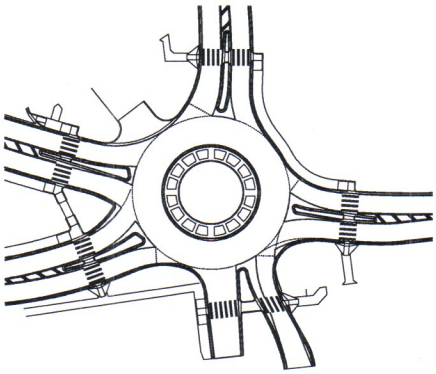
Roundabout Feasibility study for the Intersection of Seminole Road, Sherry Drive and Plaza Drive

Prepared for the City of Atlantic Beach, Florida

April 2004



gai consultants

10199 Southside Blvd., Suite 103
Jacksonville, Fl 3256-0757
Phone: 904-363-1110
Fax: 904-363-1115

TABLE OF CONTENTS

1 Executive Summary

The City of Atlantic Beach (City) requested a feasibility study to assess the potential for installing a roundabout at the "all-way stop controlled" intersection of Seminole road, Sherry drive and Plaza drive.

The feasibility study details roundabout justification based on current guidelines, recent traffic counts and preliminary known site conditions. To address the findings, the City has requested that the following questions be addressed:

- ***Will a roundabout be safer?***
- ***Will traffic move in a quick and easy manner through the intersection?***
- ***What impacts will the roundabout have on the existing intersection?***
- ***What will it take to build the roundabout?***

Will a roundabout be safer? The roundabout design is a safer intersection configuration than the existing All-Way-Stop for the following reasons:

- The roundabout is designed to promote an average speed of 12mph or less between merging traffic.
- Vehicles only move in one direction.
- Turning movements into and out of the roundabout are right turns.
- Drivers are forced to slow down prior to entering the intersection and yielding to traffic.
- Pedestrian and bicycle safety is improved because of the designed crossing and refuge island.

It is important to note that the City of Atlantic Beach has indicated that the existing All-Way- Stop intersection has not experienced serious accidents and that it is currently considered a safe intersection. Serious vehicle crashes typically occur when motorists run through stop signs.

Will traffic move in a quick and easy manner through the intersection? Traffic will move quicker through the intersection because:

- Roundabouts operate at an improved efficiency compared to intersections operating under an all-way stop condition, since the motorist does not have to consider multiple vehicle movements.
- Intersection entry is designed as a yield condition in lieu of a stop condition.
- An improved intersection capacity was calculated, due to reduction in delay.

What impacts will the roundabout have on the existing intersection? The preliminary layout indicates the following:

- The proposed roundabout intersection can be built within the existing right-of-way. Right-of-way acquisition is not necessary.
- A residential property owner on the NW corner of Seminole Road has a driveway that will interfere with the proposed roundabout. The property owner will need to be advised of the driveway realignment required.
- The Fire station vehicle access can be accommodated. A pre-emptive signal is being considered to help stop motorists during ingress and egress of the emergency vehicles.
- Several amenities located on Plaza Drive will need to be removed or relocated (i.e. USPS mailbox, Newspaper box, etc…)
- Overhead and underground utility adjustments will be assessed in design.

What will it take to build the Roundabout? Funds, planning, final design and construction.

- Facility estimate including design and construction: **$ 530,000.**
- Planning: Determine additional elements to proposed design such as special monuments, changes to concept, etc.
- Final design of the roundabout will need to consider community input, engineering survey, utility adjustments, drainage modifications, permits and details to include roadway, crosswalks, driveways, sidewalk, signing, pavement marking, lighting, landscaping and emergency pre-emptive signals
- Construction and CEI (City Supervision)

