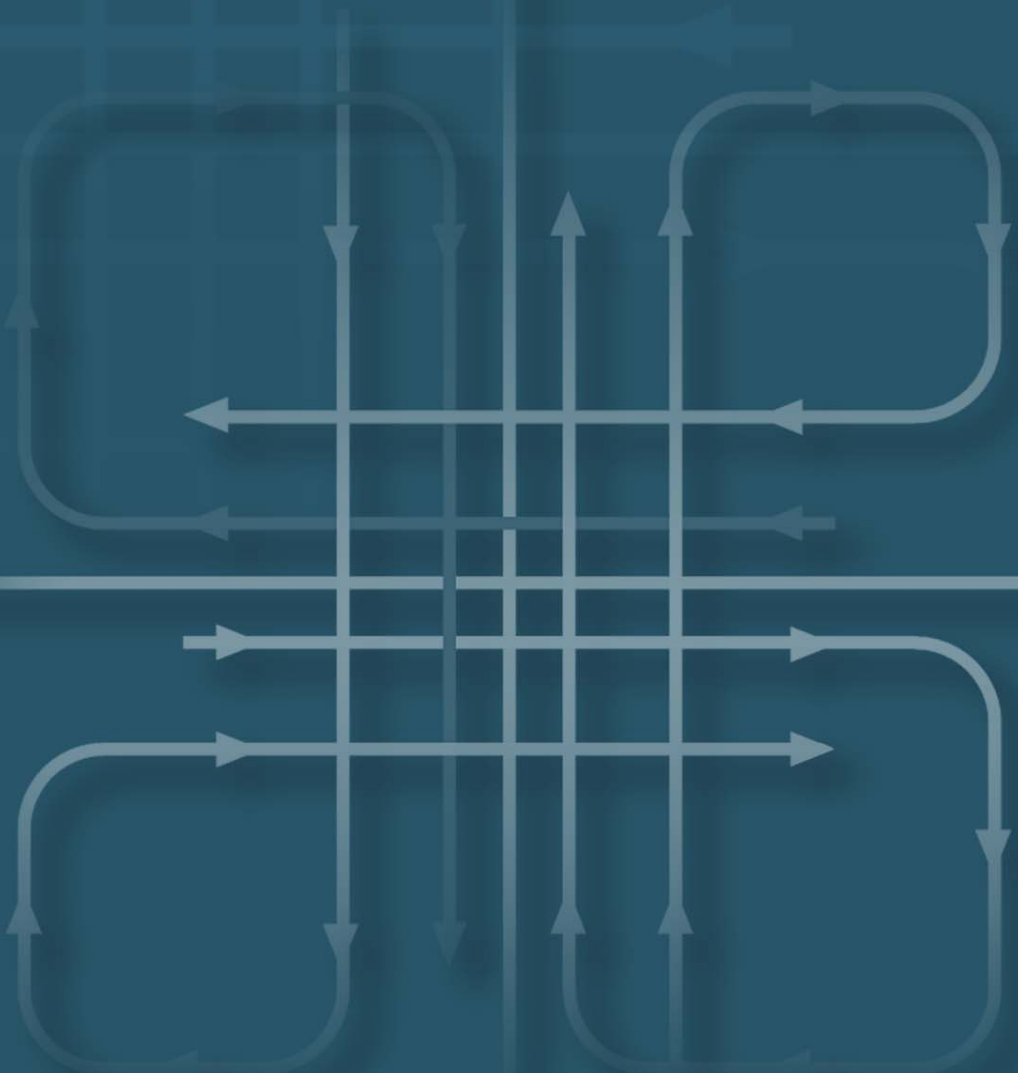
Indirect Left Turns Study



MIAMI-DADE MPO Metropolitan Planning Organization

dpa

Indirect Left Turns Study
formerly
Intersection Capacity Analysis
Left Turns Via 3 Rights

Work Order # GPC III-22

Final Report

DRAFT

December, 2008

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LIST OF EXHIBITS

1.0 INTRODUCTION

Miami-Dade County asked the general public to suggest ideas to improve traffic flow through a program called MOV'N. In response, citizens proposed the concept of replacing let turns at signalized intersections with three right turn movements. The Citizen's Independent Transportation Trust (CITT) authorized the Metropolitan Planning Organization (MPO), through their Unified Planning Work Program (UPWP), to study this concept.

The MPO was further interested in exploring additional methods of treating left turn maneuvers at signalized intersections. The objective was to identify treatments that will service these movements while at the same time reduce the negative impact of such maneuvers on the intersection capacity. This study considered different Indirect Left Turn (ILT) movement treatments at numerous locations throughout Miami-Dade County, eventually making recommendations suitable for two locations. Throughout the entire study, the MPO Transportation Planning Technical Advisory Committee (TPTAC) served as the Study Advisory Committee (SAC) providing valuable input and insight into the analysis and recommendations of the study.

The severe capacity impact of left turn movements at signalized intersections is well known to traffic engineers. It is recognized and reflected in the Highway Capacity Manual. As traffic volumes increase, the intersection reaches capacity. Oversaturated intersections result in excessive delays for motorist and often create additional operational difficulties such as turn bays filling up and spilling over to through lanes further restricting flow. There is no doubt that removing left turning movements from signalized intersections has great potential to increase intersection capacity and restore efficient flow through congested intersections. This may be possible by reallocating the green signal time from left turning traffic to through movements.

Typically, intersections with significant left turning volumes go through four signal phases with two phases allocating green signal time to left turns and two phases allocating time to through traffic. The removal of left turns from the intersection allows for potentially increasing through traffic capacity as illustrated, in concept, in the example shown in Exhibits 1.1 and 1.2.

Sample Signal Phasing with Protected Left Turns

phase	1	2	3	4	
seconds	15	45	10	30	100 secs
Through Traffic Capacity vph/lane	0	810	0	540	1350

Exhibit 1.1

Sample Signal Phasing without Left Turn Movements*

phase	1	2	
seconds	60	40	100
Through Traffic Capacity vph/lane	1080	720	1800
Improvement	33%	33%	33%

*Note: Left turns rerouted

Exhibit 1.2

2.0 LITERATURE RESEARCH

2.1 Introduction

The Miami-Dade Metropolitan Planning Organization (MPO) is interested in exploring different methods of treating left turn maneuvers at signalized intersections. The objective is to identify treatments that will service these movements while at the same time reduce the negative impact of such maneuvers on the intersection capacity. Specifically, the concept of rerouting left turns using a series of right turns is considered in this study. This memorandum investigates different indirect left turn movement treatments used throughout the United States and the South Florida area.

2.2 Background

The severe capacity impact of left turn movements at signalized intersections is well known to traffic engineers. It is recognized and reflected in the Highway Capacity Manual. There are traditional methods to accommodate left turns at signalized intersections. The first approach is providing a separate left turn lane for that movement. Otherwise, left turning vehicles would stop on the through lane to yield to opposing traffic and cause the blockage of through traffic. At this point, left turning vehicles turn on opportunity taking advantage of gaps in the opposing traffic flow. After that, given sufficiently high left turn volumes and the absence of gaps due to heavy traffic, left turn indications (arrows) are installed. This latter treatment provides added capacity for left turns, but only at the expense of capacity for other movements. Opposing traffic must be stopped and the capacity of a left turn lane is lower than a through lane due to the operating characteristics of left turning vehicles. Traffic operational treatments to compensate for this loss of efficiency include signal timing that incorporates protected and permissive indications where left turn traffic proceeds protected (opposing through traffic not allowed) during the arrow indication before the through movements (lead phase) or after the through movements (a less common phasing called lag phase). Then, during the through phase, left turn movements are allowed to proceed unprotected (without a left turn arrow, using gaps in the opposing traffic). The next level of treatment, as left turn volumes increase, is the construction of double left turn lanes. These lanes cause additional inefficiencies as added turn lanes have even less capacity than the first turn lane. Furthermore, some agencies such as FDOT, only allow the use of a protected left turn phase for double left turn lanes further reducing the efficiency of that configuration because vehicles are no longer able to turn on opportunity taking advantage of gaps in the opposing traffic stream. Additionally, double left turn lanes are not feasible at many locations in urban areas because of the lack of right of way and the high costs of acquiring land in densely developed areas.

2.3 National Literature

National literature was researched during the investigation of alternative methods of reducing left turn related delays at congested intersections. The following reference materials, among others, were located and found to include important relevant information about the topic:

- A Policy on Geometric Design of Highways and Streets (American Association of State and Transportation Officials (AASHTO)
- Evaluating Intersection Improvements: An Engineering Guide (National Cooperative Highway Research Program – NCHRP - Report 457)
- Innovative Intersection Safety Improvement Strategies and Management Practices: A Domestic Scan (Federal Highway Administration - FHWA – US Department of Transportation - USDOT)
- Signalized Intersections: Information Guide (FHWA – USDOT)
- A Toolbox For Alleviating Traffic Congestion and Enhancing Mobility, Institute of Transportation Engineers - ITE)
- Institute of Transportation Engineers ITE Journal

These references recognize traditional left turn treatments and alternative, indirect, left turn treatments including:

Traditional Treatments

- Single left turn lane
- Double left turn lane
- Prohibit left turn movements (peak hour or all day)

Indirect Left Turn Treatments

- Replace left turns with 3 right turns
- Jughandle intersection design
- Quadrant Roadway Intersection
- Median U-turn Crossover
- Super-Street Median-Crossover
- Continuous Flow Intersection

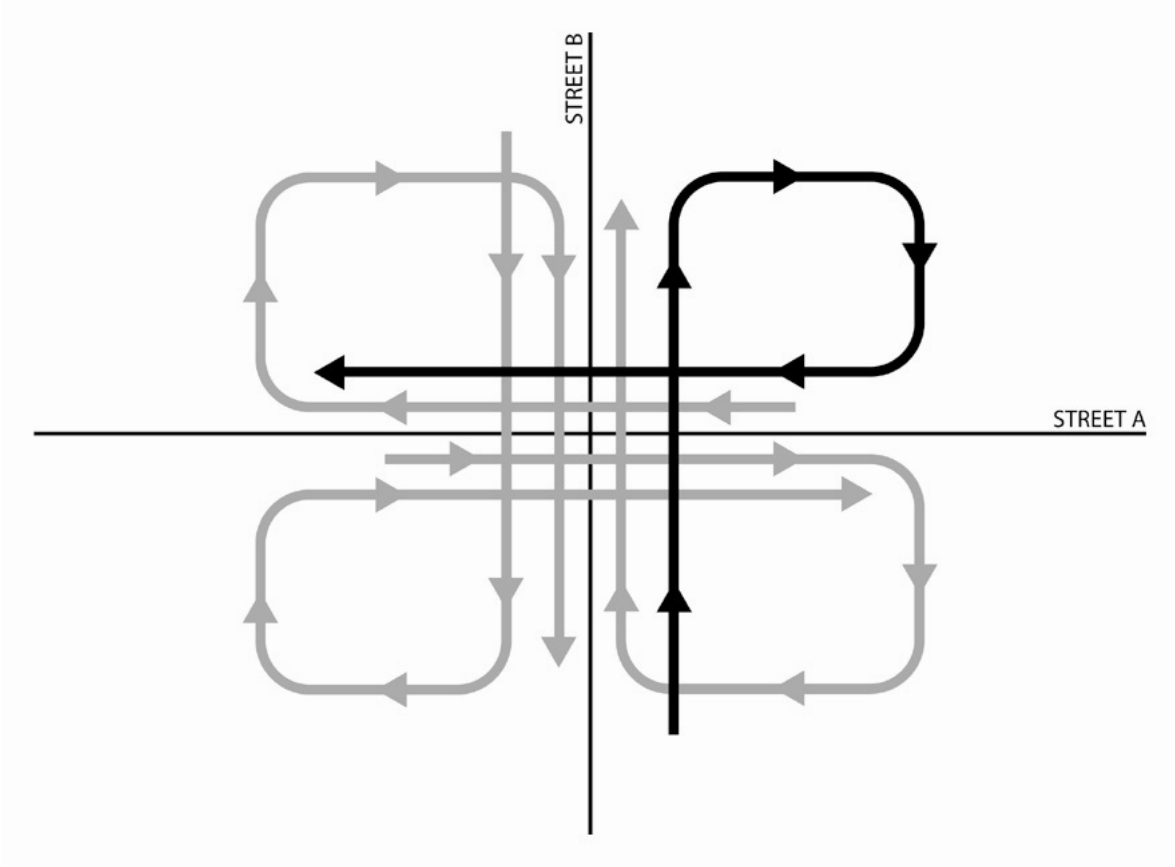
The main concept behind the indirect left turn movement treatments is to remove left turns from a busy signalized intersection so that the number of signal phases can be reduced, and the signal time reallocated resulting in an increase in intersection capacity. The required path change makes imperative the use of clear advance signage. Other geometric design and operational issues are also critical to successful implementation. Among these are: adequate storage (stacking) distance/capacity and signal coordination.

Available Indirect Left Turn Treatments, and their primary advantages and disadvantages, are explained below. It should be noted that simulation analysis by others found that benefits vary greatly from option to options as well as within each option under different traffic volume combinations. Therefore, generalized operational benefit conclusions are not possible. Options should be evaluated on a case by case basis. Comparison of construction costs and right of way requirements are easier to generalize and in many cases could rule out certain options based on the goals of the implementing agency.

2.3.1 Replace Left Turns With 3 Right Turns

This study sponsored by the Miami-Dade MPO evaluates a specific indirect left turn treatment at signalized intersections: replacement of the left turn movement with three right turns (LT via 3RT). This technique takes advantage of adjacent streets to replicate the configuration of a Type B Cloverleaf interchange exit ramp (see typical diagrams below), where the ramp is located beyond the cross street. The treatment is not unheard of. In fact, it has been used locally and in other cities in extreme cases of delays at signalized intersections with left turn movements that affect the capacity of the intersection. Left turn movements need not be excessively high if the saturation of the intersection is also otherwise high and operation can be improved by reducing the number of signal phases and reallocating the green time to movements that use less capacity than the left turn lanes. Some traffic engineers, however, caution that this is not a universal solution. While right turn movements are somewhat more efficient than left turns: a) right turning traffic slows down through traffic; b) three right turns require vehicles to traverse the same critical intersection twice, increasing the total traffic using the intersection, with the corresponding use of through capacity and the ensuing delays; c) alternative routes may not be appropriate (in design and/or type of area) for the rerouted traffic; d) right turn traffic will likely experience greater delays than if they were turning left due to the increase travel distance and the need to rejoin the arterial traffic stream (after the third right turn) at a location most likely without a traffic signal which will require these motorists to wait for infrequent gaps. Notwithstanding these potential impacts, the replacement of left turn movements with 3 right turns does have a lot of merit because it has the potential to reduce overall intersection delays and in many cases can be easily and inexpensively implemented without acquiring right of way.

Left Turn via 3 Right Turns



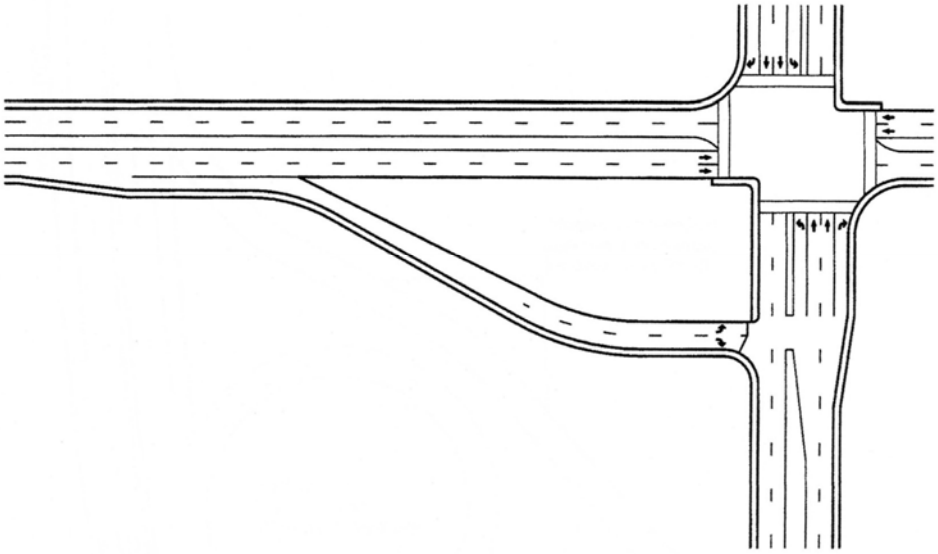
Functional Diagram

2.3.2 Jughandle Intersection Design

A Jughandle is an indirect left turn treatment based on special road geometrics replicating the configuration of an interchange exit ramp (see typical diagrams below). It usually requires new construction and it can be used either on the main road or the cross street or both. The Jughandle can emulate a "diamond" interchange ramp replacing left turns from (for example) the main road by creating a separate "ramp" roadway (or lane) separating from the main road to the right in advance of the signal. The "ramp" ends at the cross street where diverted vehicles must turn left either at a stop controlled intersection or another signal. The Jughandle can also take the form of a "cloverleaf" ramp separating from the main road beyond the signal. After the signal, the "ramp", in the shape of a loop, redirects the diverted traffic 270 degrees. The diverted vehicle can then join the traffic on the cross street after observing a stop or a yield sign, or as a merge maneuver if the distances and geometrics are adequate. All diverted turns must traverse the main intersection twice.

Jughandles are used often in northeastern states such as New Jersey. Connecticut, Delaware, and Pennsylvania. Studies have found that, in general, Jughandles can: reduce overall intersection delays in some cases; often increase the travel time for diverted vehicles due to the additional travel distance; and sometimes require additional right-of-way for implementation.

Jughandle



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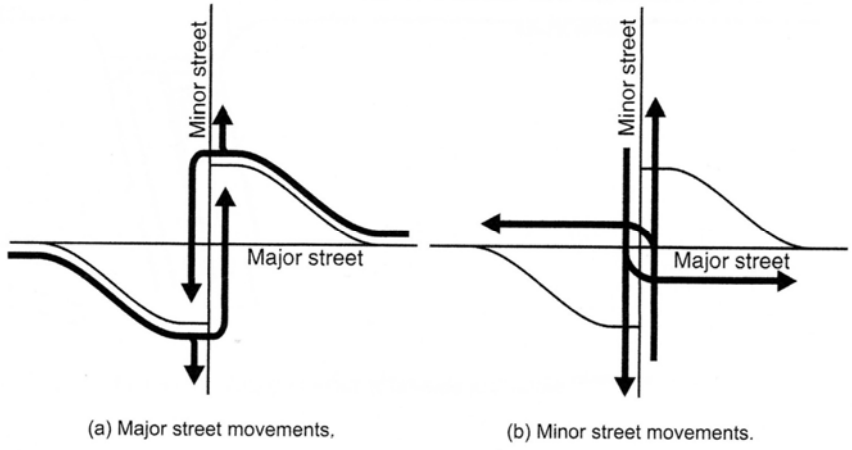
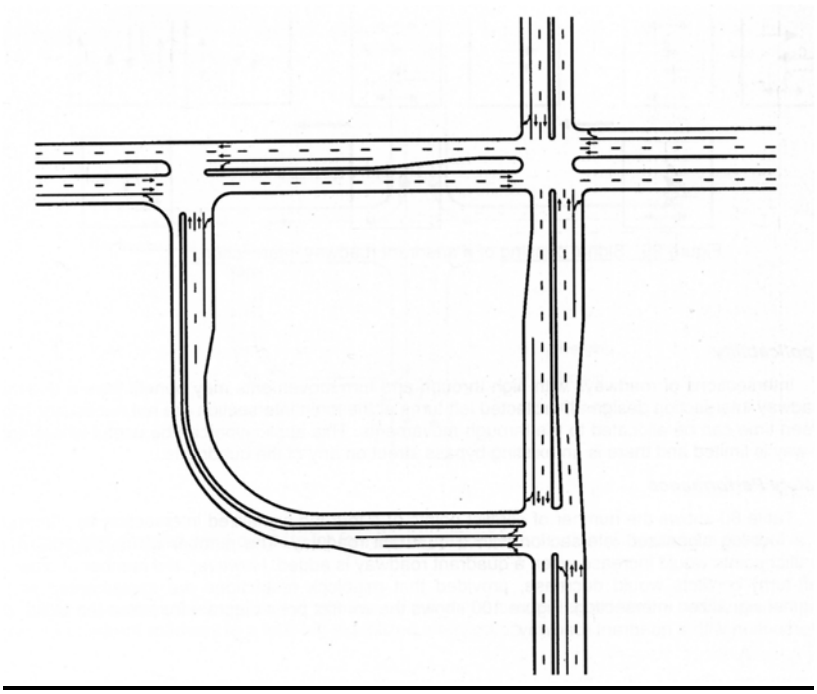


Functional Diagram

2.3.3 Quadrant Roadway Intersection

A Quadrant Roadway Intersection is an indirect left turn treatment based on an additional two-way roadway segment on one of the major intersection quadrants (see diagram below). The auxiliary roadway connects two of the legs of the intersection and allows prohibition of all left turns at the major intersection by diverting those movements to the auxiliary road. Typically, the two ends of the auxiliary road are signalized T-intersections which can be operated as a three phase cycles. The main intersection, now free of left turns can operate as a two phase cycle. The four diverted left turn movements become : one right turn loop (three right turns); one left turn loop (two left turns and one right); one displaced left turn (two left turns and one right); and one mixed loop (one right turn and one left). Two of the 4 diverted movements must traverse the intersection twice. All "loop" maneuvers involve extra travel distance for the displaced left turn movements. If implementation of this treatment is able to take advantage of an existing road and traffic signals, then additional right-of-way is not needed and the cost is minimal. The impact on other traffic will also be relatively small, with a good chance of having an overall positive effect on traffic flow when combining all three intersections. Otherwise, cost can be high and benefits small when compared to the investment.

Quadrant Roadway Intersection



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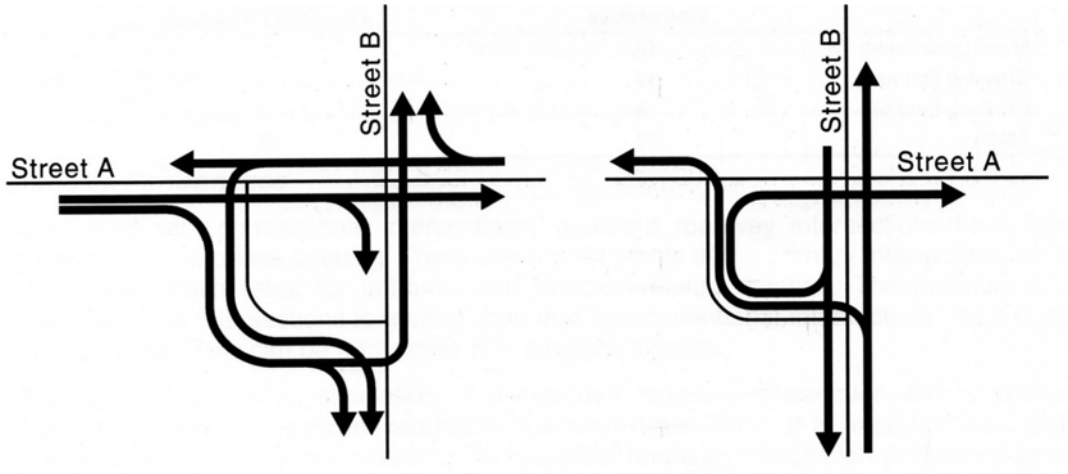


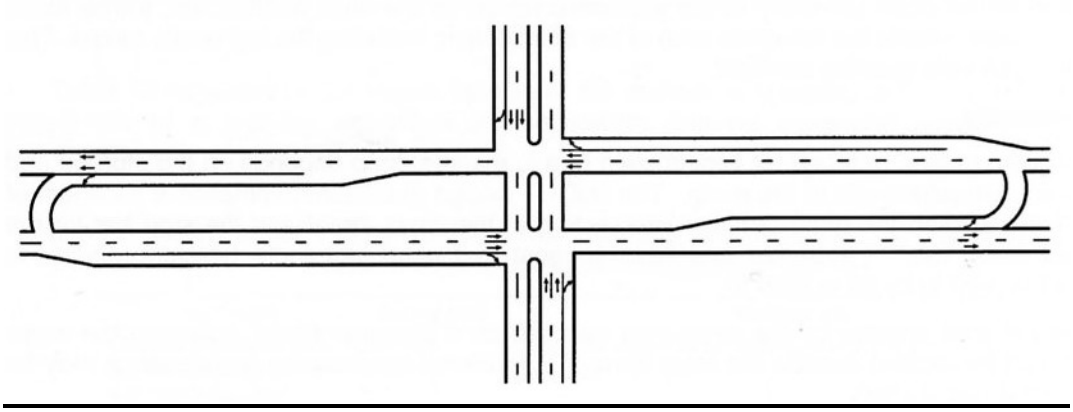
Functional Diagram

2.3.4 Median U-turn Crossover

A Median U-turn Crossover is an indirect left turn treatment based on the prohibition of left turn movements and replacing them with a U-turn and a right turn. It requires the creation of U-turn median openings (preferably directional) on one of the two streets (see diagram). These openings may or may not need to be signalized depending on the traffic volumes. If the U-turn opening is on the main street, left turn movements diverted from the main street proceed to the opening beyond the intersection, make a U-turn and then turn right at the major intersection. Left turns diverted from the minor street turn right at the subject intersection (instead of left) and then use the U-turn opening to join the major street in the direction they wanted to travel originally. All displaced maneuvers involve extra travel distance and must traverse the major intersection twice.

