



Technical Memorandum No.4

Conceptual Engineering
Alternatives

SR 90/SW 7th Street/SW 8th Street
from SR 5/US 1/Brickell Avenue
to SR 9/SW 27th Avenue

Miami-Dade County, Florida

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1. Introduction

1.1 Objective

The purpose of this technical memorandum is to present conceptual engineering alternatives developed for the study segment of SR 90/SW 7th Street and SR 90/SW 8th Street from SR 5/Brickell Avenue to SR 9/SW 27th Avenue. These alternatives were conceptualized based on the existing conditions analysis, the feedback received from the assembled Project Advisory Team (PAT), and the intention of improving conditions for the different modes of transportation served by the study corridor.

1.2 Project Description

The study focuses on the segment of SR 90/SW 7th Street and SR 90/SW 8th Street, sections 87120001 and 87120000 respectively, from SR 5/Brickell Avenue to SR 9/SW 27th Avenue. This segment of SR 90 is an east-west urban principal arterial consisting of a one-way pair, with SW 7th Street operating as SR 90 westbound and SW 8th Street operating as SR 90 eastbound.

This dense urban corridor, from SR 5/Brickell Avenue to SR 9/SW 27th Avenue, includes over 30 signalized intersections. Located near SW 3rd Avenue and SW 4th Avenue, the interchange with I-95 has a significant impact on operations along the corridor as well as on traffic volumes as it acts as the main access to the Brickell area for commuters via the regional transportation system. Moreover, the Brickell area serviced by SR 90/SW 7th Street and SR 90/SW 8th Street has seen significant growth in the last decade with high-density high-rise developments, which have contributed to changes in the operations of the study corridor. Additionally, several new major development projects are currently proposed within the Brickell area, all of which can further impact operations and increase traffic volumes along this already congested corridor.

1.2.1 Purpose

The project efforts consist of developing and evaluating corridor alternatives and providing recommendations to improve existing and future physical, operational, and safety deficiencies of the corridor. The project will focus on preserving future expansion needs for multimodal transportation facilities and enhancing mobility of the corridor, including the movement of freight and goods. It will also focus on conducting intergovernmental coordination with an emphasis on communication with key decision makers and stakeholders.

1.3 Study Segment

The study area consists of a half-mile buffer around the segment of SR 90 extending from SR 5/Brickell Avenue to SR 9/SW 27th Avenue. This area includes the existing interchange with I-95, located near SW 3rd Avenue and SW 4th Avenue as well as two major north-south corridors, SR 933/SW 12th Avenue and SR 7/SW 8th Avenue. Figure 1-1 exhibits the limits of the SR 90 study segment as well as the half-mile buffer study area.

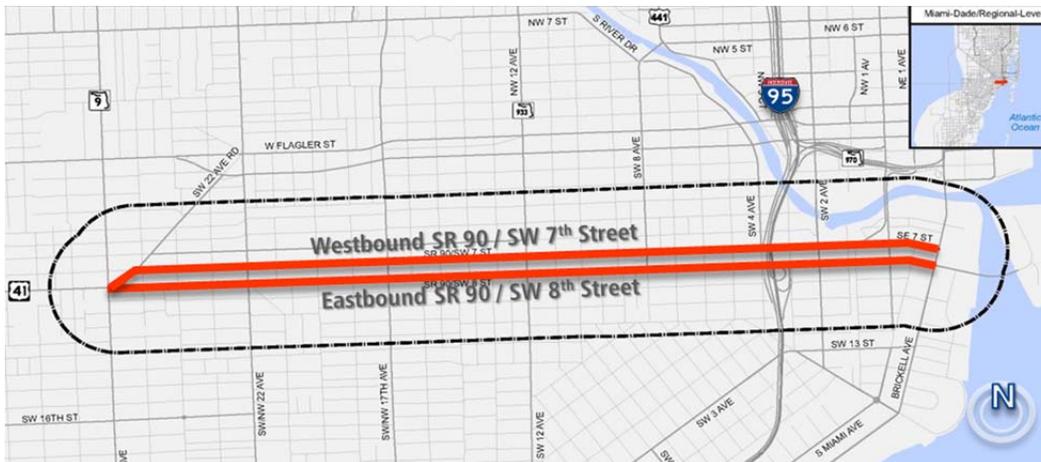


Figure 1-1: Study Area

The SR 90 study segment is located entirely within the City of Miami, in Miami-Dade County. Though located only within one municipality, the study segment passes through six (6) different neighborhoods: West Flagler, Shenandoah, Little Havana, Riverside, The Roads, and Brickell.

Based on the year 2010 Census data, the study area consists of a total population of 39,628. This represents approximately 1.5 percent of Miami-Dade County's total population, which was estimated at 2,496,457 by the 2010 Census. The highest concentration occurs to the north of the corridor from SW 22nd Avenue to SR 7/SW 8th Avenue. This high density area is located within the neighborhoods of West Flagler and Little Havana, which are mostly residential.

The existing land use directly adjacent to the study corridor is predominantly multifamily residential, highway infrastructure (i.e. I-95), and commercial. Furthermore, the land use along eastbound SR 90 is predominantly commercial on either side of the street. In contrast, the land use along westbound SR 90 is predominantly commercial with scattered residential east of I-95 and primarily residential west of I-95. The residential area is composed of multifamily buildings.

1.3.1 Existing Infrastructure

The study segment of SR 90 is classified as an Urban Other Principal Arterial with a posted speed of 30 miles per hour (MPH). The existing typical section elements are portrayed in Figures 1-2 and 1-3. Additionally, existing available right-of-way (ROW) along eastbound SR 90 ranges from 58 feet to 80 feet, with an average of 70 feet, and along westbound SR 90 from 50 feet to 60 feet, with an average of 60 feet.

More detailed information on the existing characteristics of the study segment of SR 90 can be found in Technical Memorandum No. 1 (Existing Conditions). Technical Memorandum No. 1 presents an inventory and assessment of the following items: crash data, transit data, bicycle and pedestrian data, on-street parking, roadway data, access management, and traffic data. Moreover, Technical Memorandum No. 1 provides data regarding: project related documents, environmental features, utilities, and ROW.



Figure 1-2: Existing Roadway Typical Section of Eastbound SR 90 (SW 8th Street)



Figure 1-3: Existing Roadway Typical Section of Westbound SR 90 (SW 7th Street)



2. Conceptual Engineering Alternatives Development

Once the existing conditions analysis phase was completed, and strategies were established, conceptual alternatives were developed with various goals in mind. These goals are focused on improving conditions, in terms of safety, mobility, connectivity, and livability, for the different modes of transportation served by the study corridor.

Additional to the existing condition analysis, relevant input from the PAT was considered when developing alternatives. This team consists of members from agencies, local governments, and associations directly connected or involved with the study corridor whose input is essential for the development of this study. After the project was introduced to the members of the PAT and after inquiring on their views about the corridor, it became clear that their main focus is on pedestrians and transit, and that they envision SR 90 as a corridor which ultimately provides desirable and reliable infrastructure for both.

It is essential that conceptual alternatives are created based on overall corridor goals, developed strategies, and the existing conditions analysis. Nevertheless, equal focus shall be maintained on the Department's operational, safety, and mobility goals, as these provide the basis for effective multimodal transportation planning.

2.1 Multimodal Mobility Goals and Performance Measures

SR 90 is part of the state highway system and as such, it should maintain the Department's vision that a corridor's primary function is to provide mobility for people and goods. The Florida Department of Transportation (FDOT) defines mobility as the ease with which people and goods move throughout their community, state, and world; and believes that mobility is valuable because it provides access to jobs, services, and markets.

To represent and measure the success of its transportation system, FDOT has defined mobility through four (4) different dimensions: quantity, quality, accessibility, and utilization. All these dimensions take into account both service to people and freight movement, with the exception of accessibility which does not account for freight movement. This study however, focuses on the performance measures regarding the movement of people since this corridor study will not consider freight movement because SR 90 within the study area is not part of FDOT's Strategic Intermodal System (SIS) Roads. Additionally, observations of the traffic movements at all the study area intersections reveal truck percentages averaging at around 2%. In comparison to NW 25th Street, a corridor commonly known for exhibiting heavy freight movement and having truck percentages around 15%, 2% can be considered low. The mobility dimensions are described in this document as they are presented in the FDOT's Multimodal Mobility Performance Measures 2013 Source Book.

2.1.1 Quantity of Travel

The quantity of travel relates to the length and time people utilize a transportation system. The applicable measures of quantity for the study corridor are:



- Vehicle miles traveled
- Person miles traveled
- Passenger miles traveled
- Passenger trips

2.1.2 Quality of Travel

The quality of travel refers to whether a trip results in a positive or negative experience. Over the years, measurements of effectiveness, such as level of service (LOS), have been used to quantify this dimension of mobility. The applicable measures of quality for the study corridor are:



- % of Corridor miles meeting LOS criteria
- Travel time reliability
- Person hours of delay
- Vehicle hours of delay
- Average travel speed
- Average headways

2.1.3 Accessibility

The accessibility offered by a transportation system refers to how easy it is for its users to engage in activities. Connectivity, modal options, and time to reach destinations comprise measurements of this dimension. The applicable measures of accessibility for the study corridor are:



- % Sidewalk coverage
- % Bike lane/shoulder coverage
- Person time, distance or cost to reach a destination
- Person modal choices/alternatives
- Connectivity
- Number of transfers

2.1.4 Utilization

Utilization describes the supply and demand characteristic of transportation facilities and services. In other words, utilization indirectly refers to a user's assessment of the level of congestion of a transportation system. The applicable measures of utilization for the study corridor are:



- Vehicles per lane mile
- % Travel severely congested
- Hours severely congested



Corridor mobility, from a multimodal perspective, requires the assessment of all the performance measures from the four (4) dimensions. Table 2-1 presents a matrix of the dimension performance measures in relation to each of the transportation modes served by the study corridor.

Mode	Quantity	Quality	Accessibility	Utilization
Automobile	<ul style="list-style-type: none"> • Vehicle miles traveled • Person miles traveled 	<ul style="list-style-type: none"> • % of Corridor miles meeting LOS criteria • Travel time reliability • Person hours of delay • Vehicle hours of delay • Average travel speed 	<ul style="list-style-type: none"> • Person time, distance or cost to reach a destination • Person modal choices / alternatives • Connectivity 	<ul style="list-style-type: none"> • Vehicles per lane mile • % Travel severely congested • Hours severely congested
Transit	<ul style="list-style-type: none"> • Passenger miles traveled • Passenger trips 	<ul style="list-style-type: none"> • Average headways 	<ul style="list-style-type: none"> • Number of transfers 	
Pedestrian		<ul style="list-style-type: none"> • LOS 	<ul style="list-style-type: none"> • % Sidewalk coverage 	
Bicycle		<ul style="list-style-type: none"> • LOS 	<ul style="list-style-type: none"> • % Bike lane/shoulder coverage 	

Table 2-1 Multimodal Mobility Performance Measures



2.2 Alternatives Development

As previously mentioned, conceptual alternatives were developed with a multimodal perspective, focusing on the individual needs of all travel modes served by the study corridor: automobiles, transit, bicycles, and pedestrians.

2.2.1 Lane Repurposing

In order to incorporate corridor improvements that reflect the developed strategies, the conceptual alternatives were developed assuming that lane repurposing could take place. The term lane repurposing simply stands for reassigning a general use travel lane(s) and/or on-street parking lane(s) of full roadway pavement to another mode of transportation: transit, bicycles and/or pedestrians. As it can be seen in Figures 1-2 and 1-3, eastbound SR 90 (SW 8th Street) allows some flexibility for lane repurposing since it currently accommodates five (5) general use lanes; three (3) travel lanes and two (2) on-street parking lanes. On the other hand, westbound SR 90 (SW 7th Street) offers a narrower canvas for possible recommendations with only three (3) general use travel lanes. Although, the range of options is not as broad for SW 7th Street, lane repurposing was also considered for this corridor since both streets function as a pair or couplet.

