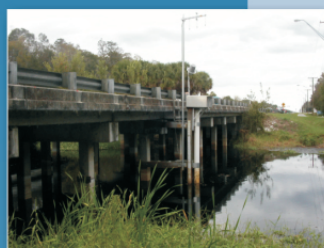
CR 581 (BRUCE B. DOWNS BOULEVARD)

(South of Bearss Avenue to Palm Springs Blvd.)



TRANSIT ASSESSMENT

CIP: 61045

Submitted to:

Hillsborough County Department of Public Works

and

Hillsborough County MPO

Submitted by:

PB Americas, Inc.

June 2010

TRANSIT ASSESSMENT REPORT

Bruce B. Downs Boulevard (C.R. 581)
Segment A

From East Bearss Avenue to south of Palm Springs Boulevard
CIP: 61045

Prepared for:
Hillsborough County Public Works Department and
Hillsborough County Metropolitan Planning Organization
Tampa, Florida

Prepared by:
PB Americas, Inc.
Tampa, Florida

June 2010

Table of Contents

Table of Contents

List of Figures

List of Tables

INTRODUCTION

Under direction from the Hillsborough County Department of Public Works, PB Americas is completing the engineering plans for widening this segment of Bruce B. Downs Boulevard from four to eight lanes. This study assesses the feasibility of integrating enhanced, high capacity transit service, either Light Rail Transit (LRT) or Bus Rapid Transit (BRT), into the proposed Bruce B. Downs Boulevard (C.R. 581) six or eight-lane alignment and typical section. The focus is on an assessment of either LRT or BRT in an exclusive transitway. This study encompasses Segment "A" from immediately south of the E. Bearss Avenue intersection to immediately south of the Palm Springs Boulevard intersection with Bruce B. Downs Boulevard (Figure 1). The purposes of the study are to evaluate roadway and transit engineering elements, focusing on the ability to physically integrate high-capacity transit into the Bruce B. Downs Boulevard corridor, and to determine any associated impacts, including generalized traffic operations and safety impacts. It does not include quantitative traffic operations analysis or travel demand analysis.

The intent of this study is to evaluate the opportunities to maximize high capacity transit options in the future while minimizing impact to the design, funding/costs and committed schedule for the widening of Bruce B. Downs Boulevard Segment A. The question to be answered is will high-capacity transit physically fit in the eight- or reduced six- lane improvement, and at what operational cost for the roadway and for transit.

PLANNING DOCUMENTS

Bruce B. Downs Boulevard plays an important transportation role in north central Hillsborough County. The newly adopted Hillsborough County Metropolitan Planning Organization (MPO) 2035 Cost Affordable Long Range Transportation Plan identifies a six-lane Bruce B. Downs Boulevard with express bus and potentially LRT service in the corridor. This premium transit service would run through the I-75 interchange and into Pasco County. The older MPO 2025 Needs Plan indicated an eight-lane Bruce B. Downs Boulevard with express bus enhancements would be needed by that year. The MPO 2035 Bicycle and Trail Cost Affordable Plan also reflects enhanced bicycle path and sidewalk facilities on this segment of Bruce B. Downs Boulevard.

The "MPO Transit Study – Transit Concept for 2050" indicates LRT service in this segment of Bruce B. Downs Boulevard, connecting New Tampa with the Westshore area and ultimately extending into Pasco and Pinellas Counties.

BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT

(South of E. Bearss Avenue to South of Palm Springs Boulevard)

CORRIDOR STUDY MAP

Figure 1

ASSUMPTIONS

The following assumptions provided a framework for this evaluation.

Transit – Two separate transitway configurations were evaluated, for both a six- and eight-lane roadway on Bruce B. Downs Boulevard: 1) a median configuration and 2) on the northbound (east) side of the roadway. These configurations were evaluated for both LRT and BRT facilities. Two-way transit operations and only at-grade alignments were assumed.

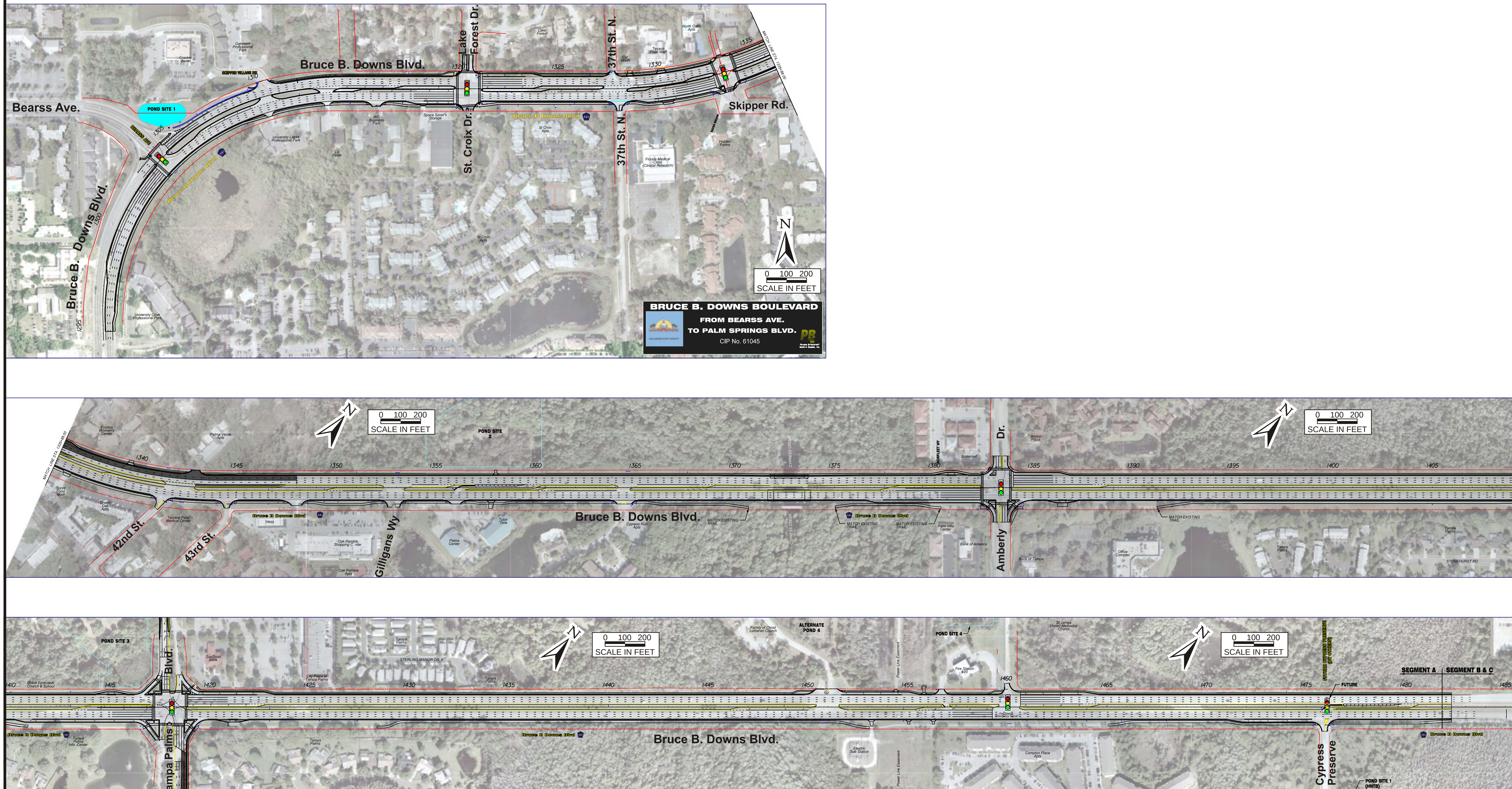
Transit Stations – Three station options were considered in a generic sense. The particular characteristics of any site were not considered in any detail. It was assumed that any stations along the Bruce B. Downs Boulevard corridor would be at signalized intersections. For both the median or east side transitway options, a station envelope could be developed for a full station on one side of the intersection (either a single, center platform or two side platforms) or a split station with platforms on both sides of the intersection.

Roadway – Three separate roadway alternatives were initially evaluated. The goal of assessing multiple roadway alternatives was to attempt to minimize the impact on the nearly completed Bruce B. Downs Boulevard Segment A design plans. Under the first alternative, the outside curb lines for the eight-lane roadway section currently being designed were maintained. For the six-lane roadway option, the inside through lanes were eliminated and curb lines shifted creating a wider median. Under the third alternative, the planned curb lines were shifted but stayed within the existing right-of-way. Modification of the left- and right- turn lanes was permitted, under all three alternatives but consequences to intersection capacity and level of service were noted. Figure 2 shows the current planned eight-lane roadway in Segment A.

EXISTING CONDITIONS

Roadway

Segment A of Bruce B. Downs Boulevard currently has six through lanes (three in each direction) from E. Bearss Avenue to Lake Forest Drive. At Lake Forest Drive the roadway transitions to four through lanes for the remainder of Segment A. The entire segment has a raised grass median with median breaks for intersections and some local access drives. The median breaks are more closely spaced at the southwest end of the corridor segment. Traffic signals are present at the intersections with E. Bearss Avenue, Lake Forest Drive /St. Croix Drive, Skipper Road, Amberly Drive, Tampa Palms Boulevard, and Cypress Preserve Drive. There is a major bridge structure over Cypress Creek. The speed limit is 45 MPH. The roadway right-of-way is generally 200 feet wide. The functional classification of the roadway is Principal Arterial.



BRUCE B. DOWNS BOULEVARD
(South of Bearss Avenue to Palm Springs Blvd.)
TRANSIT ASSESSMENT

EXISTING 8-LANE PLAN DESIGN

Figure 2

Adjacent Land Use

The southern part of the corridor is well developed as single-family and multi-family residential development with commercial and office uses along both sides of Bruce B. Downs Boulevard, primarily along the six-lane section. North of Cypress Creek, the development pattern changes due to the wetlands associated with the creek. Major intersections have commercial services in one or more of their quadrants and single- and multi-family residential development backs up to the roadway with access off side streets. The local street system converges on Bruce B. Downs Boulevard between E. Bearss Avenue and I-75; there is little interconnectivity with other roadways, and all traffic from adjacent development uses Bruce B. Downs Boulevard for access in and out of the area.

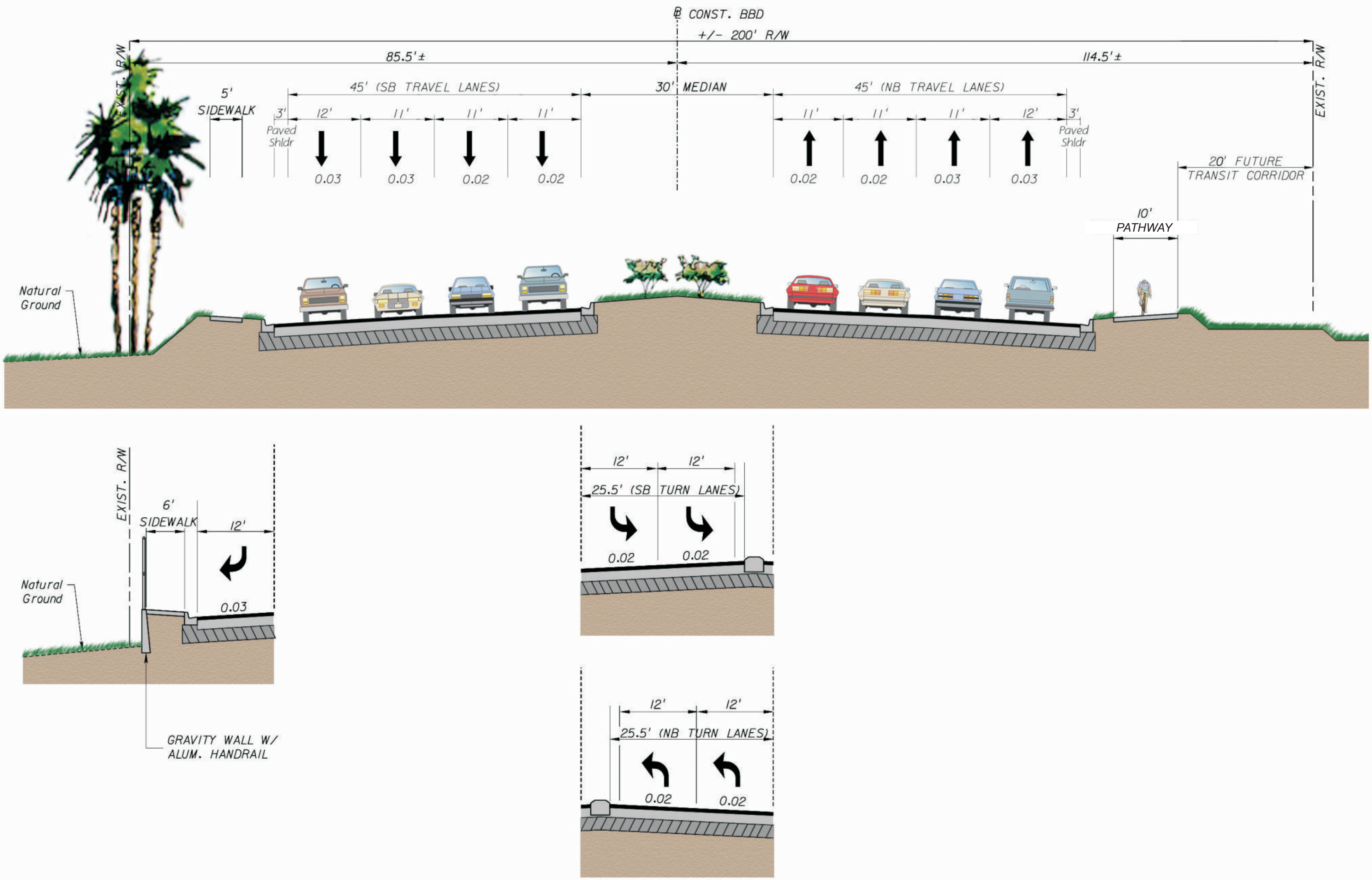
POTENTIAL ROADWAY CONFIGURATIONS

Three different configurations were considered; planned eight-lane, reduced six-lane, and eight-lane with a shifted curb section.