Median U-turn Crossovers are used regularly in Michigan. In that state this treatment is also known as Indirect Left Turn Junction. Additionally, at some locations in Michigan, U-turn maneuvers are removed from the left turn signal demand by creating a turnoff immediately in advance of the intersection. A crucial design issue for the crossover treatment is the adequacy of the opening for U-turn maneuvers. Due to the large turning radius of many vehicles, U-turn openings require either a wide median (at least 30 ft - including the turn lane - for passenger cars, wider if trucks are expected to use the opening) if two opposing lanes and/or three through lanes in the opposite direction of travel (and a 18 ft median including the turn lane). Otherwise, additional right-of-way may be required to create an auxiliary jughandle-type roadway for completing the turn comfortably and safely joining the opposite lanes. In Michigan, this latter design refinement is referred to as a "loon".

Median U-turn Crossover



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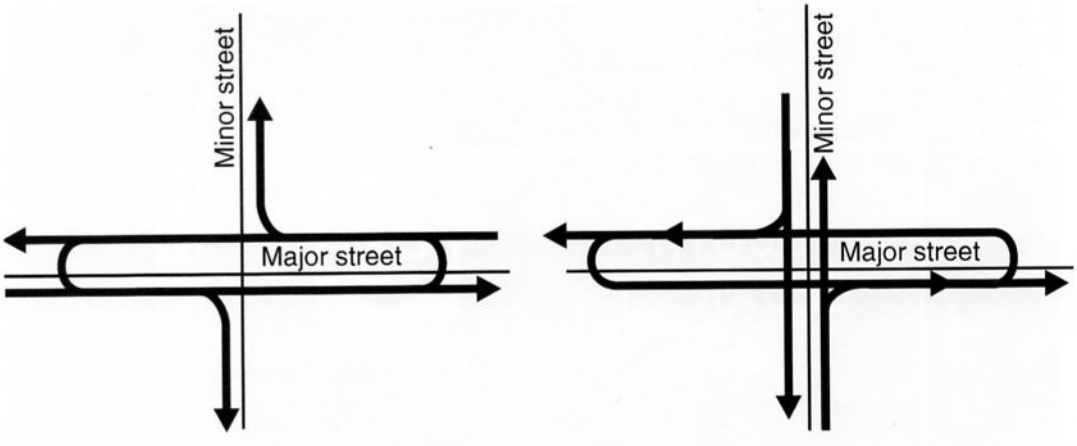


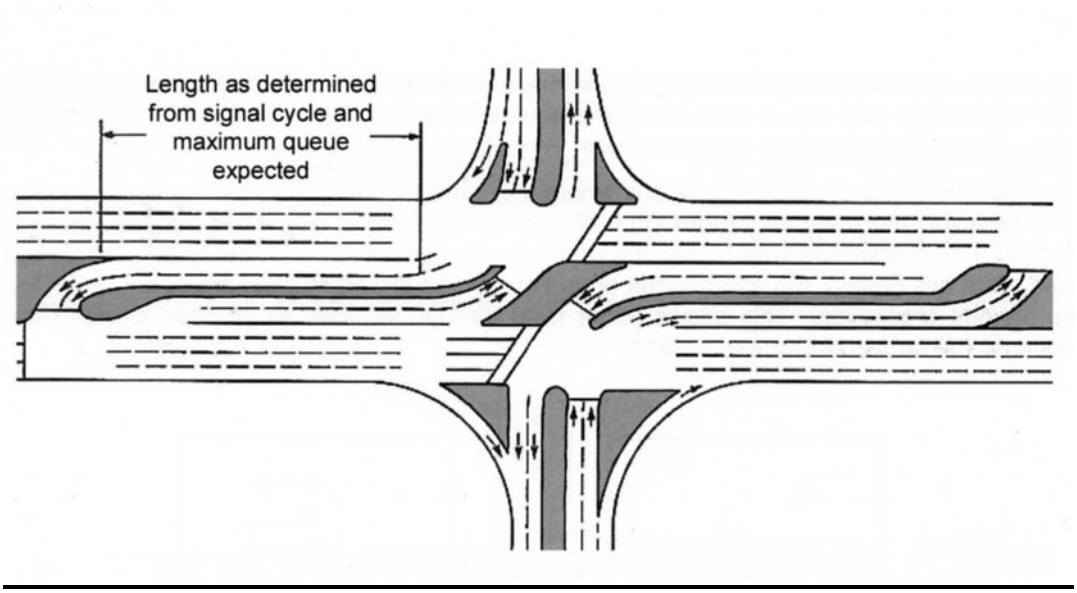
Functional Diagram

2.3.5 Super-Street Median-Crossover

A Super-Street Median-Crossover is a special geometric configuration designed to favor the major street while penalizing the minor street. Traffic patterns for the main street traffic remain unchanged (left turns are allowed). However, both the left turns and the through movements from the minor street are prohibited and rerouted using the median crossover concept described above. Therefore, diverted left turns from the minor street turn right at the subject intersection and make a U-turn. Through movements also turn right and then U-turn but they turn right again at the intersection to continue on their original path. All displaced maneuvers involve extra travel distance and must traverse the major intersection twice.

In addition to the three lane requirement for the opposing direction of the major street, a wide median is also necessary because double left turn lanes are typically required at the median openings. These lanes must be able to accommodate all the diverted left and through movements from the minor street. While the Super-Street Median-Crossover will usually benefit main street traffic flow, traffic patterns on the minor street are seriously disrupted. Therefore minor streets with very heavy traffic volumes may result in unacceptable delays for the minor street traffic and/or conflicts such as queue spillback caused by the diverted movements.

Super-Street Median Crossover



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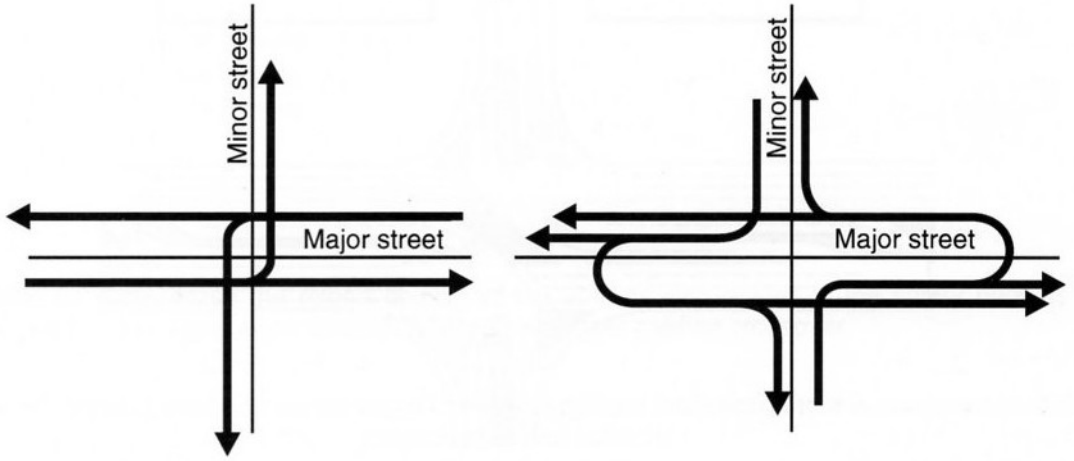


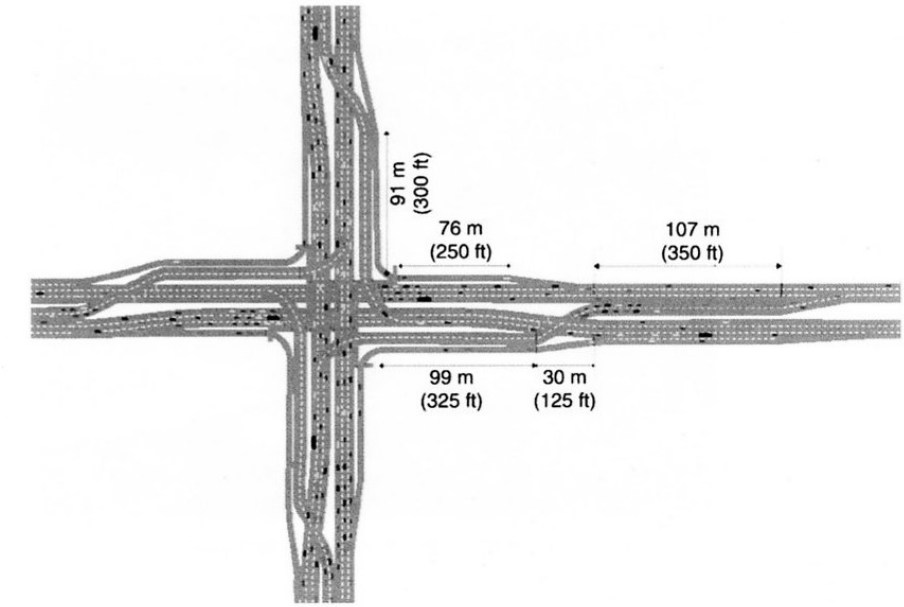
Functional Diagram

2.3.6 Continuous Flow Intersection

The name of this treatment is misleading. While traffic flow through the main signalized intersection is somewhat simplified (no turn movements at all), the intersection operates as a two phase signal which by definition requires traffic flow to be interrupted by the signal. This innovative, but intricate design was actually patented until the year 2003. The design also has a second name: Crossover-Displaced Left Turn (XDL). The most distinctive element of the Continuous Flow Intersection (CFI) is the displacement of left turn movements to a signalized upstream median opening that is used to allow left turn movements to cross the oncoming traffic and take a road segment parallel to their original travel path. Upon reaching the cross street (now to the left of the oncoming traffic), another signal is used to stop cross street traffic and allow a protected left turn maneuver. Left turn movement, therefore, must negotiate three traffic signals instead of one. The complex geometrics also require careful coordination of the signals because most of the operational benefits of the design are derived from moving these left turns simultaneously with the through movements on the original travel route.

These complex geometrics require more right of way than a conventional signalized intersection. The right of way is needed for the auxiliary left turn roadways, as well as a separate roadway ("ramp") to allow right turn movements to bypass the signal and join the cross street as a merge maneuver. Furthermore, there should be no driveways on any of the intersection quadrants, which in some cases, may require construction of frontage roads, further increasing the right-of way needs. It also requires 5 traffic signals (instead of one) in order to implement the concept. While significant benefits can be realized with relatively minor traffic pattern disruption, these factors can make the construction cost fairly high. Actual application throughout the US is very limited.

Continuous Flow Intersection



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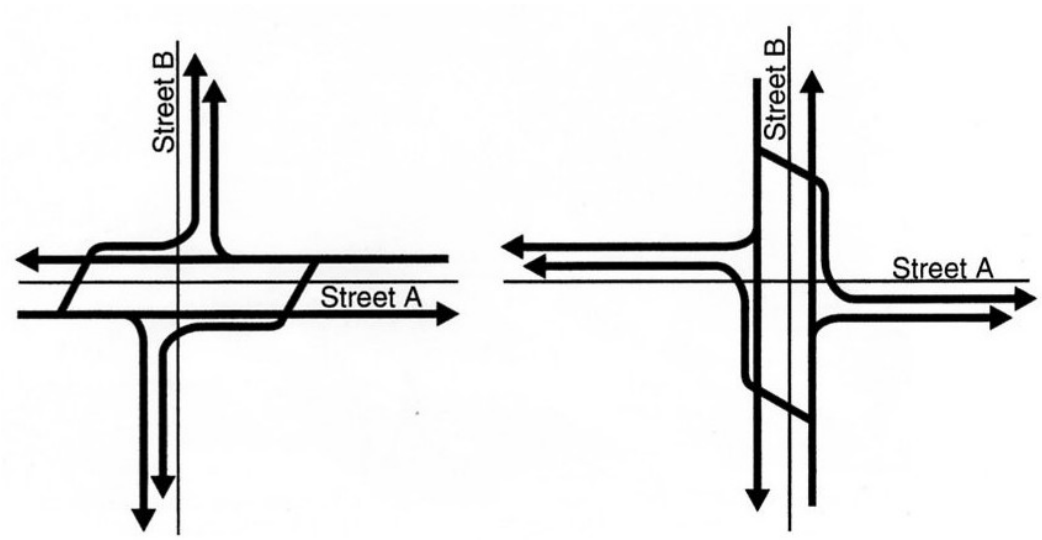


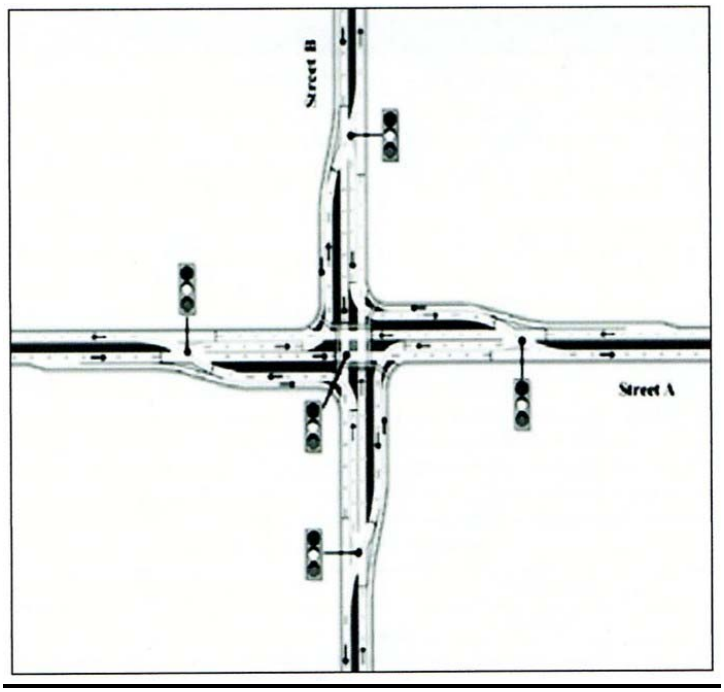
Functional Diagram

2.3.7 Parallel Flow Intersection

This is a variation of the Continuous Flow Intersection Design described above. Like its counterpart, it also requires traffic flow to be interrupted by a signal. This specific design is presently patented. The main difference between these two designs is that in the Parallel Flow treatment the left turn movements cross the opposite traffic flow immediately prior (adjacent, not in advance) to the main intersection. Upon reaching the cross street (now to the left of the oncoming traffic), another signal is used to stop cross street traffic and allow a protected left turn maneuver. The left turn movement, therefore, must negotiate two traffic signals instead of one in the conventional design (or three in the Continuous Flow configuration). Like the previous design, complex geometrics also require careful coordination of the signals because most of the operational benefits of the design are derived from moving these left turns simultaneously with the through movements on the original travel route.

These complex geometrics require more right of way than a conventional signalized intersection (though not as much as the Continuous Flow). The right of way is needed for the auxiliary left turn roadways, as well as a separate roadway ("ramp") to allow right turn movements to bypass the signal and join the cross street as a merge maneuver. Here too, there should be no driveways on any of the intersection quadrants, which in some cases, may require construction of frontage roads, further increasing the right-of way needs. This design also requires 5 traffic signals (instead of one) in order to implement the concept, just like the CFI. While significant benefits can be realized with relatively minor traffic pattern disruption, these factors can make the construction cost fairly high. There are no known locations where this treatment has been implemented within the US.

Parallel Flow Intersection



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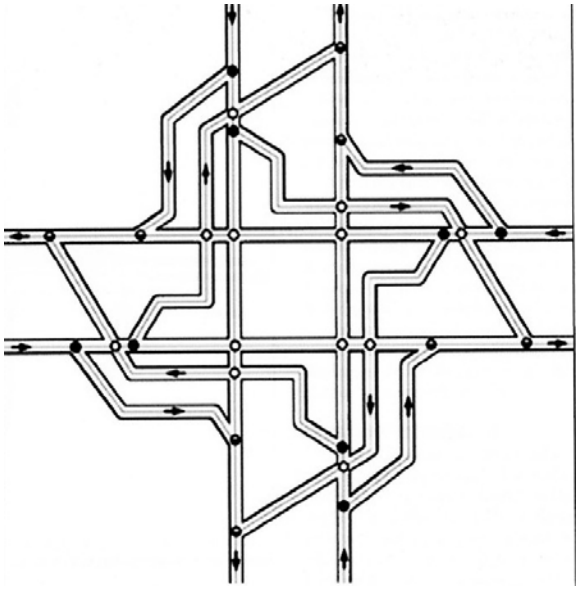


Functional Diagram

2.4 Local Studies

Our research of these concepts also included a survey of local and state traffic engineering personnel in order to develop an inventory of locations in Miami-Dade where these treatments have been implemented. Before and after studies were requested but none were available. Commentary, as well as professional opinions of these professionals were sought. One of the concerns expressed was the impact of diverted movements on nearby residential neighborhoods. Additionally, field observations of selected locations took place to examine first hand how the treatments operate and whether there are any detrimental effects to intersection capacity as a result of such operations.

2.4.1 Northbound LeJeune Rd. @ Okeechobee Rd (recently replaced with a flyover Structure)

One of the oldest and busiest intersections with this treatment was replaced a few years ago by a major flyover structure to accommodate the northbound left turns from northbound LeJeune Road to Okeechobee Rd. For many years this movement was serviced by a "right turn loop" rerouting the northbound left turn traffic across Okeechobee Rd., with the first right onto SE 12 Street (Hialeah), the second right on SE 8 Ct. and the third right back onto westbound Okeechobee Rd. This configuration in fact allowed the postponement of the major expense of the flyover structure for at least 15 years.

2.4.2 Southbound Pine Tree Dr. @ W 41 Street

This location has one ground loop for the southbound left turn movement. The need here, however, seems to be more safety than capacity related. The north leg of the intersection (Pine Tree Drive) has a fairly wide median with mature trees and a large tree located right at the median nose. Because of this tree, there is no left turn bay. The inside lane is marked for through traffic movements only, implying that left turns are not allowed. There are no signs prohibiting such movement. The ground loop signage is not obvious either. There is a route-ahead sign for A1A (W 41 Street) southbound in advance of the intersection, but it is misaligned and hard to see. After proceeding south beyond the intersection, a route guide sign can be seen at the end of the block pointing to the right at W 40 Street. After turning, other signs direct the motorist to right turns from westbound W 40 Street to northbound Sheridan Avenue and then from northbound Sheridan to eastbound W 41 Street, completing the loop. Observation of the subject movements confirmed a few left turn violations and very light use of the loop route.

2.4.3 Northbound NW 119 St. @ 27 Ave

A ground loop was designed and installed northbound on NW 27 Avenue at NW 119 Street. While the loop is still in place, signage for users on 27 Ave has been removed. Therefore, the loop is no longer in use. Research into the reason for this abandonment yielded no definite answers. It was suggested, however, that the intersection might have been improved, making the loop unnecessary.

2.4.4 Northbound LeJeune Rd @ NW 36 St

There was a reference to a ground loop at this location. However, upon field inspection, none was detected. In fact, northbound left turns are allowed here. Other movements at the intersection are prohibited, but no designated reroutings in the configuration of traditional ground loops (3 right turns) were found.

2.5 Evaluation of Indirect Left Turn Treatments

An evaluation of the seven Indirect Left Turn Treatment enumerated above was conducted using the information available from the stated sources. Five evaluation criteria were developed as follows:

- Operational Benefits – reduction of delays
- Directness – additional travel distance
- ROW Impacts – additional right-of-way requirements
- Construction Cost – order of magnitude cost
- Neighborhood Impacts – arterial traffic through residential areas

A three point score system used. Weights were assigned to the criteria working with the Study Advisory Committee and subcommittee. ROW Impacts and Neighborhood Impacts were given a weight of 3 and 2 respectively relative to the other factors. Results of the evaluation show only minor variations in the scores (see Exhibit 2.1), but the first two treatments (LT via 3 RT and Jughandle) obtained the same highest score, making them superior to the others based on the above weighted criteria.

Looking at the results closer, reveals that:

- The operational benefit scores are very general in nature because the original evaluation found, based on simulation of different conditions, a wide variation of results. Therefore, the traffic volumes and movements at the intersection and the area in general can make a location unsuitable and possibly make operations worse.
- Right-of-way impacts may, in some cases, make unfeasible the use of certain treatments at some locations
- Careful selection of locations can overcome some of the disadvantages of certain treatments, for example, the LT via 3 RT can increase its score by 2 to 4 points (making it the best option) if implemented in areas where there would be little or no neighborhood impacts.

Exhibit 2.1 – Evaluation of Indirect Left Turn Treatments

Raw Scores

Indirect Left Turn Treatment	Operational Benefits	Directness	ROW Impacts	Construction Cost	Neighborhood Impacts	Total
A. LT via 3 RT	1	2	3	3	1	10
B. Jughandle	1	2	2	2	3	10
C. Quadrant Roadway Intersection	1	2	2	2	2	9
D. Median U-turn Crossover	1	1	2	2	3	9
E. Super-Street Median Crossover	1	1	2	2	3	9
F. Continuous Flow Intersection	2	3	1	1	2	9
G. Parallel Flow Intersection	1	3	2	1	2	9

Legend: 1=low score; 3=high score

Weighted Scores

Indirect Left Turn Treatment	Operational Benefits	Directness	ROW Impacts	Construction Cost	Neighborhood Impacts	Total
Criteria Weight ---------->	1	1	3	1	2	
A. LT via 3 RT	1	2	9	3	2	17
B. Jughandle	1	2	6	2	6	17
C. Quadrant Roadway Intersection	1	2	6	2	4	15
D. Median U-turn Crossover	1	1	6	2	6	16
E. Super-Street Median Crossover	1	1	6	2	6	16
F. Continuous Flow Intersection	2	3	3	1	4	13
G. Parallel Flow Intersection	1	3	6	1	4	15

2.6 Summary of Findings

A number of Alternative Indirect Left Turn Movement Treatments have been studied and used both nationally and locally. Their operational benefits and cost effectiveness have been tested elsewhere. Of the available treatments, the LT via 3RT option fares particularly well if implemented in areas where there would be no neighborhood impacts. The main advantages of the LT via 3 RT treatment are:

- Low cost by taking advantage of existing street network to avoid new construction
- No Right-of-way impacts
- May not require additional traffic signals
- Speed and ease of implementation

When neighborhood impacts are a factor, the Jughandle design has similar benefits.

Like the other 6 Indirect Left Turn treatments, however, the specific location for the LT via 3 RT or Jughandle options must be carefully evaluated to ensure that the overall effect will be beneficial.

3.0 INTERSECTION SCREENING

3.1 Screening Criteria

The scope of this study required compiling a list of approximately 12 intersections that would make potential candidates for Indirect Left Turn (ILT) treatments. The initial locations were then to be further reviewed against appropriate screening criteria to determine the locations best suited for such treatment. Of these, two locations are to be studied in detail to ascertain the best type of treatment and degree of improvement achieved by the recommended ILT treatment.

