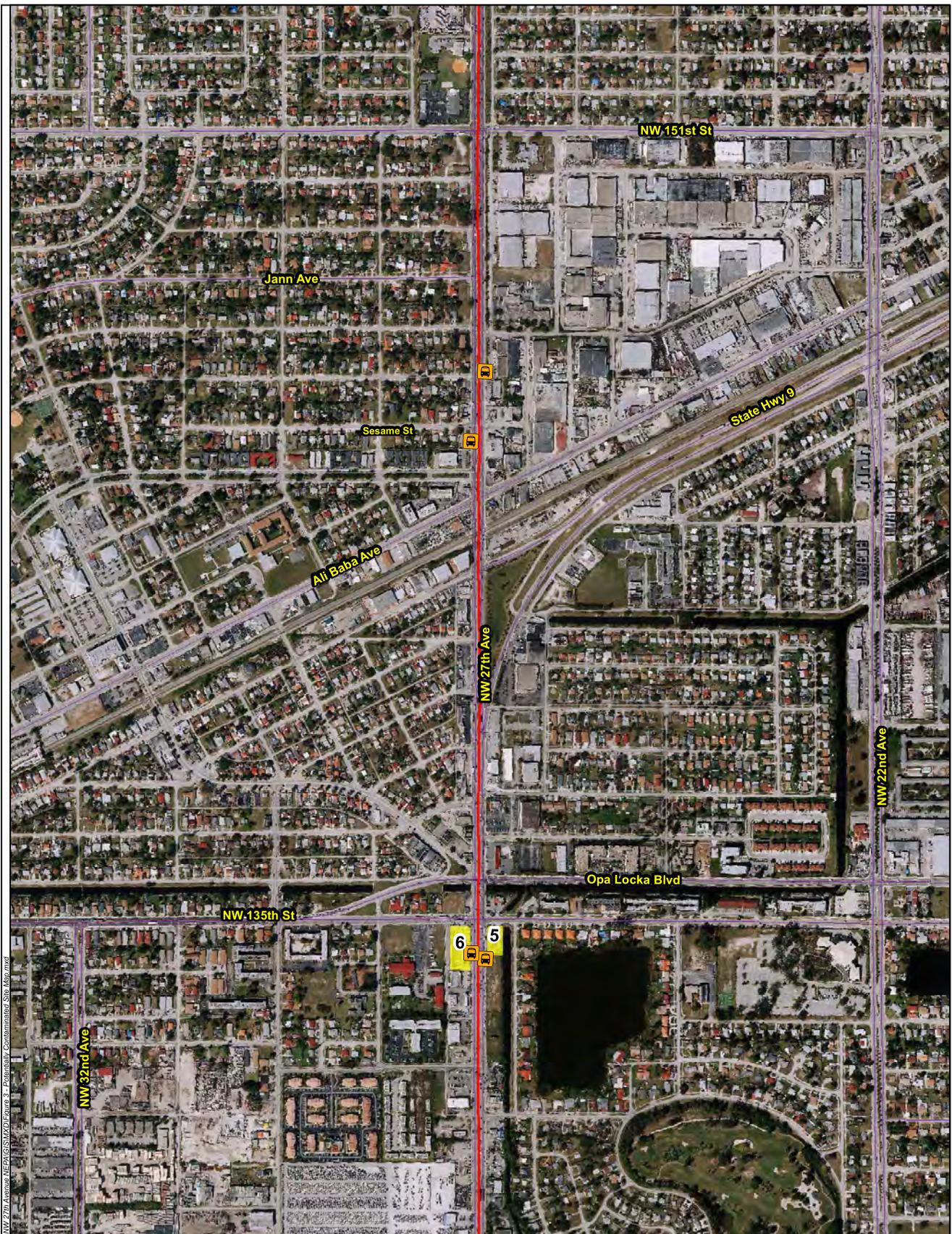
- Potential Contamination Site in Proximity to Proposed Bus Station
- Project Corridor
- B Bus stations



Source: Aerials Express, Inc. 2010

Potentially Contaminated Sites Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





K:\VSB - Environmental\20130303\NW 27th Avenue NEPA\GIS\XDO\Figure 3 - Potential Contamination Site Map.mxd

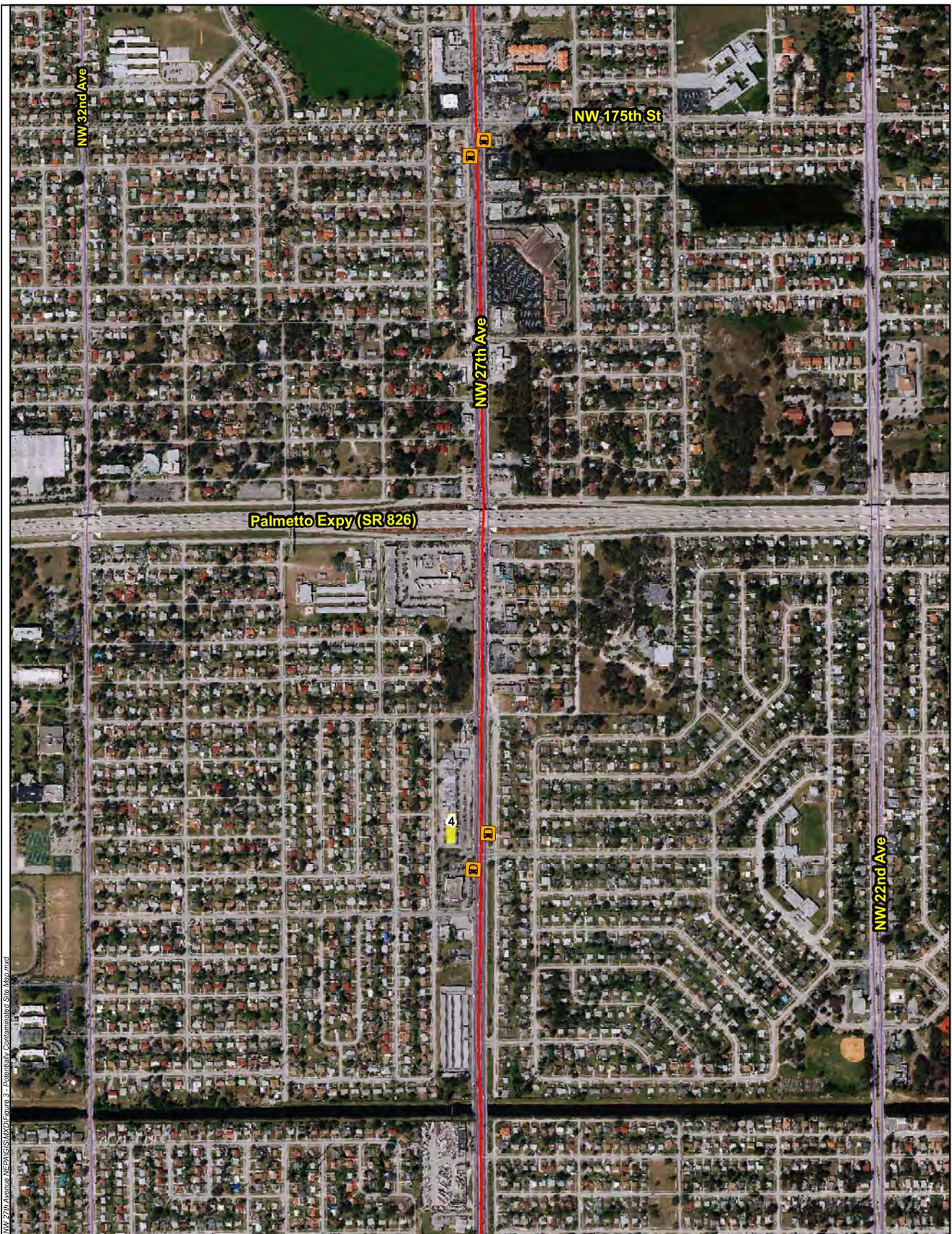
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- Potential Contamination Site in Proximity to Proposed Bus Station
- Project Corridor
- B Bus stations



Potentially Contaminated Sites Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





K:\VSB_Environmental\42829030\NW 27th Avenue NEPA\GIS\X2011\Figure 3 - Potential Contaminated Sites Map.mxd
Sources: Aerials Express, Inc. 2010

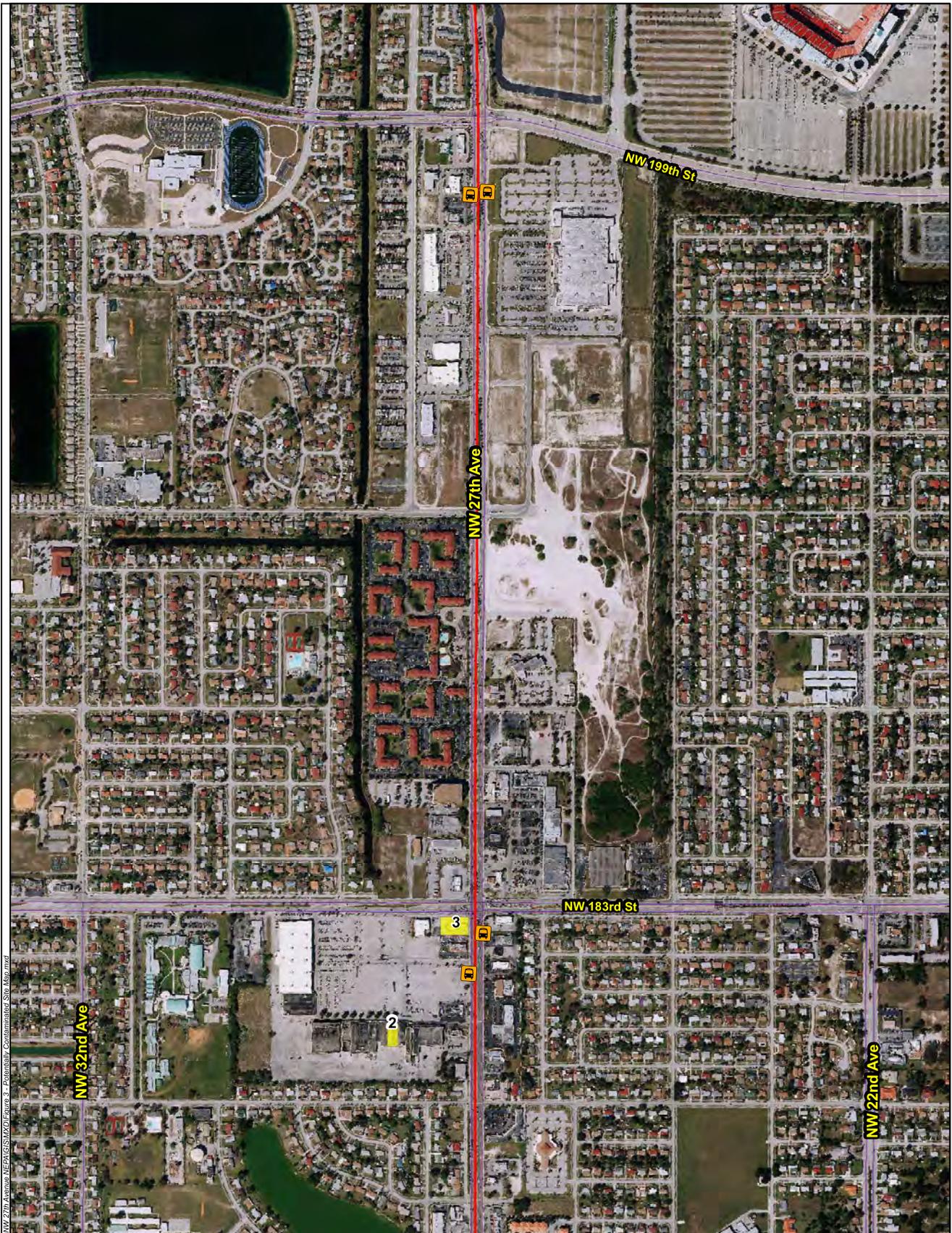
Legend

- Potential Contamination Site in Proximity to Proposed Bus Station
- Project Corridor
- B Bus stations



Potentially Contaminated Sites Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





K:\VSB - Environmental\42829030\NW 27th Avenue NEPA\GIS\XDO\Figure 3 - Potential Contamination Site Map.mxd
 Sources: Aerials Express, Inc. 2010

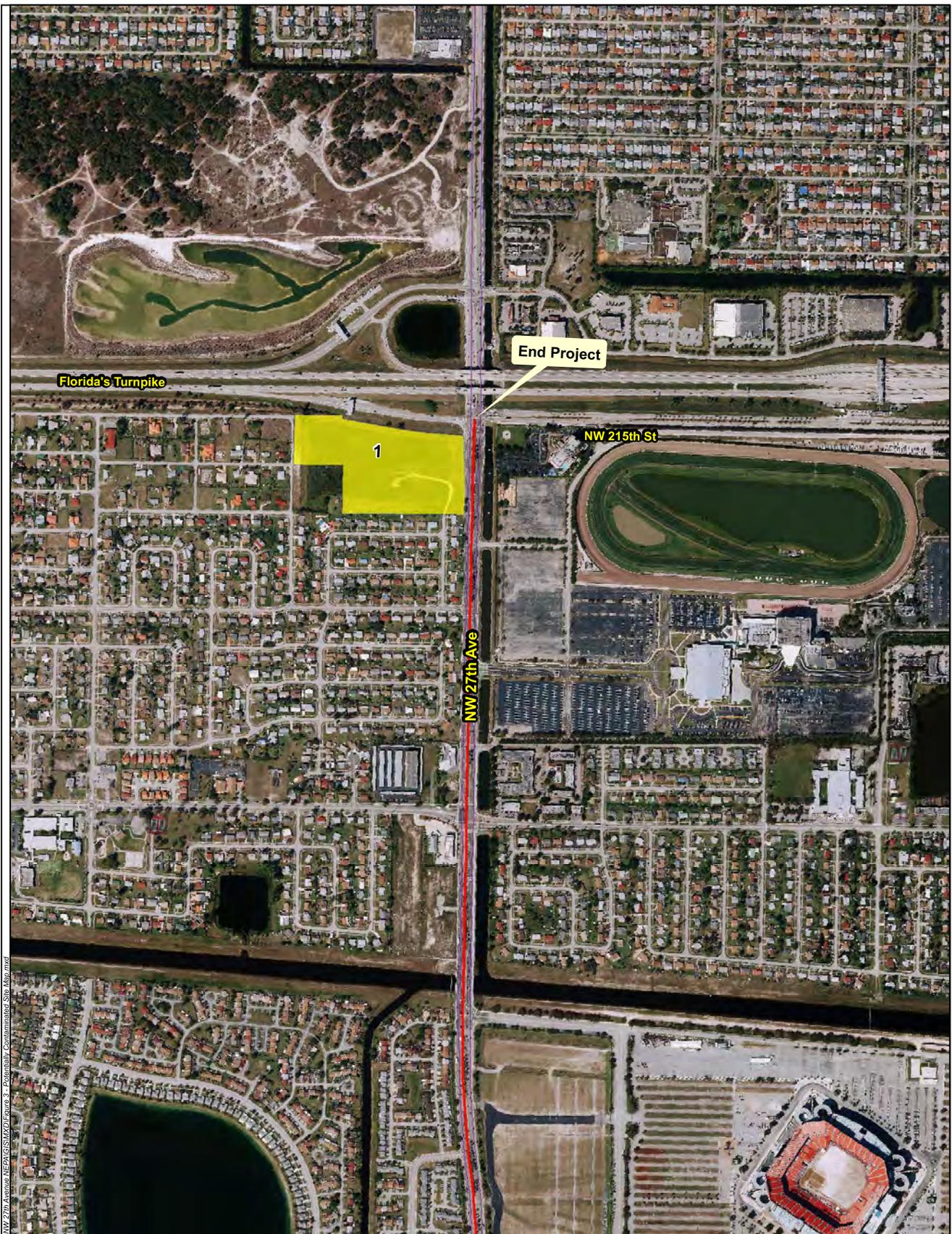
Legend

- Potential Contamination Site in Proximity to Proposed Bus Station
- Project Corridor
- B Bus stations