Lane repurposing for the development of alternatives was considered and applied in the following manner:

- Repurposing of one (1) general use travel lane (On SW 8th Street and/or SW 7th Street)
 - To provide exclusive transit lane
 - To provide bicycle facilities
 - Bicycle lanes: an exclusive, one-way, designated lane for bicyclists
 - Cycle track: an exclusive two-way facility for bicyclists composed of two adjacent bicycle lanes with opposite travel directions
 - To provide wider sidewalks
- Repurposing of one (1) or two (2) on-street parking lane(s) (On SW 8th Street)
 - To provide exclusive transit lane
 - To provide bicycle facilities
 - Bicycle lanes
 - Cycle track
 - To provide wider sidewalks

It should be mentioned, that although repurposing of on-street parking was deemed acceptable by the PAT, if any alternative recommending the removal of existing on-street parking spaces on SR 90 moves forward to further stages of development and implementation, a separate study should be conducted to evaluate the number of parking spaces for retail and general use on the corridor based on future capacity needs.



2.2.2 Traffic Flow Reversal

Reversal of the corridor’s existing traffic flow was considered for the development of alternatives. Currently, SR 90/SW 7th and SR 90/SW 8th Streets operate as a traditional one-way couplet, or pair of streets, with its traffic flow following the right hand rule (i.e. keeping to the right). In relation to the central business district area, the eastbound direction of SR 90/SW 8th Street flows inbound and the westbound direction SR 90/SW 7th Street flows outbound. The existing traffic flow of SR 90 is shown in Figure 2-1.

Flow reversal would improve traffic conditions at the interchange of SR 90 and I-95. Currently, vehicles traveling on westbound SR 90/SW 7th Street have two options for accessing the existing northbound I-95 on-ramps located on eastbound SR 90/SW 8th Street; both of which have operational and safety issues. The first option consists of using SW 3rd Avenue to access the on-ramp located at the intersection of SW 3rd Avenue and SW 8th Street. This creates extensive vehicle queues on westbound SR 90/SW 7th Street because SW 3rd Avenue does not have enough capacity in the southbound direction to accommodate vehicles accessing northbound I-95. The second option consists of driving past 3rd Avenue on westbound SR 90/SW 7th Street, turning left onto southbound SW 4th Avenue, and then turning left onto eastbound SR 90/SW 8th Street to access the existing northbound I-95 on-ramp. Because of weaving issues created by this movement at the intersection of SW 8th Street and SW 4th Avenue, this intersection has been identified as a high crash location. These issues could be resolved if traffic flows were reversed since vehicles could have direct free-flow access to northbound I-95 from both directions of SR 90. Existing operations and conceptual alternatives of the SR 90 and I-95 interchange are further discussed and portrayed in Section 2.5 of this document.

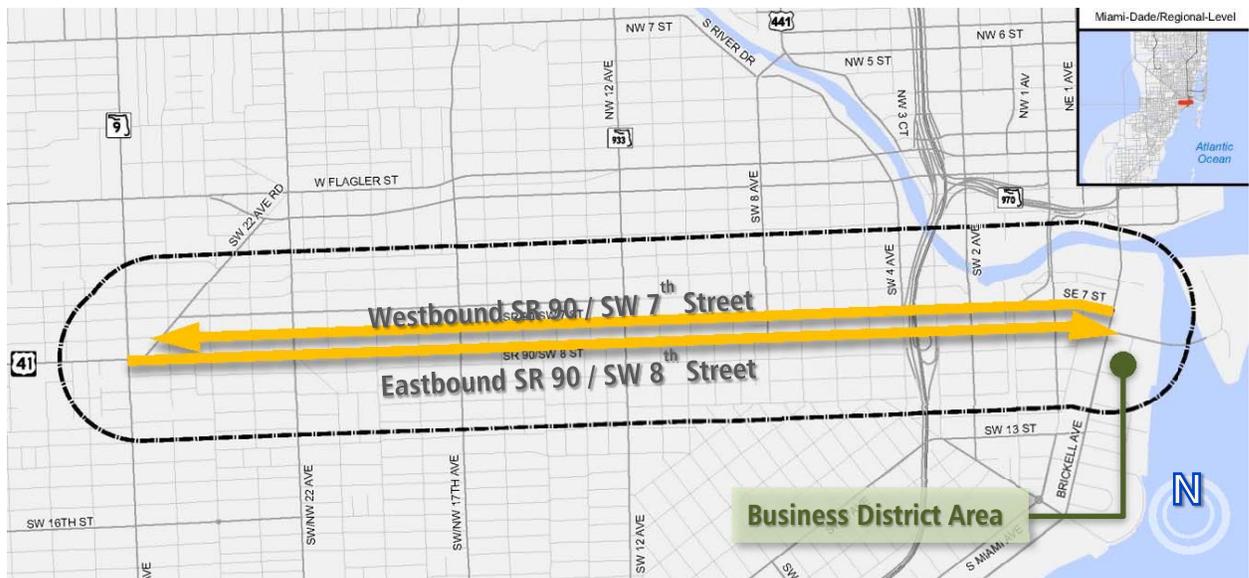


Figure 2-1: Existing Traffic Flow for SR 90



Reversing the corridor’s traffic flow would also improve traffic conditions at the intersection of SR 90 and SR 5/Brickell Avenue. It would provide a direct connection for vehicles exiting Brickell Key to travel westbound on SR 90. Currently, vehicles exiting Brickell Key have to make a right turn onto a very congested northbound SR 5/Brickell Avenue to then make an immediate left turn to access westbound SR 90/SW 7th Street. Vehicles are prevented from making this movement when the bascule bridge on SR 5/Brickell Avenue over the Miami River is opened because queues extend to the intersection at SR 90/SW 8th Street) and impede any movement in the northbound direction. Essentially, by reversing traffic flows of SR 90, this situation will no longer exist.

In regards to transit, flow reversal could prove beneficial since it would bring both parts of the existing split transit line/route(s) closer together resulting in a reduction in walking distance between bus stops. Also, the area of service would increase as a result. Transit vehicles currently run on the rightmost mixed traffic lanes of both directions of SR 90. This results in transit users having to cross two (2) major roads and one (1) minor one. Research shows that the further apart the two directions of a transit line/route are, the smaller the area that provides a reasonable walking distance to both of them becomes. By reversing the directions, transit vehicles would still run on the rightmost mixed traffic lanes; however, they would now only be separated by the existing land use between both streets. This implies that stop pairs would be located closer to each other and that transit users would only have to cross, at most, one (1) minor road to access them. Figure 2-2 provides a graphical description of the transit benefits provided by traffic flow reversal on SR 90.



Figure 2-2: Benefits to Transit from Traffic Flow Reversal

The concept of flow reversal presents design challenges when approaching the western limits of the study segment. The existing configuration approaching SR 9/SW 27th Avenue, in which SR 90 becomes a two-way street, should be carefully analyzed and designed to adequately accommodate reversed directions of the corridor. Traffic flow reversal within this area could translate into high implementation costs since the acquisition of right-of-way may potentially be required. Figure 2-3 presents the existing traffic flows where SR 90 approaches SR 9/SW 27th Avenue and becomes a two-way street.

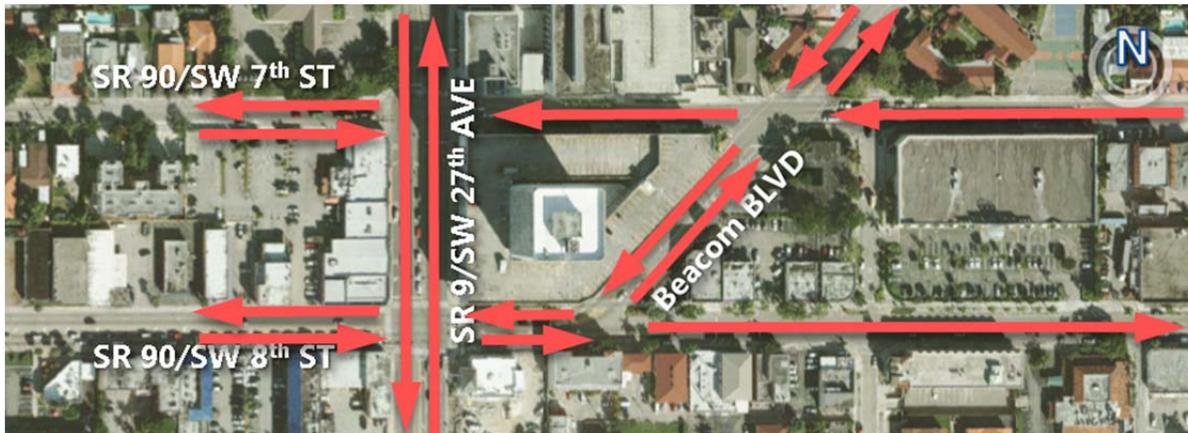


Figure 2-3: Existing Traffic Configuration at SR 90 and SR 9/SW 27th Avenue

Lastly, an economic impact analysis of the study segment of SR 90 as well as meetings with stakeholders, suggest that reversing the traffic flow would provide economic improvements to “Calle 8”. The City of Miami conducted an economic impact analysis in 2003 which suggested that existing retail on SW 8th Street would benefit from potential consumers stopping in this commercial area during the westbound afternoon peak. To evaluate the economic impacts of reversing the traffic flow of SR 90, a separate study should be conducted during a further phase of this study.



2.3 Conceptual Roadway Typical Sections Development

With a focus on the safety, mobility, connectivity, and livability vision for the study segment, each conceptual alternative developed makes an attempt to accommodate the needs of all the transportation modes which share the corridor (i.e. automobiles, transit, bicycles, and pedestrians). Although each of the aforementioned transportation modes was taken into account for the potential reconfigurations of the corridors' typical section, some concepts favor a particular mode(s) more than others. Therefore, each alternative is presented and described based on the mode(s) it mostly favors.

To maximize the options for potential improvements to the corridor's typical section, travel lane widths were recommended according to Chapter 21 of the FDOT Plans Preparation Manual (PPM). This chapter of the PPM establishes standards for Transportation Design for Livable Communities (TDLC) that focus on features of the State Highway System intended to provide balance between mobility and livability. Chapter 21 states that if a roadway's design speed is less than or equal to 35 MPH and it presents little or no truck volume, travel lane widths can be reduced to 10 feet. The study segment of SR 90 exhibits these conditions, thus all conceptual alternatives considered for the typical section of the corridor accommodate travel lane widths of 10 feet. Additionally, for those alternatives which do not consider exclusive transit lanes, 11 feet outside lanes were provided to accommodate transit vehicles as well as other large vehicles in mixed traffic.

2.3.1 Automobile Mode



For purposes of this document, the automobile mode encompasses motorcycles, passenger cars, pick-up trucks, sport utility vehicles (SUVs), vans, etc. Automobiles are benefited in ways other than just the capacity offered by the number of general use lanes on the roadway typical section. Due to ROW constraints and the fact that the conceptual typical sections intend to accommodate all of the transportation modes, the existing number of travel lanes (three) in each direction of SR 90 is either maintained or reduced. Subsequently, the typical sections considered to favor automobiles were those which maintained three (3) travel lanes and/or on-street parking.

Other factors considered in this study that would provide potential benefits for automobile traffic but that cannot be portrayed on the conceptual typical sections include: signalization improvements, implementation of Intelligent Transportation Systems (ITS), and signage improvements (such as branding). Additionally, the interchange improvements discussed later in this document have the potential of benefiting automobile traffic.



2.3.2 Transit Mode



The existing conditions analysis phase, as well as feedback received from the PAT, revealed that public transit plays an important role within the study area. Therefore, potential improvements to the corridor's typical section should provide benefits for this transportation mode. While all the potential improvements to the typical section are in efforts of benefiting every mode, certain alternatives were categorized as transit favorable based on these conditions:

- Provides exclusive transit lane
- Provides exclusive shared bicycle/bus lanes (SBBL)
- Maintains at least one on-street parking lane adjacent to the outside lane in the direction of traffic
 - This provides room for bulb-outs (curb extensions) on which transit stops/stations can be better accommodated.

2.3.2.1 Exclusive Transit Lanes

Exclusive transit lanes were considered for the development of conceptual alternatives as a way to incorporate the overall vision for public transit within the study area. The provision of a lane(s) solely dedicated to transit offers a range of opportunities for a corridor, those being in the operations sector as well as the economic one. Various alternatives presented in this document provide either bus only lanes or bus and bicycle only lanes. These alternatives, just as the rest, will be measured on their viability and overall suitability for the study corridor, and screened accordingly. Nevertheless, should any alternative recommending exclusive transit lanes move to further stages of development and implementation, the following should be considered:

- Exclusive transit lanes allow for the implementation of **bus rapid transit (BRT) systems**.
 - BRT is a form of rapid transit that combines stations, vehicles, services, and ITS elements into an integrated system with a predominant identity.
 - Planning BRT projects requires a detailed assessment of demands, costs, benefits, and impacts.
- Buses have **higher occupancies** than automobiles; hence economic benefits can result from increased ridership. Higher ridership numbers could lead to fewer automobiles on the roadway, which could translate into passenger time savings as well as a reduction on automobile operating and maintenance costs.
- **Concurrent flow bus lanes** should allow at least two adjacent general traffic lanes in the same direction of travel.
 - Research shows that concurrent flow curb bus lanes are relatively easy to install, their costs are low, and they minimize the street space devoted only to transit. However, they usually present enforcement difficulties and their operational benefits may be reduced due to conflicts between right-turning traffic and pedestrians.
- **Contra flow bus lanes** should allow at least two traffic lanes in the opposite direction of travel.