The initial selection of intersections was accomplished through the use of aerial photography. Congested intersections on major routes and adjacent grid network structure were considered. Every attempt was made to obtain a geographically balanced sample. Additionally, the availability of alternate routes was factored-in, and residential areas were avoided as much as possible to minimize the potential impacts of diverted traffic. The initial sample consisted of 13 locations. These were presented to the Transportation Planning Technical Advisory Committee (TPTAC). The committee members suggested five additional locations to increase the sample to 18. The locations are shown on Exhibit 3.1.

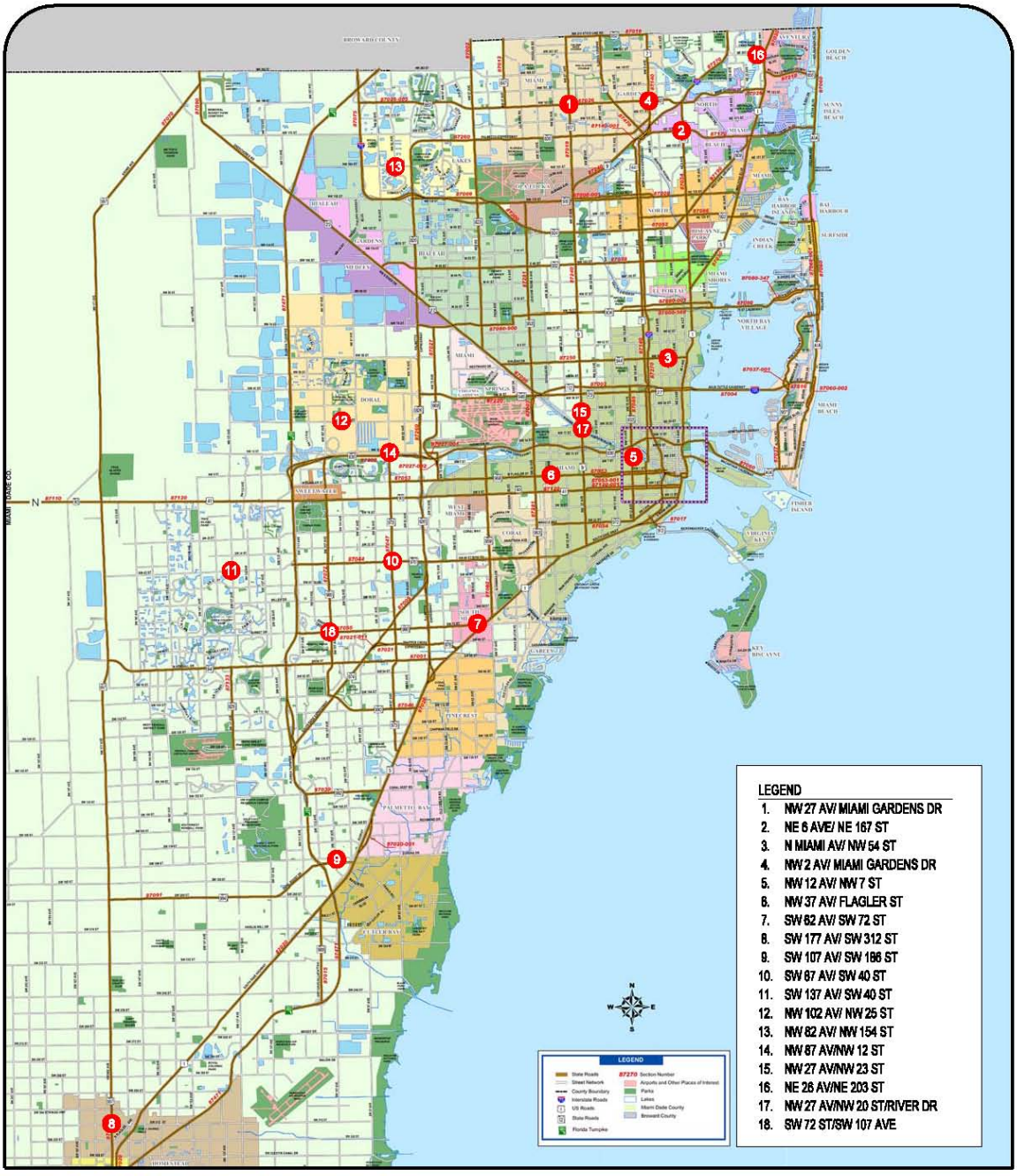
The screening criteria initially suggested were as follows:

a. Traffic volumes
b. Number of signal phases
c. Left turn lane length
d. Type of route
e. Availability of alternative routes

Following additional analysis and consultation with the MPO and the TPTAC, the initial screening criteria were expanded. Possible sources of available data were also considered to ensure an effective screening of locations without excessive data collection costs. The expanded screening criteria are shown below.

a. Traffic volumes
b. Number of signal phases
c. Left turn lane length
d. Type of route
e. Availability of alternative routes
f. Suitability of alternative routes
g. County and/or state route
h. Constrained right-of-way
i. Planned improvement
j. Residential impacts
k. Transit left-turns

Exhibit 3.1 – Location Map



3.2 Data Gathering

Data gathering for the intersection screening was primarily an office effort taking advantage of several Miami-Dade and private sector internet sites, a few study reports commissioned by the MPO, and remotely accessed data from the traffic signal control center. A description of the parameters and specific data sources is provided below.

1. Traffic volumes: Traffic Level of Service was used as a more effective parameter of congestion. The report entitled "Arterial Grid Analysis Study" Provided LOS measurements throughout the county.
2. Number of signal phases: Number of left turn and/or lead phases was found to be more effective for this evaluation. The data was obtained directly from Miami-Dade County Traffic Signal Control Center
3. Left turn lane length: The total left turn bay length for each approach (including double left turn lane lengths were measure from aerial photography found in the Google Earth site.
4. Type of route : Routes were classified as Commuter, Heavy Vehicle, or Tourist. Heavy vehicle routes were identified in the report entitled "Tuck Route System for Miami-Dade County". Tourist Routes were established by inspection relative to tourist attractions or routes to the beaches.
5. Availability of alternative routes: Aerial photographs of each location (Google Earth) were inspected to determine if alternative routes are already found in close proximity to each intersection.
6. Suitability of alternative routes: Aerial photos were also reviewed to establish whether the available alternative routes are suitable for rerouting left turning traffic from the subject intersection. The primary suitability criterion is that the routes are non-residential in nature. Other factors such as street width, and flow were also considered
7. County and/or State route: Maps of the State Roadway System were reviewed to determine which roads are state routes. Non-State routes, are still major roads and county roads by default.
8. Constrained right-of-way: Constrained right-of-way, in this case, was defined as roads where the existing improvements use all the available right–of–way. This was approximated by inspecting the aerial photo and property lines on the Miami-Dade Property Appraiser site.
9. Planned improvement: Planned roadway improvements planned in the next five years were found in the Miami-Dade page "My Neighborhood", under transportation improvements and they represent the most recently available information on line.
10. Residential impacts: Aerial photos were reviewed as well to ascertain if the single family homes are found along available alternative routes.
11. Transit left-turns: The transit system map found at the Miami-Dade Transit site was inspected to determine if, and how many bus routes traverse the subject intersections making left turns along their prescribed routes.

3.3 Screening Results

A three point scoring system was developed to perform the evaluation of locations using the above screening criteria. The objective was to determine the top five scoring intersections from the standpoint of suitability for Indirect Left Turn treatments. The top scoring locations were then field reviewed to verify whether the scoring was appropriate and/or additional issues were uncovered from a ground level inspection.

The scoring system is generally described in Exhibit 3.2.

Exhibit 3.2 – Intersection Screening Scoring System

Screening Criteria	High Score = 3 points	Low Score = 1 point	Comment
1. Traffic volumes	Traffic Level of Service F	Traffic Level of Service D or better	Congested intersections will benefit from Indirect LT treatments
2. Number of signal phases	Two left turn phases	No left turn phases	Most benefit obtained from eliminating LT signal phases
3. Left turn lane length	100 - 200 ft LT bays	At least one movement 500 ft or more	Excessive LT volumes are difficult to reroute
4. Type of route	Commuter	Heavy Vehicle or Tourist	Commuter traffic is easier to reroute
5. Availability of alternative routes	Existing grid system close by	No grid of remote grid	Traffic is easier to reroute when grid is near
6. Suitability of alternative routes	Commercial, wide streets	Residential, narrow streets	Narrow streets may not have adequate capacity
7. County and/or state route	Intersection of two county roads	Intersection of two state roads	State roads require more, longer reviews and permitting
8. Constrained right-of-way	Constrained right-of-way	Unconstrained right-of-way	Unconstrained ROW roads should be improved instead
9. Planned improvement	No improvements planned	Improvements planned	Roads with planned improvements may not need Indirect LT treatments
10. Residential impacts	Commercial uses along alternative routes	Many single family homes along alternative routes	Residential impacts are highly undesirable
11. Transit left-turns	No bus routes turning left	Many bus routes turning left	Rerouting buses is physically difficult and cause delays to passengers

Data for each criterion was secured by intersection. Using the scoring system above, each location was evaluated as to their suitability for ILT treatments. Results of the scoring are shown in Exhibit 3.3

Exhibit 3.3 – Intersection Screening Score

Int. Num	Major Street	Minor Street	LRTP Planning Area	Original Screening Criteria					Additional Screening Criteria						Total Score
				a	b	c	d	e	f	g	h	i	j	k	
				Traffic Vol. (LOS)	Num. LT Signal Phases	LT Lane Length (ft)	Type of Route	Alt. Route Available	Suitability of Alt. Routes	County or FDOT Road	Cons-trained ROW	Planned Improv	Residential Impacts	Transit Left Turns	
1	NW 27 Av	NW 183 St	North	D(F)/C(F)	2LT	490/260/240/360	C	Some	Fair	S/S	Yes	No	Some	W/S legs	25
2	NE 167 St	NE 6 Av	North	F/D	2LT	200/185/205/225	T	Some	Fair	S/S	Yes	DT4226781	Some	S/E legs	23
3	N 54 St	Miami Av	North	D/D	2LT	120/170/145/135	C	Yes	Fair	S/C	Yes	PW0000105	Some	2 routes	25
4	NW 183 St	NW 2 Av	North	C(D)/F	2LT	630/410/520/320	C	Some	Fair	S/C	Partial	No	Some	ok	26
5	NW 12 Av	NW 7 St	Beach/CBD	D/F(C)	2Ld	145/0/0/265	C	Some	Fair	S/C	Yes	No	No	ok	28
6	Flagler St	W 37 Ave	Central	F/D	2LT	135/135/85/125	T	Yes	Fair	S/C	Yes	No	Some	W/S legs	27
7	SW 72 St	SW 62 Av	Central	D/C	2LT	100/210/120/125	C	Some	Fair	S/C	Yes	No	No	2 routes	25
8	SW 177 Av	SW 312 St	South	F/D	2Ld	150/110/130/150	HV	Yes	Fair	S/C	Partial	PW20040342	No	W/N legs	24
9	SW 186 St	SW 107 Av	South	D/C	2LT	225/205/195/160	C	Some	Fair	S/C	Yes	No	No	ok	27
10	SW 40 St	SW 87 Av	West	F/F(C)	2LT	770/510/320/125	HV	Yes	Fair	S/S	Yes	No	Some	ok	25
11	SW 42 St	SW 137 Av	West	E(F)/D	2LT	400/420/440/390	C	Some	Fair	C/C	Partial	No	Yes	2 routes	24
12	NW 25 St	NW 102 Av	Northwest	E/-	1Ld	760/225/55/75	C	Some	Fair	C/C	Partial	No	Some	ok	24
13	NW 154 St	NW 82 Av	Northwest	F/C	1LT, 1Ld	110/100/300/100	C	Some	Fair	C/C	Partial	No	Some	1 route	26
14	NW 12 St	NW 87 Av	Northwest	D(F)/F	2LT	185/150/225/660	HV	Few	Good	S/C	Yes	DT4226121	No	ok	25
15	NW 23 St	NW 27 Av	North	-/D	NA	0/0/0/325	HV	Some	Fair	S/C	Yes	No	Yes	ok	20
16	NE 203 St	NE 26 Av	North	F/D	2LT	500/350/650/850	T	Few	Poor	C/C	Partial	No	Yes	1 route	20
17	**NW 27 Av**	**NW 20 St/River Dr**	North	F(D)/D(C)	LT, LTR	300/200/175/100	C	Some	Fair	S/C	Yes	No	No	ok	**29**
18	**SW 72 St**	**SW 107 Av**	Central	F/E(D)	2LT	300/300/275/275	C	Yes	Good	S/S	Yes	No	No	1 route	**29**

Notes on Screening Criteria

Crit.	Data source	Range
a -	KHA report	LOS A-F
b -	MD Traffic Control	Num. LT or Lead (Ld) phases
c -	Google Earth	actual length in feet
d -	MPO	Commuter, Heavy Vehicles (Trucks=>10%) or Tourist
e -	Google Earth	(within 600 ft) yes, no or some
f -	Google Earth	good, fair or poor land uses, street width, parking, etc.
g -	KHA report	County or FDOT
h -	Google/KHA report	yes, no or partially constrained
i -	TIP	yes or no
j -	Resid. Impacts	yes, no or some
k -	MDT transit map	# legs or routes

3 points	Good candidate for indirect LT treatment
2 points	Fair candidate for indirect LT treatment
1 point	Poor candidate for indirect LT treatment

Italics: 6 Highest Score Locations
Bold: Recommended Locations

Two locations were tied in the scores for first and third place. Therefore, the three highest scores actually include five locations as listed below.

1. NW 27 Ave/NW 20 St/NW N. River Dr 29 points
2. SW 72 St/SW 107 Ave 29 points
3. NW 12 Ave/NW 7 St 28 points
4. W Flagler St/37 Ave (Douglas Rd) 27 points
5. SW 186 St/SW 107 Ave 27 points

3.4 Recommendations

The final step in the screening and selection was field inspection of the five locations above by the Consultant and the MPO (See Appendix A). The inspection revealed a few factors that lowered the desirability of some locations. However, the two top scoring locations: NW 27 Avenue/20 Street/NW North River Drive and SW 72 Street/107 Avenue, with 29 points, remained viable.

There are no residential land uses at NW 27 Avenue/20 Street/NW North River Drive (see Exhibit 3.4) and the angle of NW North River Drive makes for a shorter triangular loop route for diverted turns. SW 72 Street/107 Avenue (see Exhibit 3.5), tied in first place, remained viable as well. The N. Snapper Creek Dr alignment also creates a shorter triangular loop at this location. Furthermore, there are no residential uses fronting on the northeastern quadrant of the intersection.

Therefore, the two intersections described above are recommended to the TPTAC for further review. These intersections, recommended by the TPC, will move to the detailed evaluation stage where the most appropriate Indirect Left Turn treatments will be tested to determine how much improvement in the intersection operations can be achieved by the recommend ILT treatments.

Exhibit 3.4 – NW 27 Avenue/20 Street/NW North River Drive

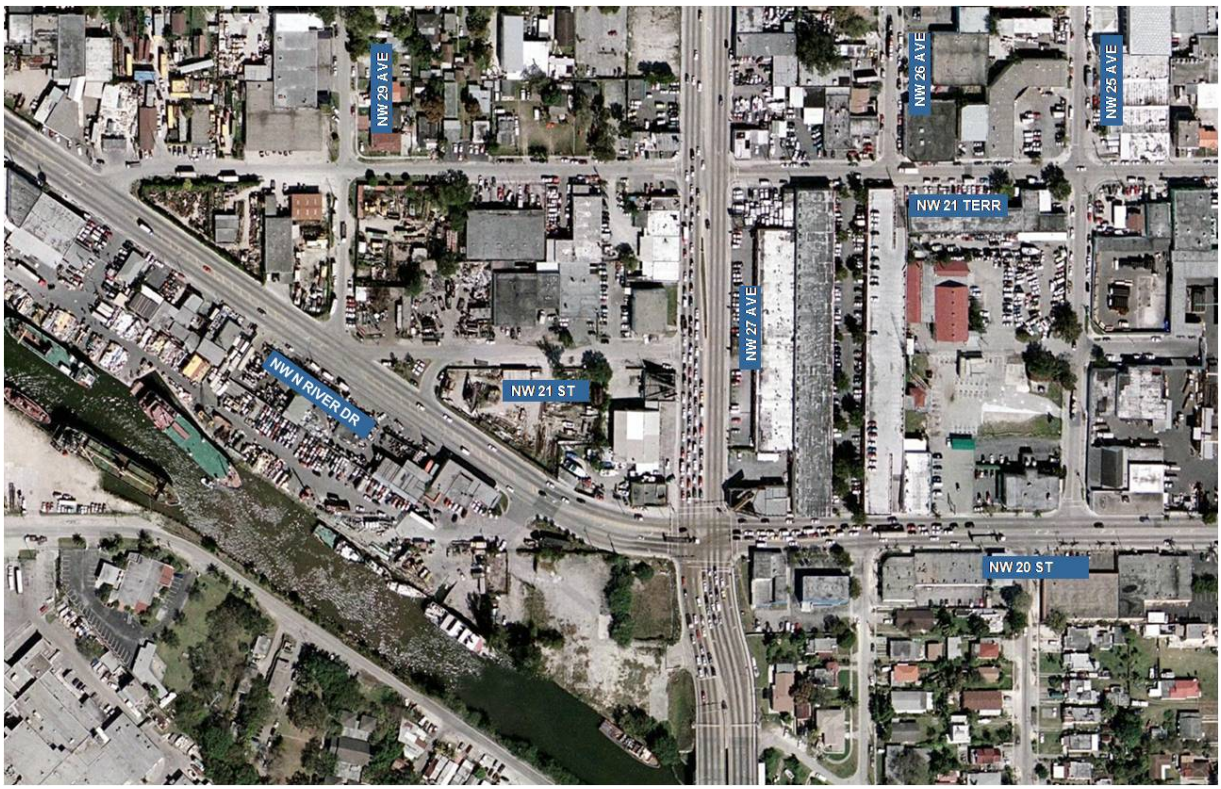


Exhibit 3.5 – SW 72 Street/SW 107 Avenue

4.0 ANALYSIS METHOD

4.1 Data Collection

The main field data gathered for this study were as follows:

- Morning and afternoon peak hours vehicle turning movement counts
- Traffic signal timing information
- Intersection geometrics (number and use of lanes)

Additionally, several field observation sessions took place during the peak hours. Field observations were used to obtain a better understanding of the operation difficulties at these locations as well as to allow for visual validation of the traffic simulation tools used in the analysis.

The data collection extended from the main intersection of concern at each location to the adjacent intersections likely to be directly affected by rerouted traffic volumes.

4.2 Methodology

The primary analysis tool used to develop and evaluate our recommendations was the software package Synchro/SimTraffic. This software is based on the widely recognized Highway Capacity Manual. Yet the program also has a visual (animation) component that allows a dynamic representation of the traffic operation conditions resulting from the roadway geometric and signalization plans under consideration. Additionally, the software is capable of generating system-wide measures of effectiveness for the network being analyzed. This feature is important in determining whether there is a net improvement in operating conditions after all the affected intersections are analyzed.

The methodology used to analyze the proposed improvements involved the following steps:

- Summarize morning and afternoon traffic count data
- Enter traffic volume, intersection geometrics and signal timing onto the software
- Run existing conditions analysis and optimize signal timing for existing conditions
- Develop initial Indirect Left Turn (ILT) concept based on existing conditions analysis results
- Estimate rerouted volumes and turning movement volumes for the initial ILT concept
- Enter new traffic volume, intersection geometrics and signal timing onto the software

- Run analysis of initial ILT concept
- Optimize routing, geometrics, and signal timing using software
- Finalize recommendations

The determination of whether a particular ILT concept was feasible was based on:

- Reduction in vehicle delays (including control delay and queue delay) at the primary intersection as well as system-wide
- Suitability if the alternate routes
- Availability of right–of-way
- Order of magnitude of the improvement cost when compared to delay reductions

A more specific description of the concept development, analysis results and recommendations is provided below for each of the two locations under study. Concept schematics, cost estimates and implementation plan are provided as well. The analysis results and the corresponding data are included in Appendix D.

5.0 DETAILED EVALUATION

5.1 SW 72 Street/SW 107 Avenue

The subject intersection is located in the Kendall area of Miami-Dade County. SW 72 St (SR 986, Sunset Drive) is a four lanes divided road, and so is SW 107 Ave (SR 985). Both routes have significant continuity and are classified as State Minor Arterials. This intersection was selected due to its severe peak hour congestion (LOS F), as well as its unique location/adjacent roadway network. These include the presence of a diagonal road connector (N Snapper Creek Drive) and the existing signals at its intersections with the adjoining arterial roads (Exhibit 5.1). Such configuration is ideally suited for the Quadrant Roadway Intersection (QRI) concept for ILT. This concept uses a roadway (existing or new) on one of the intersection quadrants to reroute all the left turns away from the adjacent major intersection. In fact, the southbound left turn movements from SW 107 Ave are relatively low today because many motorists are already using N Snapper Creek Dr as a shortcut.

Exhibit 5.1

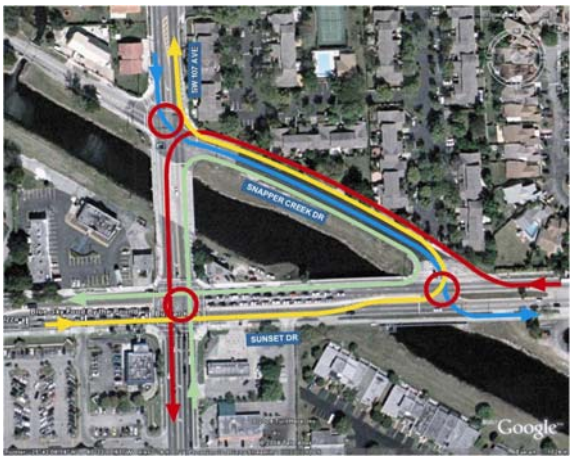


Exhibit 5.2

5.1.1 Concept Development

Examination of the surrounding roadway network and land uses confirmed that the QRI concept was the most promising option at this location. Based on that concept the plan for rerouting left turns from the main intersection was develop as shown in Exhibit 5.2. This plan is consistent with the planned Snapper Creek Trail along the canal.

5.1.2 Analysis Results

The results of the Synchro software analysis are presented in Exhibit 5.3. The exhibit shows morning and afternoon peak hour vehicle delays at each of the affected intersections. The conditions analyzed were as follows:

- "Before" - existing configuration with optimized signal timing
- "After" - results of the rerouted traffic without any geometric changes
- "Recommended" – operations with adjusted/optimized geometric and signal timing

In general, the main intersection of SW 72 St/SW 107 Avenue shows a significant reduction in vehicle delay. The two other intersections, for the most part, show an increase in delays.

Indirect Left Turns Study
Evaluation of Alternatives
Sunset Dr/SW 107 Ave
Delay (sec/veh)

Intersection	AM Peak				PM Peak			
	Before	After	Recom.	Change	Before	After	Recom.	Change
Sunset Dr/SW 107 Ave	79	58	51	-28	109	70	50	-59
Sunset Dr/N Snapper Creek Dr	9	8	8	-1	21	123	72	51
SW 107 Ave/N Snapper Creek Dr	8	12	12	4	7	17	43	36
Network Total (Weighted)	42	31	28	-14	59	74	55	-4
Percent Change				-33%				-7%

Exhibit 5.3

However, the system-wide results still show a noticeable reduction in delay that justifies the recommended improvements, particularly in light of their relative low cost. This is possible because the traffic volumes at the main intersection are greater than the volumes at the other intersections. The delay reduction is 59 seconds per vehicle combined with an improvement in the intersection level of service from F to D during the critical afternoon peak hour.

It is clear from the analysis, as well as the corresponding simulation (animation), that queue delays are a major issue at the main intersection today because it is over saturated with traffic. Left turning vehicles do not have sufficient green signal time to clear the intersection, causing queues that exceed the capacity of the left turn bays, causing spillover onto the adjacent through lanes. Blocking one of the two through lanes cuts traffic flow in half and causes additional capacity losses due to lane changing, further restricting traffic flow through the intersection. The recommended improvements are, rerouting left turns away from the main intersection, remove the left turns to the nearby less congested intersections and completely eliminates the spillover at the main intersection. The subject adjacent intersections can comfortably accommodate the

displaced queues because they still have available capacity.