Potentially Contaminated Sites Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA





K:\VSB - Environmental\42829030\NW 27th Avenue NEPA\GIS\2013\Figure 3 - Potentially Contaminated Site Map.mxd
 Sources: Aerials Express, Inc. 2010

Legend

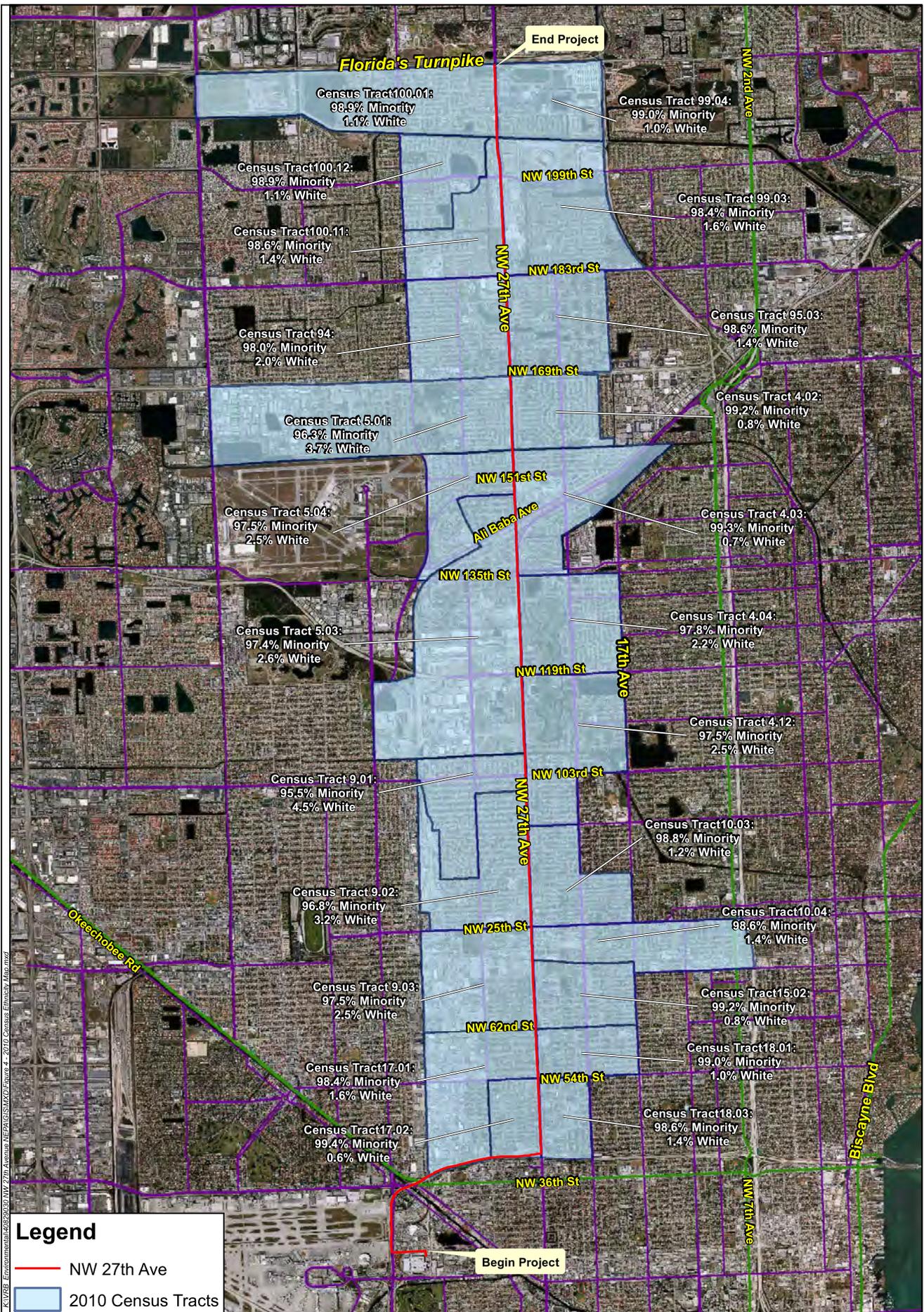
- Potential Contamination Site in Proximity to Proposed Bus Station
- Project Corridor
- Bus stations



Potentially Contaminated Sites Map
NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA



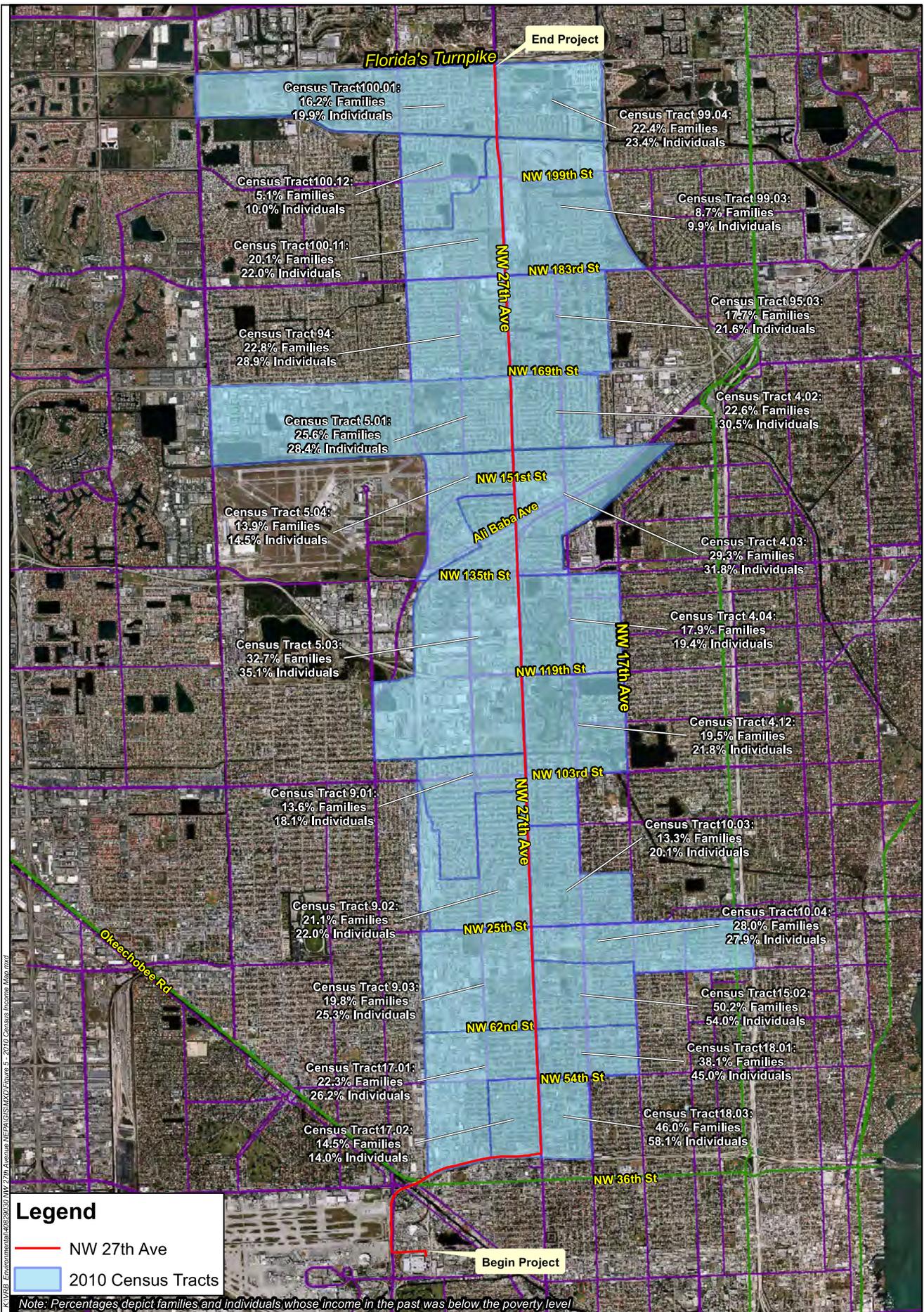
**FIGURE 4:
2010 CENSUS ETHNICITY MAP**



K:\VSB_Environmental\2010 Census\2010 Census Ethnicity Map.mxd
 Sources: Aerials Express, Inc. 2010



**FIGURE 5:
2010 CENSUS INCOME MAP**



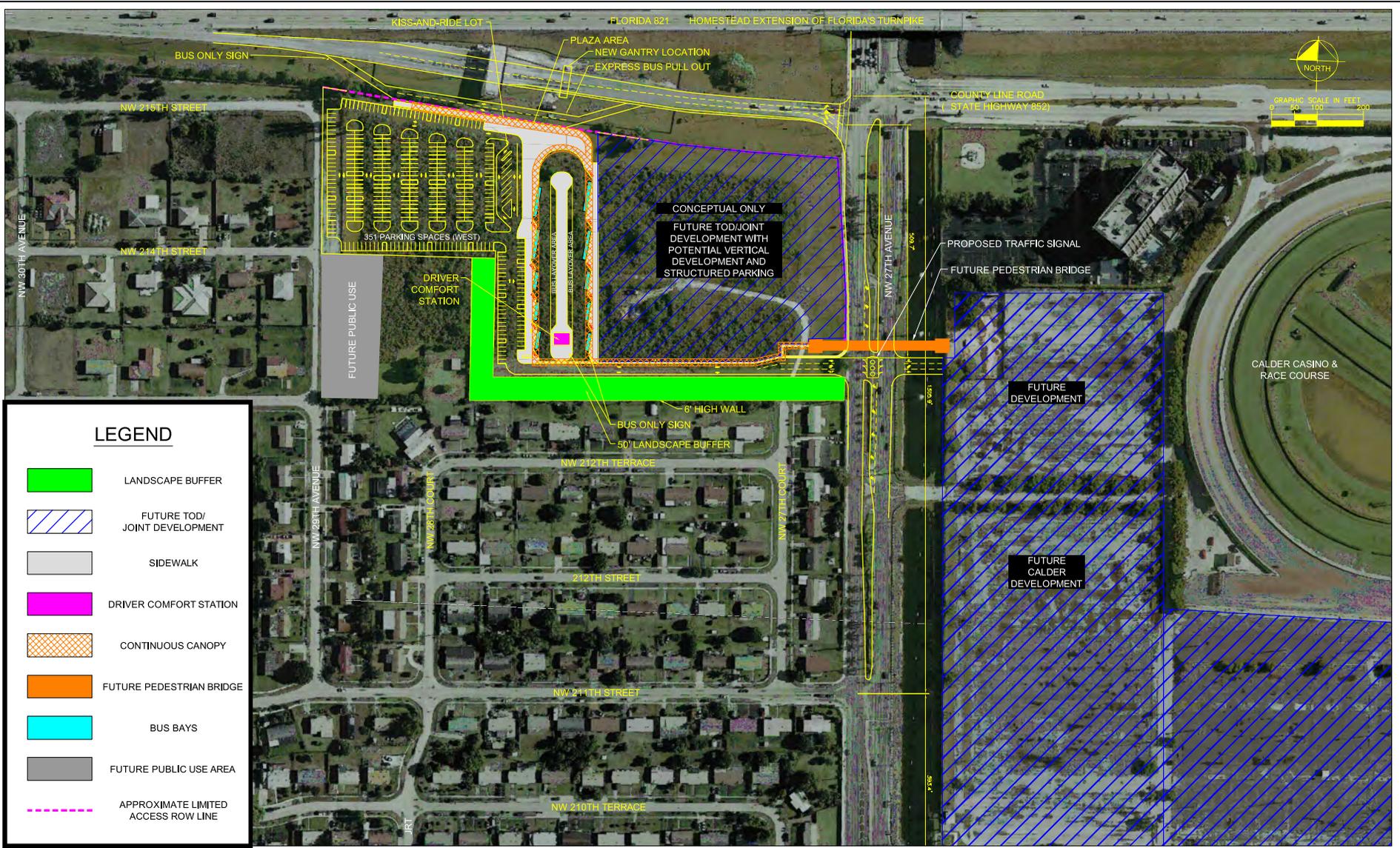
2010 Census Income Map

**NW 27TH AVENUE ENHANCED BUS PROJECT
FROM MIAMI INTERMODAL CENTER TO NW 215TH STREET
MIAMI-DADE COUNTY, FLORIDA**



**APPENDIX A:
CONCEPTUAL SITE PLAN FOR NW 215th STREET
TRANSIT TERMINAL AND PARK AND RIDE
FACILITY**

Plotted By: Vito, Kofie Sheet: Set: Pns Layout: Layout1 July 30, 2013 09:41:45am K:\MFE_Civil\040829030_BCT Bus Bay_2013_07-122_Site Plan.dwg
 This document, together with the drawings and design presented herein, is an instrument of service. It is prepared only for the specific project and shall be valid only if accompanied by a signed and stamped copy of the contract. Without either subscription or approval by Kimley-Horn and Associates, Inc. and the client, no part of this document shall be used for any other project or purpose.