- Research shows contra flow curb lanes enable two-way operation for buses on one-way streets, which may increase the number of curb faces available for passenger stops, completely separate transit from general traffic flow, and are generally self-enforcing. Contra flow lanes require buses to run against the prevailing traffic signal progression, limit passing opportunities around stopped or disabled buses, and create conflicts with opposing left turns. Additionally, proper markings and signage should be used along with strict enforcement to maintain proper use of the lane as well as the safety of the corridor.
- **Community willingness** to support public transportation, foster transit-oriented development, and enforce bus lanes is essential. Therefore, extensive and effective public participation in the decision-making process should be well established and maintained.

Certain benefits to transit can come from other improvements that do not necessarily pertain to the corridor's typical section. While, enhancement to the existing transit service can originate from a number of different sources, those that particularly apply to the study corridor and that can potentially be implemented are:

- Installation of bus-priority traffic signals.
- Provision, if feasible, of queue-jumper lanes at intersections where there are no stops.
 - This applies to the alternatives that consider transit in mixed traffic.
- Consolidation of stops.
 - This would have to be coordinated with Miami-Dade Transit (MDT), a member of the PAT. MDT informed during a PAT meeting about their current effort to consolidate some of the existing stops within the study corridor.
- Infrastructure enhancements (Improvements to stops).
 - Provide shelters where none are present or improve them where they are inadequate.
 - Provide real time passenger information, or the capability to provide it in the near future, at bus stops.
 - Improve way-finding.
 - Improve seating accommodations.
 - Provide bicycle racks.
- Relocation of stops to the far side of the signalized intersections where feasible.

Figure 2-4 presents example of corridors, similar to SR 90, which accommodate bus only lanes.



Figure 2-4: Bus Only Lane Examples



2.3.3 Bicycle Mode



As portrayed in Figures 1-2 and 1-3, the study corridor's existing typical section does not accommodate any type of bicycle facility. Current FDOT standards make an effort to implement bicycle lanes or wide curb lanes on every suitable state road on which work is being performed. Since the study corridor is indeed a state owned and maintained roadway facility, every conceptualized alternative presented herein considers accommodating bicycles in one way or another.

Although westbound SR 90/SW 7th Street presents more ROW limitations than eastbound SR 90/SW 8th Street, at a minimum, a wide curb lane can be provided on the former. Taking this into consideration and the fact that both directions are treated as a pair, all conceptual alternatives provide bicycle facilities. This means that all concepts benefit the bicycle mode; however, in order to distinguish certain alternatives as being more favorable to this mode, the following condition was considered:

- The alternative favors mostly bicycles if it provides an exclusive buffer separated two-way cycle track on one of the directions of the study corridor. Additionally, it was considered preferable if the cycle track is provided on SW 8th Street since, out of the two directions of SR 90, this is the street with the most bicycle supportive land use patterns (i.e., more frequented places, more businesses, etc.).

The following documents were used for the development of these conceptual alternatives:

- Chapter 8 of the FDOT PPM Vol. 1. 2014
- A Summary of Design, Policies and Operational Characteristics 2012
- 2014 National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide
- Boston Complete Streets 2013 Design Guideline



All conceptual alternatives provide at least one of the following types of bicycle accommodations:



Exclusive shared bicycle/bus lanes (SBBL)

- This is a lane solely dedicated for the use of buses and bicyclists. Vehicles performing right turns may also use this lane.
- The SBBLs considered for the alternatives provide widths that range from 13 feet to 14.5 feet.
- **Sufficient signage** is essential to indicate that bicycles are allowed to travel on these lanes.
- The safety of bicyclists in bus lanes may also be improved if **adequate training is provided for bus operators**.



Dedicated conventional bicycle lanes

- As it pertains to the study corridor, conventional bicycle lanes should be 4 feet in width when adjacent to the curb and gutter, and 5 feet in width when between a travel lane and an on-street parking lane, as per Chapter 8, Vol. 1 of the 2015 FDOT Plans Preparation Manual.



Buffered bicycle lanes

- Provide space for bicyclists to pass each other without encroaching into the adjacent general use traffic lane.
- Can encourage bicycling by **contributing to the perception of safety**.
- The alternatives in which this was considered provide a buffer separation of 2.5 feet in width.



Contra flow bicycle lanes

- Bicycle facilities designed to allow cyclists to travel legally in the opposite direction on a one-way street, delineated from the opposing motor vehicle lane with double yellow striping.
- **Provide connectivity and access for bicyclists** traveling in both directions and reduce dangerous wrong-way riding.
- Special consideration should be taken at intersections to account for the expectancy of those traveling in the opposite direction.
- The alternatives in which this was considered provide a buffer separation of 2 feet in width.



Two-Way cycle tracks

- These allow bicycle movement in both directions on one side of the road.
- Research shows that they are **more attractive for bicyclists**, and that they **reduce out of direction travel** by providing contra-flow bicycle movement.
- Special consideration should be given at transit stops to manage bicycle and pedestrian interactions.
- Special consideration should be taken at intersections to account for the expectancy of those traveling in the opposite direction.
- The buffer widths provided on the alternatives which consider two-way cycle tracks range from 1.5 feet to 3 feet. A 3 feet buffer is the minimum separation that should be provided for the cycle tracks between the curb and gutter and an on-street parking lane to avoid conflict with parked vehicles.

Additional to providing the aforementioned bicycle accommodations, other enhancements which cannot be represented on the corridor's typical section, could be implemented to create a better environment for bicyclists. The following items could be provided on the study corridor as improvements for the bicycle mode:

- Bicycle parking
 - Short-term (Bike racks)
 - This provides bicyclists, who generally park for two hours or less, a convenient and readily accessible place to station bicycles. It should be located within a reasonable distance (50 feet) from the area most frequented by cyclists.
 - Sufficient bicycle racks should at least be provided on most, if not all, transit stops/stations within the study corridor.



- Long-term (Bike lockers and/or cages)
 - This provides bicyclists who stay at a site for several hours a secure and weather-protected place to store their bicycles. It should be located on site or within 750 feet of the site since daily bicycle commuters are generally willing to walk a short distance if they are confident the parking is secure.



- Bike boxes
 - NACTO defines a bike box as a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase.
 - Given sufficient level of analysis and design, bike boxes could be provided at certain intersections of the study corridor.



- Colored bicycles lanes
 - Should bicycles facilities be implemented as per the conceptual alternatives presented in this document, sufficient analysis ought to subsequently take place to identify and obtain approval for locations within the study corridor in which color could be applied to the pavement.



- Wayfinding (Signage)
 - Adequate signage is essential to direct bicyclists, who may be unfamiliar with the area, to places of interest.
 - Wayfinding signs for cyclists on this corridor should include travel distances, direction arrows, and facility names. Additionally, they should complement other roadway and city signage.



2.3.4 Pedestrian Mode



Accommodating pedestrians is essential for accomplishing a livable community. Walking is the most basic form of transportation and thus any corridor aiming to provide safety, mobility, and connectivity must accommodate an accessible, secure, and appealing pedestrian environment. While both directions of SR 90 provide wider than standard sidewalks, there is room for improvement. After the existing conditions phase of this study and after conducting PAT meetings, it became clear that pedestrian safety is the number one priority for this corridor.

The existing average sidewalks widths of the study corridor are portrayed in Figures 1-2 and 1-3. All of the conceptual alternatives either maintain the existing sidewalk widths or provide wider ones. Clearly, every alternative which provides wider sidewalks is considered favorable for the pedestrian mode. Nonetheless, it should be mentioned that the alternatives which consider maintaining the existing sidewalk widths, do so under the notion that:

- The City of Miami, within which the study corridor is located, has a 10 feet setback requirement for any new development in the area. This implies that over time, as the land use within the study area is redeveloped, the pedestrian area of the corridor’s typical section will accommodate an extra 10 feet of either frontage zone or greenscape/furnishing zone.

Though at times not feasible because of existing ROW constraints, especially on westbound SR 90 (SW 7th Street), all sidewalk zones were considered for the development of conceptual alternatives. Figure 2-5 portrays the different areas that should be taken into account when designing/improving the pedestrian environment of a corridor. The desired widths for the different areas are found in various literature regarding pedestrian zones. The ones described here were obtained from the Boston Complete Streets 2013 Design Guideline.

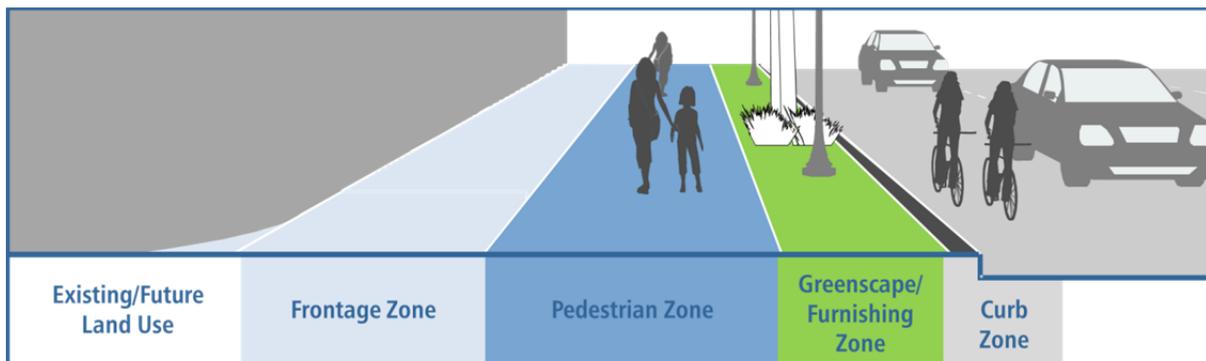


Figure 2-5: Sidewalk Zones



- Frontage (Spillout) Zone: This is the area adjacent to the ROW line where transitions between the sidewalk and the adjacent land uses occur. This area is commonly used for public activities such as outdoor cafes and sidewalk sales. The minimum width of this zone is typically 2 feet but it should desirably be 6 feet to 10 feet wide (NACTO Urban Street Design Guide and Boston Complete Streets Design Guidelines).
- Pedestrian (Throughway) Zone: This refers to the basic portion of the sidewalk that is used for pedestrian travel along the corridor. This zone should be clear of obstructions, straight, continuous, well lit, and functional in all weather conditions. Chapter 8 of the FDOT PPM Vol. 1. 2015, states that the minimum width of this zone, for an urban corridor such as SR 90, should be 5 feet when situated at least 2 feet from the back of the curb. If adjacent to the back of the curb, then this zone should have a minimum width of 6 feet. This zone should desirably be 8 feet to 10 feet wide (NACTO Urban Street Design Guide and Boston Complete Streets Design Guidelines).
- Greenscape/Furnishing Zone: This is the portion of the sidewalk between the back of the curb and the walkable area, which is commonly used for the placement of landscaping, transit stops, street lights, site furnishings, bicycle racks, street signs, utilities and various other pedestrian amenities and objects. This zone is usually 2 feet wide and has a desirable width of 6 feet (NACTO Urban Street Design Guide and Boston Complete Streets Design Guidelines).

SW 8th Street is undoubtedly the most pedestrian friendly street of the two directions of SR 90. This corridor is bounded on both sides by businesses and restaurants, offers tourist attractions, transforms every Friday into an artistic expo, and hosts one of the largest cultural events in Miami-Dade County every year. Therefore, it is essential for sidewalks to provide a vibrant public environment and a sense of place and community. As time goes by and the land use within the area is redeveloped, sidewalks on SW 7th Street should exhibit equal characteristics.