Some resistance can be expected from the rerouted motorists. It is possible that a few may change their travel route altogether rather than increasing their travel distance and possibly their perceived travel time when using the intended detour. However, displaced left turn motorist are typically only 5% to 15% of all the traffic using an intersection. Therefore, a slight inconvenience for few can be of great benefit to all the other traffic using the intersection.

5.1.3 Recommendations

Exhibit 5.4 shows, using symbols, the main elements of the recommendations for this location. They are:

- Remove the existing left turn bays at the main intersection, remove left turn signals and install no left turn signs
- Adjust signal timing/phasing and progression offsets at the affected signals including additional pedestrian crossing markings, signals and pedestrian actuation buttons coordinated with the planned Snapper Creek Trail along the canal.
- Install advance directional signage advising rerouted left turn motorist of the new indirect left turn route
- Adjust lane geometry (restriping) and storage bay lengths at the nearby minor intersections

5.1.4 Concept Schematics

The recommendations summarized above are presented in more detail in Exhibit 5.5. These concept schematic drawings, based on readily available information, are intended to provide sufficient detail to facilitate final design and permitting. Future efforts will include the topographic surveys and engineering necessary to prepare design plans and specifications for implementing the improvements including additional coordination with the County Parks Department regarding the planned Snapper Creek Trail. Appendix C shows each affected intersection at a large scale.

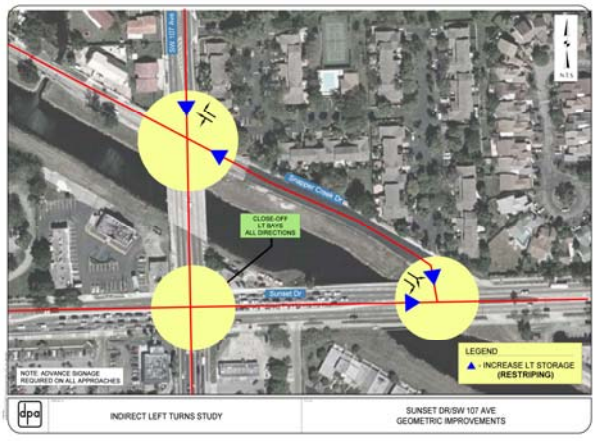
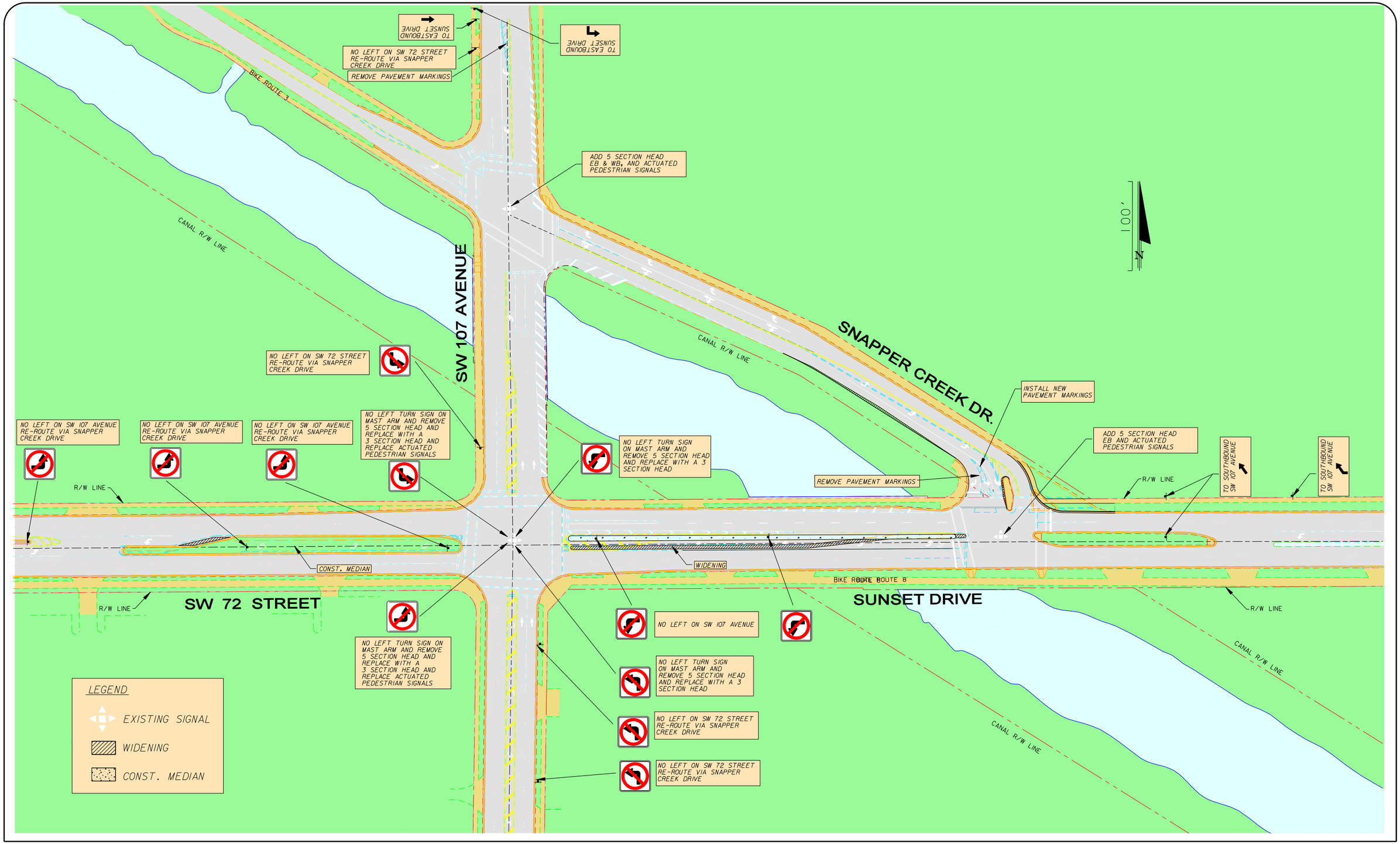


Exhibit 5.4

Exhibit 5.5 - SW 72 St /SW 107 Ave Concept Schematic



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CERTIFICATE OF AUTHORIZATION EB 2690

PROJECT:

INDIRECT LEFT TURN STUDY

TITLE:

EXHIBIT 5.5
SW 72 STREET / SW 107 AVENUE
CONCEPT SCHEMATIC

DATE	PROJECT NO. 07218
DRAWN	SHEET NO.
CHECKED	
APPROVED	

5.1.5 Cost

Preliminary cost estimates have been developed based on the concept drawings. Available road construction/reconstruction cost information was secured from the Miami-Dade Public Works Department (MD PWD) and/or the Florida Department of Transportation (FDOT). The estimated costs of the improvements at this location are as follows:

Signal Construction	$ 50,000-$ 70,000
Sidewalk/Curb and Gutter	$ 20,000-$ 40,000
Pavement Widening/Milling Resurfacing/Striping	$ 60,000-$ 90,000
Total	$130,000-$200,000

5.1.6 Implementation

The main elements of implementation for the recommended improvements are: 1) select implementing agency; 2) project development stage including public outreach as needed; 3) secure TIP funding; 4) prepare design plans and secure the required construction permits from FDOT; 5) bid and construct the improvements.

Funding can be obtained from a variety of sources including: FDOT Traffic Operations and Safety; Road Impact Fees; People's Transportation Plan; Gas Taxes; etc. Both agencies consider the funding of new projects annually as part of their budgeting process, in preparation for the annual update of the Miami-Dade Transportation Improvement Program (TIP) coordinated by the Metropolitan Planning Organization (MPO).

Design Plans can be prepared by the FDOT consultants preselected for these types of design projects. The MD PWD also has a cadre of design consultants available for projects such as this.

Bidding of the project is undertaken by the funding agency. Once awarded, the same agency provides the necessary project management until the improvements are successfully completed and opened to traffic.

Once funding is secured, it is estimated that that the implementation process will take less than one year.

5.2 NW 27 Avenue/NW 20 Street/N River Drive

The area on the northwest quadrant of this intersection is located in Unincorporated Miami-Dade County. The three other quadrants are within the limits of the City of Miami. NW 27Ave (SR 9, Unity Boulevard) is a six lanes divided road and a State Principal Arterial. NW 20 St, and its diagonal extension - N River Dr, are five lane County Minor Arterial roads. This intersection was selected due to its severe peak hour congestion, as well as its unique location/ adjacent roadway network. The location, immediately north of the Miami River, results in a high concentration of traffic (and LOS F congestion) which are further compounded by the frequent opening and closing of the drawbridge on NW 27 Ave. The adjacent roadway network includes a fairly complete grid system north of NW 20 St as well as a diagonal road - N. River Dr (see Exhibit 5.6).

Exhibit 5.6

5.2.1 Concept Development

Examination of the surrounding roadway network and land uses confirmed that a combination of ILT treatments would be necessary at this location. The main issues became which existing streets to use for the rerouted left turn traffic and how many new signals would be required to ensure an efficient operation. Based on these considerations, a concept plan for rerouting left turns from the main intersection was developed as shown in Exhibit 5.7. We determined that a minimum of three new traffic signals would be required to effectively and efficiently reroute left turns away from the main intersection.

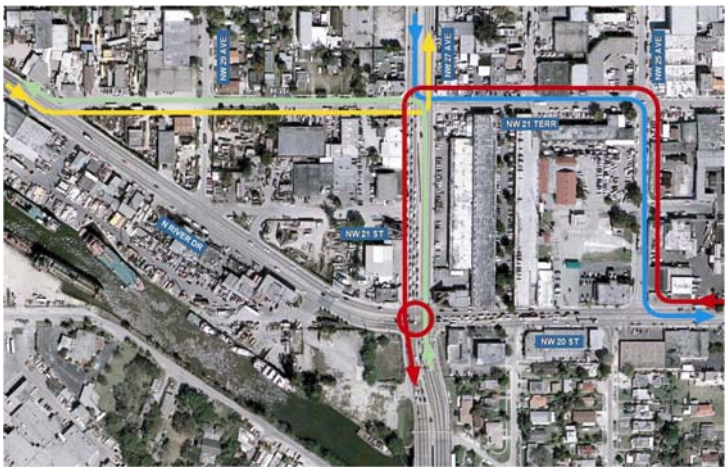


Exhibit 5.7

5.2.2 Analysis Results

The results of the Synchro software analysis are presented in Exhibit 5.8. The exhibit shows morning and afternoon peak hour vehicle delays at each of the affected intersections. The conditions analyzed were as follows:

- "Before" - existing configuration with optimized signal timing
- "After" - results of the rerouted traffic without any geometric changes
- "Recommended" – operations with adjusted/optimized geometric and signal timing

In general, the main intersection of NW 27 Ave/NW 20 St/N River Dr shows a very significant reduction in vehicle delay. The other adjacent intersections, for the most part, show an increase in delays. However, the system-wide results still show a significant reduction in delay that justifies the recommended improvements and the relatively high cost caused by the need for three new signals and improvement/reconstruction of certain existing street. This overall delay reduction is possible because the traffic volumes at the main intersection are greater than the volumes at the other intersections. The delay reduction is 52 seconds per vehicle during the critical afternoon peak hour even through the actual intersection level of service will not change.

Indirect Left Turns Study
Evaluation of Alternatives
NW 27 Ave/20 St/N. River Dr
Delay (sec/veh)

Intersection	AM Peak				PM Peak			
	Before	After	Recom.	Change	Before	After	Recom.	Change
NW 27 Ave/N. River Dr	48	19	18	-30	147	100	95	-52
N. River Dr/21 St	NA	NA	NA	NA	NA	NA	NA	NA
NW 27 Ave/21 St	NA	NA	NA	NA	NA	NA	NA	NA
NW 20 St/25 Ave	NA	7	7	NA	8	602	9	1
NW 27 Ave/21 Ter	263	1287	35	-228	370	1400	36	-334
N River Dr/21 Ter	NA	NA	6	NA	NA	NA	9	NA
NW 21 Ter/29 Ave	3	1	1	-2	4	2	2	-2
NW 21 Ter/25 Ave	3	10	10	7	3	19	19	16
Network Total (Weighted)	62	251	14	-48	119	381	37	-82
Percent Change				-77%				-69%

Exhibit 5.8

It is clear from the analysis, as well as the corresponding simulation (animation), that queue delays are a major issue at the main intersection today because it is over saturated with traffic. Left turning vehicles do not have sufficient green signal time to clear the intersection, causing queues that exceed the capacity of the left turn bays, causing spillover onto the adjacent through lanes. Blocking one of the two through lanes on NW 20 St cuts traffic flow in half while blocking one of the three through lanes on NW 27 Ave cuts traffic flow by one third. The spillover also causes additional capacity losses due to lane changing, further restricting traffic flow through the intersection. The worst left turn bay spillover locations are westbound NW 20

Street due to extremely high volumes and northbound NW 27 Ave due to the relatively short left turn bay (this bay is restricted by the distance between NW 20 St and the drawbridge). The recommended improvements, rerouting left turns away from the main intersection, remove the left turns to the nearby less congested intersections and completely eliminate the spillover at the main intersection. The subject adjacent intersections can comfortably accommodate the displaced queues because they still have available capacity.

Some resistance can be expected from the rerouted motorists. It is possible that a few may change their travel route altogether rather than increasing their travel distance and possibly their perceived travel time when using the intended detour. However, displaced left turn motorist are typically only 5% to 15% of all the traffic using an intersection. Therefore, a slight inconvenience for few can be of great benefit to all the other traffic using the intersection.

5.2.3 Recommendations

Exhibit 5.9 shows, using symbols, the main elements of the recommendations for this location. They are:

- Remove the existing left turn bays at the main intersection, remove left turn signals and install no left turn signs
- Adjust signal timing/phasing and progression offsets at the affected signals
- Install advance directional signage advising rerouted left turn motorist of the new indirect left turn route
- Adjust lane geometry and storage bay lengths at the nearby minor intersections
- Repave/restripe and/or reconstruct selected existing streets in the area, including the removal of some on-street parking

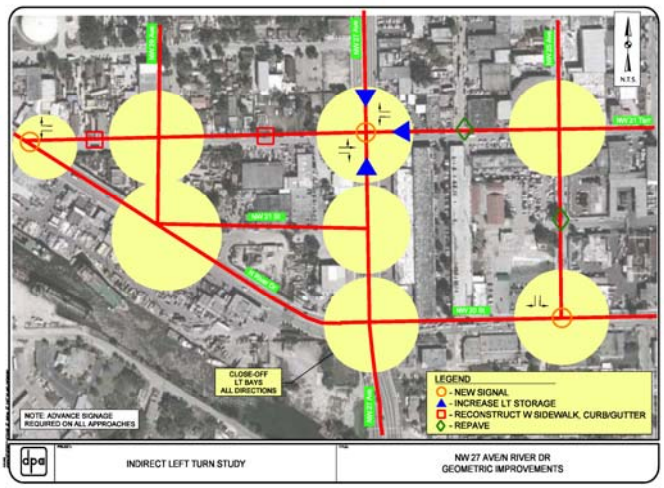


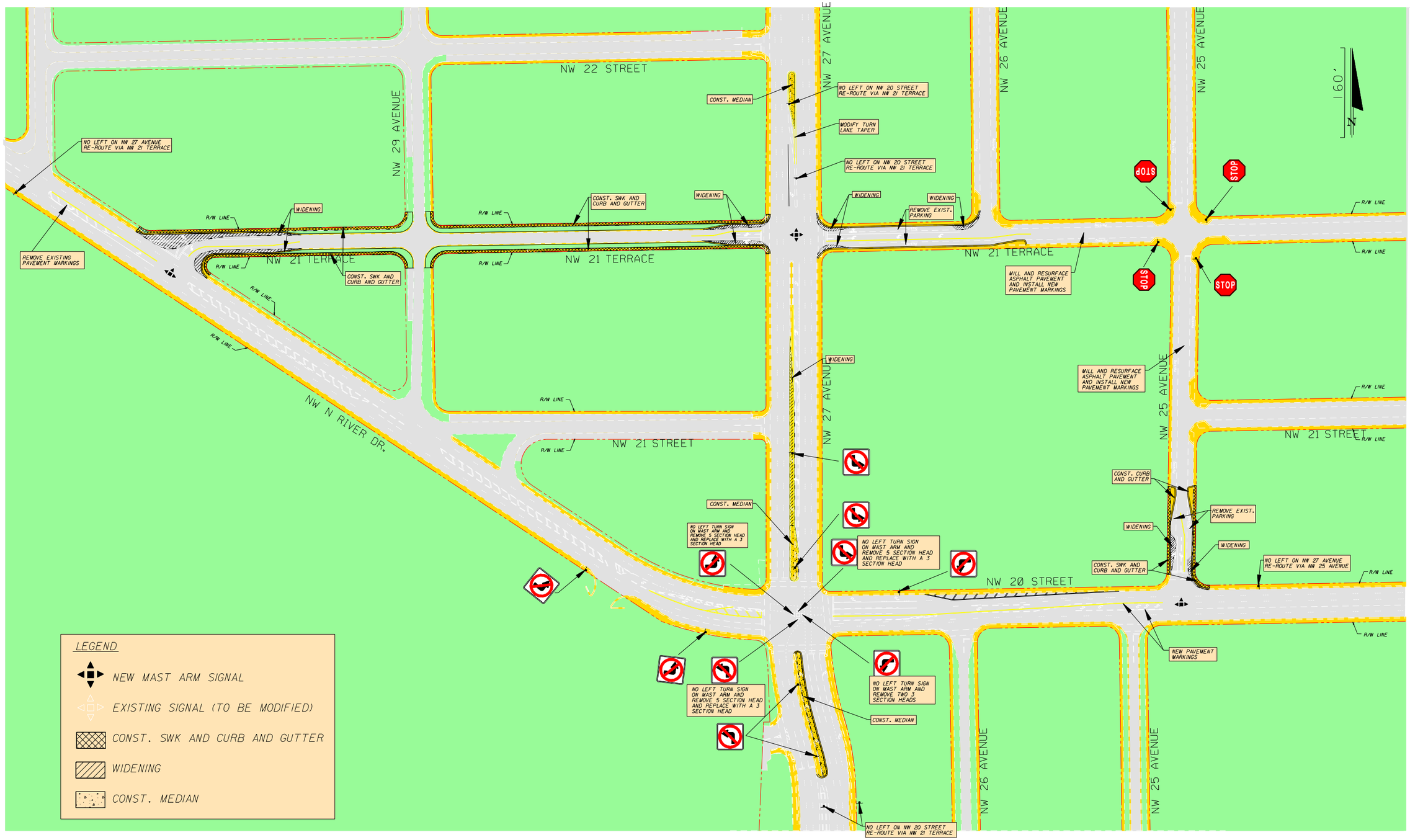
Exhibit 5.9

It should be noted that today many buses turn left from northbound NW 27 Ave to NW 20 St. The reason for this is that there is a bus maintenance/storage facility in the area northwest of the intersection. Because these left turning buses are not carrying passengers, they will also be rerouted via NW 21 Terr., together with other left turning vehicles. This will maximize the operational benefits of the recommendations.

5.2.4 Concept Schematics

The recommendations summarized above are presented in more detail in Exhibit 5.10. These concept schematic drawings, based in readily available information, are intended to provide sufficient detail to facilitate final design and permitting. The schematics also show a few additional lane striping and/or minor construction to accommodate new and/or extended turn lanes. These are concept refinements aimed at optimizing traffic flow through the road network. Future efforts will include the topographic surveys and engineering necessary to prepare design plans and specifications for implementing the improvements. Appendix C shows each affected intersection at a large scale.

Exhibit 5.10 – NW 27 Ave/NW 20 ST/N River Dr Concept Schematic



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CERTIFICATE OF AUTHORIZATION EB 2690

PROJECT:

INDIRECT LEFT TURN STUDY

TITLE:

EXHIBIT 5.10
NW 27 AVENUE/ NW 20 STREET / N. RIVER DRIVE
CONCEPT SCHEMATIC

DATE	PROJECT NO.
	07218
DRAWN	SHEET NO.
CHECKED	
APPROVED	

5.2.5 Cost

Preliminary cost estimates have been developed based on the concept drawings above. Available road construction/reconstruction cost information was secured from the Miami-Dade Public Works Department (MD PWD) and/or the Florida Department of Transportation (FDOT). The estimated costs of the improvements at this location are as follows:

Signal Construction (including equipment right-of-way)	$ 570,000-$ 630,000
Sidewalk/Curb and Gutter	$ 120,000-$ 140,000
Pavement Widening/Milling Resurfacing/Striping	$ 320,000-$ 410,000
Total	$1,010,000-$1,180,000

5.2.6 Implementation

The main elements of implementation for the recommended improvements are: 1) select implementing agency; 2) project development stage including public out reach as needed; 3) secure TIP funding; 4) prepare design plans and secure the required construction permits from FDOT; 5) bid and construct the improvements.

Funding can be obtained from a variety of sources including: FDOT Traffic Operations and Safety; Road Impact Fees; People's Transportation Plan; Gas Taxes; etc. Both agencies consider the funding of new projects annually as part of their budgeting process, in preparation for the annual update of the Miami-Dade Transportation Improvement Program (TIP) coordinated by the Metropolitan Planning Organization (MPO).

Design Plans can be prepared by the FDOT consultants preselected for these types of design projects. The MD PWD also has a cadre of design consultants available for projects such as this.

Bidding of the project is undertaken by the funding agency. Once awarded, the same agency provides the necessary project management until the improvements are successfully completed and opened to traffic.

Once funding is secured, it is estimated that that he implementation process will take one to one and a half years.

6.0 ADDITIONAL INFORMATION

In addition to this report, the MPO has an executive summary, as well as a PowerPoint presentation for this study. The materials are available in hardcopy (printed reports) format from their office (305-375-4507). Digital versions are also available to be downloaded from the MPO website at www.miamidade.gov/mpo.

Appendix A
Field Review Notes

Flagler Street & 37 Avenue

- Additional signal at 36 Court, questions whether it meets FDOT standards.
- Quadrant treatment possible
- Ground loops too long and cumbersome around Publix
- Street width very narrow on Flagler Terrace - west of 37 Avenue
- Western quadrants have significant residential
- Eastern quadrants look feasible especially southeast

NW 7 Street & NW 12 Avenue

- Heavy & dominant left turn movement from EB to NB, existing double left turn lanes.
- Loop possible from north side of the bridge via underpass
- SE quadrant ground loop possible on south side through one-way streets which are in the correct directions but very narrow with multi-family residential with street parking on both sides.
- Southwest quadrant possible with existing light on NW 13 Avenue.
- Stadium circulation may be impacted.

NW 183 Street & NW 2 Avenue

- Heavy left turn movements from NW 2 Avenue with double left turn lanes on both NB and SB approaches
- NE quadrant impossible because of one way streets within school zone.
- NW quadrant is very long but possible.
- SW quadrant is circuitous and with in a light traffic single family neighborhood.
- SE quadrant is extremely long and deemed not feasible.

NW 82 Avenue & NW 154 Street

- Predominant left turn movement is from SB to EB along NW 154 Street.
- Lack of roadway network and connectivity in surrounding area.
- Only NW quad is viable but still has potential problems with parallel parking in center of street and congestion at NW 84 Avenue already exists due to surrounding commercial activity. Light exists at NW 84 Avenue.

NW 12 Street & NW 87 Avenue

- No southern quadrant due to SR 836
- NW quadrant is ¼ mile to the west of 87 Avenue (at 89 Court), but roadway is wide to accommodate possible expansion
- NW quadrant also has an active rail line to contend with
- Truck traffic is very heavy in the area
- NE quadrant is extremely long but feasible
- Short cuts through private properties presents possible problems.

Appendix B
ROW Cost for Signal Equipment

Probable Signal Equipment ROW Cost

(in response to FDOT comments)

The recommendations from the MD MPO-sponsored project: Indirect Left Turns Study were presented to the FDOT D6 Scoping Committee on November 18, 2008. The purpose of the presentation, requested by the district's Traffic Operations Division, was to secure comments from the Department before bringing the recommendation to the MPO Board in December.