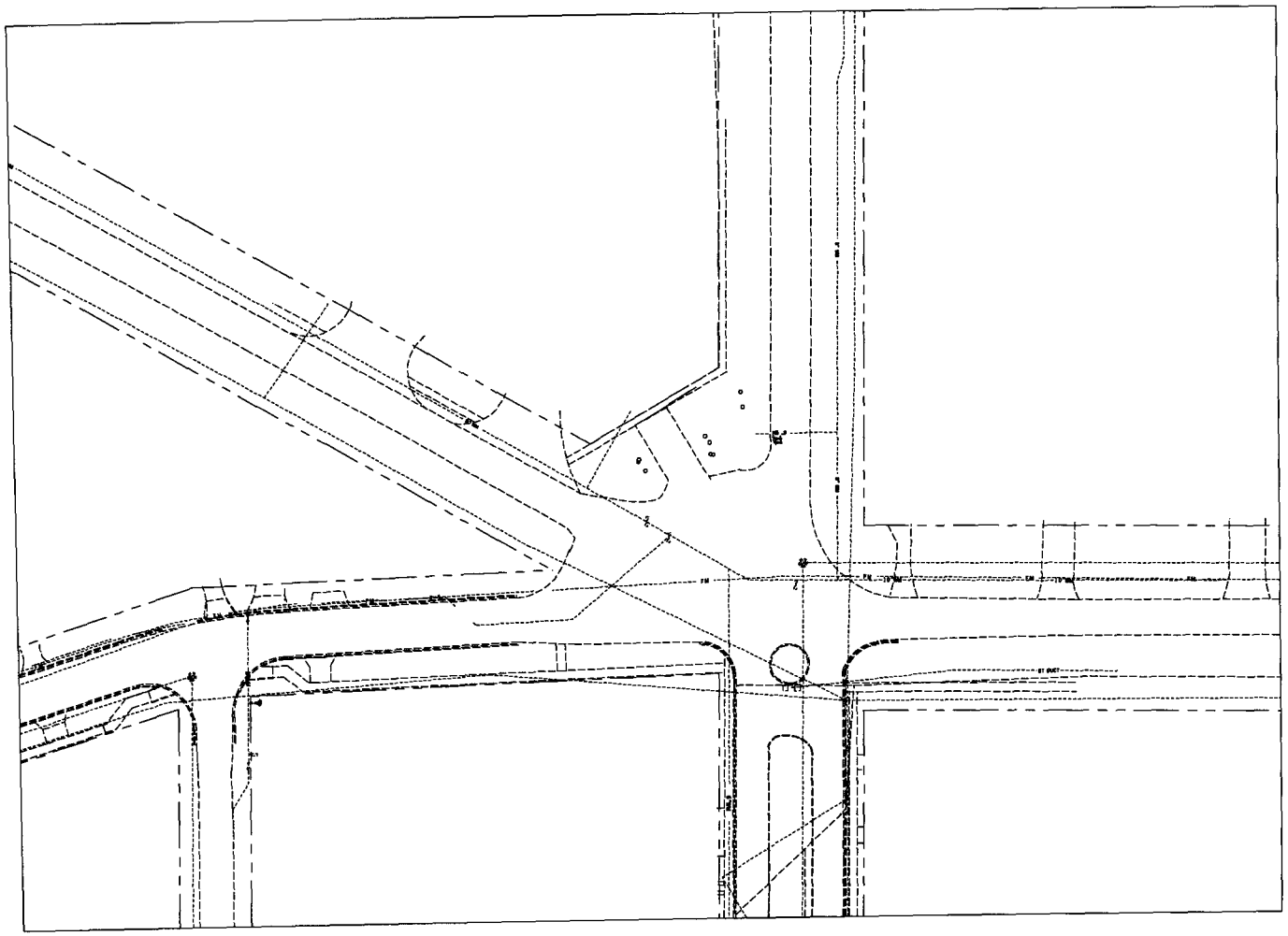


Figure 1: Existing Layout of the Seminole Roundabout

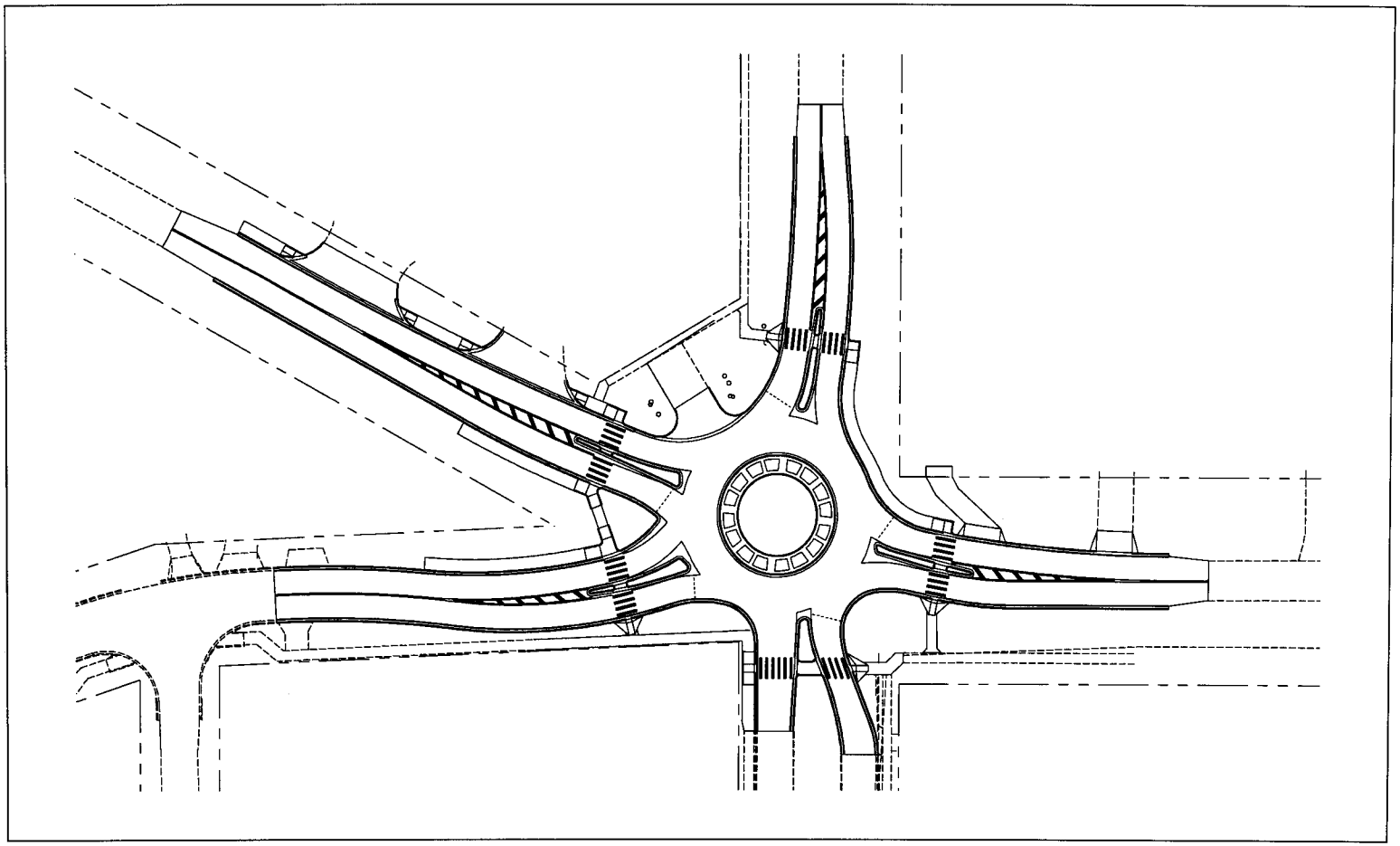


Figure 2: Conceptual Layout of the Proposed Seminole Roundabout

2 Introduction

The City of Atlantic Beach has authorized GAI Consultants, Inc. (GAI) to conduct a roundabout feasibility study for the intersection of Seminole road, Sherry drive and Plaza drive. This intersection has five approaches that currently use All-Way Stop Control (AWSC) to maintain traffic flow. In addition to the five approaches, there is a driveway located at the SW corner of Seminole road and Plaza drive that provides access to the fire station for emergency vehicles. Traffic through the intersection consists mostly of passenger cars and a few trucks and the posted speed for the approaching lanes is 25mph.