The alternatives which consider wider sidewalks for SW 8th Street provide widths that range from 10.5 feet to 16 feet. Though the three main zones are accommodated within the existing 9 feet average sidewalk width at certain locations of the corridor, all pedestrian zones should be more prevalent throughout the entire study segment of SR 90. Additionally, most alternatives for SW 7th Street provide sidewalk widths of at most 7 feet. One alternative, however, recommends widths of 11 feet which would allow for more than one of the zones to be effectively accommodated. Figure 2-6 serves as an example of the possibilities for the environment that could and should be exhibited on the sidewalks of the study segment of SR 90.



Figure 2-6: Sidewalks Vision for SR 90



2.4 Conceptual Roadway Typical Sections

This section presents and describes the range of developed conceptual typical sections for both directions of the study corridor in terms of which transportation mode they favor. This range of typical section groups will be screened during the following phase of this study.

As each of the typical section groups are discussed, one or more of the following icons will display the favored transportation mode(s), and the icon size will represent the level of priority.



Additionally, conceptual typical sections are described using the following terms, which identify changes to the existing typical section and their implication:

- Narrower pavement width
 - Can be accomplished through complete or partial roadway reconstruction. Both of these imply high construction costs because of potential modification to the existing drainage system and utilities and entail long term implementation effort. Complete or partial reconstruction would have to be determined through further engineering analysis.
- Existing pavement width
 - Can be accomplished through resurfacing and restriping. This implies low construction costs and a short-term implementation effort.
- Wider pavement width
 - Can be accomplished through complete roadway reconstruction or partial widening. Both of these methods imply high construction costs because of potential modification to the existing drainage system and utilities which entails long term implementation effort. Complete reconstruction or partial widening would have to be determined through further engineering analysis.

All conceptual typical sections presented in this section provide two traffic flow configurations:

- Existing traffic flow (traditional right-hand rule)
- Reversed traffic flow (inverted / left-hand rule)



2.4.1 Typical Sections Group A



Group A is considered favorable to automobiles because it maintains three (3) general use travel lanes on both SW 7th and 8th Streets and one (1) on-street parking lane on SW 8th Street. This group is also considered favorable to bicycles because it provides a buffer separated two-way cycle track on SW 8th Street.

This group proposes:

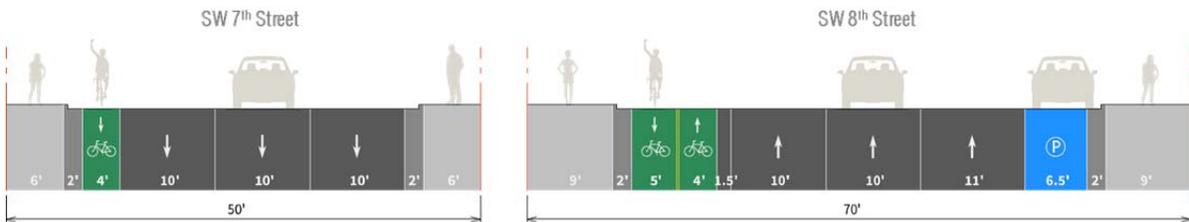
SW 7th Street

- 4 feet conventional bicycle lane.
- 6 feet sidewalks on both sides.
- Wider pavement width.

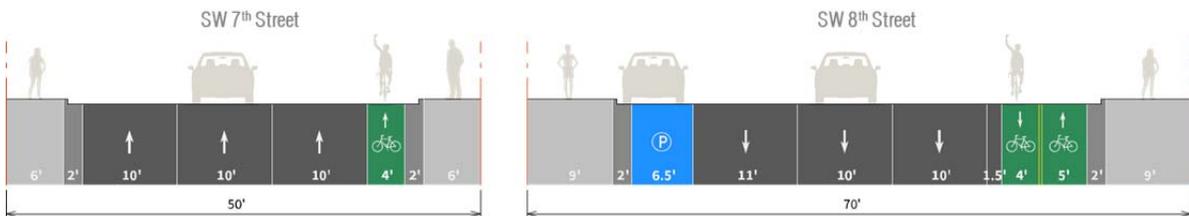
SW 8th Street

- Repurposing of one (1) of the two (2) existing on-street parking lanes to provide a two-way cycle track separated from traffic by a 1.5 feet buffer.
- Providing one 11 feet outside lane to accommodate large vehicles such as buses and trucks.
- 9 feet sidewalks on both sides.
- Existing pavement width.

Group A - Existing Traffic Flow



Group A - Reversed Traffic Flow





2.4.2 Typical Sections Group B



Group B is considered favorable to automobiles because it maintains three (3) general use travel lanes on SW 7th Street and two (2) on-street parking lanes on SW 8th Street. This group is also considered favorable to bicycles because it provides a buffer separated two-way cycle track on SW 8th Street.

This group proposes:

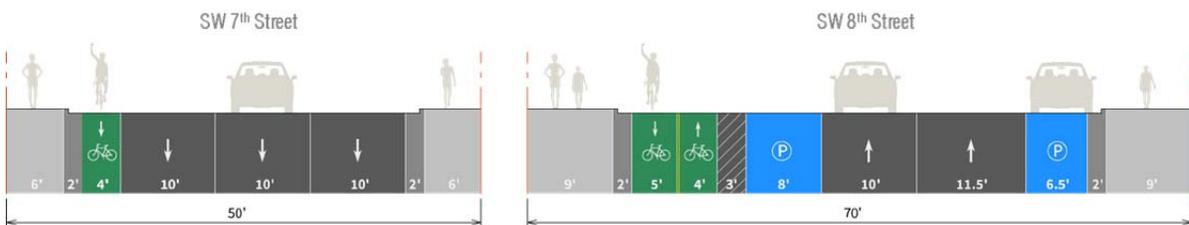
SW 7th Street

- 4 feet conventional bicycle lane.
- 6 feet sidewalks on both sides.
- Wider pavement width.

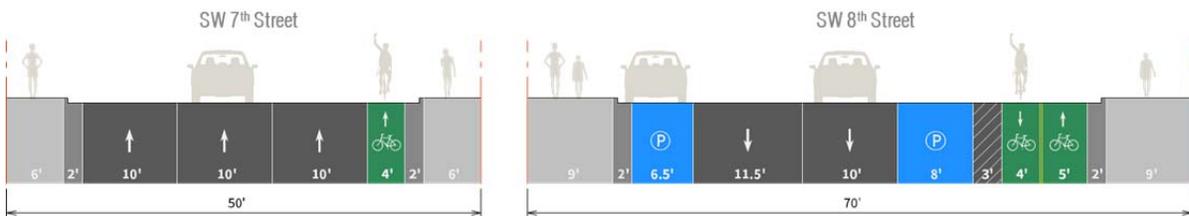
SW 8th Street

- Repurposing of one (1) general use travel lane to provide a two-way cycle track separated from an on-street parking lane by a 3 feet buffer.
- Providing one 11.5 feet outside lane to accommodate large vehicles such as buses and trucks.
- 9 feet sidewalks on both sides.
- Existing pavement width.

Group B - Existing Traffic Flow



Group B - Reversed Traffic Flow





2.4.3 Typical Sections Group C



Group C is considered favorable to automobiles because it maintains three (3) general use travel lanes on both SW 7th and 8th Streets and one (1) on-street parking lane on SW 8th Street. Pedestrians are also considered to benefit from this group because it provides wider sidewalks on SW 8th Street. This group is also considered favorable to bicycles because it provides a buffer separated bicycle lane on SW 8th Street.

This group proposes:

SW 7th Street

- 4 feet conventional bicycle lane.
- 6 feet sidewalks on both sides.
- Wider pavement width.

SW 8th Street

- Repurposing of one (1) of the two (2) existing on-street parking lanes to provide a bicycle lane separated from traffic by a 2.5 feet buffer.
- Providing one 11 feet outside lane to accommodate large vehicles such as buses and trucks.
- 10.5 feet sidewalks on both sides.
- Narrower pavement width.

Group C - Existing Traffic Flow



Group C - Reversed Traffic Flow





2.4.4 Typical Sections Group D



Group D is considered favorable to automobiles because it maintains three (3) general use travel lanes on both SW 7th and 8th Streets. Pedestrians are also considered to benefit from this group because it provides wider sidewalks on SW 8th Street. Also, this group is considered favorable to bicycles because it provides a buffer separated two-way cycle track on SW 8th Street.

This group proposes:

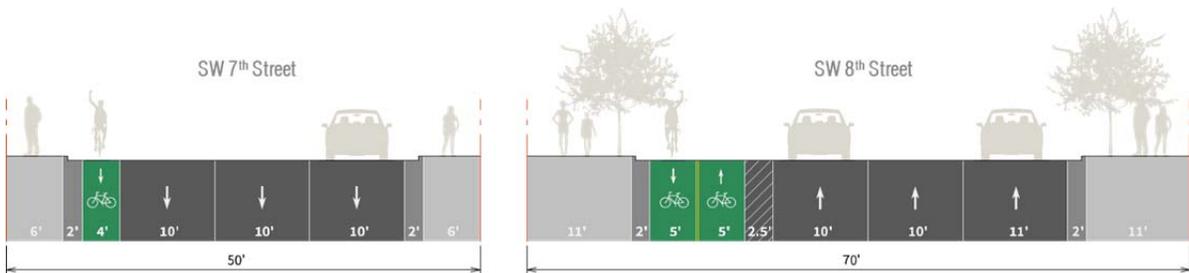
SW 7th Street

- 4 feet conventional bicycle lane.
- 6 feet sidewalks on both sides.
- Wider pavement width.

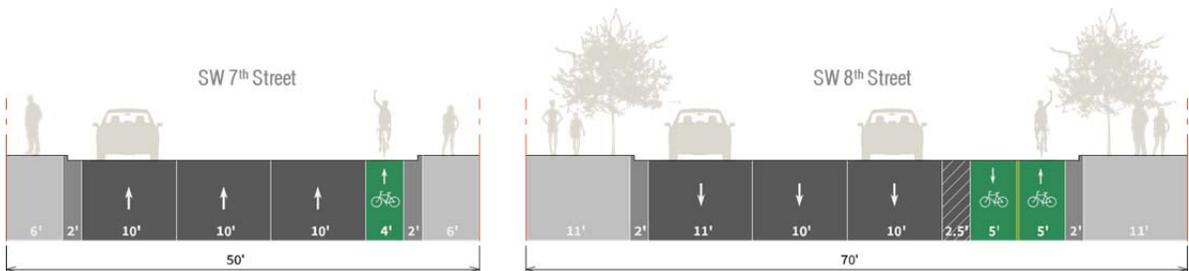
SW 8th Street

- Repurposing both existing on-street parking lanes to provide a two-way cycle track separated from traffic by a 2.5 feet buffer.
- Providing one 11 feet outside lane to accommodate large vehicles such as buses and trucks.
- 11 feet sidewalks on both sides.
- Narrower pavement width.

Group D - Existing Traffic Flow



Group D - Reversed Traffic Flow





2.4.5 Typical Sections Group E



Group E is considered favorable to pedestrians because it provides wider sidewalks on both SW 7th and 8th Streets. Automobiles are considered to benefit from this group because it maintains three (3) general use travel lanes on SW 8th Street. Also, this group is considered favorable to bicycles because it provides bicycle lanes on both SW 7th and 8th Streets.

This group proposes:

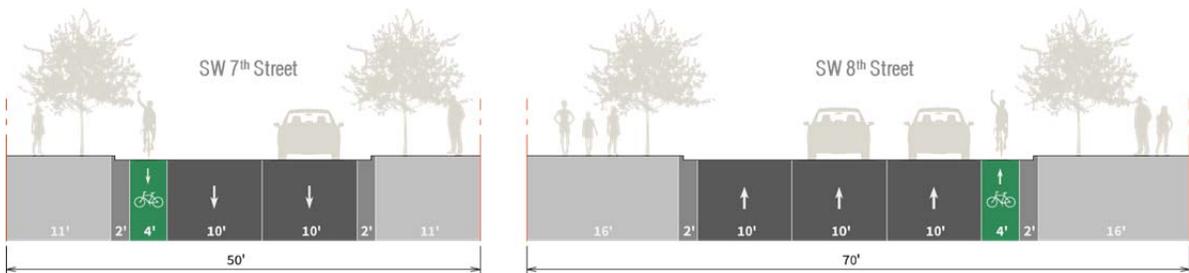
SW 7th Street

- 4 feet conventional bicycle lane.
- 11 feet sidewalks on both sides.
- Narrower pavement width.