One concern raised by FDOT at said meeting was new design standards for signal pole bases and foundations which occupy significant space and often require additional right-of-way in order to avoid encroachment onto ADA sidewalk wheelchair path widths. The MPO was asked to examine whether additional right-of-way would be needed to accommodate new signals. The cost of additional right-of-way, if needed, should be reflected in the cost of the recommended improvements.

The above referenced recommended signals would be located at:

1. NW N River Dr/NW 21 Ter
2. NW 20 St/25 Ave
3. NW 27 Ave/21 Ter

The first two signals are not on the State Roadway System, therefore MD signal design standards apply. The county standards call for smaller bases and foundations that are unlikely to require additional right-of-way. Additionally, the county routinely secures easement for signal poles (when placed outside the right-of-way) in order to avoid the lengthy and costly right–of-way acquisition process.

Given the conceptual nature of the recommendations for the signal on NW 27 Ave, it is premature to precisely determine whether additional right-of way would be needed for the signal equipment. However, it seems prudent at this time, in order to be conservative, to assume that such right-of way (or equivalent easements) may be needed.

We have prepared a preliminary estimate of possible right-of-way costs for a signal NW 27 Ave/21 Ter as follows.

Signal pole base/foundation area requirement: 6 ft x 6 ft = 36 sf/corner

Four corners, plus signal cabinet = 36 sf x 5 = 180 sf

Land unit cost = $ 28.50 / sf

Total land cost = $ 28.50 / sf x 180 sf = $5,130

Contingency factor = 5.0

Probable right-of-way cost = $ 5,130 x 5.0 = $ 25,650

Range: $20,000 – $30,000

Notes:

1. The land cost is the average market value of land on the four corners of the intersection according to the MD Property Appraiser's Office
2. The contingency factor is intended to cover inflation, acquisition costs and other contingencies. Cost of business damages or cures, if any, are not included.
3. Assumes signal cabinet right-of-way needs are similar to one pole.
4. Last updated 11/24/08

Appendix C
Larger Scale Intersection Schematic Diagrams

EXHIBIT C-1B

EXHIBIT C-1A

EXHIBIT C-1C

SW 107 AVENUE

SW 72 STREET

SNAPPER CREEK DR.

SUNSET DRIVE

BIKE ROUTE 3

BIKE ROUTE 8

CANAL R/W LINE

R/W LINE

CONST. MEDIAN

WIDENING

100'

TO EASTBOUND SUNSET DRIVE

NO LEFT ON SW 72 STREET RE-ROUTE VIA SNAPPER CREEK DRIVE

REMOVE PAVEMENT MARKINGS

ADD 5 SECTION HEAD EB & WB, AND ACTUATED PEDESTRIAN SIGNALS

NO LEFT ON SW 107 AVENUE RE-ROUTE VIA SNAPPER CREEK DRIVE

NO LEFT TURN SIGN ON MAST ARM AND REMOVE 5 SECTION HEAD AND REPLACE WITH A 3 SECTION HEAD AND REPLACE ACTUATED PEDESTRIAN SIGNALS

NO LEFT TURN SIGN ON MAST ARM AND REMOVE 5 SECTION HEAD AND REPLACE WITH A 3 SECTION HEAD

NO LEFT TURN SIGN ON MAST ARM AND REMOVE 5 SECTION HEAD AND REPLACE ACTUATED PEDESTRIAN SIGNALS

INSTALL NEW PAVEMENT MARKINGS

ADD 5 SECTION HEAD EB AND ACTUATED PEDESTRIAN SIGNALS

TO SOUTHBOUND SW 107 AVENUE

NO LEFT ON SW 107 AVENUE

NO LEFT TURN SIGN ON MAST ARM AND REMOVE 5 SECTION HEAD AND REPLACE WITH A 3 SECTION HEAD

NO LEFT ON SW 72 STREET RE-ROUTE VIA SNAPPER CREEK DRIVE

LEGEND

EXISTING SIGNAL

WIDENING

CONST. MEDIAN

DAVID PLUMMER & ASSOCIATES, INC.

TRANSPORTATION ∘ CIVIL ∘ STRUCTURAL ∘ ENVIRONMENTAL

CORAL GABLES FORT MYERS FORT LAUDERDALE

1750 PONCE DE LEON BLVD. CORAL GABLES FL 33134 TELEPHONE (305) 447-0900 FAX (305) 444-4986

CERTIFICATE OF AUTHORIZATION EB 2690

PROJECT:

INDIRECT LEFT TURN STUDY

TITLE:

EXHIBIT C-1
SW 72 STREET / SW 107 AVENUE
CONCEPT SCHEMATIC
KEY MAP

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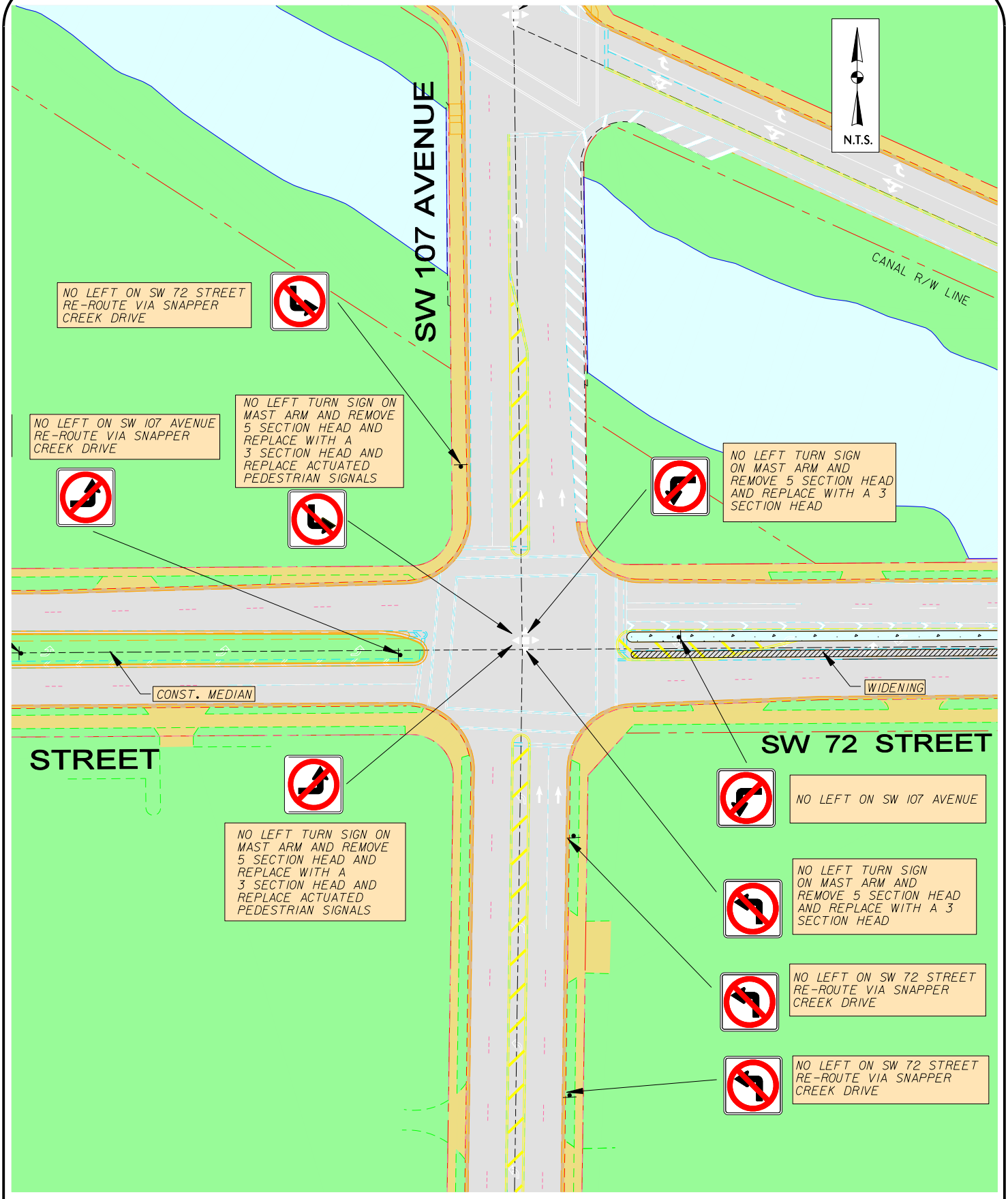
DRAWN	SHEET NO.
CHECKED	
APPROVED	



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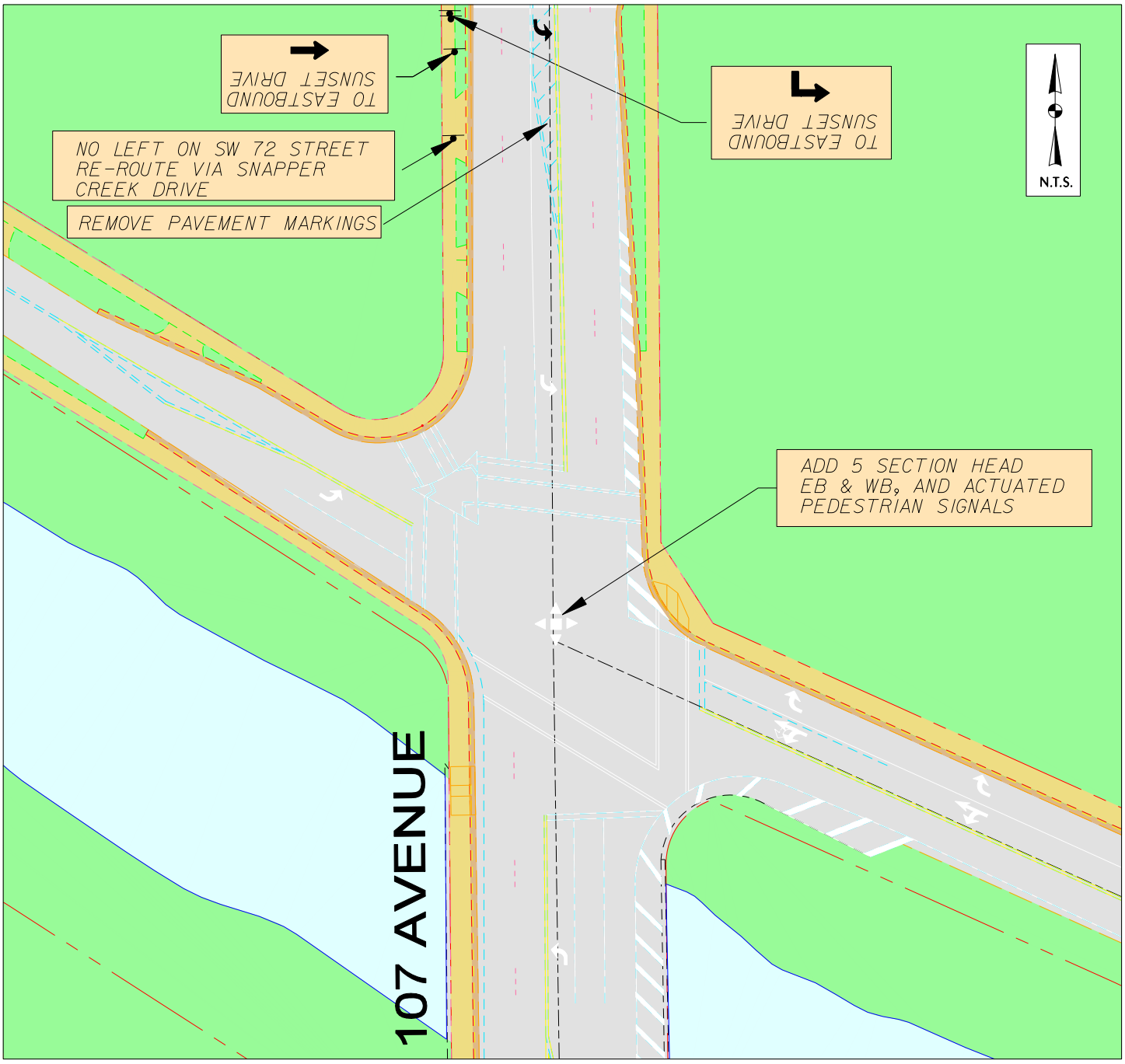
$TIME$ $FILE$



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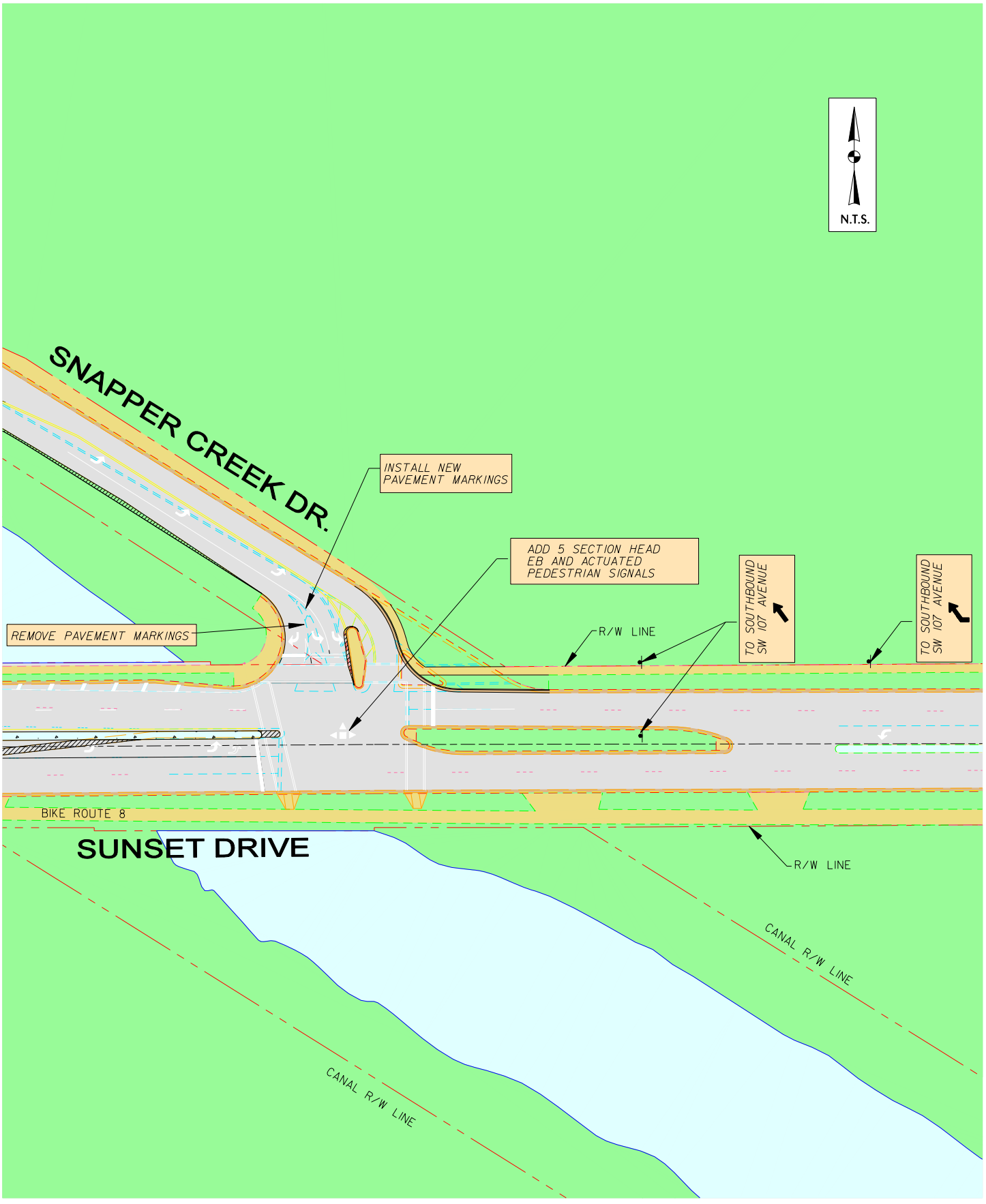
$TIME$
$FILE$



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$DATE$
$TIME$ $FILE$

EXHIBIT C-2C

EXHIBIT C-2B

EXHIBIT C-2A

EXHIBIT C-2D

NO LEFT ON NW 27 AVENUE RE-ROUTE VIA NW 21 TERRACE

REMOVE EXISTING PAVEMENT MARKINGS

R/W LINE

WIDENING

CONST. SWK AND CURB AND GUTTER

CONST. MEDIAN

NO LEFT ON NW 20 STREET RE-ROUTE VIA NW 21 TERRACE

MODIFY TURN LANE TAPER

REMOVE EXIST. PARKING

MILL AND RESURFACE ASPHALT PAVEMENT AND INSTALL NEW PAVEMENT MARKINGS

STOP

160'

N

NO LEFT TURN SIGN ON MAST ARM AND REMOVE 5 SECTION HEAD AND REPLACE WITH A 3 SECTION HEAD

NO LEFT TURN SIGN ON MAST ARM AND REMOVE TWO 3 SECTION HEADS

NO LEFT ON NW 20 STREET RE-ROUTE VIA NW 21 TERRACE

CONST. CURB AND GUTTER

NO LEFT ON NW 27 AVENUE RE-ROUTE VIA NW 25 AVENUE

NEW PAVEMENT MARKINGS

LEGEND

- NEW MAST ARM SIGNAL
- EXISTING SIGNAL (TO BE MODIFIED)
- CONST. SWK AND CURB AND GUTTER
- WIDENING
- CONST. MEDIAN

DAVID PLUMMER & ASSOCIATES, INC.

TRANSPORTATION CIVIL STRUCTURAL ENVIRONMENTAL

CORAL GABLES FORT MYERS FORT LAUDERDALE

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CERTIFICATE OF AUTHORIZATION EB 2690

PROJECT:

INDIRECT LEFT TURN STUDY

TITLE:

EXHIBIT C-2
NW 27 AVENUE/ NW 20 STREET / N. RIVER DRIVE
CONCEPT SCHEMATIC
KEY MAP

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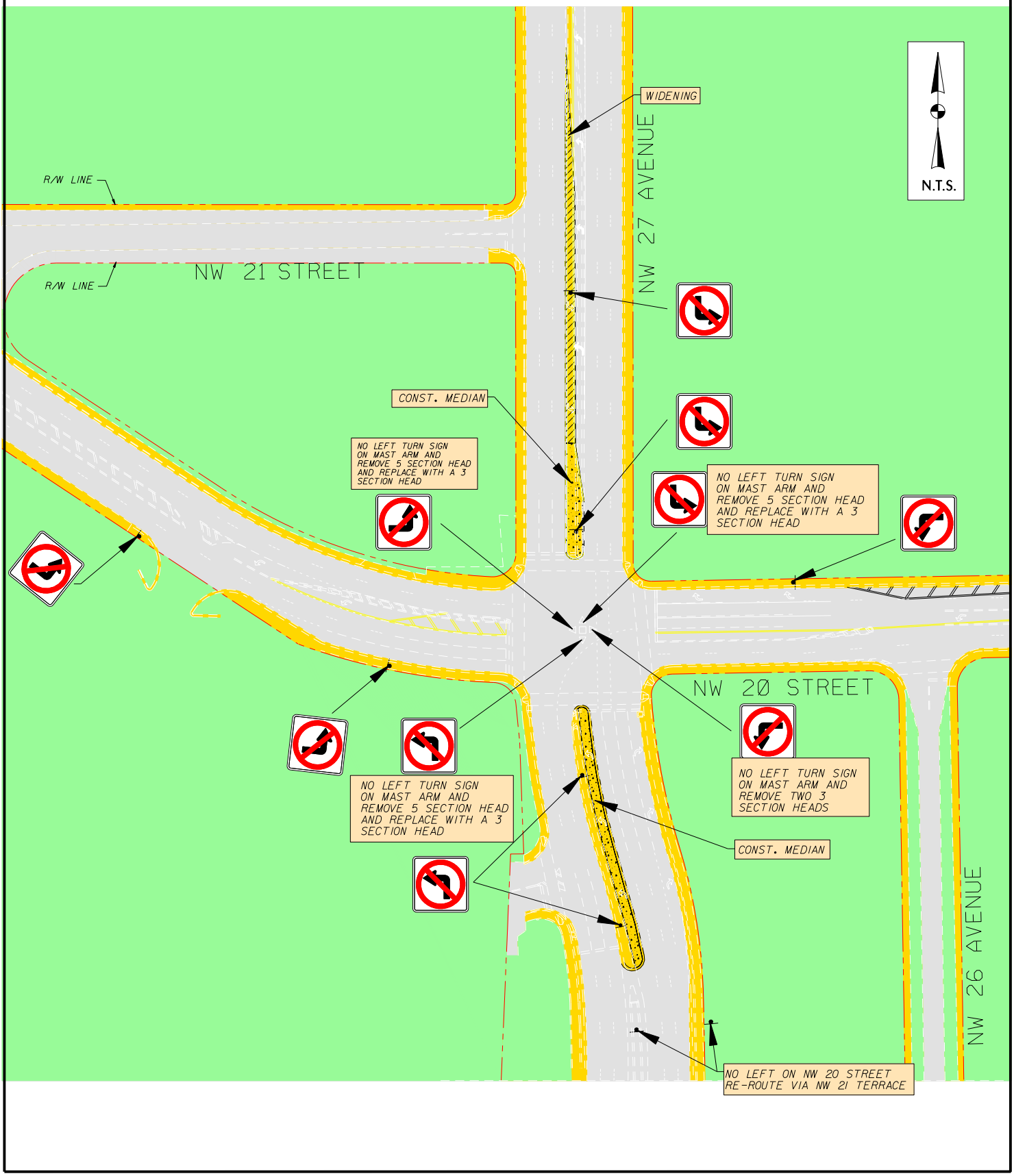
CHECKED	
APPROVED	



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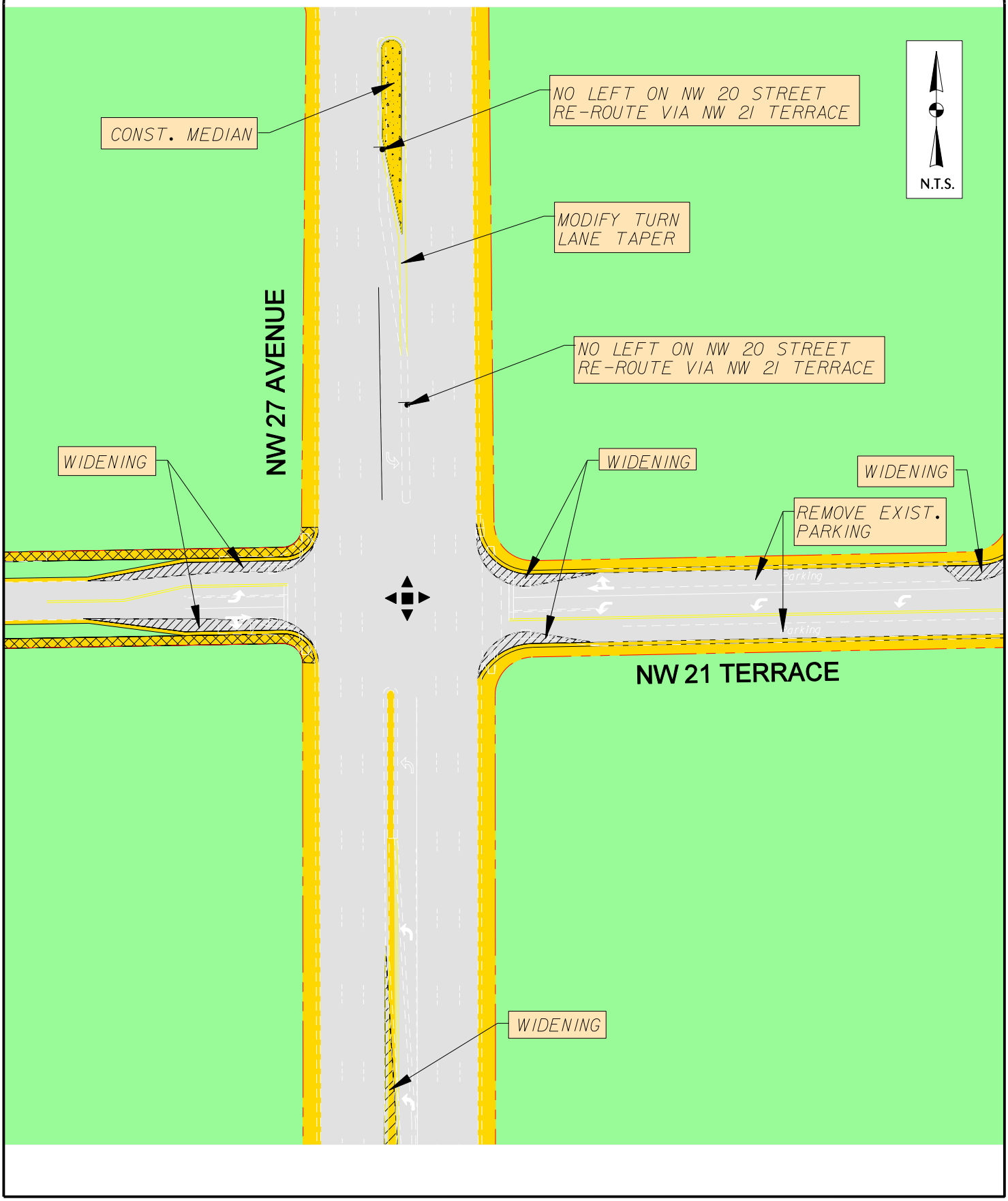