Eight-Lane – Plans for the widening of Bruce B. Downs Boulevard to eight through lanes are nearly complete. Figure 2 illustrates the plan layout, and Figure 3 depicts the typical section, for this design. The outside curb travel lanes would be 12 feet in width, with the remaining three travel lanes in each direction 11 feet. Left- and right- turn lanes would be 12 feet. The eight-lane design includes a 30-foot median (26 feet between back of curbs), and is offset to the west in the right-of-way, providing 46 feet on the northbound side. This area currently has, and is proposed to continue with a 10-foot separated pathway.

Six-Lane – An alternate six-lane configuration would be identical to the eight-lane configuration except for the elimination of one through lane in each direction against the median. This would create a 52-foot median. The outside curb lanes would remain in the same location as the eight-lane section. There would continue to be a 46-foot space between the back of the proposed curb and the edge of the right-of-way on the northbound side. The pathway would be located in this space. Figure 4 illustrates the roadway typical section for this alternate design.

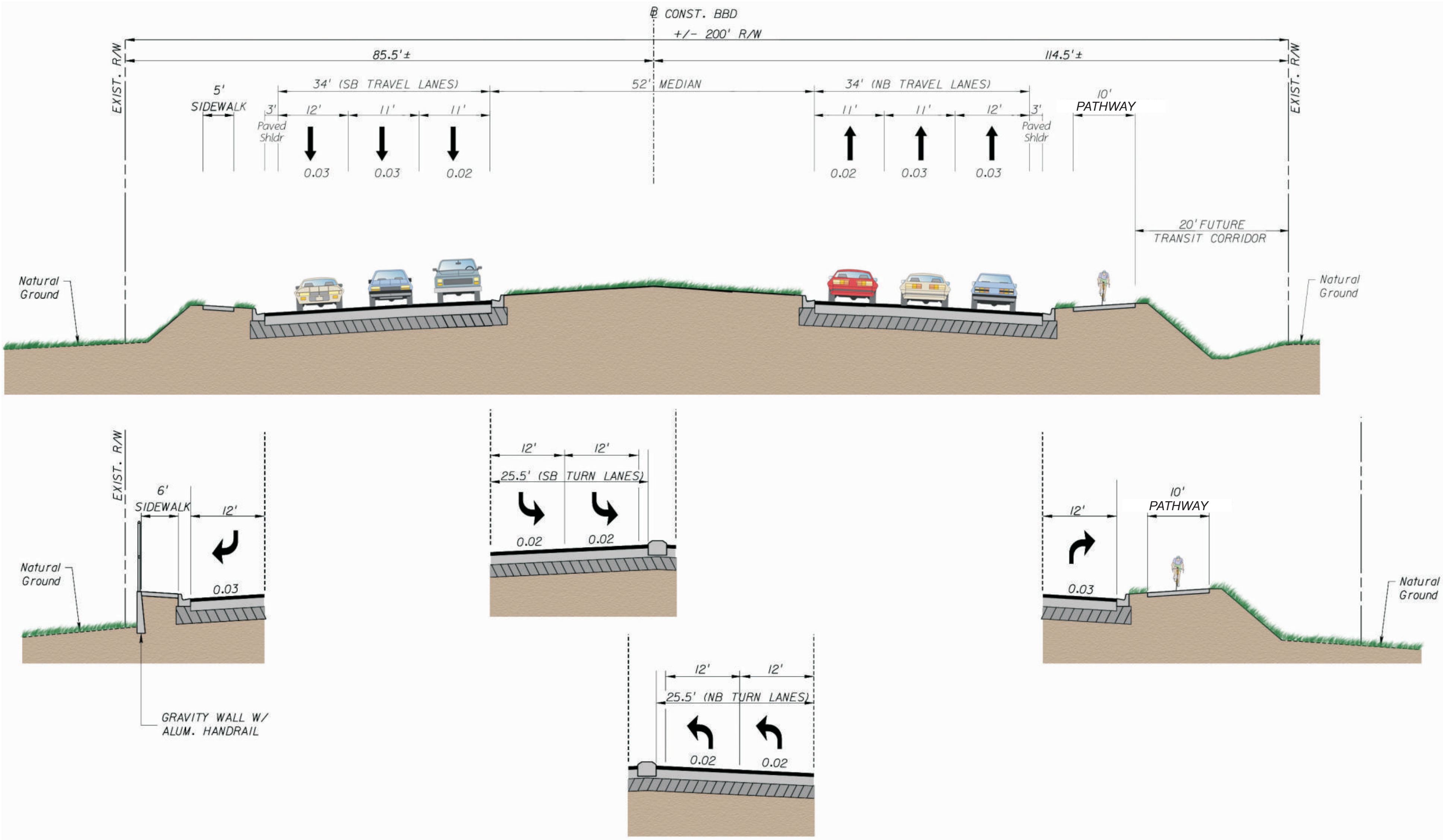
Relocated Curb Line – This alternate configuration provides eight travel lanes, but shifts the curb line to increase the median width at intersections as required to accommodate transit stations. To the extent possible the increased median width would be provided by shifting the curbs on the northbound side of Bruce B. Downs Boulevard. This would impact the width of the pathway.



BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

EXISTING 8-LANE TYPICAL SECTION DESIGN

Figure 3



BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

ALTERNATE 6-LANE TYPICAL SECTION DESIGN

Figure 4

RELATED DATA

Adjacent Segments – South of E. Bearss Avenue, Bruce B. Downs Boulevard has a six travel lane cross section. North of Cypress Preserve Drive (Segment B) the roadway design has been completed and construction has begun on an eight-lane cross section in a similar configuration to the current design of Segment A. The median for Segment B is 28 feet and the adjacent roadway path and grass strip space is 44 feet.

Design Year Traffic Volumes – The 2035 design year traffic volumes for Segment A, as noted on the plans, is 75,800 AADT (Average Annual Daily Traffic). In 2008, the AADT volume for Segment A (based on the 2008 FDOT Traffic Information DVD) was around 41,000.

Failure Year Analysis – At the request of the Hillsborough County Public Works Department, HNTB Corporation prepared a report entitled Traffic Analysis – Failure Year Analysis Bruce B. Downs Boulevard from Bearss Avenue to County Line Road (Draft – June 2009 (Revised June 2010)). Each segment, A-D was evaluated using the Tampa Bay Regional Planning Model (TBRPM) for the base Year (2000), Interim year (2015) and 2025 Plan Year utilizing the existing and Cost Feasible Networks with some modifications as noted. No transit links were assigned to the corridor. The study utilized SYNCHRO 7 to perform an arterial analysis of the corridor and tested the anticipated year the respective segments would perform below the adopted level of service (LOS) standard of "D."

The report indicates that Segment A performed below the LOS standard in 2012 as a six-lane facility and below the LOS standard in 2025 as an eight-lane facility. The below standard performance was always southbound in the AM peak period. The analysis utilized the socio-economic data and roadway network developed for the 2025 TBRPM and is linked to those assumptions. Intuitively the inference can be made that overall the socio-economic forecast values may be high based on the current economic climate, it is clear that a six-lane facility has a relatively short life under the 2025 TBRPM. Doubling the current capacity to eight-lanes only achieves the adopted LOS standard for approximately 15 years (2025).

TRANSIT ENVELOPE

Horizontal distance is the critical component in determining the viability of an exclusive transitway in the Bruce B. Downs Boulevard corridor. The transitway envelope has multiple components that, taken together, define the overall width of the envelope required for the transitway. It was assumed that the transit envelope would be of similar width either in the median or in an off-road location. Separate envelopes were developed for mainline and station locations, and for BRT and LRT applications.

LRT generally requires slightly less width than standard BRT applications. In an effort to minimize the horizontal distance a guided variant of BRT (in use in Eugene, Oregon and Leeds, United Kingdom) was also assessed. The guided variant uses a significantly smaller envelope for operations.

The transit envelope varies primarily due to station location and the platform configuration; center platform, two-platform, or split platform.

Mainline Transitway

LRT – The mainline transit envelope for LRT must accommodate two vehicle tracks and the supports for the overhead catenary power system. Separation from the adjacent travel lanes is also required. This separation is an important factor, as the travel lanes will be operating at 45 mph. Depending on station spacing, the LRT vehicles could be operating at different speeds than the vehicles on the roadway. If the speed differential is high it may be appropriate to provide greater separation between the transitway and the travel lanes. Figure 5 illustrates a typical LRT mainline cross section, with a basic 25-foot width (not including separation width from adjacent roadways). Separation of the transitway and the travel lanes is particularly important when operating in the median, where the travel lanes are immediately adjacent to the transitway. In this assessment the impact associated with either a 2-foot curb and gutter or barrier separation versus a 4-foot concrete median separation on both sides of a median LRT transitway was assessed. Under the off-road LRT transitway, the pathway and grass strip areas provide the separation.

BRT – The mainline transit envelope for BRT must accommodate two lanes for vehicles. The separation issues are similar between BRT transitways and the roadway travel lanes as identified for LRT vehicles. However, where buses are operated side by side in a regular roadway configuration, some shoulder treatment to an external curb and gutter/barrier or concrete median treatment is required, given vehicles are under driver control and not tracked. The new American Public Transit Association (APTA) BRT Planning and Design Guidelines identify a basic width for a median busway of 26 feet, with two 11-foot lanes and 2-foot shoulders. In an effort to reduce the width of a BRT guideway through station areas, guided BRT vehicles were also identified as a potential option. Guided BRT has been used successfully in several cities as a means to reduce lane width and the overall width of the transitway where the width of a median or overall right-of-way is limited. The BRT vehicle then operates much like an LRT vehicle. The transitway width could be reduced to 18 feet in the guided BRT option. In the guided option evacuation in the event of a bus breakdown may be difficult due to the narrow lane width, particularly if the separation is only two feet. Figure 5 illustrates a typical BRT cross section for both unguided and guided transitways.

Station Configurations

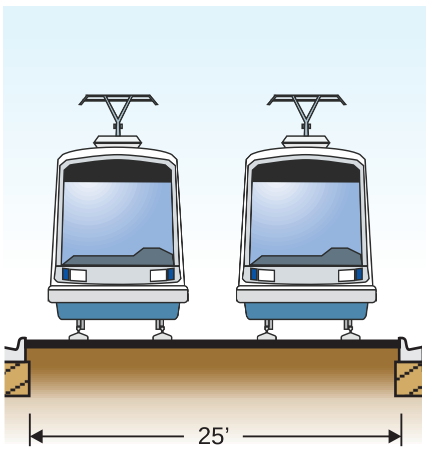
No analysis of potential station locations was prepared as part of this evaluation. The development pattern in the corridor and typical station spacing standards suggest the location of one or two stations within Segment A (1.5 to 2 mile separation). To maximize accessibility, stations were assumed to be located at intersections. Intersection locations are desirable due to the convergence of roadway and pedestrian access systems and the occurrence of higher intensity of development.

For the purposes of this study the alternate station configurations are identical (except for transitway width) regardless of mode (LRT or BRT) and of location (median or edge of roadway). Three types of station prototypes were developed: 1) a staggered side platform with platforms on both sides of the cross street, 2) full stations with a central platform on one side of the intersection cross street, and 3) double side platforms, a full station with two directional side platforms on one side a cross street. Stations should be located at signalized intersections for pedestrian access and traffic control at the station site. Figures 6 and 7 illustrate the three different station configurations for both a median transitway and off-road transitway.

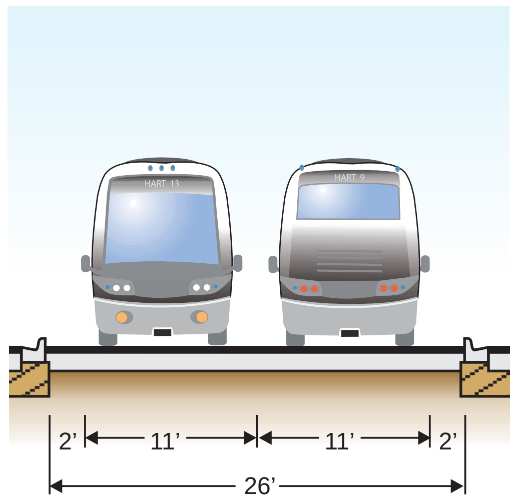
Staggered Side Platform Station – The split platform station is a variant of the two platform station. There are two directional platforms; however they are located on either side of the cross street at an intersection, one serving each direction. Since they are directional platforms, platform width was set at 10 feet. Staggered side platform stations can be served by traditional BRT or LRT equipment from right side doors, and facilitate transit signal priority through the intersection.

Center Platform Station – The single platform station has a center platform between the tracks/lanes of the transitway. The center platform serves both directions of travel and is wider than a single direction platform. Center platforms were assumed to be 15 feet, reflective of a minimum width per industry guidelines. Center platform stations can be served by traditional LRT vehicles. For BRT, the vehicles must have left side doors if they are right side running, or be able to crossover to the left side of the platforms (at the intersection or a location upstream) to operate with more traditional right side doors. Similar to the two-platform station concept, transit signal priority at an intersection is only facilitated in the direction with the farside platform.