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**PARK AND RIDE TRANSIT TERMINAL
 NW 215TH STREET AND NW 27TH AVENUE**

**CONCEPTUAL SITE PLAN
 OPTION 5**

SHEET NUMBER

**APPENDIX B:
MIAMI-DADE METROPOLITAN PLANNING
ORGANIZATION TRANSPORTATION IMPROVEMENT
PROGRAM**



20-THIRTEEN



**TRANSPORTATION IMPROVEMENT PROGRAM
FISCAL YEARS 2012/2013 to 2016/2017**

METROPOLITAN PLANNING ORGANIZATION FOR THE MIAMI URBANIZED AREA

Approved by MPO Governing Board on May 17th, 2012

This document was prepared by the Metropolitan Planning Organization for the Miami Urbanized Area in collaboration With the Florida Department of Transportation; Miami-Dade Expressway Authority; Florida's Turnpike Enterprise; South Florida Regional Transportation Authority; Miami-Dade County Public Works and Waste Management Department; Miami-Dade County Office of Strategic Business Management; Miami-Dade Transit Agency; Miami-Dade County Aviation Department; Miami-Dade Seaport Department; Miami-Dade County Department of Sustainability, Planning and Economic Enhancement; Miami-Dade County Department of Permitting, Environment and Regulatory Affairs; and The Miami-Dade County Developmental Impact Committee.

The Miami-Dade MPO complies with the provisions of Title VI of the Civil Rights Act of 1964, which states:
No person in the United States shall, on grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.

It is also the policy of the Miami-Dade MPO to comply with all of the requirements of the Americans with Disabilities Act.

For materials in accessible format please call 305-375-4507.

The preparation of this report has been financed in part through grant(s) from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 of Title 23, U.S. Code, as well as Miami-Dade County, Florida.

The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION
 TRANSPORTATION IMPROVEMENT PROGRAM
 PRIMARY STATE HIGHWAYS AND INTERMODAL



Public Transportation: MULTIMODAL FACILITY

MPO Project Num: **TA4280114**
 LRTP Ref.: p. 8-5
 County: **MIAMI-DADE**
 Roadway ID:
 Lanes Exist: 0
 Lanes Improved: 0
 Lanes Added: 0
 Project Length: 0
 District: 6

Project Description: **MDT - NW 27TH AVENUE**

**ENHANCED BUS SERVICE
 BUS TERMINAL**

Type of Work: **INTERMODAL HUB CAPACITY**

		Proposed Funding (in \$000s)								
		Funding Source	<2012	2012 - 2013	2013 - 2014	2014 - 2015	2015 - 2016	2016 - 2017	>2017	All Years
PHASE : Grants and Miscellaneous	DPTO		0	0	0	0	1,496	0	0	1,496
PHASE : Grants and Miscellaneous	DDR		0	0	0	0	99	0	0	99
PHASE : Grants and Miscellaneous	LF		0	0	0	0	1,595	0	0	1,595
RESPONSIBLE AGENCY: Managed by Miami-Dade Transit		Totals	0	0	0	0	3,190	0	0	3,190

Yearly Total	648,524	53,650	69,352	77,694	55,013	50,365	152,522	1,107,120
ic Transportation: MULTIMODAL FACITotals							5 Year TIP Total	#####

MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION
 TRANSPORTATION IMPROVEMENT PROGRAM
 PRIMARY STATE HIGHWAYS AND INTERMODAL



Public Transportation: TRANSIT

MPO Project Num: **TA4280111**
 LRTP Ref.: p. F-9
 County: **MIAMI-DADE**
 Roadway ID:
 Lanes Exist: 0
 Lanes Improved: 0
 Lanes Added: 0
 Project Length: 0
 District: 6

Project Description: **MDT-FTA SEC 5309 NW 27TH AVE
 ENHANCED BUS SERVICE**

Type of Work: **CAPITAL FOR FIXED ROUTE**

		Proposed Funding (in \$000s)								
		Funding Source	<2012	2012 - 2013	2013 - 2014	2014 - 2015	2015 - 2016	2016 - 2017	>2017	All Years
PHASE : Grants and Miscellaneous	LF		0	0	457	436	0	0	0	893
PHASE : Grants and Miscellaneous	CM		0	0	1,629	1,629	0	0	0	3,258
PHASE : Grants and Miscellaneous	FTAT		0	0	1,829	1,744	0	0	0	3,573
PHASE : Grants and Miscellaneous	SU		0	0	200	115	0	0	0	315
RESPONSIBLE AGENCY: Managed by Miami-Dade Transit		Totals	0	0	4,115	3,924	0	0	0	8,039

MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION
 TRANSPORTATION IMPROVEMENT PROGRAM
 PRIMARY STATE HIGHWAYS AND INTERMODAL



Public Transportation: TRANSIT

MPO Project Num: **TA4280112**
 LRTP Ref.: p. F-9
 County: **MIAMI-DADE**
 Roadway ID:
 Lanes Exist: 0
 Lanes Improved: 0
 Lanes Added: 0
 Project Length: 0
 District: 6

Project Description: **MDT-NW 27 AVENUE ENHANCED BUS SERVICE PARK AND RIDE FACILITY**

Type of Work: **CAPITAL FOR FIXED ROUTE**

		Proposed Funding (in \$000s)								
		Funding Source	<2012	2012 - 2013	2013 - 2014	2014 - 2015	2015 - 2016	2016 - 2017	>2017	All Years
PHASE : Grants and Miscellaneous	LF		0	0	0	1,225	0	0	0	1,225
PHASE : Grants and Miscellaneous	CIGP		0	0	0	1,225	0	0	0	1,225
RESPONSIBLE AGENCY: Managed by Miami-Dade Transit		Totals	0	0	0	2,450	0	0	0	2,450

MPO Project Num: **TA4280113**
 LRTP Ref.: p. F-9
 County: **MIAMI-DADE**
 Roadway ID:
 Lanes Exist: 0
 Lanes Improved: 0
 Lanes Added: 0
 Project Length: 0
 District: 6

Project Description: **MDT-NW 27 AVENUE ENHANCED BUS SERVICE BUS PURCHASE**

Type of Work: **CAPITAL FOR FIXED ROUTE**

		Proposed Funding (in \$000s)								
		Funding Source	<2012	2012 - 2013	2013 - 2014	2014 - 2015	2015 - 2016	2016 - 2017	>2017	All Years
PHASE : Grants and Miscellaneous	LF		0	0	2,643	2,582	0	0	0	5,225
PHASE : Grants and Miscellaneous	CIGP		0	0	2,643	2,582	0	0	0	5,225
RESPONSIBLE AGENCY: Managed by Miami-Dade Transit		Totals	0	0	5,286	5,164	0	0	0	10,450

**APPENDIX C:
FLORIDA MASTER SITE FILE DATA**



This record search is for informational purposes only and does NOT constitute a project review. This search only identifies resources recorded at the Florida Master Site File and does NOT provide project approval from the Division of Historical Resources. Contact the Compliance and Review Section of the Division of Historical Resources at 850-245-6333 for project review information.

February 19, 2013



Steven Hitt
Environmental Analyst
445 24th St, Suite 200
Vero Beach, Florida 32960
Phone: 772.794.4100
Email: Steven.hitt@kimley-horn.com

In response to your inquiry of December 12, 2012, the Florida Master Site File lists no previously recorded archaeological sites, seven resource groups, and 157 standing structures found in the following area of Dade County:

The portions of T51S R41E Sections 33 & 34, of T52S R41E Sections 3, 4, 9, 10, 15, 16, 21, 22, 27, 28, 33, & 34, and of T53S R41E Sections 3, 4, 9, 10, 15, 16, 21, & 22 as indicated on the project area map submitted with the search request (including a 1/4 mile buffer).

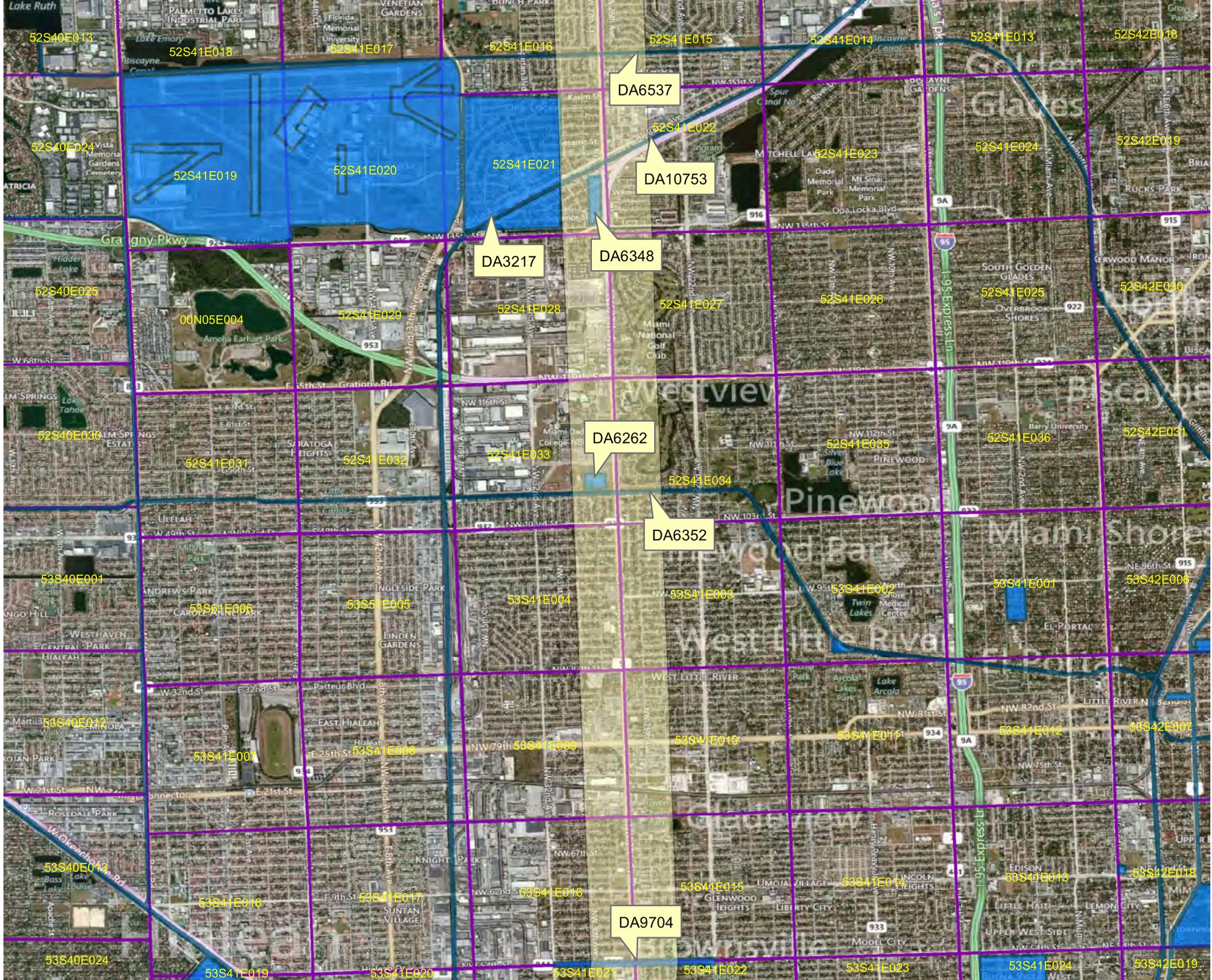
When interpreting the results of our search, please consider the following information:

- **This search area may contain *unrecorded* archaeological sites, historical structures or other resources even if previously surveyed for cultural resources.**
- **Because vandalism and looting are common at Florida sites, we ask that you limit the distribution of location information on archaeological sites.**
- **While many of our records document historically significant resources, the documentation of a resource at the Florida Master Site File does not necessarily mean the resource is historically significant.**
- **Federal, state and local laws require formal environmental review for most projects. This search DOES NOT constitute such a review. If your project falls under these laws, you should contact the Compliance and Review Section of the Division of Historical Resources at 850-245-6333.**

Please do not hesitate to contact us if you have any questions regarding the results of this search.

Sincerely,

Sarah Liko
Archaeological Data Analyst
Florida Master Site File



DA6537

DA10753

DA3217

DA6348

DA6262

DA6352

DA9704

**APPENDIX D:
NOISE AND VIBRATION ANALYSIS**

DRAFT NOISE AND VIBRATION ANALYSIS REPORT

February 2013

NW 27th Avenue Park-and-Ride
Miami Gardens, FL

Prepared For:

Miami-Dade MPO
111 N.W. 1 Street, Suite 910
Miami, FL 33128

Prepared By:

Kimley-Horn and Associates, Inc.
401 B Street, Suite 600
San Diego, CA 92101

040829030
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EXECUTIVE SUMMARY

This Noise and Vibration Analysis Report assesses potential noise and vibration impacts due to the proposed NW 27th Avenue Park-and-Ride project. This study estimates existing noise conditions in the project area, identifies noise-sensitive locations, and predicts future project noise and vibration levels. The noise analysis was prepared to satisfy National Environmental Policy Act (NEPA) requirements, using Federal Transit Administration (FTA) Noise and Vibration Impact Assessment [FTA 2006] criteria.

The proposed project site is the vacant property at the southwest corner of NW 27th Avenue and the eastbound exit of the Homestead Extension of Florida's Turnpike (SR 821), in the City of Miami Gardens, within Miami-Dade County, Florida. The north property line of the project site is on the southern boundary of the City of Miramar and Broward County.

Noise- and vibration-sensitive land uses potentially impacted by the project consist of single-family residences adjacent on the south and west. Existing noise levels at the residences range from approximately 61 dBA Ldn to 67 dBA Ldn.

Operation of the project would generate noise levels up to approximately 58 dBA Ldn at the residences, resulting in No Impact under FTA criteria. This impact is considered less than significant.

Operation of the project would generate negligible vibration levels. This impact is considered less than significant.

Construction of the project would generate noise levels up to approximately 77 dBA Leq at the residences. These noise levels are less than the FTA daytime construction noise threshold. This impact is considered less than significant.

Construction of the project would generate vibration levels up to approximately 76 VdB. This vibration level is higher than the FTA annoyance threshold. This is considered a temporary adverse impact. Implementation of a Vibration Control Plan and other measures could reduce construction vibration levels.

1 INTRODUCTION

1.1 Proposed Project Description

The “North Corridor” is a priority transit corridor in Miami-Dade County extending along NW 27th Avenue south from the Broward County Line at NW 215th Street to the Dr. Martin Luther King Jr. Metrorail Station near NW 62nd Street.