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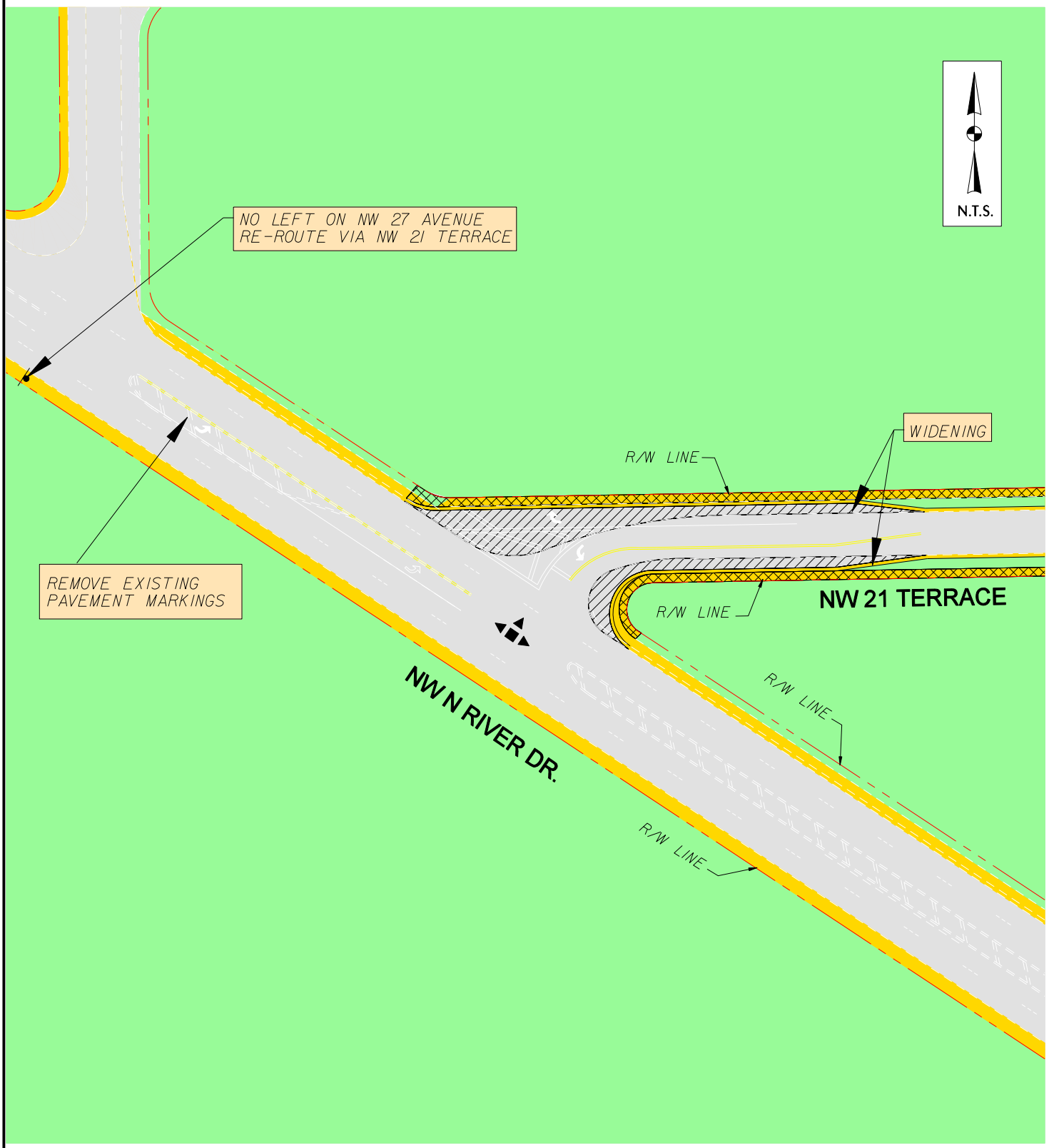

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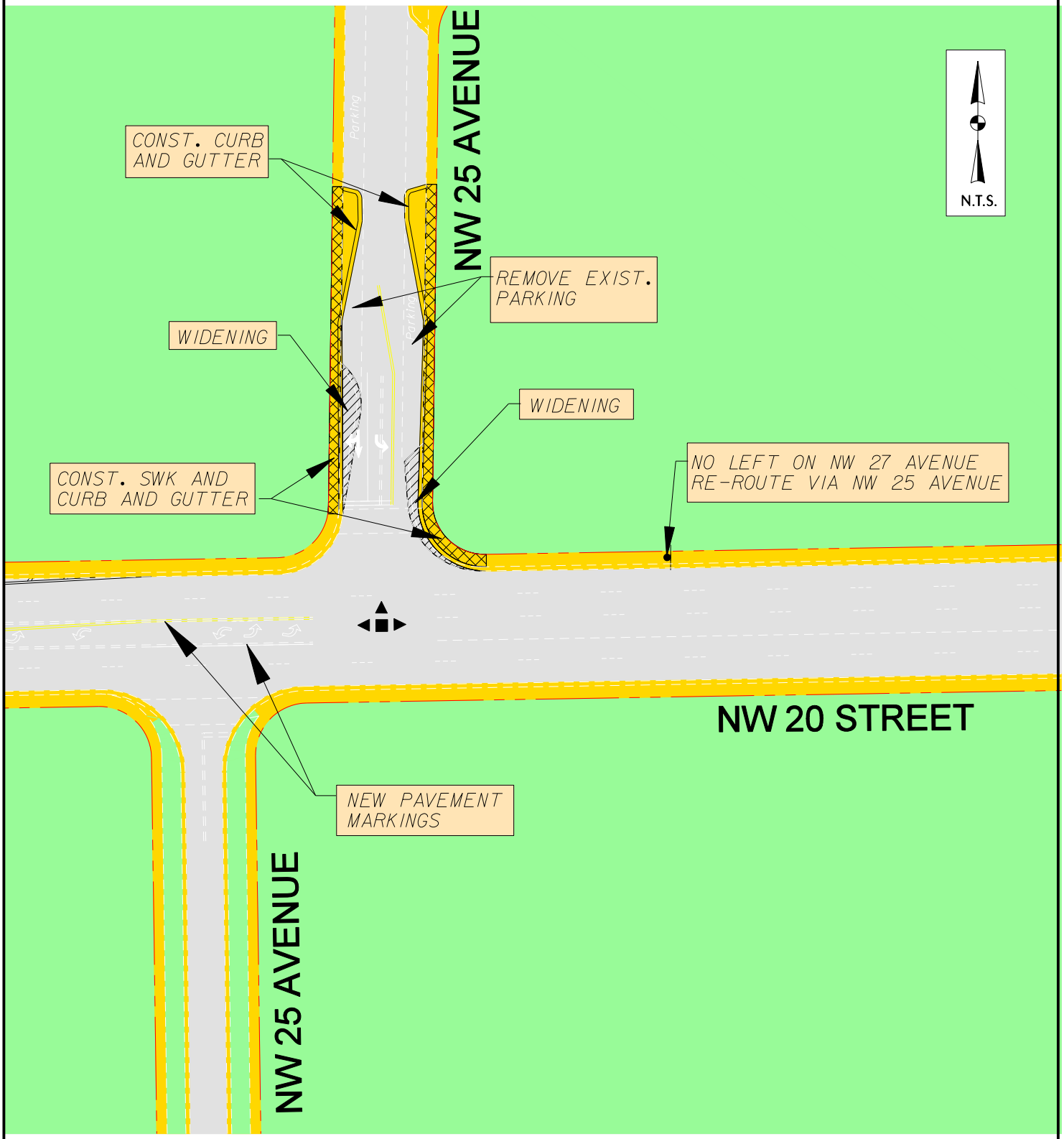

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$TIME$
$FILE$

dpa	PROJECT: INDIRECT LEFT TURN STUDY	TITLE: EXHIBIT C-2D NW 20 ST/ NW 25 AVE CONCEPT SCHEMATIC	EXHIBIT No.

Appendix D
Study Data and Analysis

1: North River Drive & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	999	673	1912	1469	5053
Control Delay / Veh (s/v)	45	41	59	37	48
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	45	41	59	37	48
Total Delay (hr)	12	8	31	15	67
Stops / Veh	0.76	0.78	0.63	0.83	0.73
Stops (#)	758	523	1202	1225	3708
Average Speed (mph)	8	8	7	5	7
Total Travel Time (hr)	17	10	40	18	86
Distance Traveled (mi)	142	83	260	92	577
Fuel Consumed (gal)	19	12	40	22	93
Fuel Economy (mpg)	7.4	6.9	6.5	4.2	6.2
CO Emissions (kg)	1.34	0.84	2.82	1.52	6.51
NOx Emissions (kg)	0.26	0.16	0.55	0.30	1.27
VOC Emissions (kg)	0.31	0.19	0.65	0.35	1.51
Unserved Vehicles (#)	0	0	81	0	81
Vehicles in dilemma zone (#)	0	0	0	0	0

3: NW 21 St & North River Drive

Direction	WB	SB	SE	NW	All
Volume (vph)	5	17	1002	513	1537
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	1.00	1.00	0.00	0.00	0.01
Stops (#)	5	17	0	0	22
Average Speed (mph)	30	30	30	30	30
Total Travel Time (hr)	0	0	3	2	6
Distance Traveled (mi)	1	1	104	73	179
Fuel Consumed (gal)	0	0	4	3	7
Fuel Economy (mpg)	NA	NA	24.3	24.3	23.9
CO Emissions (kg)	0.00	0.01	0.30	0.21	0.52
NOx Emissions (kg)	0.00	0.00	0.06	0.04	0.10
VOC Emissions (kg)	0.00	0.00	0.07	0.05	0.12
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

5: NW 21 St & NW 27 Ave

Direction	EB	NB	SB	All
Volume (vph)	11	1232	1473	2716
Control Delay / Veh (s/v)	14	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	14	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	1.00	0.00	0.00	0.00
Stops (#)	11	0	0	11
Average Speed (mph)	15	30	30	30
Total Travel Time (hr)	0	3	3	6
Distance Traveled (mi)	1	77	92	170
Fuel Consumed (gal)	0	3	4	7
Fuel Economy (mpg)	NA	24.3	24.3	24.0
CO Emissions (kg)	0.01	0.22	0.26	0.50
NOx Emissions (kg)	0.00	0.04	0.05	0.10
VOC Emissions (kg)	0.00	0.05	0.06	0.12
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

6: NW 20 St & NW 25 Ave

Direction	EB	WB	SB	All
Volume (vph)	1186	679	26	1891
Control Delay / Veh (s/v)	0	0	33	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	33	0
Total Delay (hr)	0	0	0	0
Stops / Veh	0.01	0.00	1.00	0.02
Stops (#)	17	0	26	43
Average Speed (mph)	30	30	10	29
Total Travel Time (hr)	5	2	0	7
Distance Traveled (mi)	146	64	3	213
Fuel Consumed (gal)	6	3	0	9
Fuel Economy (mpg)	23.9	24.3	NA	23.2
CO Emissions (kg)	0.43	0.18	0.03	0.64
NOx Emissions (kg)	0.08	0.04	0.01	0.13
VOC Emissions (kg)	0.10	0.04	0.01	0.15
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

9: NW 21 Terr & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	21	52	1231	1478	2782
Control Delay / Veh (s/v)	9999	9999	0	1	263
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	9999	9999	0	1	263
Total Delay (hr)	58	144	0	0	203
Stops / Veh	1.00	1.00	0.06	0.10	0.10
Stops (#)	21	52	70	148	291
Average Speed (mph)	0	0	29	29	1
Total Travel Time (hr)	58	145	3	8	214
Distance Traveled (mi)	3	7	77	228	315
Fuel Consumed (gal)	43	106	4	10	163
Fuel Economy (mpg)	0.1	0.1	21.2	22.0	1.9
CO Emissions (kg)	3.00	7.44	0.25	0.72	11.42
NOx Emissions (kg)	0.58	1.45	0.05	0.14	2.22
VOC Emissions (kg)	0.70	1.72	0.06	0.17	2.65
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

13: NW 21 Terr & North River Dr

Direction	WB	SE	NW	All
Volume (vph)	42	973	508	1523
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	1.00	0.00	0.00	0.03
Stops (#)	42	0	0	42
Average Speed (mph)	30	30	30	30
Total Travel Time (hr)	0	2	2	4
Distance Traveled (mi)	4	57	53	114
Fuel Consumed (gal)	0	2	2	5
Fuel Economy (mpg)	NA	24.3	24.3	23.1
CO Emissions (kg)	0.03	0.16	0.15	0.34
NOx Emissions (kg)	0.01	0.03	0.03	0.07
VOC Emissions (kg)	0.01	0.04	0.04	0.08
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

14: NW 21 Terr & NW 29 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	14	42	9	13	78
Control Delay / Veh (s/v)	1	1	9	9	3
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	1	1	9	9	3
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.21	0.19	1.00	1.00	0.42
Stops (#)	3	8	9	13	33
Average Speed (mph)	27	28	14	12	24
Total Travel Time (hr)	0	0	0	0	0
Distance Traveled (mi)	1	6	1	1	8
Fuel Consumed (gal)	0	0	0	0	1
Fuel Economy (mpg)	NA	NA	NA	NA	NA
CO Emissions (kg)	0.01	0.02	0.01	0.01	0.04
NOx Emissions (kg)	0.00	0.00	0.00	0.00	0.01
VOC Emissions (kg)	0.00	0.00	0.00	0.00	0.01
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

16: NW 21 Terr & NW 25 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	130	42	21	48	241
Control Delay / Veh (s/v)	1	1	10	10	3
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	1	1	10	10	3
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.11	0.19	1.00	1.00	0.38
Stops (#)	14	8	21	48	91
Average Speed (mph)	29	28	19	12	24
Total Travel Time (hr)	1	0	0	0	1
Distance Traveled (mi)	18	4	3	3	27
Fuel Consumed (gal)	1	0	0	0	2
Fuel Economy (mpg)	NA	NA	NA	NA	15.3
CO Emissions (kg)	0.06	0.02	0.02	0.03	0.13
NOx Emissions (kg)	0.01	0.00	0.00	0.01	0.02
VOC Emissions (kg)	0.01	0.00	0.00	0.01	0.03
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	62
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	62
Total Delay (hr)	270
Stops / Veh	0.27
Stops (#)	4241
Average Speed (mph)	5
Total Travel Time (hr)	324
Distance Traveled (mi)	1603
Fuel Consumed (gal)	288
Fuel Economy (mpg)	5.6
CO Emissions (kg)	20.10
NOx Emissions (kg)	3.91
VOC Emissions (kg)	4.66
Unserved Vehicles (#)	81
Vehicles in dilemma zone (#)	0
Performance Index	282.2

1: North River Drive & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	980	351	1912	1669	4912
Control Delay / Veh (s/v)	39	26	18	21	24
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	39	26	18	21	24
Total Delay (hr)	11	3	9	10	32
Stops / Veh	0.80	0.67	0.57	0.68	0.66
Stops (#)	780	235	1098	1132	3245
Average Speed (mph)	9	11	14	8	11
Total Travel Time (hr)	15	4	18	13	51
Distance Traveled (mi)	139	43	260	104	547
Fuel Consumed (gal)	18	5	24	18	64
Fuel Economy (mpg)	7.8	8.7	11.0	5.9	8.5
CO Emissions (kg)	1.25	0.35	1.66	1.23	4.48
NOx Emissions (kg)	0.24	0.07	0.32	0.24	0.87
VOC Emissions (kg)	0.29	0.08	0.38	0.29	1.04
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

3: NW 21 St & North River Drive

Direction	WB	SB	SE	NW	All
Volume (vph)	22	17	983	276	1298
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	1.00	1.00	0.00	0.00	0.03
Stops (#)	22	17	0	0	39
Average Speed (mph)	30	30	30	30	30
Total Travel Time (hr)	0	0	3	1	5
Distance Traveled (mi)	3	1	102	39	145
Fuel Consumed (gal)	0	0	4	2	6
Fuel Economy (mpg)	NA	NA	24.3	24.3	23.4
CO Emissions (kg)	0.02	0.01	0.29	0.11	0.43
NOx Emissions (kg)	0.00	0.00	0.06	0.02	0.08
VOC Emissions (kg)	0.00	0.00	0.07	0.03	0.10
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

5: NW 21 St & NW 27 Ave

Direction	EB	NB	SB	All
Volume (vph)	11	1469	1672	3152
Control Delay / Veh (s/v)	15	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	15	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	1.00	0.00	0.00	0.00
Stops (#)	11	0	0	11
Average Speed (mph)	15	30	30	30
Total Travel Time (hr)	0	3	3	7
Distance Traveled (mi)	1	92	104	198
Fuel Consumed (gal)	0	4	4	8
Fuel Economy (mpg)	NA	24.3	24.3	24.0
CO Emissions (kg)	0.01	0.26	0.30	0.58
NOx Emissions (kg)	0.00	0.05	0.06	0.11
VOC Emissions (kg)	0.00	0.06	0.07	0.13
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

6: NW 20 St & NW 25 Ave

Direction	EB	WB	SB	All
Volume (vph)	1063	698	149	1910
Control Delay / Veh (s/v)	0	0	83	7
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	83	7
Total Delay (hr)	0	0	3	3
Stops / Veh	0.02	0.00	1.00	0.09
Stops (#)	17	0	149	166
Average Speed (mph)	30	30	5	20
Total Travel Time (hr)	4	2	4	11
Distance Traveled (mi)	131	65	20	216
Fuel Consumed (gal)	5	3	4	12
Fuel Economy (mpg)	23.8	24.3	4.7	17.5
CO Emissions (kg)	0.38	0.19	0.29	0.86
NOx Emissions (kg)	0.07	0.04	0.06	0.17
VOC Emissions (kg)	0.09	0.04	0.07	0.20
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

9: NW 21 Terr & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	40	375	1468	1354	3237
Control Delay / Veh (s/v)	9999	9999	11	1	1287
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	9999	9999	11	1	1287
Total Delay (hr)	111	1042	5	0	1157
Stops / Veh	1.00	1.00	2.25	0.11	1.20
Stops (#)	40	375	3306	152	3873
Average Speed (mph)	0	0	12	29	0
Total Travel Time (hr)	111	1043	8	7	1169
Distance Traveled (mi)	5	51	92	209	357
Fuel Consumed (gal)	82	768	25	10	884
Fuel Economy (mpg)	0.1	0.1	3.6	21.8	0.4
CO Emissions (kg)	5.72	53.65	1.78	0.67	61.82
NOx Emissions (kg)	1.11	10.44	0.35	0.13	12.03
VOC Emissions (kg)	1.33	12.43	0.41	0.16	14.33
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

13: NW 21 Terr & North River Dr

Direction	WB	SE	NW	All
Volume (vph)	279	973	271	1523
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	1.00	0.00	0.00	0.18
Stops (#)	279	0	0	279
Average Speed (mph)	30	30	30	30
Total Travel Time (hr)	1	2	1	4
Distance Traveled (mi)	27	57	28	112
Fuel Consumed (gal)	3	2	1	6
Fuel Economy (mpg)	10.1	24.3	24.3	18.2
CO Emissions (kg)	0.18	0.16	0.08	0.43
NOx Emissions (kg)	0.04	0.03	0.02	0.08
VOC Emissions (kg)	0.04	0.04	0.02	0.10
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

14: NW 21 Terr & NW 29 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	33	279	9	13	334
Control Delay / Veh (s/v)	1	0	10	11	1
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	1	0	10	11	1
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.12	0.04	1.00	1.00	0.11
Stops (#)	4	11	9	13	37
Average Speed (mph)	28	30	13	11	28
Total Travel Time (hr)	0	1	0	0	1
Distance Traveled (mi)	3	37	1	1	41
Fuel Consumed (gal)	0	2	0	0	2
Fuel Economy (mpg)	NA	23.2	NA	NA	21.0
CO Emissions (kg)	0.01	0.11	0.01	0.01	0.14
NOx Emissions (kg)	0.00	0.02	0.00	0.00	0.03
VOC Emissions (kg)	0.00	0.03	0.00	0.00	0.03
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

16: NW 21 Terr & NW 25 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	252	42	343	48	685
Control Delay / Veh (s/v)	0	1	19	11	10
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	1	19	11	10
Total Delay (hr)	0	0	2	0	2
Stops / Veh	0.06	0.19	1.00	1.00	0.60
Stops (#)	15	8	343	48	414
Average Speed (mph)	29	28	14	11	18
Total Travel Time (hr)	1	0	3	0	5
Distance Traveled (mi)	35	4	45	3	87
Fuel Consumed (gal)	2	0	5	0	7
Fuel Economy (mpg)	22.7	NA	8.9	NA	11.9
CO Emissions (kg)	0.11	0.02	0.35	0.03	0.51
NOx Emissions (kg)	0.02	0.00	0.07	0.01	0.10
VOC Emissions (kg)	0.02	0.00	0.08	0.01	0.12
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	252
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	252
Total Delay (hr)	1195
Stops / Veh	0.47
Stops (#)	8064
Average Speed (mph)	1
Total Travel Time (hr)	1252
Distance Traveled (mi)	1703
Fuel Consumed (gal)	991
Fuel Economy (mpg)	1.7
CO Emissions (kg)	69.25
NOx Emissions (kg)	13.47
VOC Emissions (kg)	16.05
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	0
Performance Index	1217.8

1: North River Drive & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	980	351	1912	1669	4912
Control Delay / Veh (s/v)	32	24	18	8	18
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	32	24	18	8	18
Total Delay (hr)	9	2	9	4	24
Stops / Veh	0.72	0.58	0.58	0.22	0.48
Stops (#)	706	203	1101	367	2377
Average Speed (mph)	10	11	14	15	13
Total Travel Time (hr)	13	4	18	7	42
Distance Traveled (mi)	139	43	260	104	547
Fuel Consumed (gal)	16	5	24	9	53
Fuel Economy (mpg)	8.7	9.3	11.0	11.6	10.3
CO Emissions (kg)	1.12	0.32	1.66	0.63	3.73
NOx Emissions (kg)	0.22	0.06	0.32	0.12	0.73
VOC Emissions (kg)	0.26	0.08	0.38	0.15	0.86
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

3: NW 21 St & North River Drive

Direction	WB	SB	SE	NW	All
Volume (vph)	22	17	983	276	1298
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	1.00	1.00	0.00	0.00	0.03
Stops (#)	22	17	0	0	39
Average Speed (mph)	30	30	30	30	30
Total Travel Time (hr)	0	0	3	1	5
Distance Traveled (mi)	3	1	102	39	145
Fuel Consumed (gal)	0	0	4	2	6
Fuel Economy (mpg)	NA	NA	24.3	24.3	23.4
CO Emissions (kg)	0.02	0.01	0.29	0.11	0.43
NOx Emissions (kg)	0.00	0.00	0.06	0.02	0.08
VOC Emissions (kg)	0.00	0.00	0.07	0.03	0.10
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