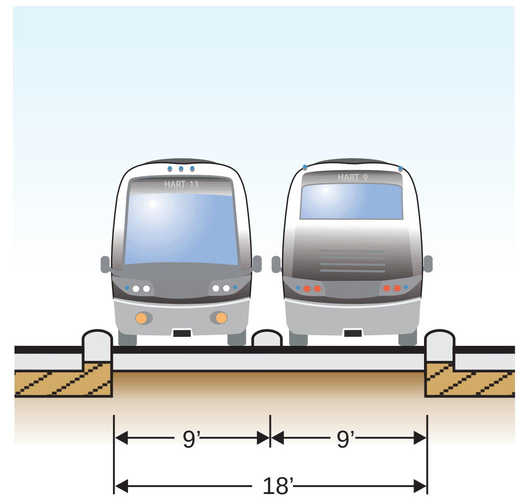
LRT Envelope



BRT Unguided Envelope



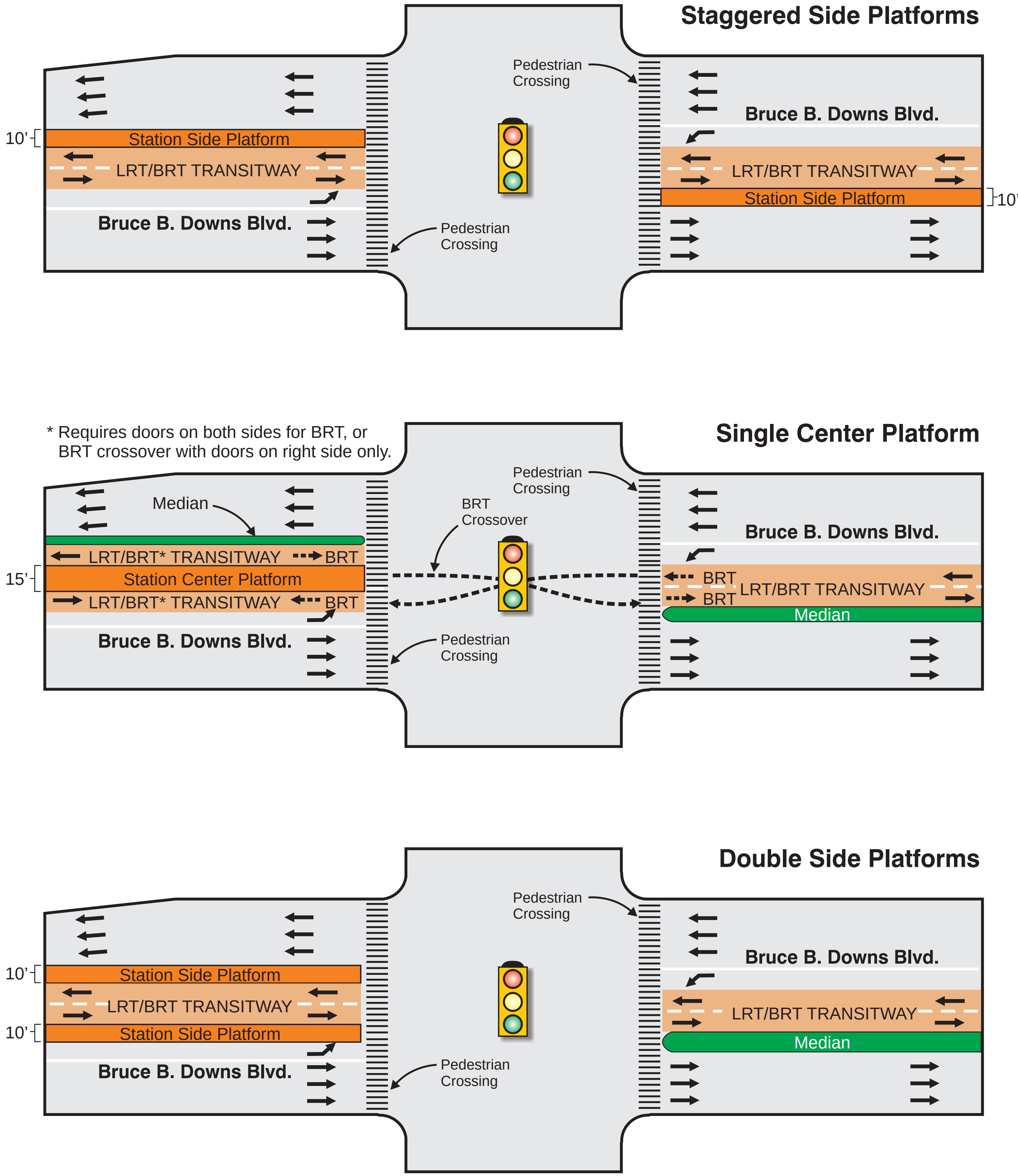
BRT Guided Envelope



BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

TRANSIT ENVELOPE DIMENSIONS

Figure 5

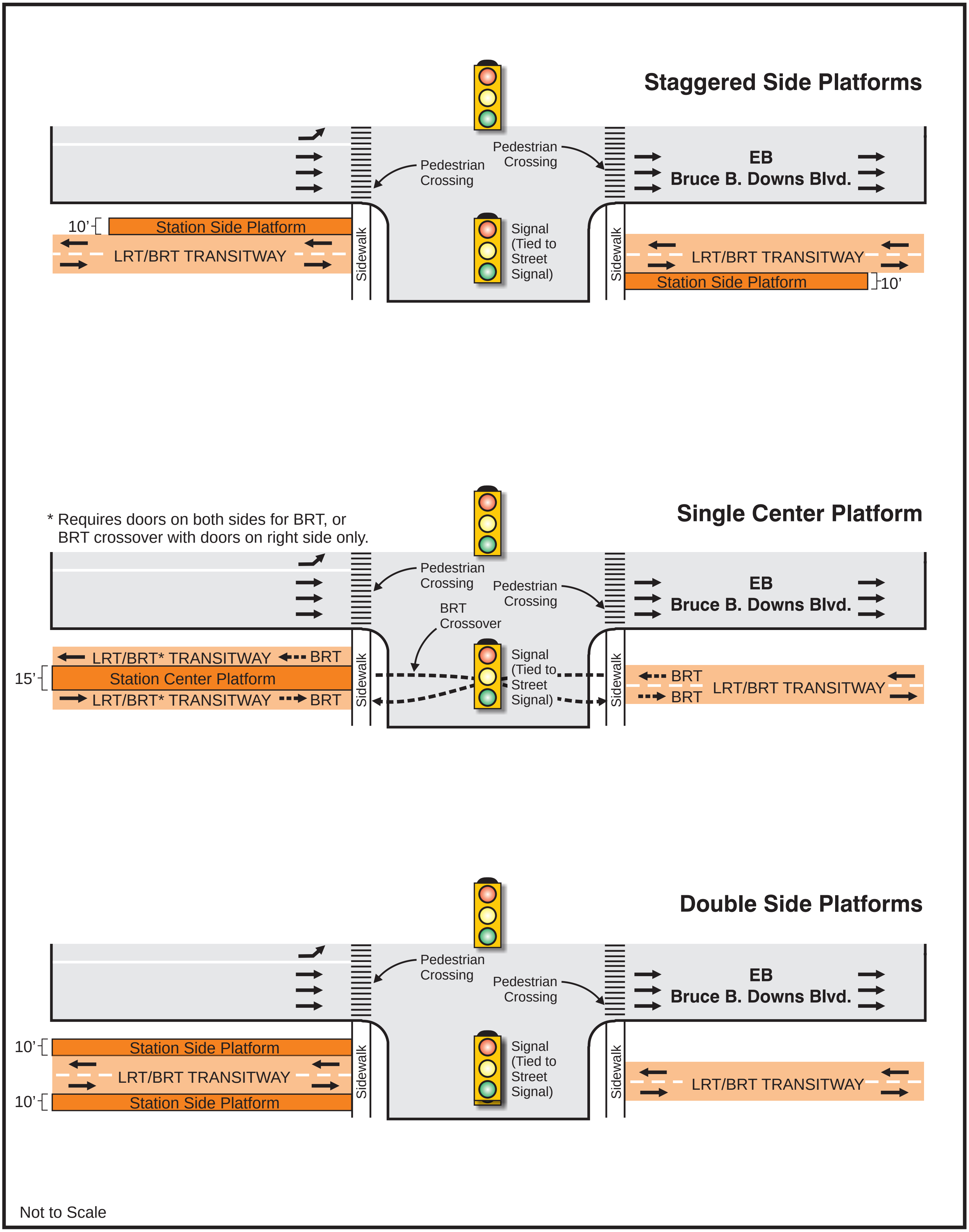


Not to Scale

BRUCE B. DOWNS BOULEVARD
TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

ALTERNATE MEDIAN TRANSITWAY STATION CONFIGURATIONS

Figure 6



BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT *(South of E. Bearss Avenue to South of Palm Springs Boulevard)*		**ALTERNATE OFF-ROAD TRANSITWAY STATION CONFIGURATIONS**	**Figure 7**

Double Side Platform Station – The double side platform station has platforms flanking both sides of the transitway directly across from each other. Each platform serves one direction of travel. Single direction platforms were assumed be ten feet, a minimal width per industry guidelines but reflective of the probable number of transit riders using a platform in the Bruce B. Downs Boulevard corridor. Two platform stations can be served by traditional LRT and BRT equipment from right side doors. With one platform being nearside of an intersection, transit signal priority in that particular direction of travel might not be facilitated as much as in the opposite direction with its farside platform location.

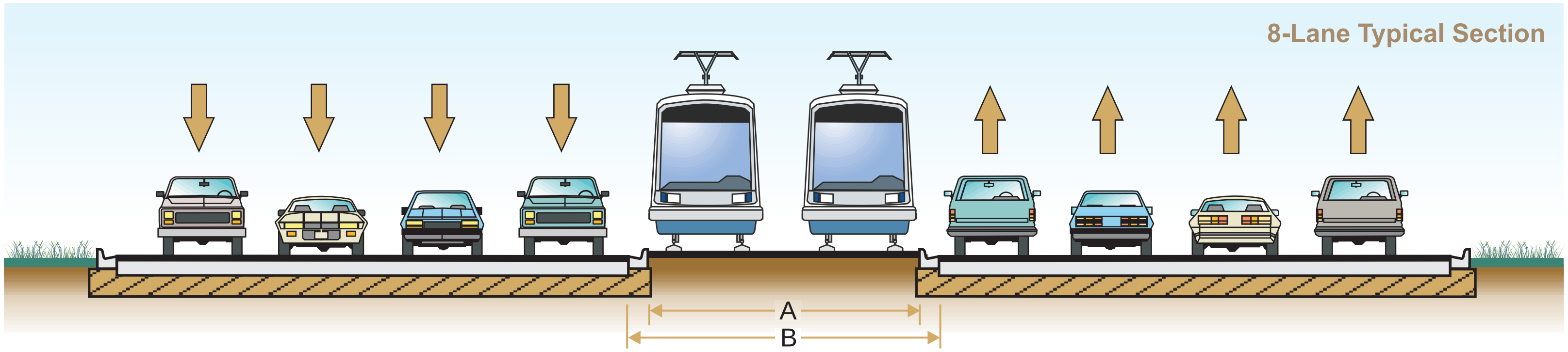
Staggered Side Platform Single Track/Lane – In an effort to find a station option that could be used in a restricted median location, a variant of the staggered side platform station was developed that provides a single track/lane at the station site. The mainline LRT or BRT would merge to a single track/lane prior to coming into the station area, after moving through the station area it would expand to two tracks/lanes again. Vehicles from the opposing direction would be stopped by wayside control signals until the station area is clear. This option would require switches for the LRT option. This station design is functional, but has considerable operational limitations and would impact headway and ultimately capacity. Sections of the new Franklin Boulevard BRT line in Eugene, Oregon have two-directional single lane operation including one lane at stations.

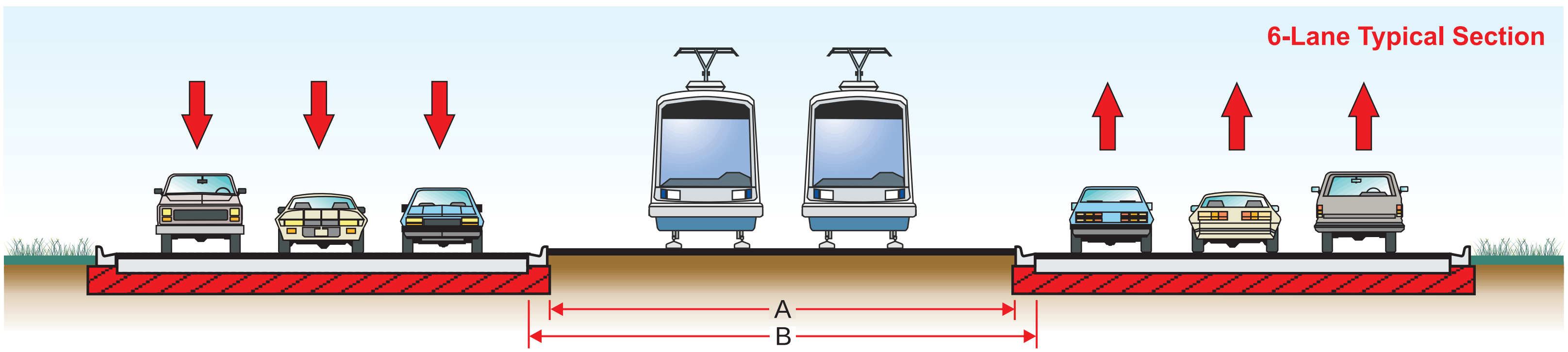
TRANSIT ENVELOPE APPLICABILITY

By combining the available roadway space in an eight- or six- lane configuration with median or edge of roadway location for a transitway, and with the transit mode and station options, the LRT and BRT options that will fit along an improved Bruce B. Downs Boulevard can be determined.

Median Location

The median transitway was initially examined under eight-lane, six-lane, and relocated curb alternatives. Figure 8 indicates the potential for the mainline median transitway, by modal option for both eight- and six-lane roadways. In the figure on top of the table, “A” reflects the clear space available for the transitway, and “B” reflects the median width to the edge of the lane (front of curb to front of curb). There are two potential edge treatments, one a typical 2-foot curb and gutter section on either side (if a barrier is not needed between the transitway and the travel lanes) and an option that provides a 4-foot raised median providing additional separation between the travel lanes and the transitway under higher speed operation.





= Applicable Transit Mode/Configuration

		DIMENSION IN FEET			
Designation	Description	No Transit	2-Way LRT	2-Way BRT Unguided	2-Way BRT Guided
8-Lane					
A	Transitway	26	25	26	18
B	Distance to Roadway (with 2 C&G)	30	29	30	22
	Distance to Roadway (4' Raised Median)		33	34	26
6-Lane					
B	Distance to Roadway (with 2 C&G)	52	29	30	22
	Distance to Roadway (4' Raised Median)		33	34	26

BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

MAINLINE ENVELOPE APPLICABILITY - MEDIAN TRANSIT

Figure 8

Under eight lanes with the 2-foot curb and gutter, all of the mainline transit options can be placed in the median. Two-way unguided BRT with a 2-foot curb and gutter on either side requires the widest mainline typical section (B = 30 feet), with 30 feet available this mode will fit, and all other modes (LRT and guided BRT) will fit as well. If a 4-foot raised median is provided, only the guided BRT will fit within the available median with eight travel lanes.