Two MDT bus routes currently serve the NW 27th Avenue corridor. Route 27 operates 24 hours per day and provides service between NW 211th Street on the north and Coconut Grove on the south. Route 27 operates with 15 minutes headway during the peak period [MPO 2013]. Route 297 Orange MAX operates on weekdays between 5:30 AM and 7:30 PM with 15 minutes headway during the peak period and 30 minutes headway during the midday, and provides service between NW 207th Street and the Miami Intermodal Center adjacent to Miami International Airport. The NW 27th Avenue Enhanced BRT project would increase the Route 297 Orange MAX frequency to 10 minutes headway during the peak period and 20 minutes headway during the midday.

An end-of-the-line bus terminal and park-and-ride facility would be constructed near the Broward County Line at NW 215th Street, on an approximately 14-acre property owned by Miami-Dade Transit (MDT) within the political jurisdiction of the City of Miami Gardens. Up to 350 park-and-ride spaces are proposed for the facility, along with approximately ten bus bays, passenger seating under canopied areas, and a bus driver comfort station. The facility would serve as a hub for several MDT and Broward County Transit (BCT) routes, and would facilitate transfers between the two systems. In addition, this facility would provide an end-of-the line layover for Route 297 Orange MAX service as well as Route 27, eliminating the two-mile turnaround presently required. The property also provides long-term transit-oriented development (TOD) opportunities, and the facility would be designed in a manner to preserve space for future development.

Additional buses accessing the site could include MDT Route 99 (30 minutes headway in each direction [not end-of-line station] throughout most of the day), BCT Route 2 (20 minutes headway throughout the day and likely an end-of-line station), the BCT University Breeze route (30 minutes headway during morning and afternoon peak periods only and likely an end-of-line station), and BCT 95 Express (assumed 15 minutes headway in each direction [not an end-of-line station] during morning and afternoon peak periods only). Additional service accessing the site could include community shuttles/circulators operated by Cities of Miami Gardens and Miramar (assumed 15 minutes headway).

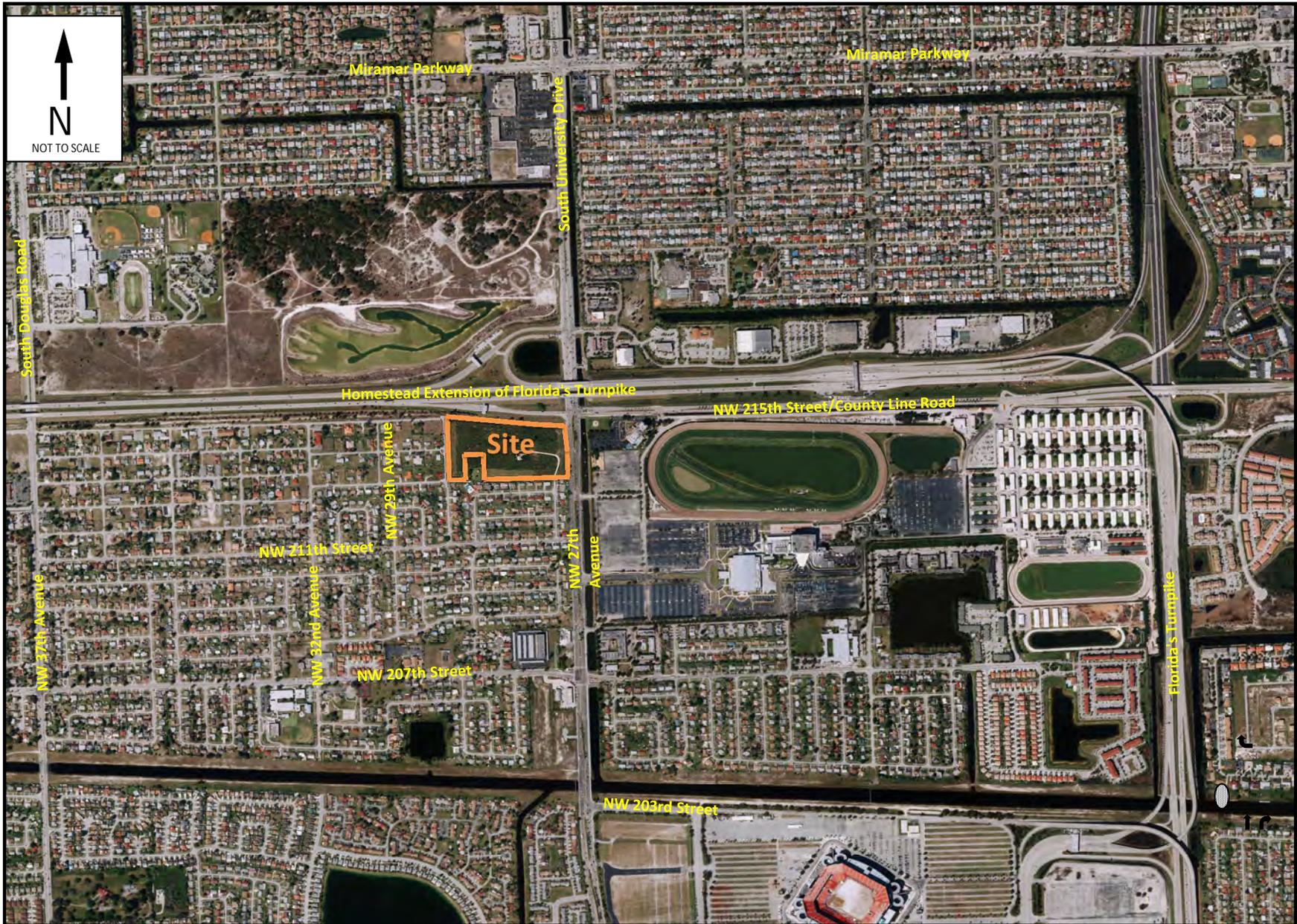


Figure 1
Location Map
NW 215th Street Park and Ride Facility

1.2 Noise Background

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Human environments are characterized by a generally consistent noise level which varies with each area. This level is called ambient noise. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise and its appropriateness in the setting, time of day and type of activity during which the noise occurs, sensitivity of the individual, and change from ambient conditions.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in cycles per second, or hertz (Hz), whereas intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. The average person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness; this relation holds true for sounds of any loudness. Sound levels of typical noise sources and environments are provided in Table 1.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. A simple rule is useful, however, in dealing with sound levels: if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example, $60 \text{ dB} + 60 \text{ dB} = 63 \text{ dB}$, and $80 \text{ dB} + 80 \text{ dB} = 83 \text{ dB}$.

The normal human ear can detect sounds that range in frequency from about 20 Hz to 20,000 Hz. However, all sounds in this wide range of frequencies are not heard equally well by the human ear, which is most sensitive to frequencies in the range of 1,000 Hz to 4,000 Hz. This frequency dependence can be taken into account by applying a correction to each frequency range to approximate the sensitivity of the human ear within each range. This is called A-weighting and is commonly used in measurements of community environmental noise. The A-weighted sound pressure level (abbreviated as dBA) is the sound level with the "A-weighting" frequency correction. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Community noise levels usually change continuously during the day. The equivalent continuous A-weighted sound pressure level (L_{eq}) is normally used to describe community noise. The L_{eq} is the energy-averaged A-weighted sound level during a measured time interval, and is equal to the level of a continuous steady sound containing the same total acoustical energy over the averaging time period as the actual time-varying sound. Additionally, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the L_{max} and L_{min} indicators, which represent the root-mean-square maximum and minimum noise levels obtained during the measurement interval. The L_{min} value obtained for a particular monitoring location is often called the "acoustic floor" for that location.

To describe the time-varying character of environmental noise, the statistical noise descriptors L_{10} , L_{50} , and L_{90} are commonly used. They are the noise levels equaled or exceeded during 10, 50, and 90 percent of a stated time, respectively. Sound levels associated with L_{10} typically describe transient or short-term events, whereas levels associated with L_{90} describe the steady-state (or most prevalent) noise conditions.

Table 1. Typical Noise Levels and Noise Environments

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels*)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140 Decibels	128 times as loud
Civil Defense Siren (100 ft)		130	64 times as loud
Commercial Jet Take-off (200 ft)		120	32 times as loud Threshold of Pain
Pile Driver (50 ft)	Rock Music Concert Inside Subway Station (New York)	110	16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Gas Lawn Mower (3 ft)		100	8 times as loud Very Loud
Food Blender (3 ft) Propeller Plane Flyover (1,000 ft) Diesel Truck (150 ft)	Boiler Room Printing Press Plant	90	4 times as loud
Garbage Disposal (3 ft)	Higher Limit of Urban Ambient Sound	80	2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (10 ft)		70	Reference Loudness Moderately Loud
Normal Conversation (5 ft) Air Conditioning Unit (100 ft)	Data Processing Center Department Store	60	1/2 as loud
Light Traffic (100 ft)	Large Business Office Quiet Urban Daytime	50	1/4 as loud
Bird Calls (distant)	Quiet Urban Nighttime	40	1/8 as loud Quiet
Soft Whisper (5 ft)	Library and Bedroom at Night Quiet Rural Nighttime	30	1/16 as loud
	Broadcast and Recording Studio	20	1/32 as loud Just Audible
		10	1/64 as loud
		0	1/128 as loud Threshold of Hearing

Source: Compiled by Kimley-Horn and Associates, Inc.

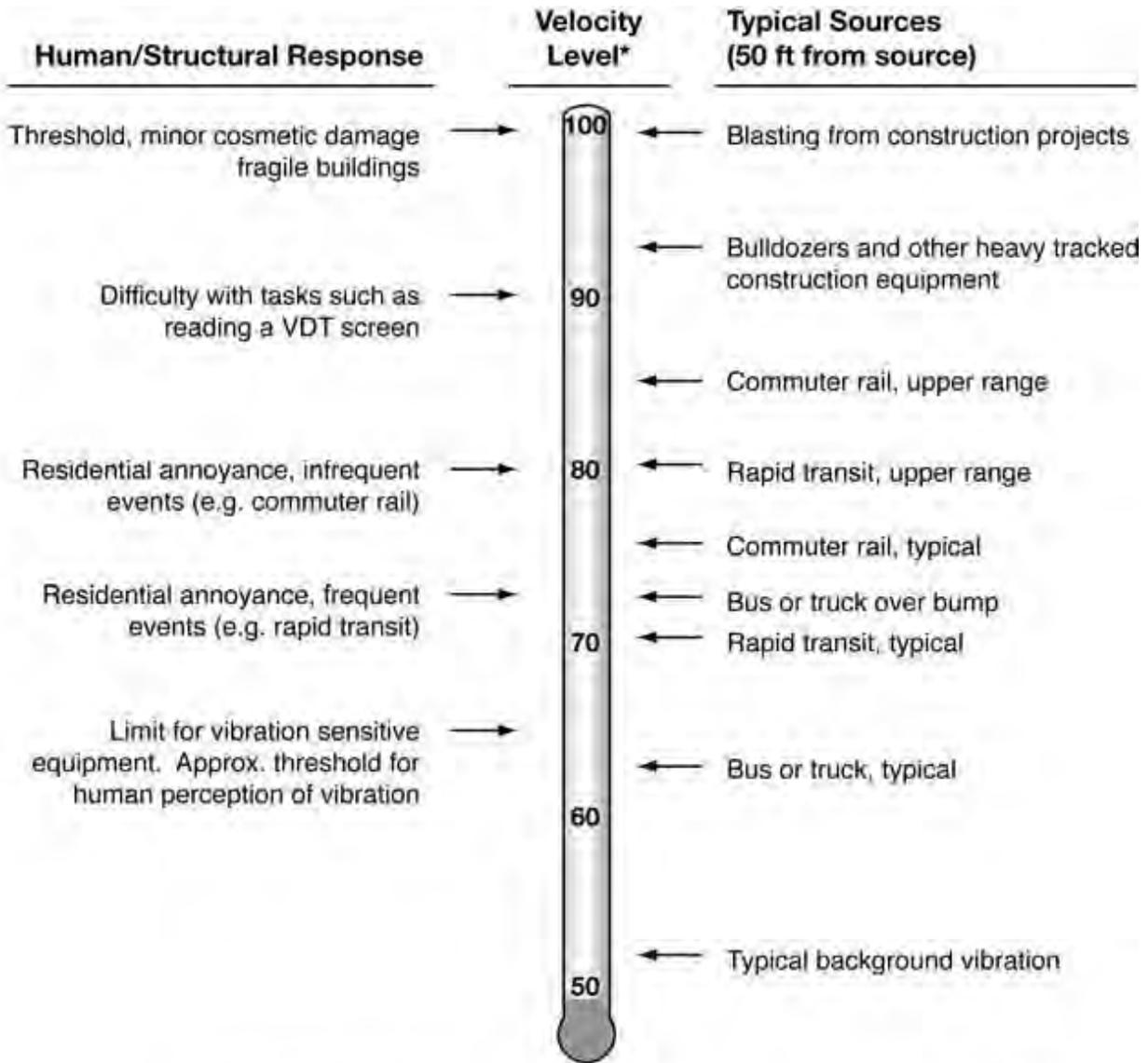
Another sound measure known as the Day-Night Level (Ldn) is an adjusted average sound level for a 24-hour day. It is calculated by adding a 10-dB penalty to sound levels during nighttime hours (10:00 p.m. to 7:00 a.m.). This penalty compensates for the increased sensitivity to noise during the typically quieter nighttime hours. The FTA uses Ldn and Leq to evaluate transportation noise impacts at the surrounding communities.

1.3 Vibration Methodology and Criteria

Vibration is defined as any oscillatory motion induced in a structure or mechanical device as a direct result of some type of applied force or displacement. Sources of groundborne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or manmade (explosions, machinery, traffic, construction equipment, etc.). Displacement, in the case of a vibrating floor, is simply the distance that a point on the floor moves away from its static position. The velocity describes the instantaneous speed of the floor movement and acceleration is the rate of change of the speed. The response of humans, buildings, and equipment to vibration is normally described using velocity or acceleration. FTA uses the abbreviation “VdB” for vibration decibels (relative to 10^{-6} inches/second) to reduce the potential for confusion with sound decibels.

Figure 2 illustrates common vibration sources and the human and structural responses to groundborne vibration. As illustrated, the threshold of perception for human response is approximately 65 VdB; however, human response to vibration is not usually significant unless the vibration exceeds 70 VdB. Vibration tolerance limits for sensitive instruments such as magnetic resonance imaging (MRI) or electron microscopes could be much lower than the human vibration perception threshold.

Figure 2. Typical Levels of Groundborne Vibration



* RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second

2 IMPACT CRITERIA

This section presents the guidelines, criteria, and regulations used to assess noise impacts associated with the proposed project.