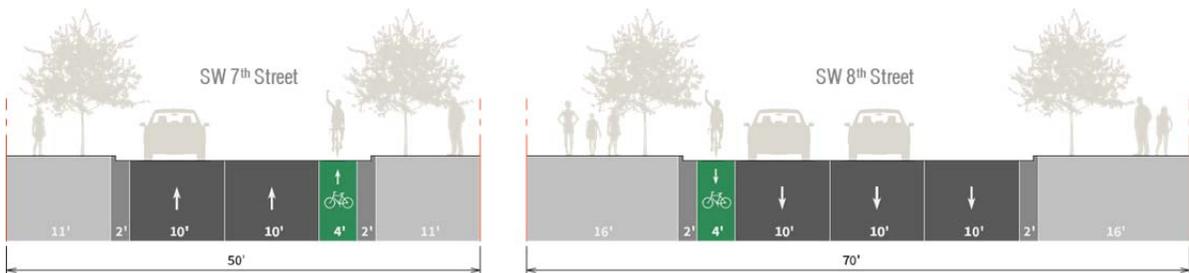
SW 8th Street

- 4 feet bicycle lane.
- 16 feet sidewalks on both sides.
- Narrower pavement width.

Group E - Existing Traffic Flow



Group E - Reversed Traffic Flow



2.4.6 Typical Sections Group F



Group F is considered favorable to transit because it provides an exclusive bus lane on SW 8th Street and an exclusive shared bus and bicycle lane on SW 7th Street. This group is also considered favorable to bicycles because it provides a buffer separated two-way cycle track on SW 8th Street. Automobiles are also considered to benefit from this group because it maintains one (1) on-street parking lane on SW 8th Street.

This group proposes:

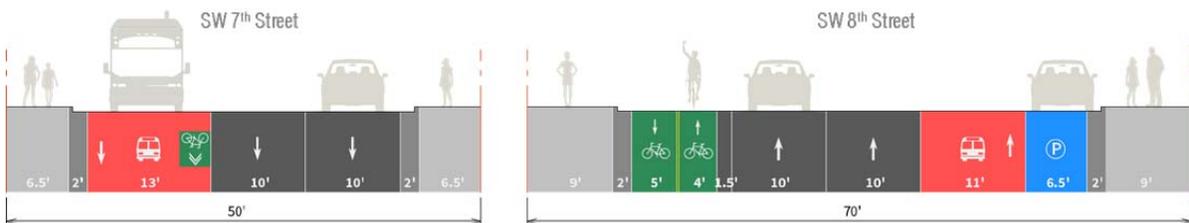
SW 7th Street

- Repurposing of one (1) general use travel lane to provide an exclusive 13 feet shared bus and bicycle lane.
- 6.5 feet sidewalks on both sides.
- Existing pavement width.

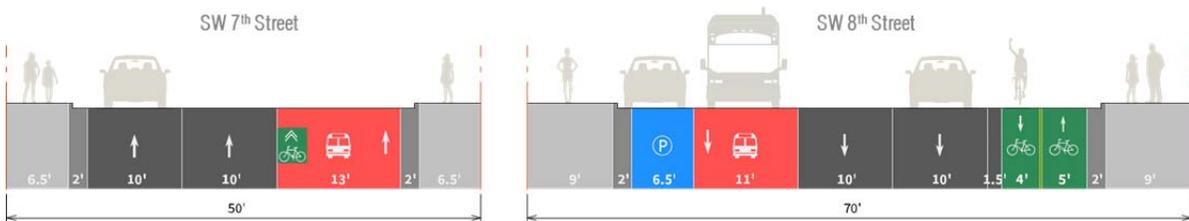
SW 8th Street

- Repurposing of one (1) of the two (2) existing on-street parking lanes to provide a two-way cycle track separated from traffic by a 1.5 feet buffer.
- Repurposing of one (1) general use travel lane to provide an exclusive 11 feet bus only outside lane.
- 9 feet sidewalks on both sides.
- Existing pavement width.

Group F - Existing Traffic Flow



Group F - Reversed Traffic Flow





2.4.7 Typical Sections Group G



Group G is considered favorable to transit because it provides an exclusive shared bus and bicycle lane on both SW 7th and 8th Streets. This group is also considered favorable to bicycles because it provides a buffer separated contra-flow bicycle lane on SW 8th Street. Automobiles are also considered to benefit from this group because it maintains one (1) on-street parking lane on SW 8th Street.

This group proposes:

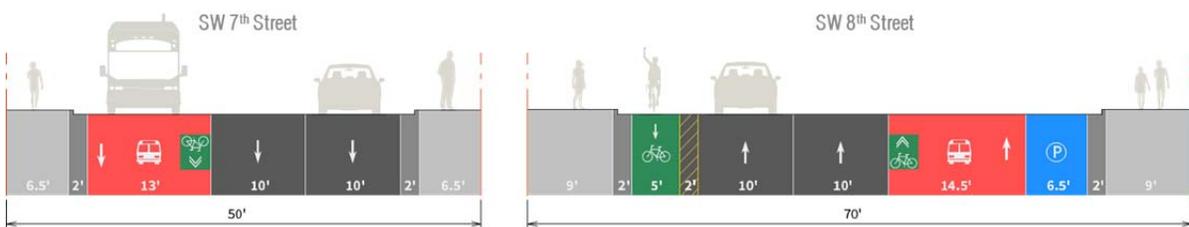
SW 7th Street

- Repurposing of one (1) general use travel lane to provide an exclusive 13 feet shared bus and bicycle lane.
- 6.5 feet sidewalks on both sides.
- Existing pavement width.

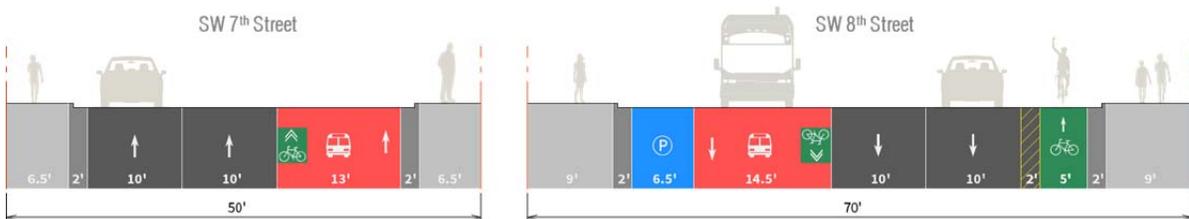
SW 8th Street

- Repurposing of one (1) of the two (2) existing on-street parking lanes to provide a contra-flow bicycle lane separated from traffic by a 2 feet buffer.
- Repurposing of one (1) general use travel lane to provide an exclusive 14.5 feet shared bus and bicycle only outside lane.
- 9 feet sidewalks on both sides.
- Existing pavement width.

Group G - Existing Traffic Flow



Group G - Reversed Traffic Flow





2.4.8 Typical Sections Group H



Group H is considered favorable to pedestrians because it provides wider sidewalks on SW 8th Street. This group is also considered favorable to transit because it provides an exclusive shared bus and bicycle lane on both SW 7th and 8th Streets. Automobiles are also considered to benefit from this group because it maintains one (1) on-street parking lane on SW 8th Street.

This group proposes:

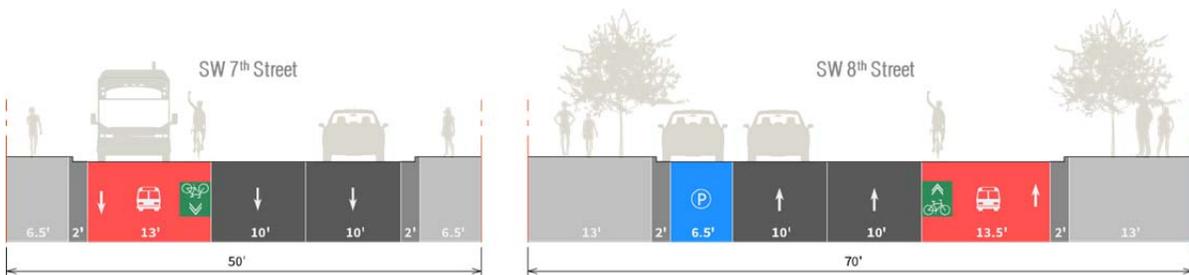
SW 7th Street

- Repurposing of one (1) general use travel lane to provide an exclusive 13 feet shared bus and bicycle lane.
- 6.5 feet sidewalks on both sides.
- Existing pavement width.

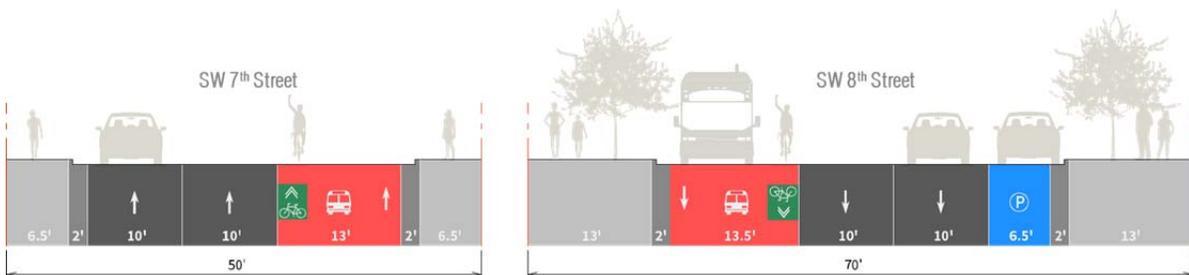
SW 8th Street

- Repurposing of one (1) of the two (2) existing on-street parking lanes to provide wider sidewalks of 13 feet in width on both sides.
- Repurposing of one (1) general use travel lane to provide an exclusive 13.5 feet shared bus and bicycle only outside lane.
- Narrower pavement width.

Group H - Existing Traffic Flow



Group H - Reversed Traffic Flow





2.4.9 Typical Sections Group I



Group I is considered favorable to transit because it provides an exclusive bus lane on SW 8th Street and an exclusive shared bus and bicycle lane on SW 7th Street. Automobiles are also considered to benefit from this group because it maintains three (3) general use travel lanes on SW 8th Streets. This group is also considered favorable to pedestrians because it provides wider sidewalks on SW 8th Street.

This group proposes:

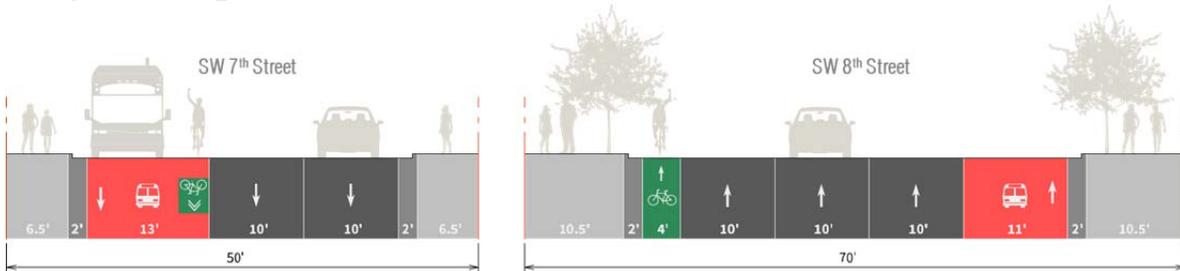
SW 7th Street

- Repurposing of one (1) general use travel lane to provide an exclusive 13 feet shared bus and bicycle lane.
- 6.5 feet sidewalks on both sides.
- Existing pavement width.

SW 8th Street

- Repurposing both existing on-street parking lanes to provide an exclusive 11 feet bus only outside lane and a 4 feet conventional bicycle lane.
- 10.5 feet sidewalks on both sides.
- Narrower pavement width.

Group I - Existing Traffic Flow



Group I - Reversed Traffic Flow





2.4.10 Typical Sections Group J



Group J is considered favorable to bicycles because it provides a buffer separated two-way cycle track on SW 8th Street. Transit is also considered to benefit from this group because it provides an exclusive bus lane on SW 8th Street and an exclusive shared bus and bicycle lane on SW 7th Street. This group is also considered favorable to pedestrians because it provides wider sidewalks on SW 8th Street.