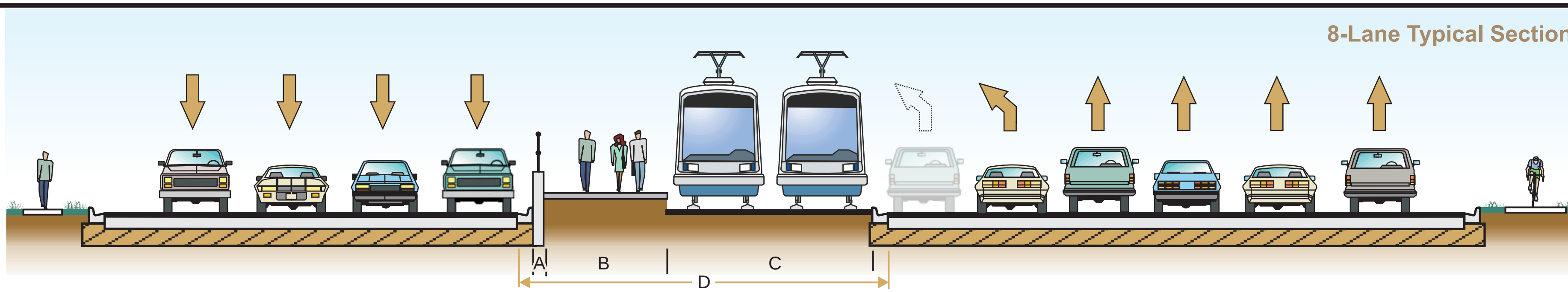
If the number of travel lanes is reduced to six, the mainline median distance (B) increases to 52 feet. All tested modes fit within the mainline median regardless of edge treatment. Because the transitway mainline fits under both the eight- and six-lane options there was no need to examine the curb relocation alternative for the median transitway.

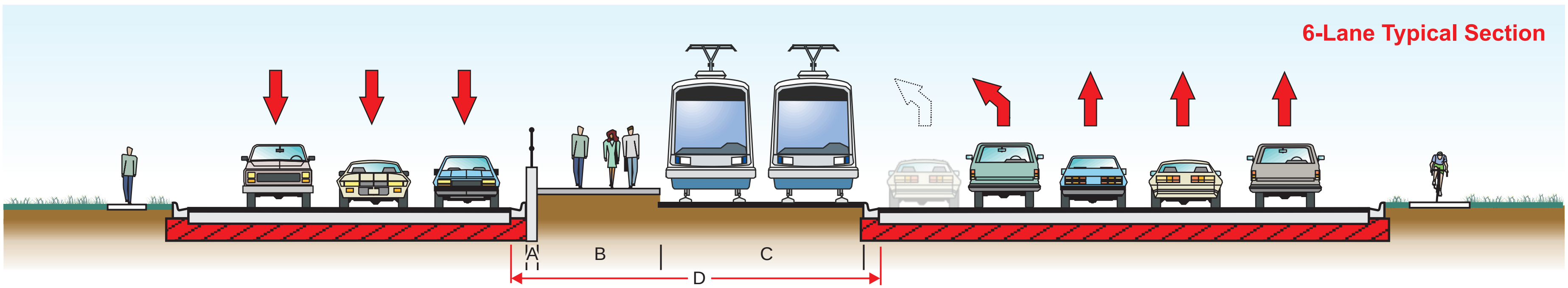
Figure 9 indicates the dimensions and available space for stations at intersections under the median configuration. Under an eight-lane roadway none of the station configurations will fit within the available space. The largest available width is 18 feet (with a single left-turn lane) and the smallest station configuration is 24 feet (one-way LRT).

If the number of travel lanes is six, Figure 9 indicates that the one-way staggered side platform station options will fit within the available space with double left-turn lanes, but none of the two-way stations will fit. If a single left-turn lane is provided the two-way split station guided BRT and two-way split station LRT options will fit. Only the two-way split station unguided BRT will not fit within the available median with a six-lane roadway.

For the relocated curb alternative, generally the southbound/westbound roadway was maintained as designed. As noted in Figure 9 the width required for a split station with two-way unguided BRT is 41 feet. Allowing the 41 feet for the station, a single left-turn lane, four travel lanes, and a right-turn lane the northbound roadway would have to shift 23 feet toward the east/south. The remaining space to the right-of-way line, still including the pathway, then becomes 24 feet. If a double left-turn lane is desired the remaining area would be 12 feet, still wide enough to accommodate the 10-foot pathway (which would be almost next to the right-of-way line). Away from the intersection, the roadway alignment can return to its current configuration with increased area for the pathway and transition distance to the right-of-way line.

In summary, none of the station options will fit under the eight-lane roadway cross section. If six travel lanes are constructed, and intersections are limited to single left-turn lanes, all split station configuration options and modes fit except for two-way unguided BRT. The two-way unguided BRT has a 41-foot width, and there would be 40 feet available with six travel lanes and a single left-turn lane, thus, it may be possible through engineering design to accommodate the two-way unguided BRT station in the median with six travel lanes.





[1] With either 2' curb and gutter or raised median. Added median possible with 2-way BRT guided or any 1-way option, with single left turn lane.
[2] With side platform on both sides of intersection. The required ROW width is 5'-10' more with center platform or two side platforms on same side.

= Applicable Transit Mode/Configuration

		DIMENSION IN FEET						
Designation	**Description**	**No Transit**	**2-Way LRT**	**2-Way BRT Unguided**	**2-Way BRT Guided**	**1-Way LRT**	**1-Way BRT Unguided**	**1-Way BRT Guided**
8-Lane								
A	Platform Wall/Barrier	0	1	1	1	1	1	1
B	Platform – 2-Side – Center – 1-Side	 0 0 0	 10 15 20	 10 15 20	 10 15 20	 10 15 20	 10 15 20	 10 15 20
C	Transitway	0	25	26	18	12.5	13	9
D[1]	Distance to Roadway – w/Double LT – w/Single LT	 6 18	 40[2] 40[2]	 41[2] 41[2]	 33[2] 33[2]	 27.5[2] 27.5[2]	 28[2] 28[2]	 24[2] 24[2]
6-Lane								
D[1]	Distance to Roadway – w/Double LT – w/Single LT	 28 40	 40[2] 40[2]	 41 41	 33[2] 33[2]	 27.5[2] 27.5[2]	 28[2] 28[2]	 24[2] 24[2]

BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

INTERSECTION/STATION ENVELOPE APPLICABILITY - MEDIAN TRANSIT

Figure 9

Given the narrow width for a station even with six travel lanes, another roadway/intersection configuration was identified, known as the “Michigan U-turn Concept.” This configuration would involve elimination of left turns at signalized intersections under the six-lane roadway configuration where stations would be developed (to provide greater space for the station) and move the left turns to downstream locations where they would be made as U-turns with separate signals (see Figure 10 for an illustration). This concept has been applied where more simplified two-phase signal operation at major intersections is critical to maintain roadway level of service. This concept was included in the overall impact assessment presented later in this report.

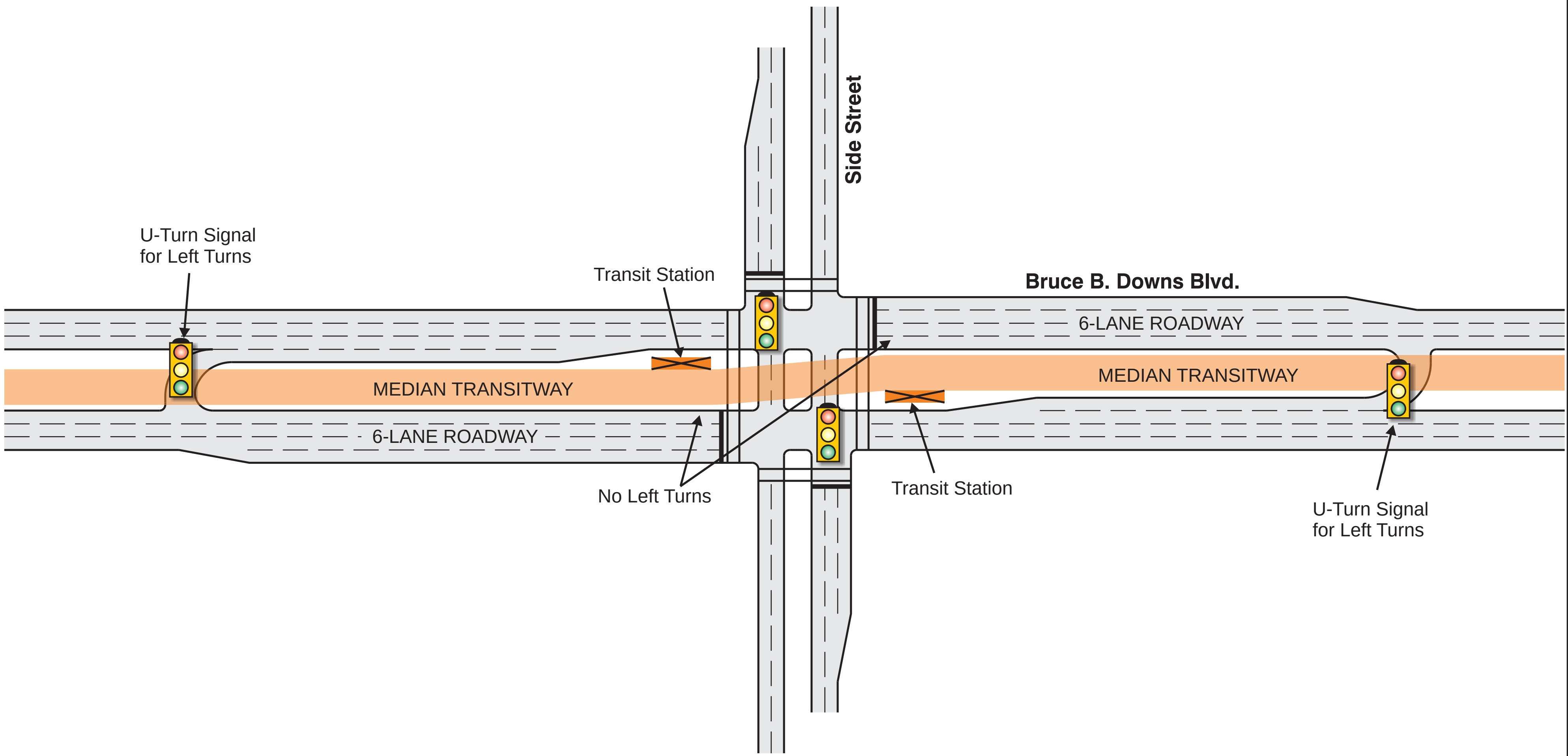
Expanding the median to accommodate a two-track staggered side platform station under the eight-lane roadway will require an additional 23 feet in the median for stations at intersection locations. Shifting the eastbound/northbound lanes 23 feet and providing a single left-turn and right-turn lane will leave 24 feet for the pathway and transition area to the right-of-way line. An added left turn lane will reduce the pathway/transition area envelope to 12 feet (the planned pathway is 10 feet in width).

Off-Road Location

The feasibility of placing the transitway along the southern/eastern edge of the improved roadway was also examined. The available space for the transitway does not vary based on the number of lanes constructed in the roadway. The distance available from the back of the curb to the edge of the right of way is 46 feet. Under some of the station location options the width of the pathway becomes a critical element. Moving the pathway (ten feet) adjacent to the southbound lanes and the sidewalk (five feet) adjacent to the northbound lanes provides added feasibility for stations. Except as noted for the staggered side platform one track/lane option, all right turn lanes and bus bay treatments would have to be eliminated to provide sufficient space for transit stations.

As Figure 11 illustrates, all transit options fit within the available edge of roadway space with the pathway on the transit side of the road. The widest mainline mode, two-way unguided BRT, requires a 45-foot envelope and 46 feet are available.

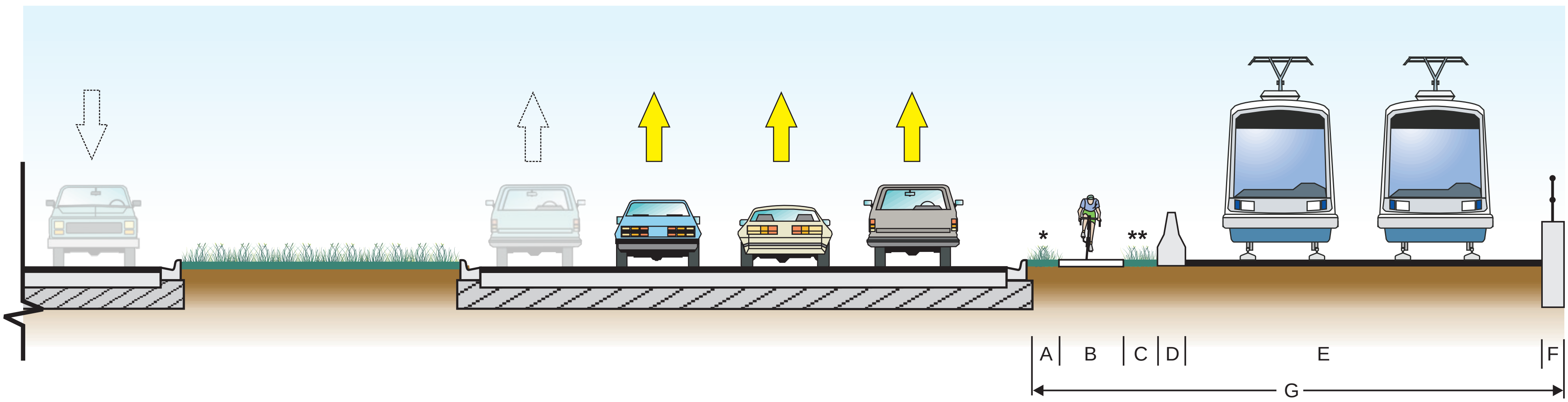
Station features and dimensions that form the transit envelope for the off-road option are shown in Figure 12. Those mode options that fit within the available space are highlighted. With the pathway on the same side of the street, only the split station guided two-way BRT and the one-way LRT station options would fit. If the pathway were relocated to the opposite side of the street and a sidewalk provided, all staggered side platform station modes would fit within the available space. The one-way stations (LRT and BRT) could also provide center platform stations.



BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

MICHIGAN U-TURN CONCEPT (WITH 6-LANE ROADWAY)

Figure 10



= Applicable Transit Mode/Configuration

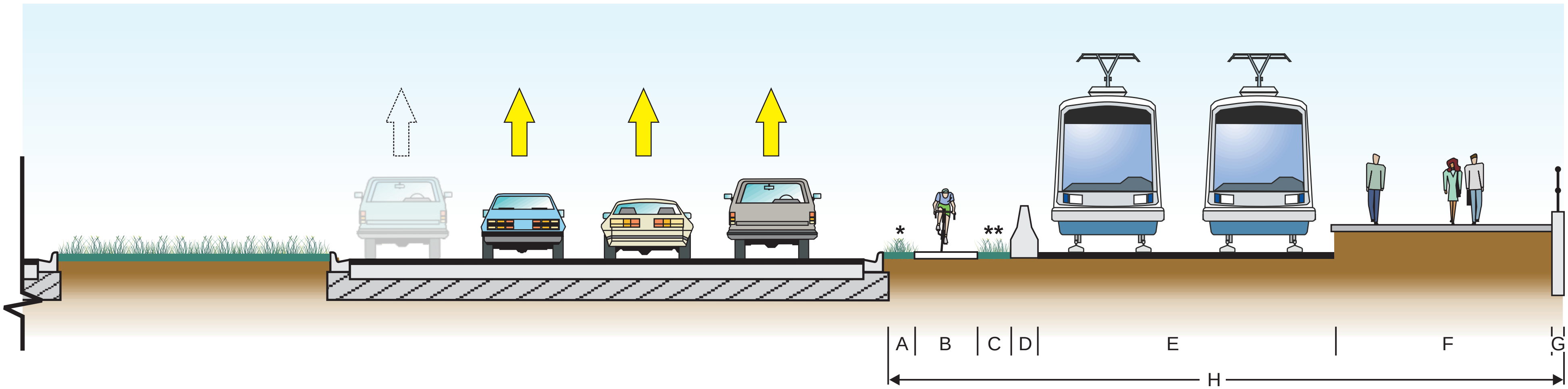
* 4' Min. Shared Use Path
** 2' Min. Criteria (PPM) Chapter 8

		DIMENSION IN FEET			
Designation	**Description**	**No Transit**	**2-Way LRT**	**2-Way BRT Unguided**	**2-Way BRT Guided**
8-Lane / 6-Lane					
A	Curb Offset	2	2	2	2
B	Pathway – Bike Path – Sidewalk	 10 5	 10 5	 10 5	 10 5
C	Transit Corridor Offset	0	3	3	3
D	Barrier	0	2	2	2
E	Transitway	0	25	26	18
F	Wall Against ROW	0	2	2	2
G	Available/Required ROW – w/Bike Path – w/Sidewalk	 46 46	 44 39	 45 40	 37 32

BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

ENVELOPE APPLICABILITY - OFF-ROAD TRANSIT

Figure 11



[1] With side platforms on both sides of intersection (2-side). The required ROW width is 5'-10' more with center platform or two side platforms on same side.

* 4' Min. Shared Use Path
** 2' Min. Criteria (PPM) Chapter 8

(yellow box) = Applicable Transit Mode/Configuration

		DIMENSION IN FEET				
Designation	**Description**	**No Transit**	**2-Way LRT**	**2-Way BRT Unguided**	**2-Way BRT Guided**	**1-Way LRT**
8-Lane / 6-Lane						
A	Curb Offset	2	2	2	2	2
B	Pathway – Bike Path – Sidewalk	 10 5	 10 5	 10 5	 10 5	 10 5
C	Transit Corridor Offset	2	2	2	2	2
D	Barrier	0	2	2	2	2
E	Transitway	0	25	24	18	12.5
F	Platform – 2-Side – Center – 1-Side	 0 0 0	 10 15 20	 10 15 20	 10 15 20	 10 15 20
G	Wall Against ROW	0	1	1	1	1
H	Available/Required ROW – w/Bike Path – w/Sidewalk	 46 46	 52[1] 47[1]	 51[1] 46[1]	 45[1] 40[1]	 39.5[1] 34.5[1]

BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

INTERSECTION/STATION ENVELOPE APPLICABILITY - OFF-ROAD TRANSIT

Figure 12

Summary

The following conclusions were drawn from the transit envelope applicability assessment.

Median Transitway

Eight-lane Roadway

- The transitway will fit under the 2-foot curb and gutter side treatment under all transit options. With a 4-foot raised median it will only fit as a BRT guided facility.

- No station configuration will fit in the median with eight travel lanes unless the curb lines are relocated.

- If curb lines are shifted 23 feet into the pathway, the two-track split side platform station configuration will fit at intersections with a single left-turn lane and a single right-turn lane.

Six-lane Roadway

- All modes will fit within the median of a six-lane roadway with either the 2-foot curb and gutter or the 4-foot raised median.

- All station configurations fit (with the provision of single left-turn lanes) except for the two-track unguided BRT. This configuration is within one foot of fitting with a single left-turn lane. The application of the Michigan U-turn concept (with no left-turn lanes at station locations) would provide greater space for the station, and accommodate two-track unguided BRT without any restrictions.

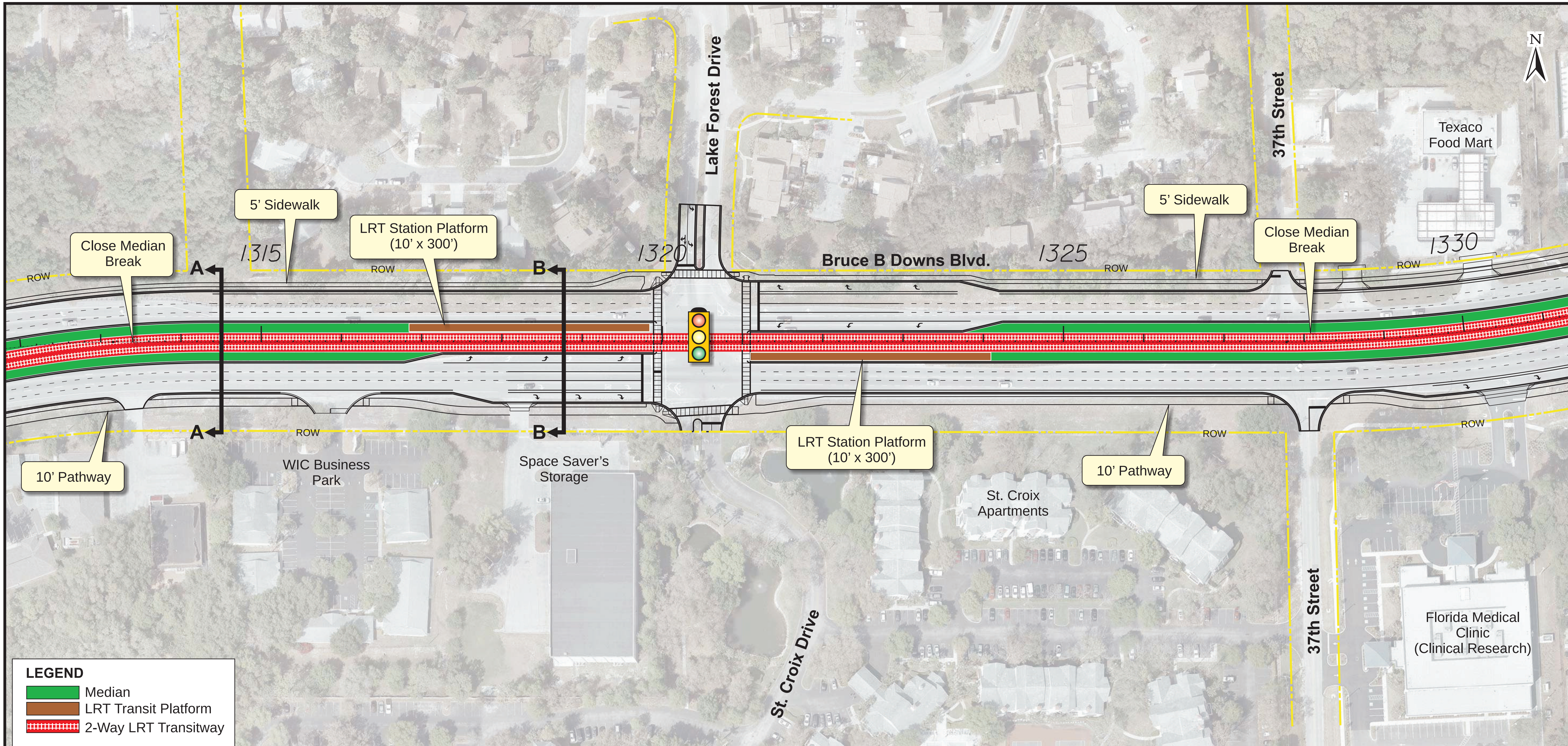
Off-Road Transitway

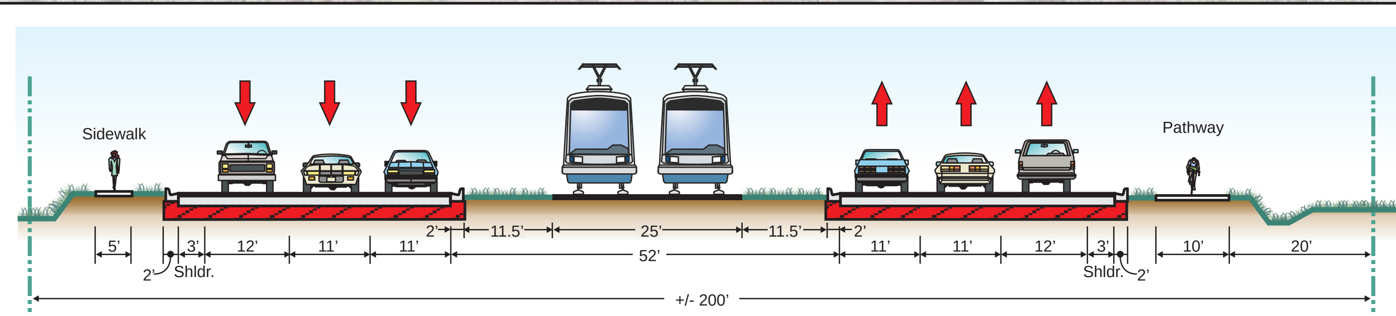
- Applicable transitway options are not impacted by whether six or eight travel lanes are provided, given it was assumed the northbound curb line would be in the same location.

- For two-way LRT and two-way unguided BRT to be accommodated through station locations, the pathway would need to be relocated to the north side of the roadway (with a 5-foot sidewalk as a potential substitute).

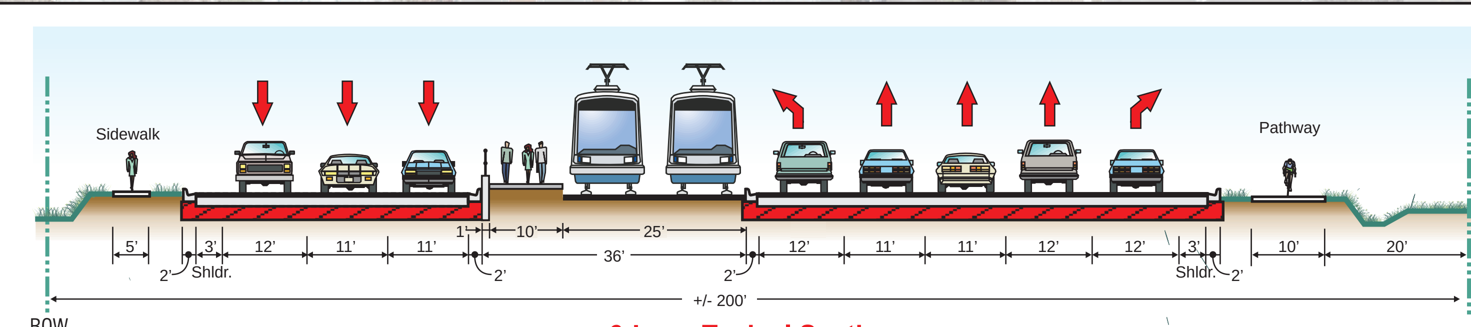
- If a south side pathway were maintained, only a two-lane guided or one-track LRT/one-lane BRT could be accommodated through stations.

A typical plan layout and sections and photo rendering of the two-way LRT both in a median transitway and off-road transitway are depicted in Figures 13 through 16. The section chosen for these depictions is in the vicinity of the St. Croix Drive/Lake Forest Drive intersection.