2.1 Federal Transit Administration

2.1.1 Operational

The criteria in the *Transit Noise and Vibration Impact Assessment* guidance manual [FTA 2006] (FTA manual) were used to assess existing ambient noise levels and opening-year noise impacts from bus operations. These criteria were developed using well-documented research on community reaction to noise and are based on change in noise exposure using a sliding scale. The amount that transit projects are allowed to change the overall noise environment is reduced with increasing levels of existing noise.

The FTA manual provides three levels of criteria for assessment of noise impact from transit projects: No Impact, Moderate Impact and Severe Impact. Noise-sensitive land uses are grouped into three categories: Category 1, Category 2 and Category 3. The categories are described in Table 2. The FTA noise impact thresholds, as indicated in Figure 3 and Figure 4, are based on the increase of the existing ambient noise level associated with operations of the project or in combination with other new planned projects (i.e., cumulative impact). The FTA manual specifies a particular noise metric to be used depending on the specific land-use (e.g., residential). The Ldn is typically used for residential uses.

The interpretations of these two levels (Moderate and Severe) of impact are summarized as follows:

Moderate Impact: The change in the cumulative noise level is noticeable to most people, but it may not be sufficient to cause strong, adverse reactions from the community.

Severe Impact: Project noise above the upper curve is considered to cause a Severe Impact since a substantial percentage of people would be highly annoyed by the new noise. Noise mitigation would normally be specified for severe impact areas unless there is no practical method of mitigating the noise.

Although the curves in Figure 3 and Figure 4 are defined in terms of the project noise exposure and existing noise exposure, it is important to emphasize that the increase in the cumulative noise – when the project noise is added to the existing noise – is the basis for the criteria.

Figure 3 shows that the criterion for impact allows a noise exposure increase of 10 dBA if the existing noise exposure is 42 dBA or less but only a 1 dBA increase when the existing noise exposure is 70 dBA. As the existing level of ambient noise increases, the allowable absolute level of project noise increases, but the total allowable increase in community noise exposure is reduced.

For residential land use, the noise criteria are to be applied outside the building locations at noise-sensitive areas with frequent human use, including outdoor patios, decks, pools, and play areas. If none, the criteria should be applied near building doors and windows.

Table 2. Land Use Categories and Metrics for Transit Noise Impact Criteria

Land Use Category	Noise Metric, dBA	Description of Land Use Category
1	Outdoor Leq(h)*	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use.
2	Outdoor Ldn	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor Leq(h)*	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios, and concert halls fall into this category. Places for meditation or study associated with cemeteries, monuments, and museums. Certain historical sites, parks, and recreational facilities are also included.

Source: FTA 2006

Note: Leq for the noisiest hour of transit-related activity during hours of noise sensitivity.

Figure 3. FTA Noise Impact Criteria for Transit Projects

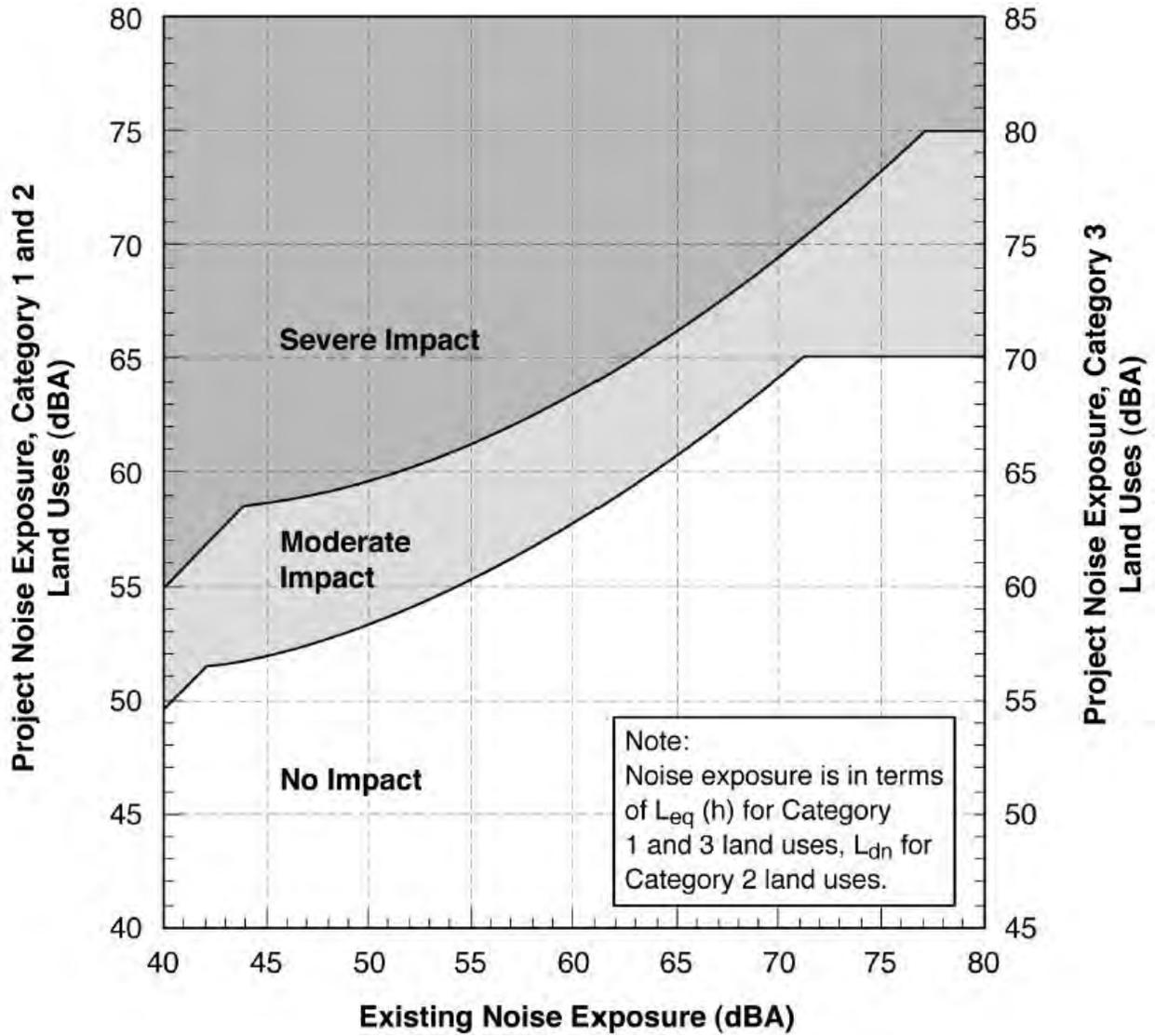
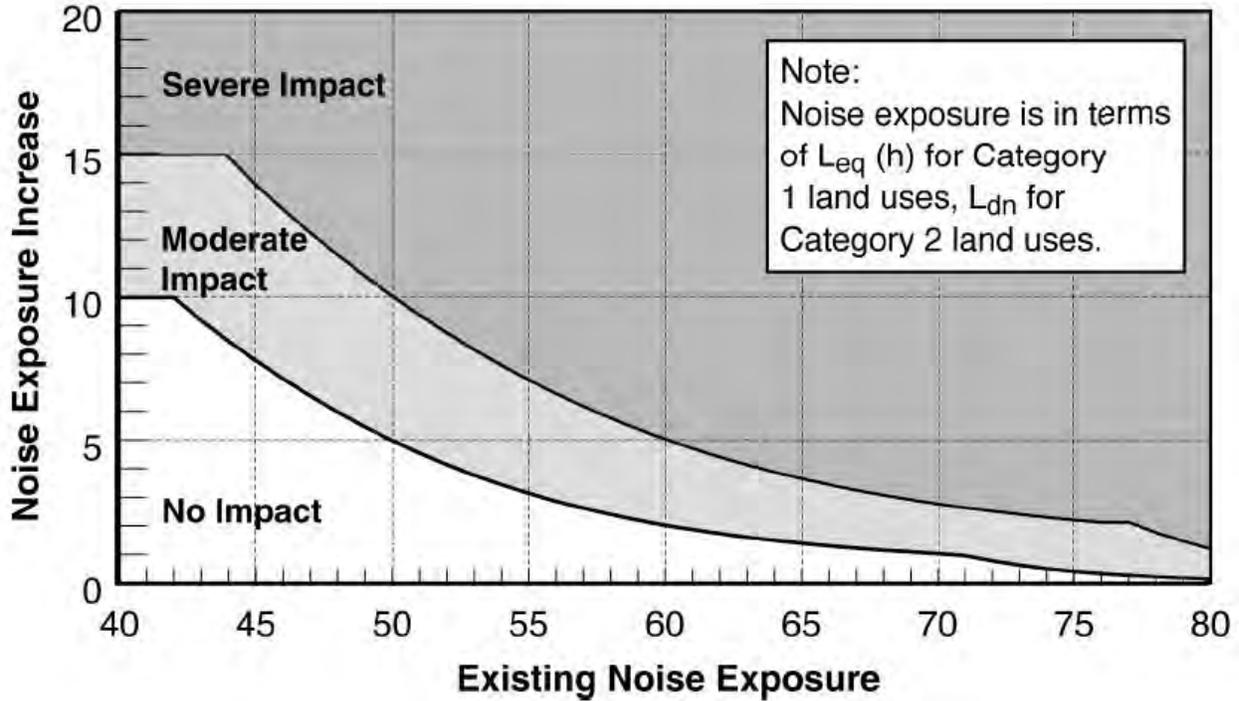


Figure 4. Increase in Cumulative Noise Levels Allowed by FTA Criteria



2.1.2 Construction

According to the FTA, project construction noise criteria should take the following into account: the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use (FTA 2006). Sound level guidelines suggested by the FTA for the evaluation of construction noise impacts are summarized below. In urban areas with high ambient noise levels (L_{dn} greater than 65 dBA), the sound level from construction should not exceed the ambient sound level by more than 10 dBA. If these criteria are exceeded, there may be adverse community reaction. FTA construction noise criteria are shown in Table 3.

Table 3. FTA Guidelines for Assessing Construction Noise Impacts

Land Use	8-Hour Leq (dBA)	
	Day	Night
Residential	80	75
Commercial	85	80
Industrial	90	85

Source: FTA 2006

2.1.3 Vibration Impact Criteria

Table 8-1 of the FTA manual (reproduced as Table 4 below) presents FTA vibration impact criteria for various land use categories. The criteria are based in part on the frequency of events and related to groundborne vibration that can cause human annoyance or interference with the use of vibration-sensitive equipment. The criteria for acceptable ground-borne vibration are expressed in terms of root mean square (RMS) velocity levels in VdB and are based on the maximum levels for a single event (Lmax).

Table 4. FTA Vibration Impact Criteria

Land Use Category	Frequent Events	Occasional Events	Infrequent Events
Category 1	65 VdB	65 VdB	65 VdB
Category 2	72 VdB	75 VdB	80 VdB
Category 3	75 VdB	78 VdB	83 VdB

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research would require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the Heating, Ventilating, and Air Conditioning (HVAC) systems and stiffened floors.
5. Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

VdB re 1 micro-inch/second

Source: FTA 2006

The land use categories in Table 4 are detailed below:

Vibration Category 1 - High Sensitivity: Included in Category 1 are buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance.

Vibration Category 2 - Residential: This category covers all residential land uses and any buildings where people sleep, such as hotels and hospitals. No differentiation is made between different types of residential areas.

Vibration Category 3 - Institutional: Vibration Category 3 includes schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment, but still have the potential for activity interference.

The FTA manual provides a procedure to determine whether or not a transit project requires a vibration analysis. Transit projects that involve rubber tire vehicles rarely show potential for vibration impacts and do not require vibration analysis. Three factors are checked to determine if there is potential for vibration impacts from bus projects:

1. Would there be expansion joints, speed bumps, or other design features that result in unevenness in the road surface near vibration-sensitive buildings? Such irregularities can result in perceptible ground-borne vibration at distances up to 75 feet away.
2. Would buses, trucks, or other heavy vehicles be operating close to a sensitive building? Research using electron microscopes and manufacturing of computer chips are examples of vibration sensitive activities.
3. Does the project include operation of vehicles inside or directly underneath buildings that are vibration-sensitive? Special considerations are often required for shared use facilities such as bus stations located inside an office building complex.

Projects that do not include any of those three conditions are exempt from vibration analysis. Projects that do include one of the factors are then screened for distances from vibration-sensitive land uses. For bus projects, the vibration source must be a minimum of 100 feet from Category 1 land uses and 50 feet from Category 2 land uses. No distances are specified for Category 3.

Section 12.2.2 of the FTA Manual establishes construction vibration criteria. Table 12-3 of the FTA Manual (reproduced as Table 5 below) defines damage criteria in Peak Particle Velocity (PPV) in inches/second and Root Mean Square (RMS) velocity (Lv) in VdB at various building types.

Table 5. FTA Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate Lv [†]
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Notes:

[†] RMS Velocity in decibels (VdB) re 1 micro-inch/second

Source: FTA 2006

3 EXISTING NOISE ENVIRONMENT

Many land uses are considered sensitive to noise. Noise-sensitive receptors are land uses associated with indoor and/or outdoor activities that may be subject to stress and/or significant interference from noise, such as residential dwellings, transient lodging (hotels/motels), dormitories, hospitals, educational facilities, and libraries. Industrial and commercial land uses are generally not considered sensitive to noise. Analysis was conducted at noise-sensitive receptors in the project area.

Noise-sensitive land uses near the project include single-family residences adjacent on the south and west. These are considered by the FTA to be Land Use Category 2. The primary existing ambient noise source at the residences is vehicular traffic on SR 821 and NW 27th Avenue.

3.1 Noise Level Measurements

An ambient noise level survey was conducted to estimate the existing noise environment in the project area. Two unattended long-term (24-hour) measurements and five attended short-term (20-minute) measurements were conducted at or near exterior noise-sensitive areas.

The data collection devices included two Larson Davis Model 720 American National Standards Institute (ANSI) Type 2 Integrating Sound Level Meters (SLMs) and one RION Model NL-31 ANSI Type 1 Integrating SLM. The meters were field-calibrated with a Larson Davis Model CAL200 or CAL150 acoustic calibrator. The meters were set for “slow” time response and A-weighting for all measurements. The microphones were equipped with windscreens and placed approximately five feet above the ground to simulate the average height of the human ear. The microphones were placed at least five feet from all reflecting surfaces. All sound level measurements were in accordance with ISO 1996-1, -2, and -3. The accuracy of the equipment is maintained through a program established by the manufacturer, and is traceable to the National Institute of Standards and Technology (NIST).

Noise sources in the project area observed during the site visit included vehicular traffic on SR 821 and NW 27th Avenue, occasional distant aircraft, the Calder Casino & Race Course fountain, wind through the trees, birds, and occasional distant dogs barking.