GAI performed the study using the Florida Roundabout Guide, 2nd Edition, FDOT 5/10/96, and Roundabouts: An Informational Guide, FHWA-RD-00-67, USDOT, June 2000.

The Florida Roundabout Guide presents a methodology for identifying appropriate roundabout sites and estimating roundabout capacity and delay. It describes the design principals and standards to which roundabouts installed on state roadways must conform and offers guidelines for operational features such as signing, marking, lighting, landscaping, etc.

Roundabouts: An Informational Guide provides information and guidance about roundabouts, resulting in designs that are suitable for a variety of typical conditions in the United States. As more recent publication, it contains more detailed design guidelines for operational analysis and geometric design.

2.1 Roundabout Characteristics

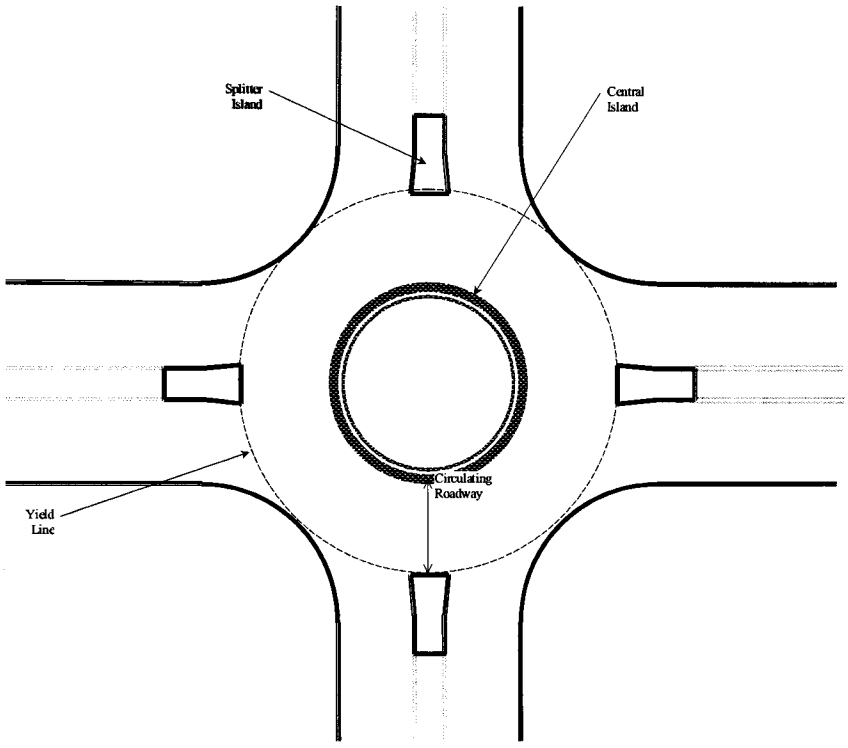


Figure 3: Basic Roundabout Configuration

The layout in *Figure 3* shows the basic features of a roundabout. The Florida Roundabout Guide distinguishes roundabouts from traffic circles by a set of common characteristics, which are listed below. Traffic circles that do not exhibit these characteristics are not considered roundabouts by the FDOT. For comparison purposes the non-conforming features found at some traffic circles are indicated in *italics*.