6-Lane Typical Section
SECTION A-A MAINLINE



6-Lane Typical Section
SECTION B-B AT STATION

BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

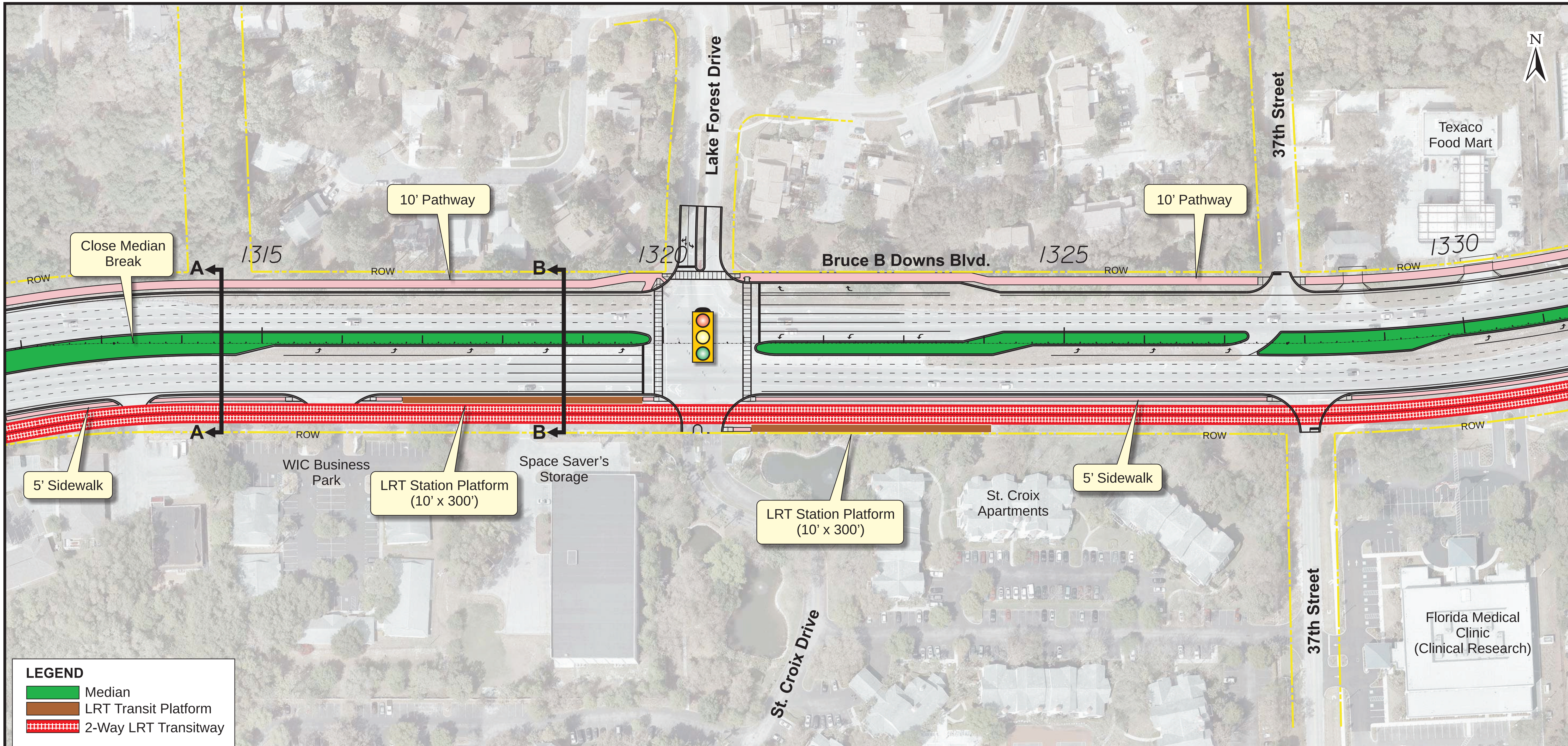
TYPICAL MEDIAN LRT TRANSITWAY PLAN AND SECTIONS AT (ST. CROIX DRIVE/LAKE FOREST DRIVE)
6-LANE ROADWAY

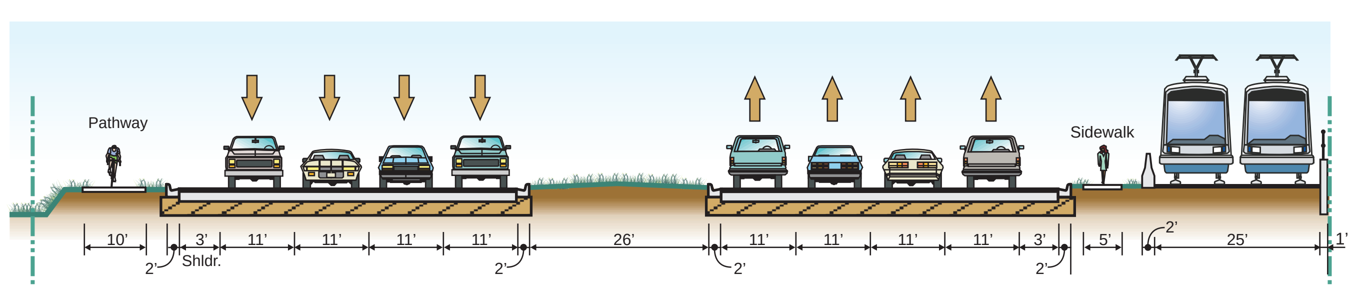
Figure 13

BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

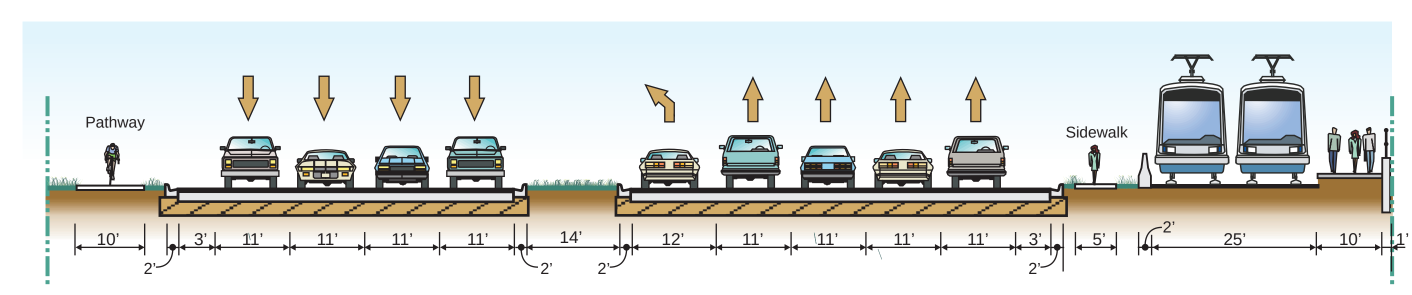
TYPICAL OFF-ROAD LRT TRANSITWAY PHOTO RENDERING (AT ST. CROIX DRIVE/LAKE FOREST DRIVE)

Figure 16





8-Lane Typical Section
SECTION A-A MAINLINE



8-Lane Typical Section
SECTION B-B AT STATION

BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

TYPICAL OFF-ROAD LRT TRANSITWAY PLAN AND SECTIONS (AT ST. CROIX DRIVE/LAKE FOREST DRIVE)
8-LANE ROADWAY

Figure 15

BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT *(South of E. Bearss Avenue to South of Palm Springs Boulevard)*		**TYPICAL OFF-ROAD LRT TRANSITWAY PHOTO RENDERING (AT ST. CROIX DRIVE/LAKE FOREST DRIVE)**	**Figure 16**

IMPACTS OF REFINED TRANSIT MODE/ROADWAY CONFIGURATIONS

Table 1 summarizes the impacts of the various transitway and roadway configuration options. The location and configuration of the transitway south of E. Bearss Avenue and north of this segment through the I-75 interchange were reflected in this assessment. South of E. Bearss Avenue an off-road alignment on the east side of the roadway is likely for any transitway. Through the I-75 interchange on the north end of the segment, the FDOT would prefer a median alignment for any transitway to minimize impact on interchange ramp operations. An off-road transitway alignment through Segment A would require a transition from the east side of the roadway across the northbound through lanes into the median east of Palm Springs Boulevard. If a median transitway were developed in Segment A, this transition from an off-road transitway south of E. Bearss Avenue would be required at the south end of Segment A instead. For LRT, a 370 foot transition through the offset distance of around 100 feet would be required even with just a 15 MPH design speed, and would require northbound traffic to be stopped while trains cross the roadway. For BRT, the transition from off-road to median could occur at any signalized intersection through a queue jump treatment under a separate signal phase.

Table 1 – Impact Evaluation Matrix

Transitway Location	Mainline Transitway Treatment	Transitway Restriction at Intersections & Stations	Station Platform	Intersection Operations	Local Access Impact				Pedestrian Impacts		Utility Impacts	Envir. Impacts
					Unsig. Median Breaks	Unsig. Driveways/ Streets	Local Access Diversion	Parking Spaces Removed	Pedestrian Crossings	Pathway Location		
Median 8-Lane	2-way LRT	No transitway possible without added median width	Staggered side	None, assuming added width to develop transitway	Closed – 8 impacted	Right-in/right-out only - 12 impacted	U-turns at signals	None	All riders cross ½ street	South	Storm drainage in median needed. Water main and gas main relocates.	Flood Plain Crossing
	2-way BRT unguided /guided	No transitway possible without added median width	Staggered side	None, assuming added width to develop transitway	Closed – 8 impacted	Right-in/right-out only – 12 impacted	U-turns at signals	None	All riders cross ½ street	South	Storm drainage in median needed. Water main and gas main relocates.	Flood Plain Crossing
Median/6-Lane	2-way LRT	Only 1-way LRT with double left turn lanes	Staggered side	Reduced LOS with fewer through lanes and single left turn lanes	Closed – 8 impacted	Right-in/right-out only – 12 impacted	U-turns at signals	None	All riders cross ½ street	South	Storm drainage in median needed	Flood Plain Crossing
	2-way BRT unguided	Only 1-way BRT unguided with either single or double left turn lanes	Staggered side	Same as for 2-way LRT	Closed – 8 impacted	Right-in/right-out only – 12 impacted	U-turns at signals	None	All riders cross ½ street	South	Storm drainage in median needed	Flood Plain Crossing
	2-way BRT guided	Only 1-way guided with double left turn lanes	Staggered side/center with single left turn lanes	Same as for 2-way LRT	Closed – 8 impacted	Right-in/right-out only – 12 impacted	U-turns at signals	None	All riders cross ½ street	South	Storm drainage in median needed	Flood Plain Crossing
Michigan U-Turn Concept (w/ 6-Lanes)	Any	None	Staggered side/center possible with no left turn lanes	Improved LOS at station signalized intersections if no left turns; creates added traffic signals for U-turns which could have some operations	Closed – 8 impacted	Right-in/right-out only – 12 impacted;	U-turns at signals	None	All riders cross ½ street	South	Storm drainage in median needed	Flood Plain Crossing

Transitway Location	Mainline Transitway Treatment	Transitway Restriction at Intersections & Stations	Station Platform	Intersection Operations	Local Access Impact				Pedestrian Impacts		Utility Impacts	Envir. Impacts
					Unsig. Median Breaks	Unsig. Driveways/ Streets	Local Access Diversion	Parking Spaces Removed	Pedestrian Crossings	Pathway Location		
				impacts								
Off-Road	2-way LRT	2-way LRT requires sidewalk on south side/1-way LRT with pathway	Staggered side	Removal of right turn lanes and bus bays; transition to Segment B requires EB signal east or west of Palm Springs	Closed – 8 impacted	Closed – 18 impacted	Backdoor access to signals	18 (Green Oaks Apts.)	Some riders cross entire street	Relocate to north	Relocation of power, water, sewer lines on south side	Potential noise - south side; Flood Plain Crossing
	2-way BRT unguided	2-way BRT unguided requires sidewalk on south side/1-way BRT with pathway	Staggered side	Removal of right turn lanes and bus bays; queue jump to median at Palm Springs signal	Closed – 8 impacted	Closed – 18 impacted	Backdoor access to signals	18 (Green Oaks Apts.)	Some riders cross entire street	Relocate to north	Relocation of power, water, sewer lines on south side	Potential noise – south side; Flood Plain Crossing
	2-way BRT guided	2-way BRT guided with pathway on south side	Staggered side/center	Removal of right turn lanes and bus bays; Queue jump to median at Palm Springs signal	Closed – 8 impacted	Closed – 18 impacted	Backdoor access to signals	18 (Green Oaks Apts.)	Some riders cross entire street	South	Relocation of power, water, sewer lines on south side	Potential noise – south side; Flood Plain crossing

Median Transitway

Local Access

All of the median transitway options require the closing of unsignalized median breaks. This is because vehicles wanting to turn left could get trapped across the transitway corridor waiting for a gap in opposing traffic (with longer gap acceptance time required with the higher traffic volumes and great number of lanes to cross), even if crossing gates were provided. This would increase the number of traffic conflicts and potential crashes. Such conflicts are illustrated in Figure 17. This operational/design issue is discussed in a noted Transit Cooperative Research Program (TCRP) Report 17 - Integration of Light Rail Transit into City Streets, with median break closure strongly recommended. New LRT and BRT facilities in median transitway configurations in the US and internationally that have been or are being constructed have followed these recommendations as standard design practice.