This group proposes:

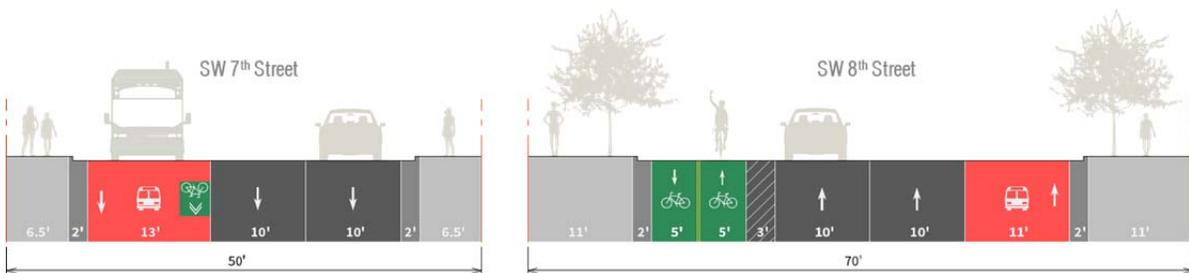
SW 7th Street

- Repurposing of one (1) general use travel lane to provide an exclusive 13 feet shared bus and bicycle lane.
- 6.5 feet sidewalks on both sides.
- Existing pavement width.

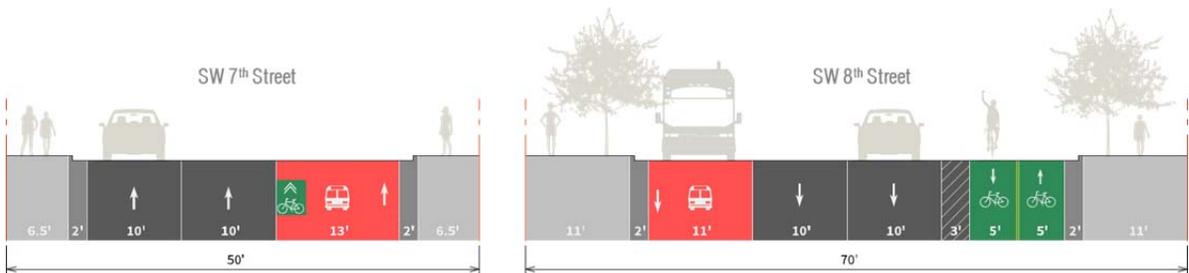
SW 8th Street

- Repurposing both existing on-street parking lanes to provide an exclusive 11 feet bus only outside lane and a two-way cycle track separated from traffic by a 3 feet buffer.
- 11 feet sidewalks on both sides.
- Narrower pavement width.

Group J - Existing Traffic Flow



Group J - Reversed Traffic Flow





2.4.11 Typical Sections Group K



Group K is considered favorable to transit because it provides exclusive bus and bicycle lanes on SW 8th Street. This group is also considered favorable to bicycles because it provides a buffer separated two-way cycle track on SW 7th Street.

This group proposes:

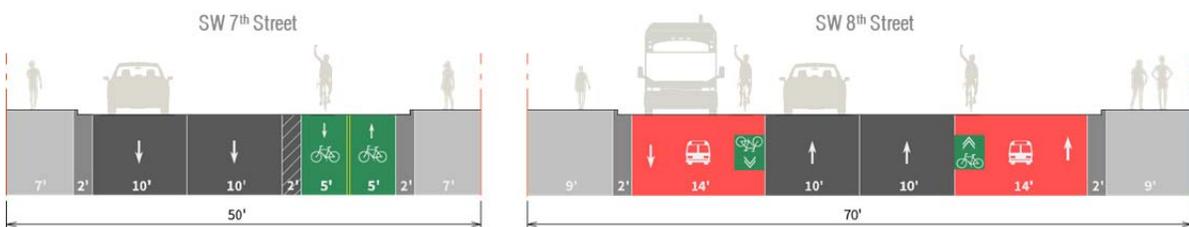
SW 7th Street

- Repurposing of one (1) general use travel lane to provide a two-way cycle track separated from traffic by a 2 feet buffer.
- 7 feet sidewalks on both sides.
- Narrower pavement width

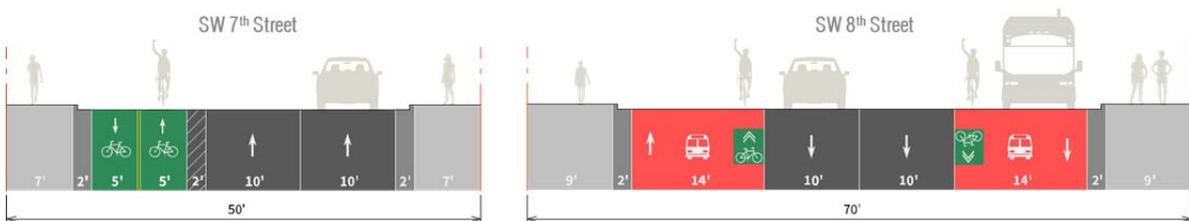
SW 8th Street

- Repurposing both existing on-street parking lanes to provide an exclusive 14 feet shared bus and bicycle only outside lane and an exclusive 14 feet shared bus and bicycle only contra-flow lane.
- 9 feet sidewalks on both sides.
- Existing pavement width.

Group K - Existing Traffic Flow



Group K - Reversed Traffic Flow





2.4.12 Typical Sections Group L



Group L is considered favorable to transit because it provides exclusive bus and bicycle lanes on SW 8th Street. This group is also considered favorable to automobiles because it provides reversible traffic flow lane on SW 7th Street. This group considers two-way traffic flow on SW 7th Street and SW 8th Street.

This group proposes:

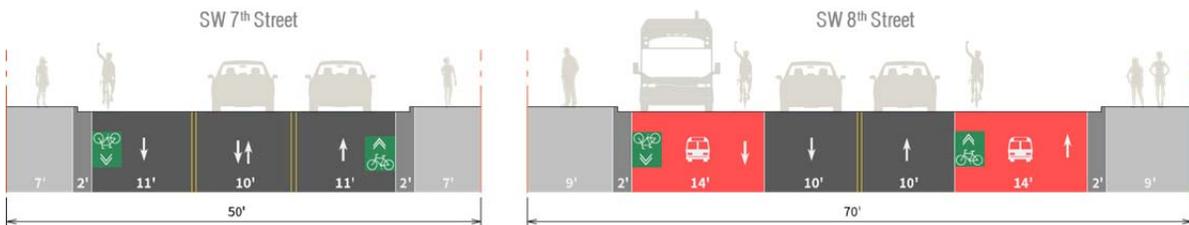
SW 7th Street

- Repurposing of one (1) general use travel lane to provide a reversible lane
- 7 feet sidewalks on both sides.
- Narrower pavement width.

SW 8th Street

- Repurposing both existing on-street parking lanes to provide two exclusive transit lanes
- 9 feet sidewalks on both sides.
- Existing pavement width.

Group L - Two-Way Traffic Flow



2.5 SR 90 and I-95 Interchange

The existing interchange of SR 90 and Interstate 95 between SW 3rd Avenue and SW 4th Avenue has considerable significance on the operations of the study corridor. Its existing configuration provides access to and from southbound I-95 on SW 4th Avenue, access from northbound I-95 on SW 3rd Avenue, and access to northbound I-95 on eastbound SR 90 (SW 8th Street). This last access point is in the form of two (2) back to back on-ramps with entrances approximately 150 feet apart. One ramp merges with northbound I-95 on its west side (inside or left merge) and the other on its east side (outside or right merge). Additionally, the easternmost I-95 northbound on-ramp can be accessed from southbound SW 3rd Avenue by crossing the signalized intersection with SR 90/SW 8th Street. Figures 2-7 and 2-8 show the existing configuration of the interchange and its points of access, respectively.