5: NW 21 St & NW 27 Ave

Direction	EB	NB	SB	All
Volume (vph)	11	1469	1672	3152
Control Delay / Veh (s/v)	10	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	10	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	1.00	0.00	0.00	0.00
Stops (#)	11	0	0	11
Average Speed (mph)	18	30	30	30
Total Travel Time (hr)	0	3	3	7
Distance Traveled (mi)	1	92	104	198
Fuel Consumed (gal)	0	4	4	8
Fuel Economy (mpg)	NA	24.3	24.3	24.0
CO Emissions (kg)	0.01	0.26	0.30	0.57
NOx Emissions (kg)	0.00	0.05	0.06	0.11
VOC Emissions (kg)	0.00	0.06	0.07	0.13
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

6: NW 20 St & NW 25 Ave

Direction	EB	WB	SB	All
Volume (vph)	1063	698	149	1910
Control Delay / Veh (s/v)	4	2	57	7
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	4	2	57	7
Total Delay (hr)	1	0	2	4
Stops / Veh	0.20	0.13	0.88	0.23
Stops (#)	214	90	131	435
Average Speed (mph)	24	25	7	19
Total Travel Time (hr)	6	3	3	11
Distance Traveled (mi)	131	65	20	216
Fuel Consumed (gal)	7	3	3	14
Fuel Economy (mpg)	17.7	18.7	6.0	15.2
CO Emissions (kg)	0.52	0.24	0.23	0.99
NOx Emissions (kg)	0.10	0.05	0.04	0.19
VOC Emissions (kg)	0.12	0.06	0.05	0.23
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

9: NW 21 Terr & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	40	375	1468	1354	3237
Control Delay / Veh (s/v)	147	63	24	36	35
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	147	63	24	36	35
Total Delay (hr)	2	7	10	13	31
Stops / Veh	0.60	0.93	0.43	0.84	0.66
Stops (#)	24	347	626	1142	2139
Average Speed (mph)	3	6	7	10	8
Total Travel Time (hr)	2	8	13	20	43
Distance Traveled (mi)	5	51	92	209	357
Fuel Consumed (gal)	2	9	14	25	50
Fuel Economy (mpg)	3.4	5.8	6.4	8.4	7.2
CO Emissions (kg)	0.11	0.62	1.01	1.73	3.47
NOx Emissions (kg)	0.02	0.12	0.20	0.34	0.67
VOC Emissions (kg)	0.03	0.14	0.23	0.40	0.80
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

13: NW 21 Terr & North River Dr

Direction	WB	SE	NW	All
Volume (vph)	279	973	271	1523
Control Delay / Veh (s/v)	5	7	4	6
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	5	7	4	6
Total Delay (hr)	0	2	0	3
Stops / Veh	0.28	0.35	0.19	0.31
Stops (#)	77	343	52	472
Average Speed (mph)	21	15	22	18
Total Travel Time (hr)	1	4	1	6
Distance Traveled (mi)	27	57	28	112
Fuel Consumed (gal)	2	6	2	9
Fuel Economy (mpg)	14.6	10.1	16.8	12.2
CO Emissions (kg)	0.13	0.39	0.12	0.64
NOx Emissions (kg)	0.02	0.08	0.02	0.12
VOC Emissions (kg)	0.03	0.09	0.03	0.15
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

14: NW 21 Terr & NW 29 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	33	279	9	13	334
Control Delay / Veh (s/v)	1	0	11	11	1
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	1	0	11	11	1
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.12	0.04	1.00	1.00	0.11
Stops (#)	4	11	9	13	37
Average Speed (mph)	28	30	13	11	28
Total Travel Time (hr)	0	1	0	0	1
Distance Traveled (mi)	3	37	1	1	41
Fuel Consumed (gal)	0	2	0	0	2
Fuel Economy (mpg)	NA	23.2	NA	NA	21.0
CO Emissions (kg)	0.01	0.11	0.01	0.01	0.14
NOx Emissions (kg)	0.00	0.02	0.00	0.00	0.03
VOC Emissions (kg)	0.00	0.03	0.00	0.00	0.03
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

16: NW 21 Terr & NW 25 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	252	42	343	48	685
Control Delay / Veh (s/v)	0	1	19	11	10
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	1	19	11	10
Total Delay (hr)	0	0	2	0	2
Stops / Veh	0.06	0.19	1.00	1.00	0.60
Stops (#)	15	8	343	48	414
Average Speed (mph)	29	28	14	11	18
Total Travel Time (hr)	1	0	3	0	5
Distance Traveled (mi)	35	4	45	3	87
Fuel Consumed (gal)	2	0	5	0	7
Fuel Economy (mpg)	22.7	NA	8.9	NA	11.9
CO Emissions (kg)	0.11	0.02	0.35	0.03	0.51
NOx Emissions (kg)	0.02	0.00	0.07	0.01	0.10
VOC Emissions (kg)	0.02	0.00	0.08	0.01	0.12
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	14
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	14
Total Delay (hr)	64
Stops / Veh	0.35
Stops (#)	5924
Average Speed (mph)	14
Total Travel Time (hr)	121
Distance Traveled (mi)	1703
Fuel Consumed (gal)	150
Fuel Economy (mpg)	11.4
CO Emissions (kg)	10.48
NOx Emissions (kg)	2.04
VOC Emissions (kg)	2.43
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	0
Performance Index	80.6

1: North River Drive & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	931	1029	2024	1872	5856
Control Delay / Veh (s/v)	187	119	80	215	147
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	187	119	80	215	147
Total Delay (hr)	48	34	45	112	239
Stops / Veh	0.68	0.79	0.78	0.74	0.75
Stops (#)	630	818	1583	1386	4417
Average Speed (mph)	3	3	5	1	2
Total Travel Time (hr)	53	38	54	115	261
Distance Traveled (mi)	132	127	276	117	652
Fuel Consumed (gal)	44	35	53	94	226
Fuel Economy (mpg)	3.0	3.7	5.2	1.2	2.9
CO Emissions (kg)	3.10	2.42	3.71	6.59	15.82
NOx Emissions (kg)	0.60	0.47	0.72	1.28	3.08
VOC Emissions (kg)	0.72	0.56	0.86	1.53	3.67
Unserved Vehicles (#)	196	120	135	521	973
Vehicles in dilemma zone (#)	0	0	0	0	0

3: NW 21 St & North River Drive

Direction	WB	SB	SE	NW	All
Volume (vph)	7	13	942	634	1596
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	1.00	1.00	0.00	0.00	0.01
Stops (#)	7	13	0	0	20
Average Speed (mph)	30	30	30	30	30
Total Travel Time (hr)	0	0	3	3	6
Distance Traveled (mi)	1	1	98	90	190
Fuel Consumed (gal)	0	0	4	4	8
Fuel Economy (mpg)	NA	NA	24.3	24.3	24.0
CO Emissions (kg)	0.01	0.01	0.28	0.26	0.55
NOx Emissions (kg)	0.00	0.00	0.05	0.05	0.11
VOC Emissions (kg)	0.00	0.00	0.07	0.06	0.13
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

5: NW 21 St & NW 27 Ave

Direction	EB	NB	SB	All
Volume (vph)	6	1563	1875	3444
Control Delay / Veh (s/v)	16	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	16	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	1.00	0.00	0.00	0.00
Stops (#)	6	0	0	6
Average Speed (mph)	15	30	30	30
Total Travel Time (hr)	0	3	4	7
Distance Traveled (mi)	1	98	117	216
Fuel Consumed (gal)	0	4	5	9
Fuel Economy (mpg)	NA	24.3	24.3	24.1
CO Emissions (kg)	0.01	0.28	0.34	0.62
NOx Emissions (kg)	0.00	0.05	0.07	0.12
VOC Emissions (kg)	0.00	0.07	0.08	0.14
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

6: NW 20 St & NW 25 Ave

Direction	EB	WB	SB	All
Volume (vph)	901	1061	30	1992
Control Delay / Veh (s/v)	0	0	553	8
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	553	8
Total Delay (hr)	0	0	5	5
Stops / Veh	0.03	0.00	1.00	0.03
Stops (#)	30	0	30	60
Average Speed (mph)	30	30	1	18
Total Travel Time (hr)	4	3	5	12
Distance Traveled (mi)	111	99	4	214
Fuel Consumed (gal)	5	4	4	13
Fuel Economy (mpg)	23.3	24.3	1.1	17.1
CO Emissions (kg)	0.33	0.29	0.26	0.88
NOx Emissions (kg)	0.06	0.06	0.05	0.17
VOC Emissions (kg)	0.08	0.07	0.06	0.20
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

9: NW 21 Terr & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	35	97	1563	1876	3571
Control Delay / Veh (s/v)	9999	9999	0	0	370
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	9999	9999	0	0	370
Total Delay (hr)	97	269	0	0	367
Stops / Veh	1.00	1.00	0.04	0.03	0.07
Stops (#)	35	97	67	53	252
Average Speed (mph)	0	0	29	30	1
Total Travel Time (hr)	97	270	3	10	380
Distance Traveled (mi)	5	13	98	290	405
Fuel Consumed (gal)	72	199	4	12	287
Fuel Economy (mpg)	0.1	0.1	21.9	23.6	1.4
CO Emissions (kg)	5.01	13.88	0.31	0.86	20.05
NOx Emissions (kg)	0.97	2.70	0.06	0.17	3.90
VOC Emissions (kg)	1.16	3.22	0.07	0.20	4.65
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

11: NW 21 Terr & NW 25 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	82	108	36	27	253
Control Delay / Veh (s/v)	0	1	10	10	3
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	1	10	10	3
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.07	0.22	1.00	1.00	0.37
Stops (#)	6	24	36	27	93
Average Speed (mph)	29	27	18	13	24
Total Travel Time (hr)	0	0	0	0	1
Distance Traveled (mi)	11	11	5	2	28
Fuel Consumed (gal)	1	1	0	0	2
Fuel Economy (mpg)	NA	NA	NA	NA	15.4
CO Emissions (kg)	0.04	0.04	0.03	0.02	0.13
NOx Emissions (kg)	0.01	0.01	0.01	0.00	0.03
VOC Emissions (kg)	0.01	0.01	0.01	0.00	0.03
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

13: NW 21 Terr & North River Dr

Direction	WB	SE	NW	All
Volume (vph)	68	924	625	1617
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	1.00	0.00	0.00	0.04
Stops (#)	68	0	0	68
Average Speed (mph)	30	30	30	30
Total Travel Time (hr)	0	2	2	5
Distance Traveled (mi)	6	64	65	135
Fuel Consumed (gal)	1	3	3	6
Fuel Economy (mpg)	NA	24.3	24.3	22.8
CO Emissions (kg)	0.04	0.18	0.19	0.42
NOx Emissions (kg)	0.01	0.04	0.04	0.08
VOC Emissions (kg)	0.01	0.04	0.04	0.10
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

14: NW 21 Terr & NW 29 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	23	75	23	22	143
Control Delay / Veh (s/v)	1	1	10	9	4
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	1	1	10	9	4
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.22	0.24	1.00	1.00	0.48
Stops (#)	5	18	23	22	68
Average Speed (mph)	27	28	13	11	23
Total Travel Time (hr)	0	0	0	0	1
Distance Traveled (mi)	2	10	1	1	15
Fuel Consumed (gal)	0	1	0	0	1
Fuel Economy (mpg)	NA	NA	NA	NA	13.5
CO Emissions (kg)	0.01	0.04	0.02	0.01	0.08
NOx Emissions (kg)	0.00	0.01	0.00	0.00	0.01
VOC Emissions (kg)	0.00	0.01	0.00	0.00	0.02
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	119
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	119
Total Delay (hr)	611
Stops / Veh	0.27
Stops (#)	4984
Average Speed (mph)	3
Total Travel Time (hr)	673
Distance Traveled (mi)	1855
Fuel Consumed (gal)	552
Fuel Economy (mpg)	3.4
CO Emissions (kg)	38.55
NOx Emissions (kg)	7.50
VOC Emissions (kg)	8.94
Unserved Vehicles (#)	973
Vehicles in dilemma zone (#)	0
Performance Index	624.6

1: North River Drive & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	914	598	2024	2213	5749
Control Delay / Veh (s/v)	120	33	34	170	100
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	120	33	34	170	100
Total Delay (hr)	30	6	19	104	160
Stops / Veh	0.74	0.77	0.80	0.78	0.78
Stops (#)	677	460	1618	1728	4483
Average Speed (mph)	4	9	10	1	3
Total Travel Time (hr)	35	8	28	109	180
Distance Traveled (mi)	130	74	276	138	617
Fuel Consumed (gal)	31	10	34	92	167
Fuel Economy (mpg)	4.1	7.6	8.0	1.5	3.7
CO Emissions (kg)	2.20	0.67	2.40	6.42	11.69
NOx Emissions (kg)	0.43	0.13	0.47	1.25	2.27
VOC Emissions (kg)	0.51	0.16	0.56	1.49	2.71
Unserved Vehicles (#)	127	0	0	516	644
Vehicles in dilemma zone (#)	0	0	0	0	0

3: NW 21 St & North River Drive

Direction	WB	SB	SE	NW	All
Volume (vph)	7	13	925	507	1452
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	1.00	1.00	0.00	0.00	0.01
Stops (#)	7	13	0	0	20
Average Speed (mph)	30	30	30	30	30
Total Travel Time (hr)	0	0	3	2	6
Distance Traveled (mi)	1	1	96	72	170
Fuel Consumed (gal)	0	0	4	3	7
Fuel Economy (mpg)	NA	NA	24.3	24.3	23.9
CO Emissions (kg)	0.01	0.01	0.28	0.21	0.50
NOx Emissions (kg)	0.00	0.00	0.05	0.04	0.10
VOC Emissions (kg)	0.00	0.00	0.06	0.05	0.12
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

5: NW 21 St & NW 27 Ave

Direction	EB	NB	SB	All
Volume (vph)	6	1690	2215	3911
Control Delay / Veh (s/v)	18	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	18	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	1.00	0.00	0.00	0.00
Stops (#)	6	0	0	6
Average Speed (mph)	13	30	30	30
Total Travel Time (hr)	0	4	5	8
Distance Traveled (mi)	1	106	138	245
Fuel Consumed (gal)	0	4	6	10
Fuel Economy (mpg)	NA	24.3	24.3	24.2
CO Emissions (kg)	0.01	0.30	0.40	0.71
NOx Emissions (kg)	0.00	0.06	0.08	0.14
VOC Emissions (kg)	0.00	0.07	0.09	0.16
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

6: NW 20 St & NW 25 Ave

Direction	EB	WB	SB	All
Volume (vph)	811	1062	120	1993
Control Delay / Veh (s/v)	0	0	9999	602
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	9999	602
Total Delay (hr)	0	0	333	333
Stops / Veh	0.04	0.00	1.00	0.08
Stops (#)	30	0	120	150
Average Speed (mph)	30	30	0	1
Total Travel Time (hr)	3	3	334	340
Distance Traveled (mi)	100	99	16	215
Fuel Consumed (gal)	4	4	246	254
Fuel Economy (mpg)	23.2	24.3	0.1	0.8
CO Emissions (kg)	0.30	0.29	17.17	17.75
NOx Emissions (kg)	0.06	0.06	3.34	3.45
VOC Emissions (kg)	0.07	0.07	3.98	4.11
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

9: NW 21 Terr & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	52	528	1690	1876	4146
Control Delay / Veh (s/v)	9999	9999	1	1	1400
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	9999	9999	1	1	1400
Total Delay (hr)	144	1467	1	0	1612
Stops / Veh	1.00	1.00	0.24	0.14	0.30
Stops (#)	52	528	411	269	1260
Average Speed (mph)	0	0	26	29	0
Total Travel Time (hr)	145	1469	4	10	1628
Distance Traveled (mi)	7	73	106	290	475
Fuel Consumed (gal)	106	1081	7	14	1208
Fuel Economy (mpg)	0.1	0.1	15.0	21.2	0.4
CO Emissions (kg)	7.44	75.54	0.49	0.96	84.43
NOx Emissions (kg)	1.45	14.70	0.10	0.19	16.43
VOC Emissions (kg)	1.72	17.51	0.11	0.22	19.57
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

11: NW 21 Terr & NW 25 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	172	108	467	27	774
Control Delay / Veh (s/v)	0	1	30	11	19
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	1	30	11	19
Total Delay (hr)	0	0	4	0	4
Stops / Veh	0.04	0.23	1.00	1.00	0.68
Stops (#)	7	25	467	27	526
Average Speed (mph)	30	27	10	13	13
Total Travel Time (hr)	1	0	6	0	7
Distance Traveled (mi)	24	11	61	2	97
Fuel Consumed (gal)	1	1	8	0	10
Fuel Economy (mpg)	23.2	NA	7.6	NA	9.8
CO Emissions (kg)	0.07	0.04	0.56	0.02	0.69
NOx Emissions (kg)	0.01	0.01	0.11	0.00	0.13
VOC Emissions (kg)	0.02	0.01	0.13	0.00	0.16
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

13: NW 21 Terr & North River Dr

Direction	WB	SE	NW	All
Volume (vph)	195	924	498	1617
Control Delay / Veh (s/v)	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	1.00	0.00	0.00	0.12
Stops (#)	195	0	0	195
Average Speed (mph)	30	30	30	30
Total Travel Time (hr)	1	2	2	4
Distance Traveled (mi)	17	64	52	133
Fuel Consumed (gal)	2	3	2	7
Fuel Economy (mpg)	9.6	24.3	24.3	20.3
CO Emissions (kg)	0.12	0.18	0.15	0.46
NOx Emissions (kg)	0.02	0.04	0.03	0.09
VOC Emissions (kg)	0.03	0.04	0.03	0.11
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

14: NW 21 Terr & NW 29 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	40	202	23	22	287
Control Delay / Veh (s/v)	1	1	11	11	2
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	1	1	11	11	2
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.15	0.11	1.00	1.00	0.25
Stops (#)	6	22	23	22	73
Average Speed (mph)	28	29	13	10	26
Total Travel Time (hr)	0	1	0	0	1
Distance Traveled (mi)	4	28	1	1	34
Fuel Consumed (gal)	0	1	0	0	2
Fuel Economy (mpg)	NA	21.6	NA	NA	17.6
CO Emissions (kg)	0.01	0.09	0.02	0.01	0.13
NOx Emissions (kg)	0.00	0.02	0.00	0.00	0.03
VOC Emissions (kg)	0.00	0.02	0.00	0.00	0.03
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	381
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	381
Total Delay (hr)	2109
Stops / Veh	0.34
Stops (#)	6713
Average Speed (mph)	1
Total Travel Time (hr)	2175
Distance Traveled (mi)	1986
Fuel Consumed (gal)	1665
Fuel Economy (mpg)	1.2
CO Emissions (kg)	116.36
NOx Emissions (kg)	22.64
VOC Emissions (kg)	26.97
Unserved Vehicles (#)	644
Vehicles in dilemma zone (#)	0
Performance Index	2127.9

1: North River Drive & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	914	598	2024	2213	5749
Control Delay / Veh (s/v)	116	29	34	161	95
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	116	29	34	161	95
Total Delay (hr)	29	5	19	99	152
Stops / Veh	0.66	0.64	0.80	0.64	0.70
Stops (#)	600	384	1618	1406	4008
Average Speed (mph)	4	10	10	1	4
Total Travel Time (hr)	34	7	28	103	173
Distance Traveled (mi)	130	74	276	138	617
Fuel Consumed (gal)	30	9	34	86	159
Fuel Economy (mpg)	4.3	8.5	8.0	1.6	3.9
CO Emissions (kg)	2.11	0.60	2.40	6.00	11.11
NOx Emissions (kg)	0.41	0.12	0.47	1.17	2.16
VOC Emissions (kg)	0.49	0.14	0.56	1.39	2.58
Unserved Vehicles (#)	127	0	0	516	644
Vehicles in dilemma zone (#)	0	0	0	0	0

3: NW 21 St & North River Drive

Direction	WB	SB	SE	NW	All
Volume (vph)	7	13	925	507	1452
Control Delay / Veh (s/v)	0	0	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	0	0	0	0
Total Delay (hr)	0	0	0	0	0
Stops / Veh	1.00	1.00	0.00	0.00	0.01
Stops (#)	7	13	0	0	20
Average Speed (mph)	30	30	30	30	30
Total Travel Time (hr)	0	0	3	2	6
Distance Traveled (mi)	1	1	96	72	170
Fuel Consumed (gal)	0	0	4	3	7
Fuel Economy (mpg)	NA	NA	24.3	24.3	23.9
CO Emissions (kg)	0.01	0.01	0.28	0.21	0.50
NOx Emissions (kg)	0.00	0.00	0.05	0.04	0.10
VOC Emissions (kg)	0.00	0.00	0.06	0.05	0.12
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

5: NW 21 St & NW 27 Ave

Direction	EB	NB	SB	All
Volume (vph)	6	1690	2215	3911
Control Delay / Veh (s/v)	10	0	0	0
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	10	0	0	0
Total Delay (hr)	0	0	0	0
Stops / Veh	1.00	0.00	0.00	0.00
Stops (#)	6	0	0	6
Average Speed (mph)	18	30	30	30
Total Travel Time (hr)	0	4	5	8
Distance Traveled (mi)	1	106	138	245
Fuel Consumed (gal)	0	4	6	10
Fuel Economy (mpg)	NA	24.3	24.3	24.2
CO Emissions (kg)	0.01	0.30	0.40	0.71
NOx Emissions (kg)	0.00	0.06	0.08	0.14
VOC Emissions (kg)	0.00	0.07	0.09	0.16
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

6: NW 20 St & NW 25 Ave

Direction	EB	WB	SB	All
Volume (vph)	811	1062	120	1993
Control Delay / Veh (s/v)	4	6	67	9
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	4	6	67	9
Total Delay (hr)	1	2	2	5
Stops / Veh	0.24	0.31	0.93	0.32
Stops (#)	191	333	111	635
Average Speed (mph)	23	20	6	18
Total Travel Time (hr)	4	5	3	12
Distance Traveled (mi)	100	99	16	215
Fuel Consumed (gal)	6	7	3	16
Fuel Economy (mpg)	16.9	13.8	5.4	13.5
CO Emissions (kg)	0.41	0.50	0.20	1.12
NOx Emissions (kg)	0.08	0.10	0.04	0.22
VOC Emissions (kg)	0.10	0.12	0.05	0.26
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

9: NW 21 Terr & NW 27 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	52	528	1690	1876	4146
Control Delay / Veh (s/v)	251	73	18	37	36
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	251	73	18	37	36
Total Delay (hr)	4	11	8	19	42
Stops / Veh	0.52	0.91	0.39	0.84	0.66
Stops (#)	27	481	666	1576	2750
Average Speed (mph)	2	6	9	10	8
Total Travel Time (hr)	4	13	12	29	58
Distance Traveled (mi)	7	73	106	290	475
Fuel Consumed (gal)	3	14	14	35	66
Fuel Economy (mpg)	2.3	5.4	7.4	8.4	7.2
CO Emissions (kg)	0.22	0.95	1.00	2.42	4.58
NOx Emissions (kg)	0.04	0.18	0.19	0.47	0.89
VOC Emissions (kg)	0.05	0.22	0.23	0.56	1.06
Unserved Vehicles (#)	11	0	0	0	11
Vehicles in dilemma zone (#)	0	0	0	0	0

11: NW 21 Terr & NW 25 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	172	108	467	27	774
Control Delay / Veh (s/v)	0	1	30	11	19
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	0	1	30	11	19
Total Delay (hr)	0	0	4	0	4
Stops / Veh	0.04	0.23	1.00	1.00	0.68
Stops (#)	7	25	467	27	526
Average Speed (mph)	30	27	10	13	13
Total Travel Time (hr)	1	0	6	0	7
Distance Traveled (mi)	24	11	61	2	97
Fuel Consumed (gal)	1	1	8	0	10
Fuel Economy (mpg)	23.2	NA	7.7	NA	9.8
CO Emissions (kg)	0.07	0.04	0.56	0.02	0.69
NOx Emissions (kg)	0.01	0.01	0.11	0.00	0.13
VOC Emissions (kg)	0.02	0.01	0.13	0.00	0.16
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