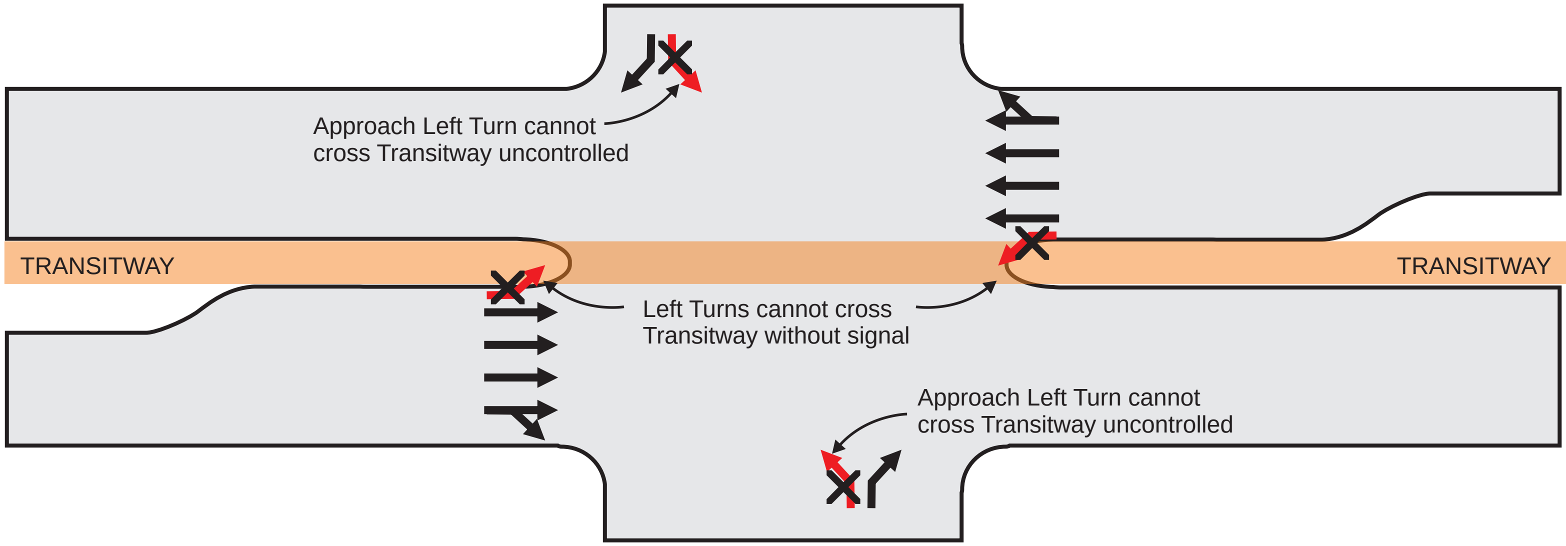
This local access restriction would impact the adjacent signalized intersections by increasing U-turn left turn movements. Eight median breaks would be closed (eliminating left turn access to unsignalized side streets and driveways):

- Cove Bend Drive/University Lakes Professional Park
- La Petite
- 37th Street North
- 42nd Street/Palma Verde Apartments
- Gilligans Way
- Palm Center/Tutor Time
- Cypress Run Apartments
- Family of Christ Lutheran Church

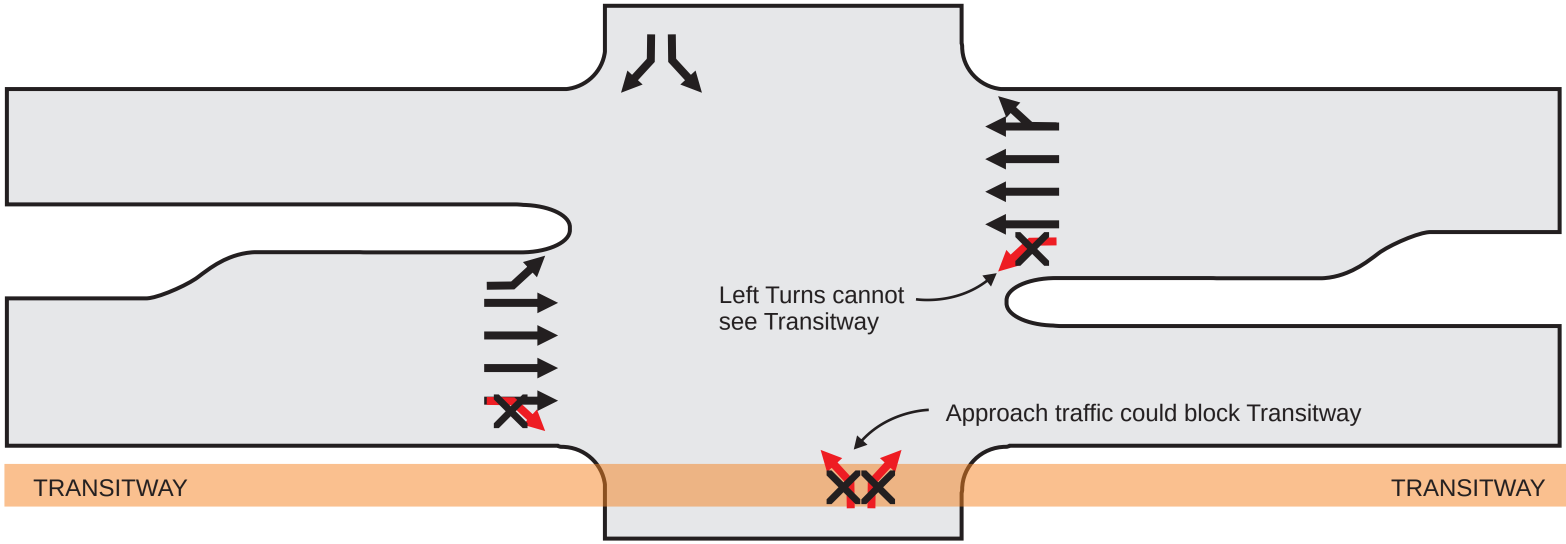
Thus, all of the unsignalized side streets and driveways would be restricted to become right in/out operations. Twelve driveways and 20 commercial and residential developments would be impacted by this closure. Providing a traffic signal at these locations would resolve the transitway conflict but would substantially impact roadway capacity and level of service. To conclude, median breaks could only remain open if signalized.

Traffic Operations

The intersections of Amberly Drive and Tampa Palms Boulevard both have double left-turn lanes. The development pattern would seem to favor a future transit station location at one or even both of these locations. If the double left-turn lanes at these locations are retained, stations are limited to the staggered side platform single track/lane configuration. This configuration substantially limits operations (speed and service headways) along the transitway since



Turning Movements precluded with Median Transitway



Turning Movements precluded with Off-Road Transitway

BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT
(South of E. Bearss Avenue to South of Palm Springs Boulevard)

RESTRICTED TURNING MOVEMENTS AT UNSIGNALIZED SIDE STREETS AND DRIVEWAYS WITH TRANSITWAY

Figure
17

vehicles are limited in their ability to enter the station area should a vehicle from the other direction already be at the station.

If single left-turn lanes were provided at the Amberly Drive and Tampa Palms Boulevard intersections a two-lane staggered side platform configuration would work for all modes except unguided BRT. However, the unguided BRT station would require a 41-foot envelope, and 40 feet are available. Eliminating the double left-turn lanes would have a substantial degradation on the intersection level of service, with extended queuing in the single left-turn lanes. If left-turn green time were increased, then the green time for other intersection movements would need to decrease, assuming a fixed cycle length. Increasing the cycle length to accommodate the single left-turn lane could disrupt the signal coordination pattern along Bruce B. Downs Boulevard and impact the ability to institute transit signal priority at these and other intersections.

The Michigan U-turn concept where applied would improve level of service at the major signalized intersections with the elimination of left turns and conversion to a two-phase signal operation. However, it would introduce added signals to accommodate U-turns downstream, which could have some corridor operational impacts.

Pedestrian Safety

The median transitway also requires that all pedestrians cross half of the street. This could impact intersection signal timing if a two-stage pedestrian signal were provided to facilitate access to the station platforms, and the limited median width provides reduced space for pedestrian queuing waiting to cross the roadway. The pedestrian queuing space issue is magnified by the narrow width of median and platform area available. Inadequate pedestrian queuing space could lead to pedestrians stopped in travel lane areas which would pose increased traffic conflicts.

Utilities

The storm drainage system would have to be revised to accommodate additional drainage from the transitway. One option would be to put underdrains along the transitway that would connect through piping to the roadway storm drainage system. The roadway drainage system could be sized for the ultimate roadway and transitway section. The roadway drainage system would include junction boxes placed along the median during the initial roadway widening construction. When the transitway was constructed the underdrains would connect directly to the roadway drainage system and eliminate any need for roadway reconstruction. Another option could be to build drainage outlets from the median into the revised inside curbing of a 6-lane roadway to allow sheet flow across the traffic lanes into the outside curb inlets with the transitway, where the roadway would not have to be torn up across the travel lanes left in place. In either case, the storm drainage system would need to be reconfigured and sized for the ultimate transit and roadway section.

There also is a proposed 48-inch water main and an existing 6-inch gas main currently within the median. It is likely these utility lines would have to be relocated if the transitway were placed within the median.

Off-Road Transitway

Local Access

The off-road alignment for the transitway requires the closing of unsignalized median breaks and any driveways on the northbound side of the roadway where the transitway would be located. The same eight median breaks noted in the median transitway section would be closed and the following driveways not located at median breaks:

- WC Business Park
- Space Savers Storage
- Florida Medical Clinic
- Spirit Food Mart
- Hess/Oak Ramble Shopping Center
- Electrical Substation

Similar to the rationale for precluding unsignalized access across a median transitway, there would be the potential for traffic turning left out of the median from southbound Bruce B. Downs Boulevard, to not see parallel transitway vehicles moving immediately adjacent to the roadway. Additionally, for left turns in and out of side streets and local driveways, there is the potential for a vehicle stopping in the transitway waiting for a gap in Bruce B. Downs Boulevard opposing traffic and not being able to clear the approach before a transitway vehicle arrives. Even providing crossing gates would not eliminate conflicts as unsignalized turning movements would still need to occur. These local access conflicts are illustrated in Figure 16. There is also the potential of a vehicle turning not seeing a pedestrian on the sidewalk pathway given their focus on the transitway crossing.

With the increase in the noted traffic conflicts comes the potential increase in crashes. The TCRP Report 17 strongly recommends closing all local driveways and side streets that interface with an off-road transitway that is immediately adjacent to the roadway, and that local access is provided only from signalized intersections where both roadway and transitway operations can be controlled together. This is now a standard design practice that has been followed across the U.S. and internationally for sections of LRT and BRT off-road facilities where the transitway is located immediately adjacent to a parallel roadway.

Some of the land uses could be afforded some level of access through side street access easement through adjacent properties, or some access road behind parcels fronting Bruce B. Downs Boulevard. In those areas where such alternate access is not possible, some businesses would have to be acquired and/or relocated.

Traffic Operations

The off-road transitway would also require the elimination of all northbound right turn lanes for northbound Bruce B. Downs Boulevard and the planned bus bays. This will have an impact on the level of service at the traffic signals. Right turn lanes would be eliminated at:

- St. Croix Drive
- Skipper Drive
- Amberly Drive
- Tampa Palms Boulevard
- Cypress Preserve Drive

Pedestrian Safety

The alignment would cause some potential riders to have to cross the entire boulevard to access transit. For most of the station configurations the pathway would have to be relocated to the opposite side of Bruce B. Downs Boulevard. A narrower sidewalk would be installed in its place on the northbound side of the roadway.

Parking

Some of the parking for the Green Oaks Apartments (18 spaces) appears to be partially within the right of way and would be impacted by the edge of road alignment.

Utilities

There are a large number of utilities along the northbound side of Bruce B. Downs Boulevard, including electrical power, water, sewer, telephone/fiber optic and cable television. These would have to be relocated to the left/right border areas or the median to provide for the transitway.

I-75 Interchange

It is likely that any transitway on Bruce B. Downs Boulevard will pass through the interchange with I-75 in the median to minimize impacts on interchange operations, particularly the southbound on-ramp and the northbound off-ramp from/to I-75. This requires the transition between an off-road transitway to a median transitway. For BRT this can be achieved by a queue jump at an existing traffic signal in northern Segment A or southern Segment B. An LRT system requires a transition with an eastbound traffic signal in a similar location.

NON-TRANSITWAY ALTERNATIVES

As this report was being prepared alternatives were suggested that incorporate the transitway into the designed eight-lane roadway corridor. Detailed analysis of these alternatives was outside the scope of this assessment. However, there has been experience nationally with these options.

One option is to construct the roadway as it is currently designed, and when the transit corridor is required, the lanes be removed from the eight-lane to create the transitway. This would mean converting a roadway from eight travel lanes to six travel lanes. The six-lane option has been estimated to reach capacity in 2022, the eight-lane in 2032. If the conversion from eight to six lanes occurs after 2022 but before 2032, it would result in a deterioration of the roadway level of service. The industry has had extensive experience in converting general purpose lanes to High Occupancy Vehicle (HOV) lanes. Experience has shown that the public strongly resists the removal of lanes that they had been using and taking action to cause congestion, no matter how sound the logic for doing so is. This typically is not a workable alternative.

A second option would be to construct the eight-lane section as designed but designate the curb lane for buses and managed lane/HOV vehicles. Experience suggests that if the designated lane is not relatively full, i.e. bus routes on short headways and a high level of managed lane/HOV usage there will be substantial abuse of the lane. If there is adjacent driveway access and the general use lanes are relatively full, there can also be abuse by right turns out of the driveways.

RISK ASSESSMENT

The final aspect of this evaluation is a risk assessment, i.e. defining the consequences of continuing with the current design or making modifications to the current design to create or enhance a transit envelope on Segment A of Bruce B. Downs Boulevard. Table 2 indicates the risks in terms of cost, design and schedule of changes to the design for changes from the current eight-lane design to six-lane design. Modifying the north/east bound lanes to create a wider median at signalized intersections would be similar in cost, schedule and approval impacts to the Six Lane Interim. It is difficult to determine exactly because the number of intersections to be modified is unknown. If it were one intersection and one station the impact could be fairly modest, if provisions were to be made for multiple stations, impacting several intersections, it may be necessary to redesign the entire northbound side of the roadway.

Table 2

Risk Assessment Summary

Typical Section	Future Transit Location	Roadway Impact	Additional Roadway Costs[1]	Schedule	Traffic Operations	Level of Service Failure Year	Land (Right-of-Way) Requirements	Ponds and Permitting
Eight-Lanes	Median	Reconstruction of the northbound roadway 23 feet east at station locations (2 assumed).	$10 Million	Project continues on current schedule.	Loss of 2nd left turn lane.	Reduced LOS at intersections with 2nd left turn lane removal.	Additional pond area for transitway drainage required.	Modification of 3 ponds sites. Environment Resource Permit required.
Eight-Lanes	Off-road	Removal of right turn lane.	$3 Million	Project continues on current schedule.	Removal of right turn lane.	Reduced LOS at intersections with right turn lane removal.	Additional pond area for transitway drainage required.	Modification of 3 ponds sites. Environment Resource Permit required.
Six-Lanes	Median	Dual left turn lanes reduced to single left turn lane.	Minimal	Approximately 10 months delay for contract modification and redesign.	Loss of 2nd left turn lane.	2022	May not require additional pond area.	Environment Resource Permit required.
Six-Lanes	Transit does not happen.	Add additional lane in each direction.	$21 Million	36 months design, permitting and right-of-way acquisition.	None	2022	Additional pond area required due to future stormwater management permitting rules.	Environment Resource Permit required.

[1] Includes the cost for design, construction and permitting, CEI, right-of -way, and contingency.