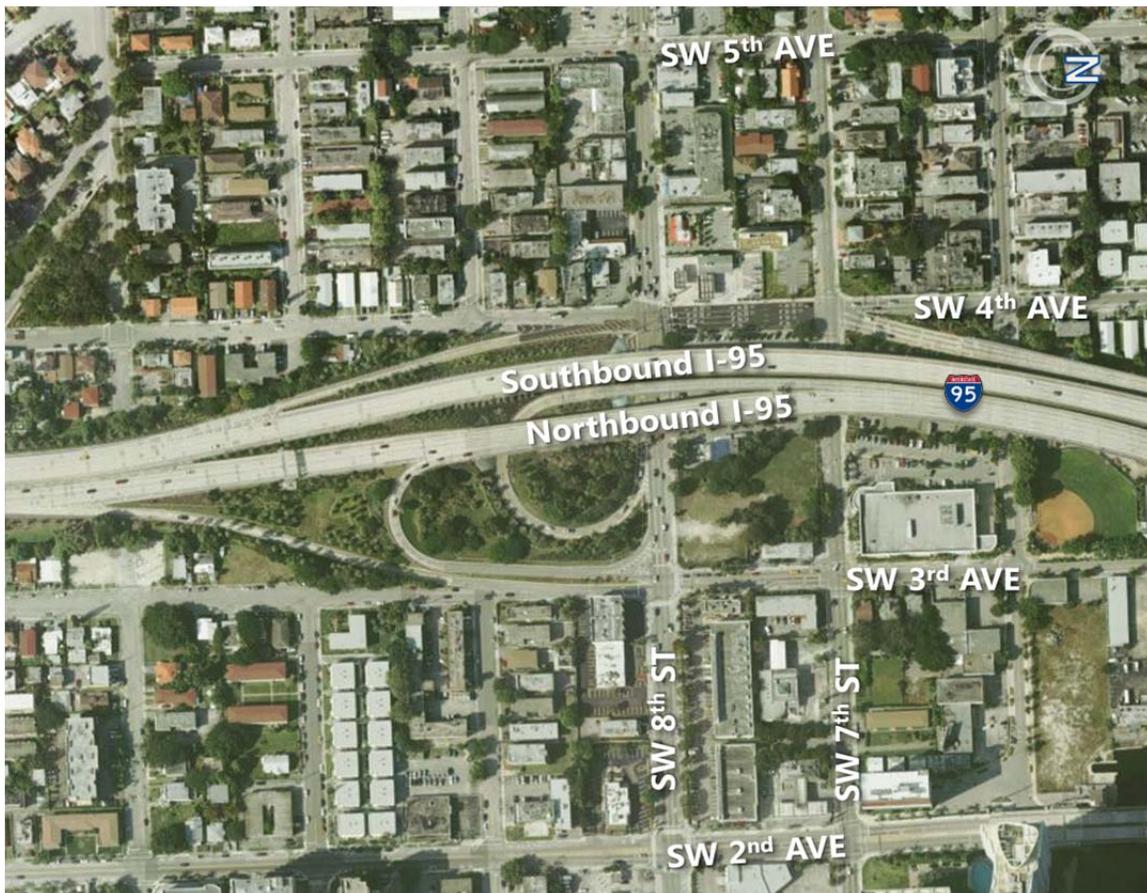


Figure 2-7: Existing Configuration of the SR 90 and I-95 Interchange

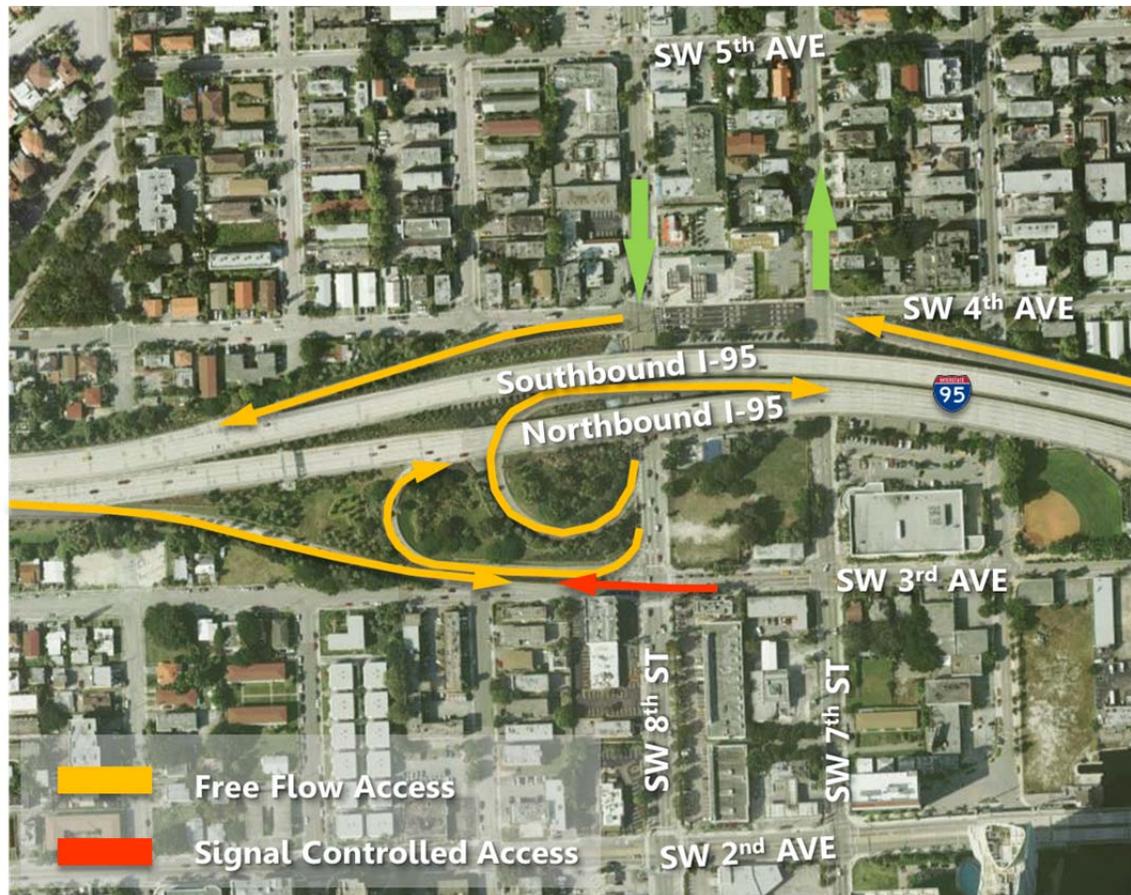


Figure 2-8: Existing Access Points for the SR 90 and I-95 Interchange

2.5.1 Existing Interchange Operational Conflicts

The existing conditions analysis phase determined that eastbound and westbound SR 90 operate at nearly failing automobile levels of service during the morning and afternoon peak traffic periods. Long queues of vehicles were observed and recorded during these times within the area bounded by SW 5th Avenue and SW 2nd Avenue. Specifically, one of the most noticeable impacts to the operations of the interchange takes place at the intersection of eastbound SR 90 (SW 8th Street) and southbound SW 3rd Avenue. As previously mentioned this is a signal controlled intersection and it is the most direct access to northbound I-95 for vehicles traveling on westbound SR 90 (SW 7th Street). The fact that this is not a free-flow connection produces long queues of vehicles on westbound SR 90 (SW 7th Street) that attempt to access the interstate freeway. A portrayal of this is shown on Figure 2-9. Additionally, numerous conflicts have been observed, and documented, on eastbound SR 90 (SW 8th Street) due to the close proximity of both on-ramps for northbound I-95. The conflicts typically arise from vehicles that turn left onto eastbound SR 90 (SW 8th Street) from southbound SW 4th Avenue trying to access northbound I-95. Observed and documented traffic patterns of this intersection show that the majority of the vehicles, not having knowledge of a second ramp, immediately try to access the first ramp while performing unsafe maneuvers to do so. As a result, numerous crashes have occurred at this location, which has placed the intersection of eastbound SR 90 (SW 8th Street) and SW 4th Avenue on FDOT’s high-crash list. A graphical depiction of this conflict is shown on Figure 2-10.



Figure 2-9: Vehicle Queues on Westbound SR 90 (SW 7th Street)



Figure 2-10: Interchange Access Conflicts on Eastbound SR 90 (SW 8th Street)



2.5.2 Conceptual Interchange Improvements (Alternatives)

Conceptual alternatives were developed for the interchange with the objective of providing solutions to some of the aforementioned existing operational problems within this area of the study corridor. Four (4) concepts were developed, three (3) maintain the existing traffic flow of SR 90 and one (1) considers reversal of the flows. Figures 2-11 through 2-14 illustrate the four (4) conceptual alternatives considered for the interchange. All of the concepts were developed under the notion that portions of I-95 would have to be realigned and/or reconstructed.

Currently FDOT is conducting a Master Plan Study for I-95 from the Miami-Dade/Broward County line to where I-95 ends and merges onto US-1. Coordination with the Project Team from that study will take place to discuss any proposed changes to the I-95 interchange. In addition, any changes to the current configuration would result in the need for an Interchange Modification Report (IMR) which would be completed during the next phase of the study, Project Development and Environment (PD&E).

2.5.2.2 Factors Considered for Interchange Alternatives Development

The following items were taken into account during the development of all conceptual alternatives for the interchange of SR 90 and I-95, and should be considered and thoroughly analyzed for the conceptualization and design of any future alternatives.

- Vertical clearance over the Miami River
 - Research indicates that the vertical clearance requirement for the Miami River is 75 feet over Mean High Water (*United States Coast Guard, US Waterways Clearance Guide*).
- Vertical profile of SR 90 and SW 3rd Avenue
 - Alternatives that consider the construction of a structure of SR 90 and/or SW 3rd Street should ensure that at least 16.5 feet of vertical clearance are provided from the crown of such corridors (*Chapter 2, FDOT PPM, 2015*).
- Ramp spacing requirements for I-95
 - The existing northbound I-95 on-ramp from SR 90 has a succeeding northbound I-95 off-ramp to US-1/Biscayne Blvd./Downtown Miami located approximately 2,200 feet to the north. Reviews of existing literature indicate that the minimum merging/weaving distance between entrance and exit ramps for urban interchanges should be 1,500 feet on average (*NCHRP Report 687, Guidelines for Ramp and Interchange Spacing, 2011*). All developed alternatives considering an on-ramp to northbound I-95 should take into account the succeeding northbound I-95 off-ramp towards downtown.



2.5.2.3 Interchange Conceptual Alternative 1



Figure 2-11: SR 90 and I-95 Interchange Conceptual Alternative 1

This alternative proposes the following:

1. Northbound I-95 direct on-ramp from westbound SR 90 (SW 7th Street)

This implies the construction of a fly-over ramp which would go over SW 3rd Avenue and eastbound SR 90 (SW 8th Street).

2. Northbound I-95 direct on-ramp from eastbound SR 90 (SW 8th Street)

This connection would follow the footprint of the existing westernmost northbound I-95 SR 90 on-ramp.

3. Southbound I-95 direct off-ramp to eastbound SR 90 (SW 8th Street)

This consists of a detached ramp that would emerge from the existing southbound I-95 off-ramp to westbound SR-90 (SW 7th Street). The ramp would remain elevated and go over westbound and eastbound SR 90 (SW 7th & 8th Streets). The ramp would curve under I-95, merge with the I-95 northbound off-ramp, and exit directly at the intersection of SR 90 (SW 8th Street) and SW 3rd Avenue.

4. Reconstruction and/or realignment (vertically and horizontally) of I-95 to accommodate proposed improvements

This implies potential construction of new bridge structures for the mainline.

5. Construction of a new segment of SW 11th Street to go under I-95

This would provide another connection for the street grid of this area that is unrestricted by I-95.

For a more detailed representation of Alternative 1 refer to Appendix A of this document.



2.5.2.4 Interchange Conceptual Alternative 2

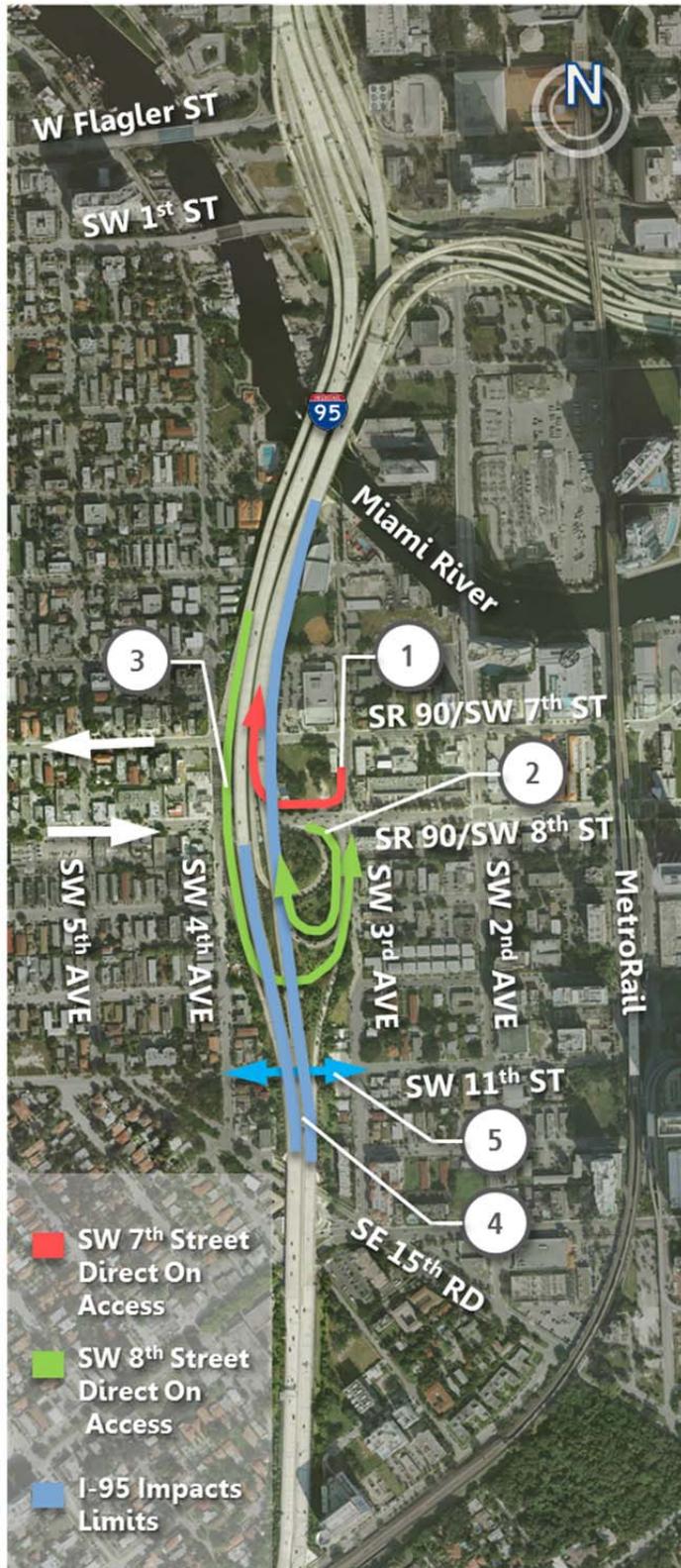


Figure 2-12: SR 90 and I-95 Interchange Conceptual Alternative 2

This alternative proposes the following:

1. Northbound I-95 direct on-ramp from southbound SW 3rd Avenue

This implies the construction of a ramp which would emerge from southbound SW 3rd Avenue, go under northbound I-95 and enter the latter on its west side.

2. Northbound I-95 direct on-ramp from eastbound SR 90 (SW 8th Street)

This ramp would be similar to the existing easternmost northbound I-95 on-ramp from eastbound SR 90 (SW 8th Street), but would have free flow access from the latter.

3. Southbound I-95 direct off-ramp to eastbound SR 90 (SW 8th Street)

This consists of a detached ramp that would emerge from the existing southbound I-95 off-ramp to westbound SR-90 (SW 7th Street). The ramp would remain elevated and go over westbound and eastbound SR 90 (SW 7th & 8th Streets). The ramp would curve under I-95, merge with I-95 northbound off-ramp, and exit directly at the intersection of SR 90 (SW 8th Street) and SW 3rd Avenue.

4. Reconstruction and/or realignment (vertically and horizontally) of I-95 to accommodate proposed improvements

This implies potential construction of new bridge structures for the mainline.

5. Construction of a new segment of SW 11th Street to go under I-95.

This would provide another connection for the street grid of this area that is unrestricted by I-95.

For a more detailed representation of Alternative 2 refer to Appendix A of this document.