13: NW 21 Terr & North River Dr

Direction	WB	SE	NW	All
Volume (vph)	195	924	498	1617
Control Delay / Veh (s/v)	26	8	3	9
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	26	8	3	9
Total Delay (hr)	1	2	0	4
Stops / Veh	0.49	0.39	0.11	0.32
Stops (#)	96	363	56	515
Average Speed (mph)	9	15	25	16
Total Travel Time (hr)	2	4	2	8
Distance Traveled (mi)	17	64	52	133
Fuel Consumed (gal)	2	6	3	11
Fuel Economy (mpg)	7.5	10.3	19.1	11.9
CO Emissions (kg)	0.16	0.44	0.19	0.79
NOx Emissions (kg)	0.03	0.08	0.04	0.15
VOC Emissions (kg)	0.04	0.10	0.04	0.18
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0

14: NW 21 Terr & NW 29 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	40	202	23	22	287
Control Delay / Veh (s/v)	1	1	11	11	2
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	1	1	11	11	2
Total Delay (hr)	0	0	0	0	0
Stops / Veh	0.15	0.11	1.00	1.00	0.25
Stops (#)	6	22	23	22	73
Average Speed (mph)	28	29	13	10	26
Total Travel Time (hr)	0	1	0	0	1
Distance Traveled (mi)	4	28	1	1	34
Fuel Consumed (gal)	0	1	0	0	2
Fuel Economy (mpg)	NA	21.6	NA	NA	17.6
CO Emissions (kg)	0.01	0.09	0.02	0.01	0.13
NOx Emissions (kg)	0.00	0.02	0.00	0.00	0.03
VOC Emissions (kg)	0.00	0.02	0.00	0.00	0.03
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	0	0	0

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	37
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	37
Total Delay (hr)	207
Stops / Veh	0.43
Stops (#)	8533
Average Speed (mph)	7
Total Travel Time (hr)	273
Distance Traveled (mi)	1986
Fuel Consumed (gal)	281
Fuel Economy (mpg)	7.1
CO Emissions (kg)	19.62
NOx Emissions (kg)	3.82
VOC Emissions (kg)	4.55
Unserved Vehicles (#)	654
Vehicles in dilemma zone (#)	0
Performance Index	230.8

3: SW 72 St (Sunset Dr) & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	1221	534	830	730	3315
Control Delay / Veh (s/v)	61	38	65	84	63
Queue Delay / Veh (s/v)	0	0	0	70	15
Total Delay / Veh (s/v)	61	38	65	153	79
Total Delay (hr)	21	6	15	31	72
Stops / Veh	0.83	0.62	0.85	0.87	0.81
Stops (#)	1011	331	702	632	2676
Average Speed (mph)	3	8	4	1	3
Total Travel Time (hr)	22	7	17	32	78
Distance Traveled (mi)	68	56	63	48	235
Fuel Consumed (gal)	27	9	20	31	88
Fuel Economy (mpg)	2.5	5.9	3.1	1.6	2.7
CO Emissions (kg)	1.92	0.65	1.41	2.15	6.13
NOx Emissions (kg)	0.37	0.13	0.27	0.42	1.19
VOC Emissions (kg)	0.45	0.15	0.33	0.50	1.42
Unserved Vehicles (#)	39	0	6	18	63
Vehicles in dilemma zone (#)	35	15	24	21	95

5: SW 72 St (Sunset Dr) & North Snapper Creek Dr

Direction	EB	WB	SB	All
Volume (vph)	1238	588	114	1940
Control Delay / Veh (s/v)	6	6	57	9
Queue Delay / Veh (s/v)	0	0	0	0
Total Delay / Veh (s/v)	6	6	57	9
Total Delay (hr)	2	1	2	5
Stops / Veh	0.21	0.31	0.84	0.28
Stops (#)	262	183	96	541
Average Speed (mph)	24	13	6	18
Total Travel Time (hr)	5	2	2	9
Distance Traveled (mi)	129	21	12	163
Fuel Consumed (gal)	9	3	2	14
Fuel Economy (mpg)	14.8	6.4	5.3	11.3
CO Emissions (kg)	0.61	0.23	0.17	1.01
NOx Emissions (kg)	0.12	0.05	0.03	0.20
VOC Emissions (kg)	0.14	0.05	0.04	0.23
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	11	21	0	32

6: North Snapper Creek Dr & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	188	55	708	701	1652
Control Delay / Veh (s/v)	42	25	1	4	8
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	42	25	2	4	8
Total Delay (hr)	2	0	0	1	4
Stops / Veh	0.46	0.49	0.06	0.24	0.20
Stops (#)	86	27	44	167	324
Average Speed (mph)	4	10	32	19	15
Total Travel Time (hr)	3	1	1	2	6
Distance Traveled (mi)	11	6	47	30	94
Fuel Consumed (gal)	3	1	2	3	9
Fuel Economy (mpg)	4.4	NA	20.1	9.1	10.6
CO Emissions (kg)	0.18	0.05	0.16	0.23	0.62
NOx Emissions (kg)	0.03	0.01	0.03	0.05	0.12
VOC Emissions (kg)	0.04	0.01	0.04	0.05	0.14
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	8	24	32

Network Totals

Number of Intersections	3
Control Delay / Veh (s/v)	35
Queue Delay / Veh (s/v)	7
Total Delay / Veh (s/v)	42
Total Delay (hr)	81
Stops / Veh	0.51
Stops (#)	3541
Average Speed (mph)	5
Total Travel Time (hr)	94
Distance Traveled (mi)	492
Fuel Consumed (gal)	111
Fuel Economy (mpg)	4.4
CO Emissions (kg)	7.76
NOx Emissions (kg)	1.51
VOC Emissions (kg)	1.80
Unserved Vehicles (#)	63
Vehicles in dilemma zone (#)	159
Performance Index	90.8

3: SW 72 St (Sunset Dr) & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	1221	559	830	775	3385
Control Delay / Veh (s/v)	40	12	62	60	45
Queue Delay / Veh (s/v)	0	0	0	55	13
Total Delay / Veh (s/v)	40	12	62	115	58
Total Delay (hr)	13	2	14	25	54
Stops / Veh	0.86	0.36	0.90	0.91	0.80
Stops (#)	1050	200	751	705	2706
Average Speed (mph)	6	18	4	2	4
Total Travel Time (hr)	16	3	16	26	61
Distance Traveled (mi)	93	58	63	51	266
Fuel Consumed (gal)	23	5	20	27	76
Fuel Economy (mpg)	4.0	10.8	3.1	1.9	3.5
CO Emissions (kg)	1.64	0.38	1.40	1.88	5.30
NOx Emissions (kg)	0.32	0.07	0.27	0.37	1.03
VOC Emissions (kg)	0.38	0.09	0.33	0.44	1.23
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	42	18	29	23	112

5: SW 72 St (Sunset Dr) & North Snapper Creek Dr

Direction	EB	WB	SB	All
Volume (vph)	1346	588	314	2248
Control Delay / Veh (s/v)	2	5	33	7
Queue Delay / Veh (s/v)	1	0	0	1
Total Delay / Veh (s/v)	4	5	33	8
Total Delay (hr)	1	1	3	5
Stops / Veh	0.07	0.26	0.51	0.18
Stops (#)	91	152	161	404
Average Speed (mph)	29	16	8	19
Total Travel Time (hr)	5	1	4	10
Distance Traveled (mi)	140	21	34	196
Fuel Consumed (gal)	7	3	4	14
Fuel Economy (mpg)	20.4	7.4	7.7	13.8
CO Emissions (kg)	0.48	0.20	0.31	0.99
NOx Emissions (kg)	0.09	0.04	0.06	0.19
VOC Emissions (kg)	0.11	0.05	0.07	0.23
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	12	21	0	33

6: North Snapper Creek Dr & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	188	337	670	701	1896
Control Delay / Veh (s/v)	26	30	0	9	11
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	26	31	1	9	12
Total Delay (hr)	1	3	0	2	6
Stops / Veh	0.39	0.47	0.00	0.35	0.25
Stops (#)	74	160	0	245	479
Average Speed (mph)	8	9	36	15	14
Total Travel Time (hr)	2	4	1	3	10
Distance Traveled (mi)	14	37	44	41	136
Fuel Consumed (gal)	2	5	2	5	13
Fuel Economy (mpg)	7.1	8.2	26.6	7.9	10.2
CO Emissions (kg)	0.14	0.31	0.12	0.36	0.93
NOx Emissions (kg)	0.03	0.06	0.02	0.07	0.18
VOC Emissions (kg)	0.03	0.07	0.03	0.08	0.22
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	1	22	23

Network Totals

Number of Intersections	3
Control Delay / Veh (s/v)	25
Queue Delay / Veh (s/v)	6
Total Delay / Veh (s/v)	31
Total Delay (hr)	65
Stops / Veh	0.48
Stops (#)	3589
Average Speed (mph)	7
Total Travel Time (hr)	81
Distance Traveled (mi)	597
Fuel Consumed (gal)	103
Fuel Economy (mpg)	5.8
CO Emissions (kg)	7.22
NOx Emissions (kg)	1.41
VOC Emissions (kg)	1.67
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	168
Performance Index	75.4

3: SW 72 St (Sunset Dr) & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	1221	559	830	775	3385
Control Delay / Veh (s/v)	50	13	53	49	44
Queue Delay / Veh (s/v)	0	0	0	29	7
Total Delay / Veh (s/v)	50	13	53	78	51
Total Delay (hr)	17	2	12	17	48
Stops / Veh	0.87	0.44	0.90	0.91	0.82
Stops (#)	1067	244	746	708	2765
Average Speed (mph)	5	16	5	3	5
Total Travel Time (hr)	19	4	14	18	55
Distance Traveled (mi)	93	58	63	51	266
Fuel Consumed (gal)	26	6	19	21	72
Fuel Economy (mpg)	3.6	9.7	3.4	2.4	3.7
CO Emissions (kg)	1.83	0.42	1.29	1.48	5.02
NOx Emissions (kg)	0.36	0.08	0.25	0.29	0.98
VOC Emissions (kg)	0.42	0.10	0.30	0.34	1.16
Unserved Vehicles (#)	7	0	0	0	7
Vehicles in dilemma zone (#)	42	18	29	23	112

5: SW 72 St (Sunset Dr) & North Snapper Creek Dr

Direction	EB	WB	SB	All
Volume (vph)	1346	588	314	2248
Control Delay / Veh (s/v)	2	5	33	7
Queue Delay / Veh (s/v)	1	0	0	1
Total Delay / Veh (s/v)	4	5	33	8
Total Delay (hr)	1	1	3	5
Stops / Veh	0.07	0.26	0.53	0.18
Stops (#)	89	152	165	406
Average Speed (mph)	29	16	8	19
Total Travel Time (hr)	5	1	4	10
Distance Traveled (mi)	140	21	34	196
Fuel Consumed (gal)	7	3	4	14
Fuel Economy (mpg)	20.4	7.4	7.7	13.8
CO Emissions (kg)	0.48	0.20	0.31	0.99
NOx Emissions (kg)	0.09	0.04	0.06	0.19
VOC Emissions (kg)	0.11	0.05	0.07	0.23
Unserved Vehicles (#)	0	0	0	0
Vehicles in dilemma zone (#)	11	21	0	32

6: North Snapper Creek Dr & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	188	337	670	701	1896
Control Delay / Veh (s/v)	23	30	0	10	11
Queue Delay / Veh (s/v)	0	0	0	0	0
Total Delay / Veh (s/v)	23	30	1	10	12
Total Delay (hr)	1	3	0	2	6
Stops / Veh	0.37	0.48	0.00	0.38	0.26
Stops (#)	70	162	0	264	496
Average Speed (mph)	9	9	36	14	14
Total Travel Time (hr)	2	4	1	3	10
Distance Traveled (mi)	14	37	44	41	136
Fuel Consumed (gal)	2	4	2	5	13
Fuel Economy (mpg)	7.7	8.2	26.5	7.4	10.1
CO Emissions (kg)	0.13	0.31	0.12	0.38	0.94
NOx Emissions (kg)	0.03	0.06	0.02	0.07	0.18
VOC Emissions (kg)	0.03	0.07	0.03	0.09	0.22
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	1	22	23

Network Totals

Number of Intersections	3
Control Delay / Veh (s/v)	25
Queue Delay / Veh (s/v)	3
Total Delay / Veh (s/v)	28
Total Delay (hr)	59
Stops / Veh	0.49
Stops (#)	3667
Average Speed (mph)	8
Total Travel Time (hr)	75
Distance Traveled (mi)	597
Fuel Consumed (gal)	99
Fuel Economy (mpg)	6.0
CO Emissions (kg)	6.95
NOx Emissions (kg)	1.35
VOC Emissions (kg)	1.61
Unserved Vehicles (#)	7
Vehicles in dilemma zone (#)	167
Performance Index	69.2

3: SW 72 St (Sunset Dr) & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	1178	1548	868	900	4494
Control Delay / Veh (s/v)	69	90	59	92	79
Queue Delay / Veh (s/v)	0	44	0	75	30
Total Delay / Veh (s/v)	69	134	59	168	109
Total Delay (hr)	22	58	14	42	136
Stops / Veh	0.85	0.83	0.83	0.85	0.84
Stops (#)	996	1288	719	763	3766
Average Speed (mph)	3	3	3	1	2
Total Travel Time (hr)	24	62	16	43	145
Distance Traveled (mi)	77	161	55	60	352
Fuel Consumed (gal)	29	61	20	40	150
Fuel Economy (mpg)	2.6	2.7	2.8	1.5	2.4
CO Emissions (kg)	2.02	4.24	1.37	2.82	10.45
NOx Emissions (kg)	0.39	0.83	0.27	0.55	2.03
VOC Emissions (kg)	0.47	0.98	0.32	0.65	2.42
Unserved Vehicles (#)	10	132	5	63	209
Vehicles in dilemma zone (#)	35	48	27	29	139

5: SW 72 St (Sunset Dr) & North Snapper Creek Dr

Direction	EB	WB	SB	All
Volume (vph)	1013	1831	136	2980
Control Delay / Veh (s/v)	1	8	176	13
Queue Delay / Veh (s/v)	0	12	0	8
Total Delay / Veh (s/v)	1	20	176	21
Total Delay (hr)	0	10	7	17
Stops / Veh	0.04	0.45	0.80	0.32
Stops (#)	38	818	109	965
Average Speed (mph)	35	7	2	9
Total Travel Time (hr)	3	12	7	22
Distance Traveled (mi)	106	81	15	201
Fuel Consumed (gal)	4	18	6	29
Fuel Economy (mpg)	23.9	4.4	2.4	7.0
CO Emissions (kg)	0.31	1.28	0.42	2.02
NOx Emissions (kg)	0.06	0.25	0.08	0.39
VOC Emissions (kg)	0.07	0.30	0.10	0.47
Unserved Vehicles (#)	0	0	22	22
Vehicles in dilemma zone (#)	21	70	0	91

6: North Snapper Creek Dr & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	214	285	782	805	2086
Control Delay / Veh (s/v)	25	19	1	4	7
Queue Delay / Veh (s/v)	2	0	1	0	0
Total Delay / Veh (s/v)	27	19	2	4	7
Total Delay (hr)	2	1	0	1	4
Stops / Veh	0.26	0.30	0.05	0.21	0.17
Stops (#)	56	85	39	166	346
Average Speed (mph)	6	12	32	23	17
Total Travel Time (hr)	2	3	2	2	8
Distance Traveled (mi)	12	31	52	45	139
Fuel Consumed (gal)	2	3	2	4	11
Fuel Economy (mpg)	5.9	11.0	20.8	11.6	12.5
CO Emissions (kg)	0.14	0.20	0.17	0.27	0.78
NOx Emissions (kg)	0.03	0.04	0.03	0.05	0.15
VOC Emissions (kg)	0.03	0.05	0.04	0.06	0.18
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	7	28	35

Network Totals

Number of Intersections	3
Control Delay / Veh (s/v)	43
Queue Delay / Veh (s/v)	17
Total Delay / Veh (s/v)	59
Total Delay (hr)	158
Stops / Veh	0.53
Stops (#)	5077
Average Speed (mph)	4
Total Travel Time (hr)	176
Distance Traveled (mi)	693
Fuel Consumed (gal)	190
Fuel Economy (mpg)	3.7
CO Emissions (kg)	13.25
NOx Emissions (kg)	2.58
VOC Emissions (kg)	3.07
Unserved Vehicles (#)	231
Vehicles in dilemma zone (#)	265
Performance Index	171.8

3: SW 72 St (Sunset Dr) & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	1179	1384	868	1168	4599
Control Delay / Veh (s/v)	49	70	25	36	48
Queue Delay / Veh (s/v)	0	70	0	6	22
Total Delay / Veh (s/v)	49	140	25	42	70
Total Delay (hr)	16	54	6	14	89
Stops / Veh	0.89	0.86	0.69	0.90	0.85
Stops (#)	1045	1197	598	1047	3887
Average Speed (mph)	4	3	7	5	4
Total Travel Time (hr)	18	57	7	16	98
Distance Traveled (mi)	77	144	55	77	353
Fuel Consumed (gal)	25	56	12	23	116
Fuel Economy (mpg)	3.1	2.6	4.5	3.4	3.0
CO Emissions (kg)	1.73	3.94	0.86	1.61	8.14
NOx Emissions (kg)	0.34	0.77	0.17	0.31	1.58
VOC Emissions (kg)	0.40	0.91	0.20	0.37	1.89
Unserved Vehicles (#)	0	128	0	0	128
Vehicles in dilemma zone (#)	44	13	34	33	124

5: SW 72 St (Sunset Dr) & North Snapper Creek Dr

Direction	EB	WB	SB	All
Volume (vph)	1202	1831	338	3371
Control Delay / Veh (s/v)	21	55	60	43
Queue Delay / Veh (s/v)	0	146	0	80
Total Delay / Veh (s/v)	21	202	60	123
Total Delay (hr)	7	103	6	115
Stops / Veh	0.40	0.84	0.64	0.66
Stops (#)	483	1532	218	2233
Average Speed (mph)	12	1	5	2
Total Travel Time (hr)	10	105	7	122
Distance Traveled (mi)	125	81	37	243
Fuel Consumed (gal)	14	93	7	114
Fuel Economy (mpg)	8.7	0.9	5.4	2.1
CO Emissions (kg)	1.01	6.51	0.48	7.99
NOx Emissions (kg)	0.20	1.27	0.09	1.56
VOC Emissions (kg)	0.23	1.51	0.11	1.85
Unserved Vehicles (#)	3	74	0	77
Vehicles in dilemma zone (#)	76	66	0	142

6: North Snapper Creek Dr & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	214	841	698	805	2558
Control Delay / Veh (s/v)	29	19	4	14	14
Queue Delay / Veh (s/v)	33	1	0	0	3
Total Delay / Veh (s/v)	62	20	5	14	17
Total Delay (hr)	4	5	1	3	12
Stops / Veh	0.29	0.68	0.23	0.46	0.46
Stops (#)	63	575	159	374	1171
Average Speed (mph)	3	12	22	10	11
Total Travel Time (hr)	4	8	2	4	18
Distance Traveled (mi)	12	92	46	45	194
Fuel Consumed (gal)	4	10	4	8	25
Fuel Economy (mpg)	3.4	8.9	11.9	5.9	7.7
CO Emissions (kg)	0.25	0.72	0.27	0.53	1.77
NOx Emissions (kg)	0.05	0.14	0.05	0.10	0.34
VOC Emissions (kg)	0.06	0.17	0.06	0.12	0.41
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	0	0	26	26	52

Network Totals

Number of Intersections	3
Control Delay / Veh (s/v)	38
Queue Delay / Veh (s/v)	36
Total Delay / Veh (s/v)	74
Total Delay (hr)	217
Stops / Veh	0.69
Stops (#)	7291
Average Speed (mph)	3
Total Travel Time (hr)	238
Distance Traveled (mi)	791
Fuel Consumed (gal)	256
Fuel Economy (mpg)	3.1
CO Emissions (kg)	17.90
NOx Emissions (kg)	3.48
VOC Emissions (kg)	4.15
Unserved Vehicles (#)	205
Vehicles in dilemma zone (#)	318
Performance Index	237.3

3: SW 72 St (Sunset Dr) & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	1179	1384	868	1168	4599
Control Delay / Veh (s/v)	30	17	34	54	33
Queue Delay / Veh (s/v)	0	39	0	20	17
Total Delay / Veh (s/v)	30	56	34	74	50
Total Delay (hr)	10	22	8	24	64
Stops / Veh	0.80	0.75	0.80	0.91	0.81
Stops (#)	944	1033	691	1067	3735
Average Speed (mph)	6	6	6	3	5
Total Travel Time (hr)	12	25	10	26	73
Distance Traveled (mi)	77	144	55	77	353
Fuel Consumed (gal)	19	31	15	31	96
Fuel Economy (mpg)	4.0	4.6	3.7	2.5	3.7
CO Emissions (kg)	1.35	2.17	1.03	2.16	6.71
NOx Emissions (kg)	0.26	0.42	0.20	0.42	1.31
VOC Emissions (kg)	0.31	0.50	0.24	0.50	1.56
Unserved Vehicles (#)	0	0	0	0	0
Vehicles in dilemma zone (#)	45	67	34	18	164

5: SW 72 St (Sunset Dr) & North Snapper Creek Dr

Direction	EB	WB	SB	All
Volume (vph)	1202	1831	338	3371
Control Delay / Veh (s/v)	20	55	53	43
Queue Delay / Veh (s/v)	0	53	0	29
Total Delay / Veh (s/v)	21	108	53	72
Total Delay (hr)	7	55	5	67
Stops / Veh	0.27	0.84	0.60	0.61
Stops (#)	330	1532	202	2064
Average Speed (mph)	12	1	6	3
Total Travel Time (hr)	10	57	6	73
Distance Traveled (mi)	125	81	37	243
Fuel Consumed (gal)	13	58	6	77
Fuel Economy (mpg)	9.8	1.4	5.8	3.1
CO Emissions (kg)	0.89	4.08	0.44	5.41
NOx Emissions (kg)	0.17	0.79	0.09	1.05
VOC Emissions (kg)	0.21	0.95	0.10	1.25
Unserved Vehicles (#)	3	74	0	77
Vehicles in dilemma zone (#)	42	66	0	108

6: North Snapper Creek Dr & SW 107 Ave

Direction	EB	WB	NB	SB	All
Volume (vph)	214	841	698	805	2558
Control Delay / Veh (s/v)	8	81	8	22	36
Queue Delay / Veh (s/v)	0	17	0	2	6
Total Delay / Veh (s/v)	8	99	8	23	43
Total Delay (hr)	0	23	2	5	30
Stops / Veh	0.20	0.53	0.16	0.60	0.42
Stops (#)	42	444	111	479	1076
Average Speed (mph)	14	4	17	7	5
Total Travel Time (hr)	1	26	3	6	36
Distance Traveled (mi)	12	92	46	45	194
Fuel Consumed (gal)	1	23	4	10	38
Fuel Economy (mpg)	11.1	4.0	11.9	4.4	5.1
CO Emissions (kg)	0.07	1.62	0.27	0.71	2.67
NOx Emissions (kg)	0.01	0.31	0.05	0.14	0.52
VOC Emissions (kg)	0.02	0.37	0.06	0.16	0.62
Unserved Vehicles (#)	0	89	0	0	89
Vehicles in dilemma zone (#)	0	0	33	26	59

Network Totals

Number of Intersections	3
Control Delay / Veh (s/v)	37
Queue Delay / Veh (s/v)	18
Total Delay / Veh (s/v)	55
Total Delay (hr)	161
Stops / Veh	0.65
Stops (#)	6875
Average Speed (mph)	4
Total Travel Time (hr)	182
Distance Traveled (mi)	791
Fuel Consumed (gal)	212
Fuel Economy (mpg)	3.7
CO Emissions (kg)	14.79
NOx Emissions (kg)	2.88
VOC Emissions (kg)	3.43
Unserved Vehicles (#)	166
Vehicles in dilemma zone (#)	331
Performance Index	180.1

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