TRAVEL DEMAND ANALYSIS

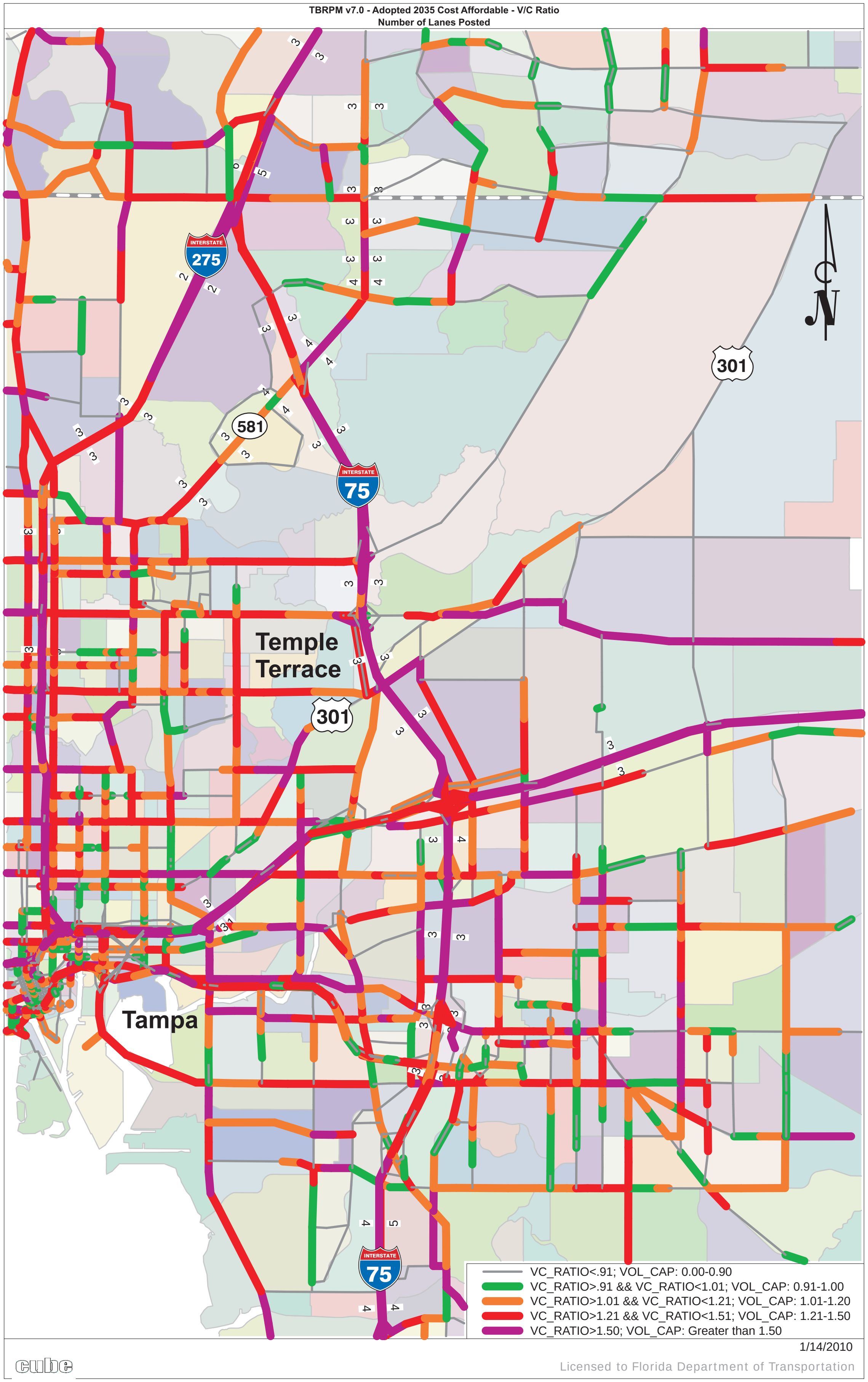
The Hillsborough County MPO performed several model runs of the Tampa Bay Regional Planning Model v7.0 to assist in the evaluating the need for an eight lane facility on Bruce B. Downs Boulevard Segment A. Based on the 2035 Forecast Year, the model runs varied the number of lanes on I-75 from 6 travel lanes to 10 travel lanes between the Bruce B. Downs Boulevard interchange and the Fowler Avenue Interchange. All the model runs incorporated a six lane Bruce B. Downs Boulevard. The number of lanes on I-75 and other major roadways is posted on Figures 18 through 20.

It should be noted that the six and eight lane options were run on the 2035 Cost Affordable roadway network and the ten lane option was run on the 2035 Needs Network. The Long Range Transportation Plan must contain projects that are "affordable" based on reasonable historical funding levels for the planning period. The "needs" network reflects projects that are necessary to reach a higher standard beyond available funding as defined in the plan.

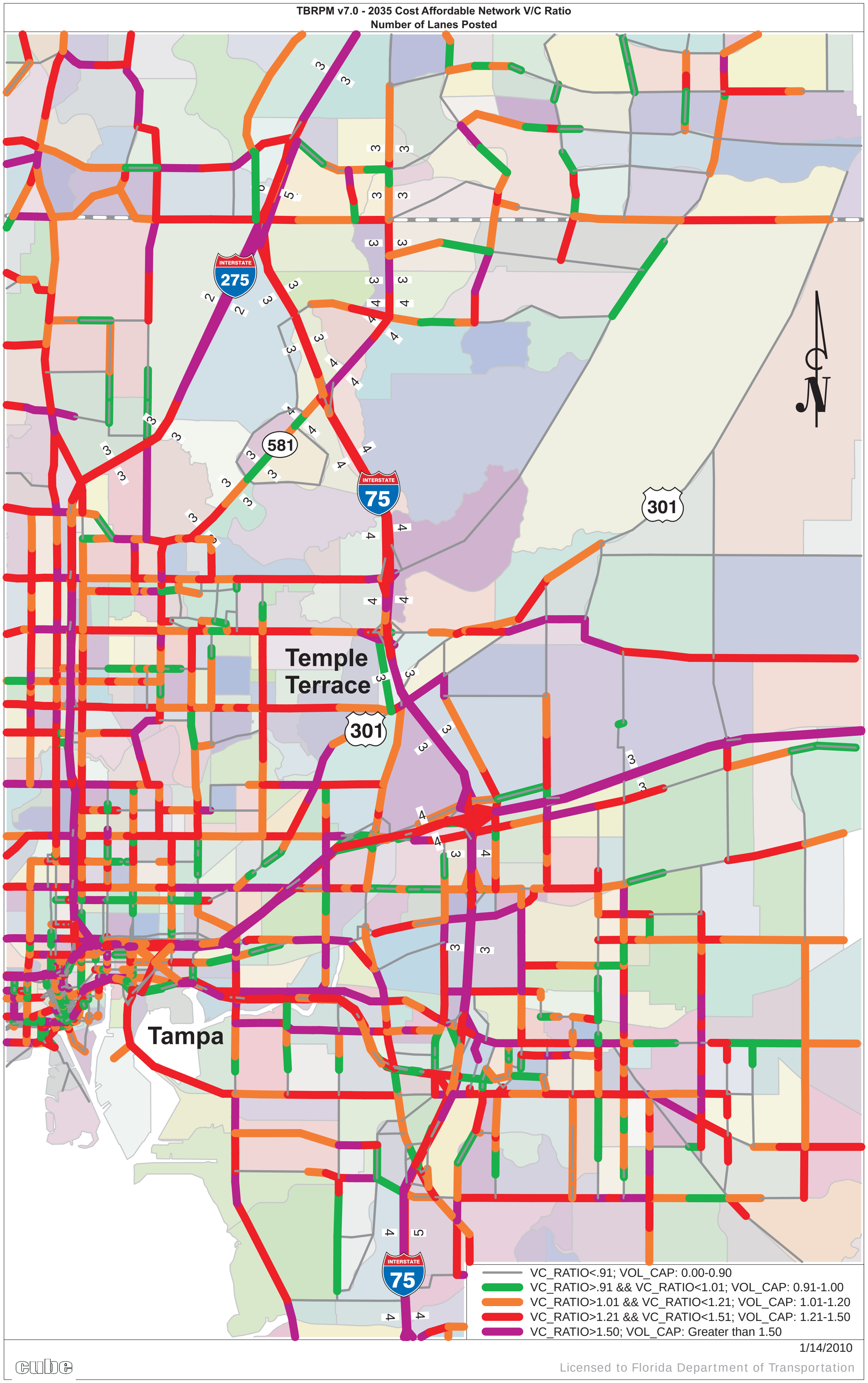
Figure 18 indicates the situation on the Cost Affordable Network with six lanes on I-75 and six lanes on Bruce B. Downs Boulevard Segment A. The portion of Segment A south of Cypress Creek operates at a volume to capacity ratio of 1.21 to 1.51, potentially as much as 50% above capacity. North of Cypress Creek the volume to capacity ratio is 1.01 to 1.20, as much as 20% above capacity. The improved I-75 segment operates at a volume to capacity ratio of greater than 1.5, more than 50% above capacity.

In Figure 19 eight lanes are provided on I-75 south of the Bruce B. Downs Boulevard interchange. Bruce B. Downs Boulevard operations are somewhat improved. Small segments of Bruce B. Downs Boulevard see better levels of service. I-75 volume to capacity ratio improves to less than 1.51.

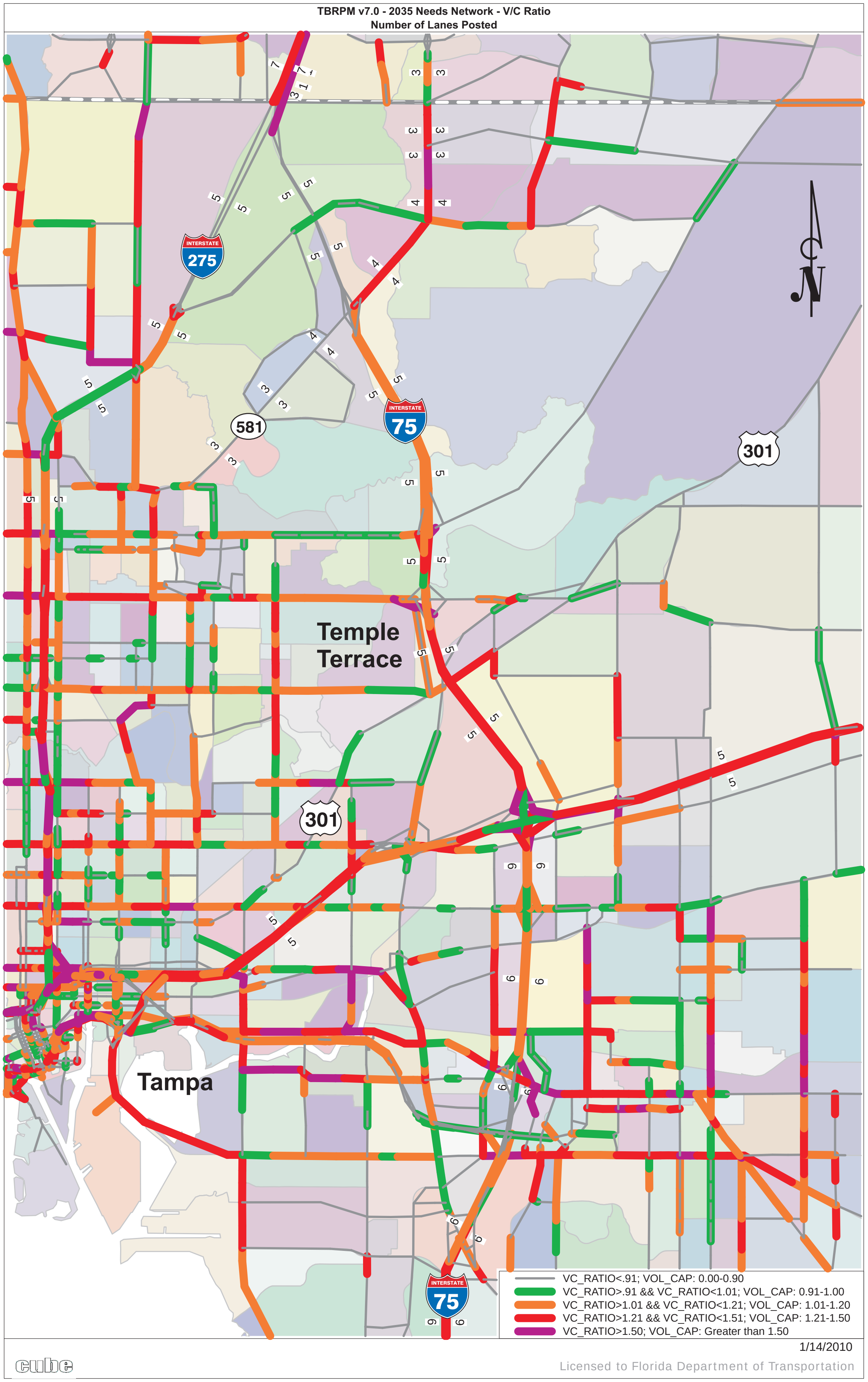
In Figure 20, ten lanes are provided on I-75. Bruce B. Downs Boulevard operates at a volume to capacity ratio of 0.9 or less, meeting the level of Service standard. This is a significant improvement. It should be noted that several other facilities in the area have also been improved as part of the "2035 Needs" network. I-75 from north of I-275 to south of US-301 has been widened substantially in this network; north of the I-275 interchange I-75 is 14 lanes, between I-275 and I-4 it is 10 lanes, and south of I-4 it is 12 lanes. I-275 has been widened to 10 lanes from I-75 to Fletcher Avenue. I-4 has also been widened to ten lanes. New Tampa Boulevard has been extended to the west, terminating in an interchange with I-275. There are likely other network changes as part of the "Needs" network which are not documented. It is not possible to determine, based on the information provided by the Hillsborough County MPO, which of these improvements or combination of improvements causes the reduction in traffic volumes on Bruce B. Downs Boulevard.



BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT *(South of E. Bearss Avenue to South of Palm Springs Boulevard)*	**I-75 (6-Lanes) 2035 Cost Affordable Network**	**Figure 18**



BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT (South of E. Bearss Avenue to South of Palm Springs Boulevard)		I-75 (8-Lanes) 2035 Cost Affordable Network	Figure 19



BRUCE B. DOWNS BOULEVARD TRANSIT ASSESSMENT *(South of E. Bearss Avenue to South of Palm Springs Boulevard)*		**I-75 (10-Lanes) 2035 Needs Network**	**Figure 20**