2.5.2.5 Interchange Conceptual Alternative 3

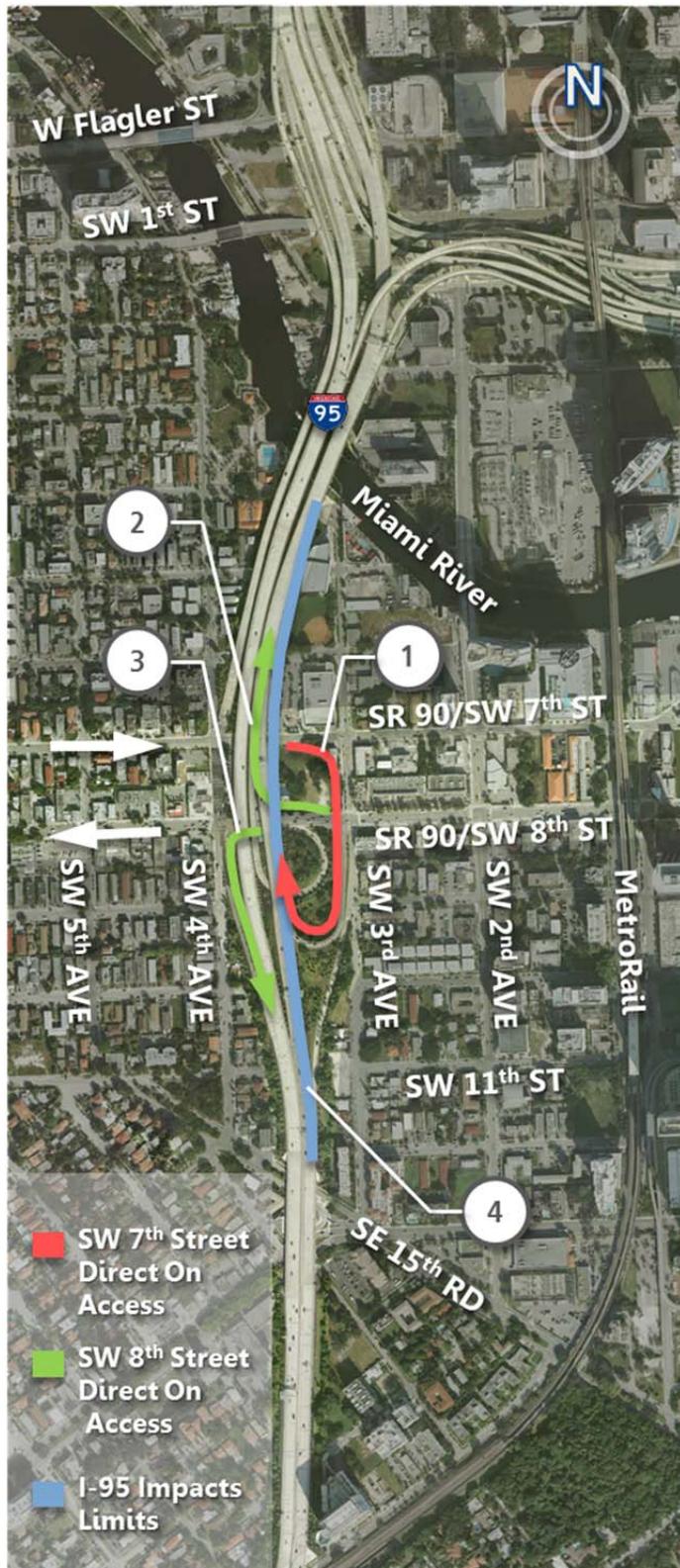


Figure 2-13: SR 90 and I-95 Interchange Conceptual Alternative 3

This alternative considers flow reversal of the existing SR 90 traffic, making SW 7th Street eastbound SR 90, and SW 8th Street westbound SR 90. It proposes the following:

1. Northbound I-95 direct on-ramp from eastbound SR 90 (SW 7th Street)

This implies the construction of a fly-over ramp which would emerge from the new eastbound SR 90 (SW 7th Street) and go over the new westbound SR 90 (SW 8th Street). It would connect to northbound I-95 similarly to its existing easternmost SR 90 on-ramp.

2. Northbound I-95 direct on-ramp from westbound SR 90 (SW 8th Street)

This consists of the construction of a ramp which would emerge from the new westbound SR 90 (SW 8th Street), go under northbound I-95 and enter the latter on its west side.

3. Southbound I-95 direct on-ramp from westbound SR 90 (SW 8th Street)

This ramp would emerge from the left side of the new westbound SR 90 (SW 8th Street), turn under southbound I-95 and merge to the existing southbound I-95 on-ramp from SW 4th Avenue.

4. Reconstruction and/or realignment (vertically and horizontally) of I-95 to accommodate proposed improvements

This implies potential construction of new bridge structures for the mainline.

For a more detailed representation of Alternative 3 refer to Appendix A of this document.



2.5.2.6 Interchange Conceptual Alternative 4

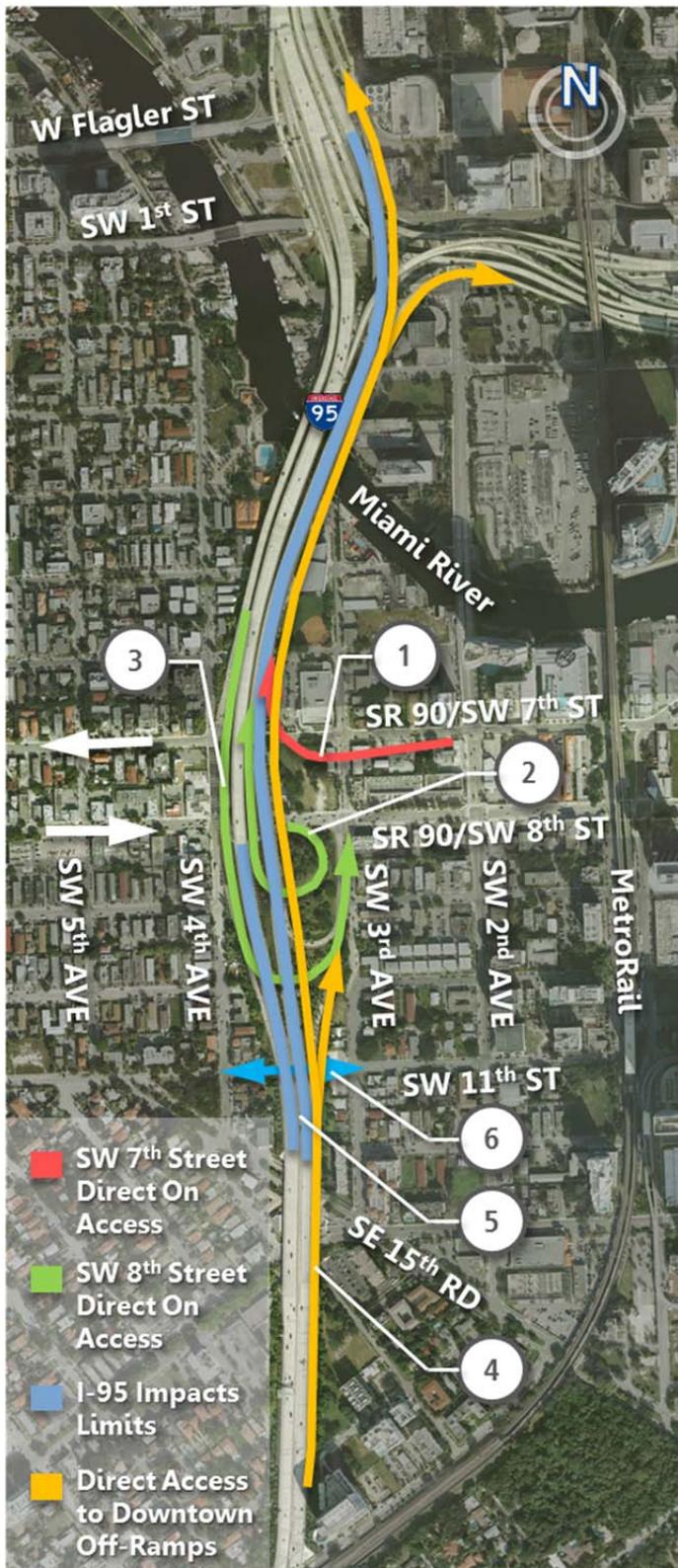


Figure 2-14: SR 90 and I-95 Interchange Conceptual Alternative 4

This alternative proposes the following:

1. Northbound I-95 direct on-ramp from westbound SR 90 (SW 7th Street)

This implies the construction of a fly-over ramp which would go over SW 3rd Avenue and westbound SR 90 (SW 7th Street). The entrance of this ramp to northbound I-95 would be too close to the succeeding off-ramp, thus to avoid this, a detached northbound I-95 off ramp to Downtown Miami has been proposed (see item 4).

2. Northbound I-95 direct on-ramp from eastbound SR 90 (SW 8th Street)

This connection would follow the footprint of the existing westernmost northbound I-95 SR 90 on-ramp.

3. Southbound I-95 direct off-ramp to eastbound SR 90 (SW 8th Street)

This consists of a detached ramp that would emerge from the existing southbound I-95 off-ramp to westbound SR-90 (SW 7th Street). The ramp would remain elevated and go over westbound and eastbound SR 90 (SW 7th & 8th Streets). The ramp would curve under I-95, merge with the I-95 northbound off-ramp, and exit directly at the intersection of SR 90 (SW 8th Street) and SW 3rd Avenue.

4. Southbound I-95 detached direct off-ramp to eastbound SR 90 (SW 8th Street) and to the existing off-ramps to Downtown

This consists of a detached ramp that would emerge approximately from where southbound I-95 goes over SW 15th Road. The ramp would remain elevated, parallel to the alignment of northbound I-95, going over westbound and eastbound SR 90 (SW 7th & 8th Streets) as well as all the I-95 on and off ramps and the Miami River. It would culminate north of W Flagler Street, at the intersection of NW 2nd Street and NW 3rd Avenue. From this ramp would emerge direct connections to: the intersection of eastbound SR 90 (SW 8th Street), SW 3rd Avenue and to the northbound I-95 fly over off-ramp that goes to Downtown Miami.



5. Reconstruction and/or realignment (vertically and horizontally) of I-95 to accommodate the proposed improvements

This implies potential construction of new bridge structures for the mainline and the I-95 southbound off-ramp to eastbound SR 90 (SW 8th Street) and to the existing off-ramps to Downtown Miami. This would require coordination with the City of Miami as observation of recent aerial imagery shows that construction is taking place to the west of the intersection of SW 3rd Avenue and SW 11th Street.

6. Construction of a new segment of SW 11th Street to go under I-95

This would provide another connection for the street grid of this area that is unrestricted by I-95.

For a more detailed representation of Alternative 4 refer to Appendix A of this document.

Although Alternative 4 (and Alternatives 1 and 2 in the details) shows a new segment of SW 11th Street to be constructed as a means of providing a new access across I-95 and improving the network of Downtown Miami, a conflict exists between a current development in the vicinity of the intersection of SW 3rd Avenue and SW 11th Street and this new proposed segment of SW 11th Street. Therefore, coordination between the City of Miami and the developers should take place during the Project Development and Environmental (PD&E) phase of this project to determine the feasibility of this new access.



Appendix A

Conceptual SR 90 and I-95 Interchange Alternatives

SR 90 and I-95 Interchange Alternative 1

Please note that this alternative presents potential weaving issues on westbound SW 7th Street to access the proposed ramp for northbound I-95. This will have to be addressed in the PD&E phase if this alternative is further developed.

Please note that this alternative presents potential weaving issues on southbound and northbound I-95 off-ramps at northbound 3rd Avenue

N
1"=200'



SR 90 and I-95 Interchange Alternative 2



Please note that this alternative presents potential weaving issues on southbound and northbound I-95 off-ramps at northbound 3rd Avenue

1" = 200'

SR 90 and I-95 Interchange Alternative 3

Please note that this alternative presents potential weaving issues for vehicles on southbound SW 4th Street turning onto eastbound SW 7th Street to access northbound I-95. This will have to be addressed in more detail during the PD&E phase if this alternative is further developed.



1" = 200'

N

SR 90 and I-95 Interchange Alternative 4

N

1" = 500'

Please note that this alternative presents potential weaving issues on westbound SW 7th Street to access the proposed ramp for northbound I-95. This will have to be addressed in the PD&E phase if this alternative is further developed.

Please note that this alternative presents potential weaving issues on southbound and northbound I-95 off-ramps at northbound 3rd Avenue

SW 6TH ST

SW 7TH ST

SW 8TH ST

SW 9TH ST

SW 10TH ST

SW 4TH AVE

SW 3RD AVE

SW 6TH ST

SW 7TH ST

SW 8TH ST

SW 9TH ST

SW 10TH ST

SW 11TH ST

SW 12TH ST

SW 13TH ST

SW 5TH AVE

SW 4TH AVE

SW 15TH RD

SW 3RD AVE

SW 2ND AVE