The long-term measurements were conducted between Tuesday, January 29, 2013, and Wednesday, January 30, 2013. The measurements correspond to the locations depicted on Figure 5. The results of the long-term measurements are summarized in Table 6.

The hourly average sound levels (Leqs) measured at LT1 and LT2 were used to calculate the Ldn for each location. A review of Table 6 shows that a noise level of approximately 61 dBA Ldn was measured at LT1, and a noise level of approximately 67 dBA Ldn was measured at LT2.

Table 6. Long-Term Noise Measurements (dBA)

Date	Time	LT1	LT2
Tuesday, January 29, 2013	0900 – 1000	58.5 dBA Leq	-
	1000 – 1100	57.7 dBA Leq	-
	1100 – 1200	57.1 dBA Leq	64.0 dBA Leq
	1200 – 1300	57.2 dBA Leq	63.7 dBA Leq
	1300 – 1400	57.0 dBA Leq	64.6 dBA Leq
	1400 – 1500	57.6 dBA Leq	64.3 dBA Leq
	1500 – 1600	58.6 dBA Leq	64.9 dBA Leq
	1600 – 1700	59.4 dBA Leq	65.5 dBA Leq
	1700 – 1800	59.0 dBA Leq	64.4 dBA Leq
	1800 – 1900	58.5 dBA Leq	63.1 dBA Leq
	1900 – 2000	57.0 dBA Leq	62.6 dBA Leq
	2000 – 2100	56.5 dBA Leq	62.4 dBA Leq
	2100 – 2200	56.0 dBA Leq	62.4 dBA Leq
	2200 – 2300	55.4 dBA Leq	62.4 dBA Leq
	2300 – 2400	54.2 dBA Leq	61.4 dBA Leq
Wednesday, January 30, 2013	0000 – 0100	52.2 dBA Leq	59.3 dBA Leq
	0100 – 0200	50.3 dBA Leq	57.6 dBA Leq
	0200 – 0300	49.0 dBA Leq	56.9 dBA Leq
	0300 – 0400	50.8 dBA Leq	56.4 dBA Leq
	0400 – 0500	51.3 dBA Leq	57.4 dBA Leq
	0500 – 0600	54.0 dBA Leq	60.6 dBA Leq
	0600 – 0700	58.0 dBA Leq	63.4 dBA Leq
	0700 – 0800	59.8 dBA Leq	64.5 dBA Leq
	0800 – 0900	58.6 dBA Leq	64.5 dBA Leq
	0900 – 1000	-	63.8 dBA Leq
	1000 – 1100	-	64.9 dBA Leq
		61.0 dBA Ldn	67.4 dBA Ldn

Notes:

LT1 was conducted in the backyard of 2901 NW 213th Street.

LT2 was conducted in the backyard of 21241 NW 27th Court.

The short-term measurements were taken on Tuesday, January 29, 2013, during the daytime period (7:00 a.m. – 7:00 p.m.). Weather conditions during the short-term measurements ranged from 79-81°F, 70-88% relative humidity, 0-80% cloud cover, and 0-11 mph wind speeds. The measurements correspond to the locations depicted on Figure 5. The results of the short-term measurements are summarized in Table 7. A review of Table 7 shows that the measured daytime noise levels ranged from approximately 56 dBA Leq to 66 dBA Leq.

The primary noise source affecting ST1 and ST3 was NW 27th Avenue; this was also the primary noise source affecting LT2. The Ldns at ST1 and ST3 were estimated by correlating the short-term noise measurements with the measured noise level during the same hourly period at LT2. Similarly, the Ldns at ST2, ST4, and ST5 were estimated using LT1. The estimated Ldns are shown in Table 7.

Table 7. Short-Term Noise Measurements (dBA)

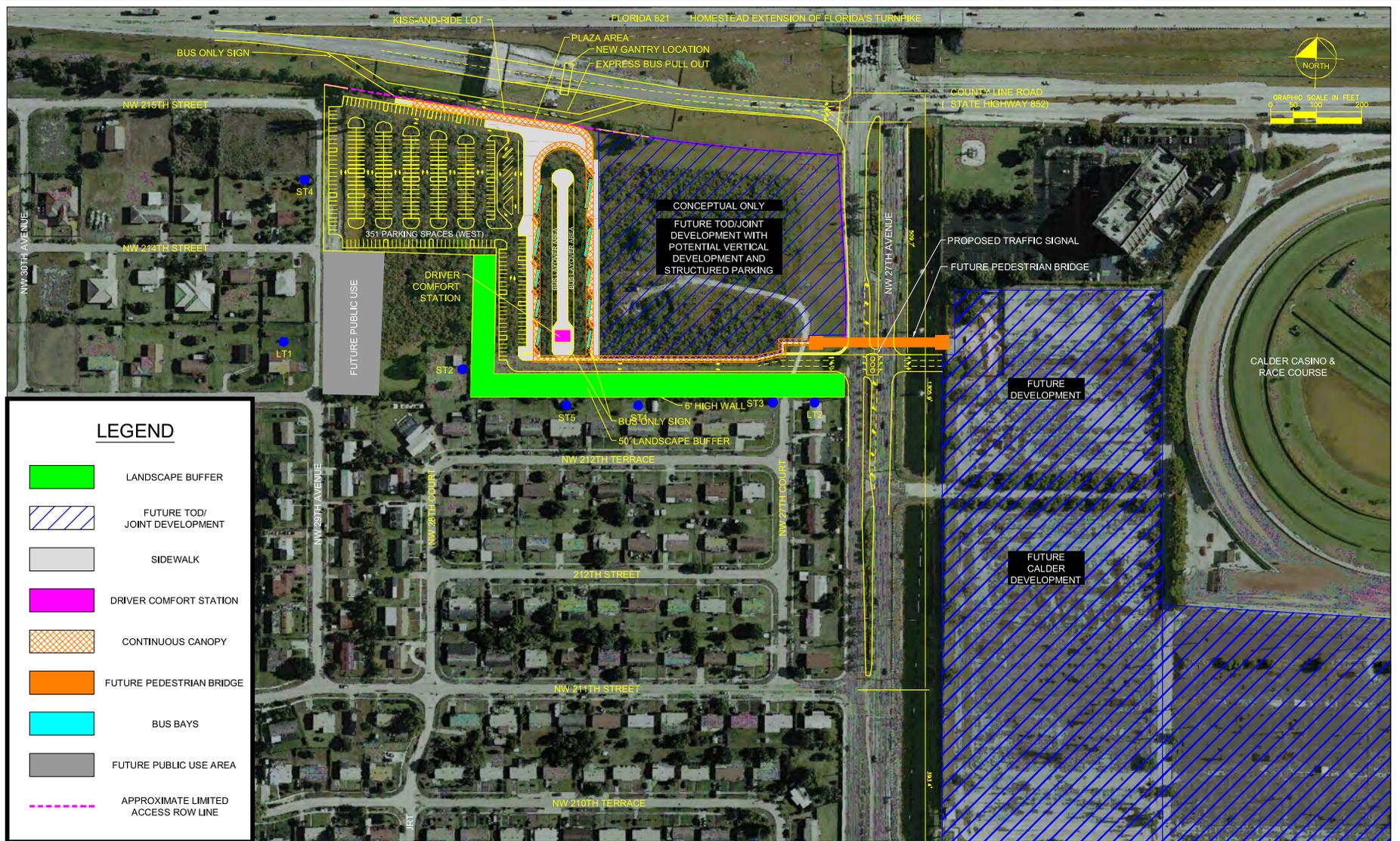
Measurement	Location / Address	Time	Leq	Lmin	Lmax	L10	L50	L90	Ldn*
ST1	2793 NW 212th Terrace – backyard	0845 - 0905	58.2	53.1	62.7	59.6	57.9	56.0	61
ST2	2843 NW 212th Terrace – backyard	0925 - 0945	55.5	51.2	62.0	57.0	55.1	53.3	58
ST3	2763 NW 212th Terrace – backyard	0955 - 1015	59.0	53.5	67.7	60.7	58.4	55.8	62
ST4	2901 NW 214th Street – backyard	1425 - 1445	61.7	56.4	68.8	63.7	61.0	59.1	65
ST5	2813 NW 212th Terrace – backyard	1505 - 1525	59.0	54.2	63.4	60.7	58.7	56.5	61

Note:

All measurements conducted on Tuesday, January 29, 2013.

*Ldn estimated by correlating ST1 and ST3 to LT2, and correlating ST2, ST4, and ST5 to LT1, as described above.

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**PARK AND RIDE TRANSIT TERMINAL
 NW 215TH STREET AND NW 27TH AVENUE
 CONCEPTUAL SITE PLAN**

NOISE MEASUREMENT LOCATIONS
 LT = LONG-TERM ST = SHORT-TERM

4 IMPACTS

4.1 Significance Criteria

The proposed project could have a significant effect with respect to noise or vibration if:

- The projected noise level increase over existing conditions at a noise sensitive land use resulting from operations exceeds the FTA Severe Impact threshold shown in Figure 3 or Figure 4.
- The projected 8-hour equivalent noise level from construction activities, including staging areas, exceeds the guidelines shown in Table 3 at a noise sensitive land use.
- The projected vibration level exceeds an FTA impact level identified in Table 4 or an FTA damage threshold identified in Table 5.

4.2 Operational

The Federal Highway Administration (FHWA) Traffic Noise Model (TNM) (version 2.5) was used to estimate project noise levels from the onsite vehicle operations. The modeling effort considered the peak-hour traffic volume and average estimated vehicle speed. The peak-hour traffic noise level was considered to be equivalent to the Ldn.

The peak-hour bus traffic directly associated with the project was assumed to consist of four MDT Route 27 buses and six MDT Route 297 Orange MAX buses. Peak-hour bus traffic indirectly associated with the project was assumed to consist of four MDT Route 99 buses, three BCT Route 2 buses, two BCT University Breeze buses, eight BCT 95 buses, and eight community shuttles/circulators. The passenger vehicle parking lot was conservatively assumed to experience a full changeover, or 350 cars in and out of the project site, during the peak hour. The kiss-n-ride drop-off / pick-up area south of the bus terminal was assumed to experience 50 cars during the peak hour.

The vehicle paths of travel were generated from the conceptual site plan of the project layout. All (35) buses and all (400) cars were assumed to enter and exit at the driveway on NW 27th Avenue; the buses were assumed to proceed directly to the bus terminal, 350 of the cars were assumed to proceed to the vehicle parking lot, and 50 cars were assumed to proceed to the kiss-n-ride lot. All onsite traffic was assumed to operate at a speed of 15 miles per hour (mph).

A default ground type of “pavement” was used in the model. This parameter affects propagation conditions, which represent noise attenuation caused by sound waves interacting with ground surfaces between the source and receiver. Sound levels caused by line sources (i.e., variable or moving sound sources such as traffic) decrease at a rate of 3.0 to 4.5 dBA when the distance from the road is doubled, depending on the ground surface hardness between the source and the receiving property. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures, barriers, and topography. However, the noise attenuating effects of changes in elevation, topography, and intervening structures (walls and buildings) were not included in the model. Therefore, the modeling effort is considered a worst-case representation of the roadway noise.

The noise emission specifications of the specific project buses were not available. Therefore, it was assumed that the buses would produce noise levels less than or equal to the default TNM 2.5 ‘bus’ vehicle type, which was used in the analysis. The noise emission level of the standard TNM 2.5 ‘bus’ vehicle type is such that the hourly average noise level produced by a long flat straight roadway carrying one vehicle per minute at a constant speed of 30 mph is approximately 60 dBA Leq at 50 feet from the centerline.

4.2.1 Project Effect on Existing Conditions

Table 8 shows estimated existing noise levels in the project area with and without the project. Existing noise levels at residences without a measurement were estimated based on nearby measurements. Note that all noise levels are rounded to the nearest decibel. Existing-plus-project noise levels were compared to existing (without-project) noise levels, and evaluated against FTA criteria.

Table 8. Existing-Plus-Project Noise Levels (dBA Ldn)

Address	ML	Existing Noise Level	FTA Impact Classification			Project Noise Level	FTA Impact: No / Moderate / Severe
			Noise Exposure [No Impact]	Noise Exposure [Moderate Impact]	Noise Exposure [Severe Impact]		
21241 NW 27th Court	LT2	67	< 63	63 – 67	> 67	58	No
2763 NW 212th Terrace	ST3	62	< 59	59 – 64	> 64	58	No
2773 NW 212th Terrace	(ST3)	62	< 59	59 – 64	> 64	56	No
2783 NW 212th Terrace	(ST1)	61	< 59	59 – 64	> 64	55	No
2793 NW 212th Terrace	ST1	61	< 59	59 – 64	> 64	54	No
2803 NW 212th Terrace	(ST1)	61	< 59	59 – 64	> 64	53	No
2813 NW 212th Terrace	ST5	61	< 59	59 – 64	> 64	52	No
2823 NW 212th Terrace	(ST5 / ST2)	60	< 58	58 – 63	> 63	52	No
2833 NW 212th Terrace	(ST2 / ST5)	59	< 58	58 – 63	> 63	51	No
2843 NW 212th Terrace	ST2	58	< 57	57 – 62	> 62	52	No
2853 NW 212th Terrace	(ST2)	58	< 57	57 – 62	> 62	49	No
21241 NW 29th Avenue	(ST2 / LT1)	59	< 58	58 – 63	> 63	48	No
21220 NW 29th Avenue	(LT1 / ST2)	60	< 58	58 – 63	> 63	47	No
2901 NW 213th Street	LT1	61	< 59	59 – 64	> 64	48	No
2900 NW 214th Street	(LT1 / ST4)	63	< 60	60 – 65	> 65	50	No
2901 NW 214th Street	ST4	65	< 61	61 – 66	> 66	52	No

Notes:

ML = Measurement Location

Parentheses indicate reference ML.

FTA Impact thresholds are reported for Land Use Category 2.

A review of Table 8 shows that the project noise levels would be considered by FTA to generate No Impact when compared with existing conditions. A No Impact classification under the FTA criteria indicates that the proposed project would have no noise impact since, on the average, the introduction of the project would result in an insignificant increase in the number of people highly annoyed by new noise. Therefore, for purposes of this study, a no impact finding under FTA criteria is considered a less than significant impact.

4.2.2 Operational Vibration

Vibration-sensitive land uses near the project include single-family residences adjacent on the south and west. These are considered by the FTA to be Land Use Category 2.

Routine operation and maintenance activities associated with the proposed Project would include the use of buses on the project site and general maintenance of project infrastructure. Operation of buses on the project site would not generate groundborne vibration.