- Vehicles entering a roundabout on all approaches are required to yield to vehicles within the circulating roadway. *Traffic circles sometimes employ stop control or signal control or give priority to entering vehicles.*
- The circulating vehicles are not subjected to any other right of way conflicts and weaving is kept to a minimum. *Some traffic circles impose control measures within the circulating roadway, or are designed with weaving areas to resolve conflicts between movements.*
- The speed at which a vehicle is able to negotiate the circulating roadway is controlled by the location of the central island with respect to the alignment of the right entry curb. *Some traffic circles provide straight paths for major movements, and some do not achieve adequate deflection for speed control because of small central island diameter.*
- No parking is allowed on the circulating roadway. *Some traffic circles permit parking within the circulating roadway.*
- No pedestrian activities take place on the central island. Pedestrians are not allowed to cross the circulating roadway. *Some traffic circles provide for pedestrian crossing to, and activities on the central island.*
- All vehicles circulate counterclockwise, passing to the right of the central island. *In some traffic circles left-turning vehicles are expected to pass to the left of the central island.*
- Roundabouts are designed to properly accommodate specified design vehicles. *Some smaller traffic circles are unable to accommodate large vehicles usually because of right of way constraints.*
- Roundabouts have raised splitter islands on all approaches. Splitter islands enhance safety by separating traffic in opposite direction, and provide refuge for pedestrians. They are also an integral part of the deflection scheme. *Some traffic circles do not provide raised splitter islands.*
- When pedestrian crossing are provided for the approach roads, they are placed approximately one car length back from the entry point. *Some traffic circles accommodate pedestrians in other places, such as the yield point.*
- The entry deflection is the result of physical features of a roundabout. *Some traffic circles rely on pavement markings to promote deflection.*

While not explicit roundabout characteristics, the following features are necessary for a roundabout to perform safely and efficiently:

- They must be easily identified in the road system;
- The layout must be clearly visible and appropriately marked;
- The layout must encourage drivers to enter the intersection slowly;
- Adequate sight distances must be provided at all entry points to enable the driver to enter the intersection and to observe the movements of pedestrians and bicycles; and
- Adequate lighting must be provided for night time operation.

2.2 Use of Roundabouts

Roundabouts are used as an alternative form of traffic control for at-grade intersections in lieu of traffic signals or stop signs. In general, roundabouts perform better at intersections where traffic flows from the approaching lanes are roughly similar and include a high proportion of left-turn traffic. However, for traffic flows with "volume to capacity ratio" greater than 0.85, roundabouts tend to perform poorly compared to traffic signal control.

Roundabouts can improve safety by simplifying conflicts, reducing vehicle speeds and providing a clearer indication of the driver's right of way compared to other forms of channelization. They also provide an opportunity to improve the aesthetics of an intersection with landscaping in connection with community enhancement projects.

One advantage for installing a roundabout at the intersection of Seminole Road, Sherry Drive and Plaza Drive will be an improved intersection operation. A roundabout will be particularly suitable because this intersection has five legs, and it is not desirable to give priority to either road.

3 Roundabout Justification

The following questions must be answered to justify a roundabout as the most appropriate form of control at any intersection:

- Will a roundabout be expected to perform better than other alternative control modes? In other words, will it reduce delay, improve safety or solve some other operational control problem?
- Are there factors present that suggest that a roundabout would be a more appropriate control, even if delays with a roundabout are slightly higher?
- If any contraindicating factors exist, can they be resolved satisfactorily?

3.1 Roundabout Justification Procedure

The FDOT has developed an eight-step procedure for conducting a roundabout justification study, as follows:

1. Obtain common data
2. Identify justification category
3. Obtain data requirements specific to a particular category
4. Perform preliminary geometric design to establish feasibility
5. Analyze performance of a roundabout
6. Analyze performance of alternative control modes
7. Assess contraindications and propose mitigation treatments
8. Final recommendations and documentation.

3.2 Common Analysis Data

Information gathered for analyzing the roundabout justification categories include, but not limited to, the following:

- Data items for the "Traffic Signal" and "All-Way Stop" warrant study:

1. 12-hour approach volumes,
2. Peak hour turning movement counts,
3. Existing geometrics,
4. Pedestrian & bicycle volumes
5. Distance to other intersections,
6. Crash experience,
7. Institutional locations,
8. Posted speed limits, and
9. Area population.

- Physical and right of way features and limitations;
- Site development features (businesses, driveways, etc.) and
- Community considerations

In addition, information on the following items were considered:

- Anticipated growth based on governing comprehensive plan
- Existence of traffic management strategies in the area
- Types of vehicles using the intersection
- Transit routes along the intersecting roadway
- Adjacent land uses
- Access to adjacent properties
- Compatibility with adjacent intersections
- Availability of power and lighting; and
- Posted and design speeds along the intersecting roads.