There would not be expansion joints, speed bumps, or other design features that result in unevenness in the road surface near vibration-sensitive buildings. There are no known vibration sensitive manufacturing or research land uses close to buses operating on the project site. The park-and-ride facility would provide a smooth, stable and sturdy pavement surface. Buses would not operate inside or directly underneath buildings that are vibration sensitive. Buses have rubber tires and suspension systems that isolate vibrations from the ground.

A screening evaluation was performed, incorporating the environmental factors and characteristics of bus operations described above, to determine whether buses might generate vibrations affecting land uses adjacent to the Project site. The screening procedure did not identify any areas where operational vibration impacts have the possibility to create a significant impact. Therefore, a more detailed general assessment of impacts is not warranted per FTA guidance (FTA 2006).

4.3 Construction

4.3.1 Construction Noise

Project construction would include grading the site, paving the roadways and parking lots, and constructing the bus terminal. All construction would occur during daytime hours of 7:00 a.m. to 10:00 p.m. in all areas.

Construction noise varies depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work.

This construction noise analysis assumes that noise would decrease at a rate of 6 dBA per doubling of distance from the construction site. At this early stage of the project, there is no detailed schedule of the actual equipment involved during construction. However, for the purpose of this initial noise evaluation, the effect of using typical heavy equipment during construction has been evaluated. Noise levels are reported in terms of 8-hour Leq. Construction equipment was assumed to have a noise source height of 11 feet above local ground level.

The highest sound levels would be expected during grading, when equipment such as scrapers, bulldozers, backhoes and water trucks would be used. Grading typically occurs over a large area and the equipment is not located at a particular location for long periods. Sound levels during the remaining construction phases would be expected to be at least 10 dB less than during grading activity. No blasting or pile driving would be necessary.

A grading plan and construction phasing plan has not been developed at this time; therefore, only a general estimate of construction noise levels can be provided. Noise levels associated with equipment used for grading are shown in Table 9.

Table 9. Grading Noise Source Levels

Noise Source	Noise Level
Bulldozer	85 dBA at 50 feet
Scraper	85 dBA at 50 feet
Backhoe	85 dBA at 50 feet
Water Truck	85 dBA at 50 feet

Acoustical calculations were performed to estimate sound levels from grading at the closest residences. The south project property line is contiguous with the north residential property line, which is approximately 300 feet from the center of the project site. It was assumed that two bulldozers, two scrapers, one backhoe, and one water truck would operate continuously in the center of the property. A combined point source level of 93 dBA at 50 feet would attenuate to approximately 77 dBA at 300 feet, the distance from the center of the site to the closest residences. This is lower than the FTA daytime construction noise threshold of 80 dBA Leq. In practice, the sound level at the residences would be less than this estimate because no correction was applied for downtime associated with equipment maintenance, breaks, or similar situations. Noise from construction is considered to be a short-term adverse impact; however, because FTA construction noise limits would not be exceeded, noise from construction is considered to result in no impact.

4.3.2 Construction Vibration

Project construction would involve the use of equipment as described in Section 4.3.1. The vibration levels associated with vibration-producing construction equipment are shown in Table 10. Source vibration levels were obtained from Table 12-2 of the FTA Manual. Construction equipment for which no vibration data is provided by the FTA manual was assumed to generate negligible vibration and was therefore not included in the analysis.

Two types of potential construction-induced vibration impacts were evaluated at the residences: Annoyance and Building Damage. The criterion used in assessing annoyance is contained in the FTA guidance manual and presented in Section 2.3.2. The criteria relating to potential cosmetic damage (i.e., cracking) due to building vibration is 0.2 in/sec PPV based on the FTA guidelines. It is important to recognize that the thresholds do not represent a level at which damage would occur; rather, as long as the vibration does not exceed these limits, building damage, even minor cosmetic damage, is very unlikely.

A 50-foot-wide landscape buffer would be provided along the south and west sides of the project site. Construction activity would occur up to within 50 feet of the property line. The ten residences along NW 212th Terrace are generally located approximately 50 feet south of this property line; however, the residence at 21241 NW 27th Court is approximately 10 feet from this property line. The vibration calculations were conducted at distances of 60 feet and 100 feet.

Table 10. Construction Equipment Vibration Levels

Equipment	PPV Source Level (at 25') ¹	RMS Source Level (at 25') ¹	PPV at Façade	RMS at Façade	PPV at Façade	RMS at Façade
			Distance to Façade: 60 feet		Distance to Façade: 100 feet	
Large Bulldozer	0.089 in/sec	87 VdB	0.034 in/sec	76 VdB	0.019 in/sec	69 VdB
Water Truck	0.076 in/sec	86 VdB	0.029 in/sec	75 VdB	0.017 in/sec	68 VdB
Concrete Mixer Truck	0.076 in/sec	86 VdB	0.029 in/sec	75 VdB	0.017 in/sec	68 VdB
Jackhammer	0.035 in/sec	79 VdB	0.013 in/sec	68 VdB	0.008 in/sec	61 VdB
Small Bulldozer (Bobcat)	0.003 in/sec	58 VdB	0.011 in/sec	49 VdB	0.007 in/sec	40 VdB

¹ Source: FTA 2006

Resultant vibration levels at façades were calculated using the methods detailed in Section 12.2.1 of the FTA Manual. It was assumed that only one piece of vibration-producing equipment would be used at one time. The threshold of damage at Category III (non-engineered timber and masonry) buildings is 0.2 in/sec, and the threshold of annoyance at Category 2 (residential) buildings is 72 VdB for frequent events. A review of Table 10 shows that at the residence at 21241 NW 27th Court, the damage (PPV) threshold would not be exceeded, but the annoyance (RMS) threshold could be exceeded. However, at all other residences in the project area, neither the damage (PPV) threshold nor the annoyance (RMS) threshold would be exceeded.

Operation of the large bulldozer, water truck, and/or concrete mixer truck within 100 feet of the residence at 21241 NW 27th Court, which would generate construction vibration levels over 72 VdB at this residence, is expected to be less than one week in duration. Thus, the impact is considered adverse and temporary.

4.4 Mitigation

4.4.1 Operational

No impacts were identified. No mitigation is necessary.

4.4.2 Construction Noise

No impacts were identified. No mitigation is necessary.

4.4.3 Construction Vibration

Vibration levels during construction would not exceed the damage threshold at any structures.

Project construction within 100 feet of the residential structure at 21241 NW 27th Court has the potential to generate vibration exceeding the annoyance threshold. This is considered a temporary adverse impact. Measures to reduce and minimize construction vibration include:

Develop a Vibration Control Plan prior to the start of construction to minimize construction vibration annoyance where feasible. The plan should establish vibration thresholds for annoyance and maximum allowable vibration values for potentially affected structures based on an assessment of each structure's ability to withstand the loads and displacements due to construction vibrations. The plan should include a standard pre-construction survey to document the existing condition of all structures within 100 feet of

the construction area. The plan should also include a vibration monitoring plan to verify that no construction activities exceed the annoyance threshold and maximum allowable vibration values established by the Vibration Control Plan, and the implementation of a compliance monitoring program during construction. The vibration monitoring program should identify the duration of monitoring, proposed monitoring equipment, who would perform the monitoring, action that would be taken to correct exceedances, and follow-up procedure. The Vibration Control Plan should be included in the contractor's construction specifications.

Where feasible, require low vibration construction procedures. For instance, perform demolition, earth-moving and ground-impacting operations during non-overlapping phases, where feasible. Unlike noise, total vibration level produced can be substantially reduced when each vibration source operates separately as opposed to simultaneously.

Distribute public notification and complaint response procedures to the resident at 21241 NW 27th Court no less than 5 days prior to the start of construction. The notification should describe the planned work, the days and hours of construction, and the procedures for submitting a complaint or an inquiry. At minimum, include a contact number for the construction manager or their designee with each notification to expedite the handling of complaints or inquiries.

4.5 Summary of Impacts and Mitigation

4.5.1 Operational Noise

Operation of the project would result in noise levels up to 58 dBA Ldn at noise-sensitive land uses in the project area. The noise levels are considered to constitute No Impact with regard to FTA thresholds; no Moderate or Severe Impact would occur. Noise from project operation would result in a less than significant impact.

4.5.2 Operational Vibration

Operation of the project would result in negligible vibration levels. Vibration from project operation would result in a less than significant impact.

4.5.3 Construction Noise

Construction of the project would result in noise levels up to 77 dBA Leq (8 hours) at noise-sensitive land uses in the project area. The noise levels are lower than the FTA daytime construction noise threshold of 80 dBA Leq (8 hours) at Category 2 land uses. Noise from project construction would result in a less than significant impact.

4.5.4 Construction Vibration

Construction of the project would result in vibration levels up to 76 VdB at the residential structure at 21241 NW 217th Court. This vibration level is higher than the FTA annoyance threshold of 72 VdB for frequent events at Category 2 land uses. This is considered a temporary adverse impact. Vibration levels can be reduced with implementation of a Vibration Control Plan, use of low-vibration construction procedures, and exposure of persons to this vibration can be reduced with implementation of public coordination procedures.

5 REFERENCES

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INPUT: ROADWAYS

NW 27th Park-and-Ride

Kimley-Horn and Associates, Inc.				12 February 2013							
SPF				TNM 2.5							
INPUT: ROADWAYS				Average pavement type shall be used unless							
PROJECT/CONTRACT:		NW 27th Park-and-Ride				a State highway agency substantiates the use					
RUN:		Project				of a different type with the approval of FHWA					
Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control		Segment		
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Kiss-n-ride	12.0	point56	56	903,006.0	595,763.8	0.00				Average	
		point55	55	902,959.1	595,763.1	0.00				Average	
		point54	54	902,855.1	595,758.9	0.00				Average	
		point53	53	902,837.9	595,763.8	0.00				Average	
		point52	52	902,832.5	595,780.6	0.00				Average	
		point51	51	902,828.6	595,873.8	0.00				Average	
		point50	50	902,822.6	595,886.3	0.00				Average	
		point49	49	902,809.5	595,891.9	0.00				Average	
		point48	48	902,715.8	595,900.0	0.00				Average	
		point47	47	902,537.2	595,893.0	0.00				Average	
		point46	46	902,529.8	595,890.2	0.00				Average	
		point45	45	902,526.2	595,882.9	0.00				Average	
		point44	44	902,528.7	595,829.9	0.00				Average	
		point43	43	902,530.1	595,820.2	0.00				Average	
		point42	42	902,537.9	595,813.9	0.00				Average	
		point41	41	902,800.1	595,824.6	0.00				Average	
		point40	40	902,813.2	595,819.8	0.00				Average	
		point39	39	902,819.3	595,809.3	0.00				Average	
		point38	38	902,821.6	595,765.0	0.00				Average	
		point37	37	902,828.3	595,751.8	0.00				Average	
		point36	36	902,846.6	595,745.6	0.00				Average	
		point35	35	902,982.8	595,752.9	0.00					
Car parking	12.0	point104	104	903,339.4	595,746.9	0.00				Average	
		point103	103	903,346.9	595,763.4	0.00				Average	
		point102	102	903,363.9	595,768.2	0.00				Average	

INPUT: ROADWAYS

NW 27th Park-and-Ride

		point101	101	903,481.5	595,772.6	0.00				Average	
		point100	100	903,493.6	595,777.6	0.00				Average	
		point99	99	903,500.2	595,792.6	0.00				Average	
		point98	98	903,493.5	595,947.2	0.00				Average	
		point97	97	903,486.6	595,956.9	0.00				Average	
		point96	96	903,472.4	595,962.1	0.00				Average	
		point95	95	903,040.3	595,943.4	0.00				Average	
		point94	94	903,026.1	595,938.5	0.00				Average	
		point93	93	903,020.1	595,924.4	0.00				Average	
		point92	92	903,026.6	595,784.8	0.00				Average	
		point91	91	903,031.0	595,777.3	0.00				Average	
		point90	90	903,037.0	595,777.3	0.00				Average	
		point89	89	903,040.2	595,785.6	0.00				Average	
		point88	88	903,032.2	595,921.9	0.00				Average	
		point87	87	903,035.4	595,929.6	0.00				Average	
		point86	86	903,046.2	595,934.4	0.00				Average	
		point85	85	903,464.2	595,951.5	0.00				Average	
		point84	84	903,477.9	595,946.8	0.00				Average	
		point83	83	903,484.9	595,935.9	0.00				Average	
		point82	82	903,485.8	595,921.1	0.00				Average	
		point81	81	903,479.2	595,906.0	0.00				Average	
		point80	80	903,465.4	595,900.0	0.00				Average	
		point79	79	903,059.5	595,885.6	0.00				Average	
		point78	78	903,044.9	595,882.6	0.00				Average	
		point77	77	903,045.9	595,874.9	0.00				Average	
		point76	76	903,059.2	595,873.6	0.00				Average	
		point75	75	903,466.4	595,890.7	0.00				Average	
		point74	74	903,481.9	595,886.5	0.00				Average	
		point73	73	903,487.3	595,876.6	0.00				Average	
		point72	72	903,488.1	595,861.1	0.00				Average	
		point71	71	903,481.2	595,846.5	0.00				Average	
		point70	70	903,466.9	595,841.9	0.00				Average	
		point69	69	903,062.7	595,825.3	0.00				Average	
		point68	68	903,050.9	595,822.0	0.00				Average	
		point67	67	903,051.2	595,813.4	0.00				Average	
		point66	66	903,064.0	595,812.9	0.00				Average	
		point65	65	903,468.6	595,831.6	0.00				Average	
		point64	64	903,485.0	595,824.9	0.00				Average	
		point63	63	903,489.8	595,811.9	0.00				Average	

INPUT: ROADWAYS

NW 27th Park-and-Ride

		point62	62	903,490.0	595,801.2	0.00				Average
		point61	61	903,482.7	595,789.6	0.00				Average
		point60	60	903,468.1	595,785.8	0.00				Average
		point59	59	903,353.4	595,780.7	0.00				Average
		point58	58	903,332.6	595,764.4	0.00				Average
		point57	57	903,328.4	595,745.8	0.00				
Bus inbound	12.0	point121	121	903,339.4	595,746.9	0.00				Average
		point29	29	903,332.6	595,764.4	0.00				Average
		point28	28	903,316.2	595,776.1	0.00				Average
		point27	27	903,006.0	595,763.8	0.00				
Bus terminal	12.0	point123	123	903,006.0	595,763.8	0.00				Average
		point26	26	902,980.3	595,773.2	0.00				Average
		point25	25	902,969.3	595,792.1	0.00				Average
		point24	24	902,966.3	595,863.4	0.00				Average
		point23	23	902,946.2	595,889.8	0.00				Average
		point22	22	902,917.5	595,899.3	0.00				Average
		point21	21	902,541.4	595,946.4	0.00				Average
		point20	20	902,520.8	595,957.3	0.00				Average
		point19	19	902,512.3	595,979.0	0.00				Average
		point18	18	902,523.2	596,059.4	0.00				Average
		point17	17	902,536.4	596,079.9	0.00				Average
		point16	16	902,559.1	596,084.6	0.00				Average
		point15	15	902,934.1	596,037.1	0.00				Average
		point14	14	902,947.9	596,026.0	0.00				Average
		point13	13	902,955.3	596,010.6	0.00				Average
		point12	12	902,946.2	595,889.8	0.00				Average
		point11	11	902,946.1	595,869.2	0.00				Average
		point10	10	902,949.6	595,786.1	0.00				Average
		point9	9	902,959.1	595,763.1	0.00				Average
		point8	8	902,982.8	595,752.9	0.00				
Bus outbound	12.0	point124	124	902,982.8	595,752.9	0.00				Average
		point7	7	903,308.5	595,766.4	0.00				Average
		point6	6	903,322.2	595,759.2	0.00				Average
		point5	5	903,328.4	595,745.8	0.00				
All inbound and outbound	12.0	point122	122	903,328.4	595,745.8	0.00				Average
		point4	4	903,335.8	595,573.2	0.00				Average
		point3	3	903,343.6	595,554.8	0.00				Average
		point2	2	903,366.6	595,546.6	0.00				Average
		point125	125	903,578.1	595,554.9	0.00				Average

INPUT: ROADWAYS**NW 27th Park-and-Ride**

		point34	34	903,577.7	595,566.8	0.00				Average	
		point33	33	903,371.1	595,558.2	0.00				Average	
		point32	32	903,354.6	595,564.6	0.00				Average	
		point31	31	903,346.4	595,583.2	0.00				Average	
		point30	30	903,339.4	595,746.9	0.00					

INPUT: TRAFFIC FOR LAeq1h Volumes

NW 27th Park-and-Ride

Kimley-Horn and Associates, Inc.		12 February 2013										
SPF		TNM 2.5										
INPUT: TRAFFIC FOR LAeq1h Volumes												
PROJECT/CONTRACT:		NW 27th Park-and-Ride										
RUN:		Project										
Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Kiss-n-ride	point56	56	50	15	0	0	0	0	0	0	0	0
	point55	55	50	15	0	0	0	0	0	0	0	0
	point54	54	50	15	0	0	0	0	0	0	0	0
	point53	53	50	15	0	0	0	0	0	0	0	0
	point52	52	50	15	0	0	0	0	0	0	0	0
	point51	51	50	15	0	0	0	0	0	0	0	0
	point50	50	50	15	0	0	0	0	0	0	0	0
	point49	49	50	15	0	0	0	0	0	0	0	0
	point48	48	50	15	0	0	0	0	0	0	0	0
	point47	47	50	15	0	0	0	0	0	0	0	0
	point46	46	50	15	0	0	0	0	0	0	0	0
	point45	45	50	15	0	0	0	0	0	0	0	0
	point44	44	50	15	0	0	0	0	0	0	0	0
	point43	43	50	15	0	0	0	0	0	0	0	0
	point42	42	50	15	0	0	0	0	0	0	0	0
	point41	41	50	15	0	0	0	0	0	0	0	0
	point40	40	50	15	0	0	0	0	0	0	0	0
	point39	39	50	15	0	0	0	0	0	0	0	0
	point38	38	50	15	0	0	0	0	0	0	0	0
	point37	37	50	15	0	0	0	0	0	0	0	0
	point36	36	50	15	0	0	0	0	0	0	0	0
	point35	35										
Car parking	point104	104	350	15	0	0	0	0	0	0	0	0

INPUT: TRAFFIC FOR LAeq1h Volumes

NW 27th Park-and-Ride

	point103	103	350	15	0	0	0	0	0	0	0	0
	point102	102	350	15	0	0	0	0	0	0	0	0
	point101	101	350	15	0	0	0	0	0	0	0	0
	point100	100	350	15	0	0	0	0	0	0	0	0
	point99	99	350	15	0	0	0	0	0	0	0	0
	point98	98	350	15	0	0	0	0	0	0	0	0
	point97	97	350	15	0	0	0	0	0	0	0	0
	point96	96	350	15	0	0	0	0	0	0	0	0
	point95	95	350	15	0	0	0	0	0	0	0	0
	point94	94	350	15	0	0	0	0	0	0	0	0
	point93	93	350	15	0	0	0	0	0	0	0	0
	point92	92	350	15	0	0	0	0	0	0	0	0
	point91	91	350	15	0	0	0	0	0	0	0	0
	point90	90	350	15	0	0	0	0	0	0	0	0
	point89	89	350	15	0	0	0	0	0	0	0	0
	point88	88	350	15	0	0	0	0	0	0	0	0
	point87	87	350	15	0	0	0	0	0	0	0	0
	point86	86	350	15	0	0	0	0	0	0	0	0
	point85	85	350	15	0	0	0	0	0	0	0	0
	point84	84	350	15	0	0	0	0	0	0	0	0
	point83	83	350	15	0	0	0	0	0	0	0	0
	point82	82	350	15	0	0	0	0	0	0	0	0
	point81	81	350	15	0	0	0	0	0	0	0	0
	point80	80	350	15	0	0	0	0	0	0	0	0
	point79	79	350	15	0	0	0	0	0	0	0	0
	point78	78	350	15	0	0	0	0	0	0	0	0
	point77	77	350	15	0	0	0	0	0	0	0	0
	point76	76	350	15	0	0	0	0	0	0	0	0
	point75	75	350	15	0	0	0	0	0	0	0	0
	point74	74	350	15	0	0	0	0	0	0	0	0
	point73	73	350	15	0	0	0	0	0	0	0	0
	point72	72	350	15	0	0	0	0	0	0	0	0
	point71	71	350	15	0	0	0	0	0	0	0	0
	point70	70	350	15	0	0	0	0	0	0	0	0
	point69	69	350	15	0	0	0	0	0	0	0	0
	point68	68	350	15	0	0	0	0	0	0	0	0

INPUT: TRAFFIC FOR LAeq1h Volumes

NW 27th Park-and-Ride

	point67	67	350	15	0	0	0	0	0	0	0	0
	point66	66	350	15	0	0	0	0	0	0	0	0
	point65	65	350	15	0	0	0	0	0	0	0	0
	point64	64	350	15	0	0	0	0	0	0	0	0
	point63	63	350	15	0	0	0	0	0	0	0	0
	point62	62	350	15	0	0	0	0	0	0	0	0
	point61	61	350	15	0	0	0	0	0	0	0	0
	point60	60	350	15	0	0	0	0	0	0	0	0
	point59	59	350	15	0	0	0	0	0	0	0	0
	point58	58	350	15	0	0	0	0	0	0	0	0
	point57	57										
Bus inbound	point121	121	0	0	0	0	0	0	35	15	0	0
	point29	29	0	0	0	0	0	0	35	15	0	0
	point28	28	0	0	0	0	0	0	35	15	0	0
	point27	27										
Bus terminal	point123	123	0	0	0	0	0	0	35	15	0	0
	point26	26	0	0	0	0	0	0	35	15	0	0
	point25	25	0	0	0	0	0	0	35	15	0	0
	point24	24	0	0	0	0	0	0	35	15	0	0
	point23	23	0	0	0	0	0	0	35	15	0	0
	point22	22	0	0	0	0	0	0	35	15	0	0
	point21	21	0	0	0	0	0	0	35	15	0	0
	point20	20	0	0	0	0	0	0	35	15	0	0
	point19	19	0	0	0	0	0	0	35	15	0	0
	point18	18	0	0	0	0	0	0	35	15	0	0
	point17	17	0	0	0	0	0	0	35	15	0	0
	point16	16	0	0	0	0	0	0	35	15	0	0
	point15	15	0	0	0	0	0	0	35	15	0	0
	point14	14	0	0	0	0	0	0	35	15	0	0
	point13	13	0	0	0	0	0	0	35	15	0	0
	point12	12	0	0	0	0	0	0	35	15	0	0
	point11	11	0	0	0	0	0	0	35	15	0	0
	point10	10	0	0	0	0	0	0	35	15	0	0
	point9	9	0	0	0	0	0	0	35	15	0	0
	point8	8										
Bus outbound	point124	124	0	0	0	0	0	0	35	15	0	0

INPUT: TRAFFIC FOR LAeq1h Volumes

NW 27th Park-and-Ride

	point7	7	0	0	0	0	0	0	35	15	0	0
	point6	6	0	0	0	0	0	0	35	15	0	0
	point5	5										
All inbound and outbound	point122	122	400	15	0	0	0	0	35	15	0	0
	point4	4	400	15	0	0	0	0	35	15	0	0
	point3	3	400	15	0	0	0	0	35	15	0	0
	point2	2	400	15	0	0	0	5	35	15	0	0
	point125	125	400	15	0	0	0	0	35	15	0	0
	point34	34	400	15	0	0	0	0	35	15	0	0
	point33	33	400	15	0	0	0	0	35	15	0	0
	point32	32	400	15	0	0	0	0	35	15	0	0
	point31	31	400	15	0	0	0	0	35	15	0	0
	point30	30										

INPUT: RECEIVERS

NW 27th Park-and-Ride

Kimley-Horn and Associates, Inc.							12 February 2013				
SPF							TNM 2.5				
INPUT: RECEIVERS											
PROJECT/CONTRACT:			NW 27th Park-and-Ride								
RUN:			Project								
Receiver											
Name	No.	#DUs	Coordinates (ground)			Height above Ground	Input Sound Levels and Criteria				Active in Calc.
			X	Y	Z		Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	
			ft	ft	ft	ft	dBA	dBA	dB	dB	
21241 NW 27th Court	1	1	903,510.9	595,466.0	0.00	4.92	0.00	66	10.0	8.0	Y
2763 NW 212th Terrace	2	1	903,368.5	595,453.1	0.00	4.92	0.00	66	10.0	8.0	Y
2773 NW 212th Terrace	3	1	903,291.3	595,449.1	0.00	4.92	0.00	66	10.0	8.0	Y
2783 NW 212th Terrace	4	1	903,208.7	595,446.6	0.00	4.92	0.00	66	10.0	8.0	Y
2793 NW 212th Terrace	5	1	903,125.8	595,445.1	0.00	4.92	0.00	66	10.0	8.0	Y
2803 NW 212th Terrace	6	1	903,046.4	595,441.8	0.00	4.92	0.00	66	10.0	8.0	Y
2813 NW 212th Terrace	7	1	902,969.0	595,440.1	0.00	4.92	0.00	66	10.0	8.0	Y
2823 NW 212th Terrace	8	1	902,889.6	595,435.8	0.00	4.92	0.00	66	10.0	8.0	Y
2833 NW 212th Terrace	9	1	902,805.8	595,433.3	0.00	4.92	0.00	66	10.0	8.0	Y
2843 NW 212th Terrace	10	1	902,735.7	595,545.3	0.00	4.92	0.00	66	10.0	8.0	Y
2853 NW 212th Terrace	11	1	902,643.6	595,426.5	0.00	4.92	0.00	66	10.0	8.0	Y
21241 NW 29th Avenue	12	1	902,533.3	595,429.2	0.00	4.92	0.00	66	10.0	8.0	Y
21220 NW 29th Avenue	13	1	902,381.4	595,394.9	0.00	4.92	0.00	66	10.0	8.0	Y
2901 NW 213th Street	14	1	902,380.4	595,578.2	0.00	4.92	0.00	66	10.0	8.0	Y
2900 NW 214th Street	15	1	902,376.1	595,727.1	0.00	4.92	0.00	66	10.0	8.0	Y
2901 NW 214th Street	16	1	902,368.4	595,904.4	0.00	4.92	0.00	66	10.0	8.0	Y

RESULTS: SOUND LEVELS

NW 27th Park-and-Ride

Kimley-Horn and Associates, Inc. SPF										12 February 2013 TNM 2.5 Calculated with TNM 2.5			
RESULTS: SOUND LEVELS													
PROJECT/CONTRACT:		NW 27th Park-and-Ride											
RUN:		Project											
BARRIER DESIGN:		INPUT HEIGHTS						Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.					
ATMOSPHERICS:		68 deg F, 50% RH											
Receiver													
Name		No.	#DUs	Existing LAeq1h	No Barrier LAeq1h		Increase over existing		Type	With Barrier		Noise Reduction	
					Calculated	Crit'n	Calculated	Crit'n	Impact	Calculated LAeq1h	Calculated	Goal	Calculated minus Goal
				dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
21241 NW 27th Court		1	1	0.0	57.9	66	57.9	10	----	57.9	0.0	8	-8.0
2763 NW 212th Terrace		2	1	0.0	57.6	66	57.6	10	----	57.6	0.0	8	-8.0
2773 NW 212th Terrace		3	1	0.0	56.2	66	56.2	10	----	56.2	0.0	8	-8.0
2783 NW 212th Terrace		4	1	0.0	54.7	66	54.7	10	----	54.7	0.0	8	-8.0
2793 NW 212th Terrace		5	1	0.0	53.7	66	53.7	10	----	53.7	0.0	8	-8.0
2803 NW 212th Terrace		6	1	0.0	52.9	66	52.9	10	----	52.9	0.0	8	-8.0
2813 NW 212th Terrace		7	1	0.0	52.2	66	52.2	10	----	52.2	0.0	8	-8.0
2823 NW 212th Terrace		8	1	0.0	51.5	66	51.5	10	----	51.5	0.0	8	-8.0
2833 NW 212th Terrace		9	1	0.0	50.8	66	50.8	10	----	50.8	0.0	8	-8.0
2843 NW 212th Terrace		10	1	0.0	51.7	66	51.7	10	----	51.7	0.0	8	-8.0
2853 NW 212th Terrace		11	1	0.0	49.3	66	49.3	10	----	49.3	0.0	8	-8.0
21241 NW 29th Avenue		12	1	0.0	48.4	66	48.4	10	----	48.4	0.0	8	-8.0
21220 NW 29th Avenue		13	1	0.0	46.8	66	46.8	10	----	46.8	0.0	8	-8.0
2901 NW 213th Street		14	1	0.0	48.3	66	48.3	10	----	48.3	0.0	8	-8.0
2900 NW 214th Street		15	1	0.0	49.9	66	49.9	10	----	49.9	0.0	8	-8.0
2901 NW 214th Street		16	1	0.0	51.8	66	51.8	10	----	51.8	0.0	8	-8.0
Dwelling Units			# DUs	Noise Reduction									
				Min	Avg	Max							
				dB	dB	dB							
All Selected			16	0.0	0.0	0.0							
All Impacted			0	0.0	0.0	0.0							
All that meet NR Goal			0	0.0	0.0	0.0							