3.3 Justification Categories

To provide an organized approach to the justification process, the FDOT has developed a series of categories, each of which represents a good reason to install a roundabout. These categories are summarized in Table 1, in terms of their anticipated relationships to warrants contained in the Manual on Uniform Traffic Control Devices (MUTCD) and the Highway Capacity Manual (HCM) levels of service (LOS).

Table 1 Roundabout Selection Categories and Justification Conditions

	Category and Description	AWSC Warrant Met?	AWSC LOS	Signal Warrant Met?	Signal LOS	Number of Lanes	Conditions for Justification
1	**Community Enhancement**	**YES**	**C**	**NO**	**N/A**	**1**	**Typically applied in commercial and civic districts. Aesthetics are important.**
2	Traffic Calming	NO	C	NO	N/A	1	Primarily a residential application. Demonstrated need for traffic calming.
3	Safety Improvement	YES	C	NO	N/A	1	Existence of a safety problem which would be alleviated by use of a roundabout intersection treatment.
4	**All-Way Stop Alternative**	**YES**	**C**	**NO**	**N/A**	**1**	**Delay should compare favorably with AWSC.**
5	Low-Volume Signal Alternative	YES	C	NO	N/A	1	Delay should compare favorably with a signal.
6	Medium-Volume Signal Alternative	YES	C	NO	N/A	1	Delay should compare favorably with a signal. Other justifying factors required.
7	Special Conditions (such as unusual geometrics, high volumes, ROW limitations, etc.	YES	C	NO	NA	1	Site specific justification required.

The traffic count data obtained at this intersection were used to analyze the traffic signal, all-way stop control and roundabout alternatives for the intersection. Analyses of the data indicate that the conditions at this intersection warrant an AWSC but do not warrant a Traffic Signal (See Appendix A for analysis of applicable signal warrants 1, 2, and 3; and AWSC warrant summary). **Therefore, the justification categories selected for this intersection are "All-Way Stop Alternative" and "Community Enhancement".**

3.4 Preliminary Geometric Design

The objective of preliminary geometric design is to establish a physical feasibility of the roundabout for this location. It is desirable to achieve an optimal roundabout size, optimal position, and optimal alignment of the approach legs, and that the geometry produces a sufficiently curved path for vehicles as they negotiate the roundabout. This forces drivers to reduce vehicular speeds, and reduce chances of collision as they merge, reduce risk to pedestrians and also maintain adequate capacity.

Alignment of the approach legs is slightly offset to the left to make the central island more conspicuous to drivers. A preliminary layout for the intersection is shown in Figure 2 (see Figure 3 for the basic geometric elements of a roundabout).

Based on the traffic data, a Single Unit (SU) truck was selected as design vehicle to check alignment and critical path radii for conformity to standard turning requirements. However, larger vehicles can negotiate the roundabout by using the mountable apron on the outside edge of the central island.

Figure 4: Photo of Existing Seminole Intersection

3.5 Roundabout Performance Analysis

A roundabout cannot be justified as the most appropriate form of control without a sense of how it will perform at a specific intersection and how that performance will compare to other intersection control alternatives. An operational analysis produces two kinds of estimates:

- **Capacity of a facility**, i.e. the ability of the facility to accommodate various streams of users, and
- **Level of performance,** often measured in terms of one or more measures of effectiveness (MOEs), such as **delay** and **queues**.

Roundabouts produce both control delay and geometric delay. Control delay is a MOE that is used to define level of service (LOS) at intersections. All intersections also cause drivers to incur geometric delays when making turns.

3.5.1 Traffic Operation at Roundabouts

A roundabout brings together conflicting traffic streams, allows streams to safely merge and traverse the roundabout, and exit the streams to their desired directions. The geometric elements of the roundabout provide guidance to drivers approaching, entering and traveling through a roundabout. Figure 5, shows the basic geometric elements of a roundabout.

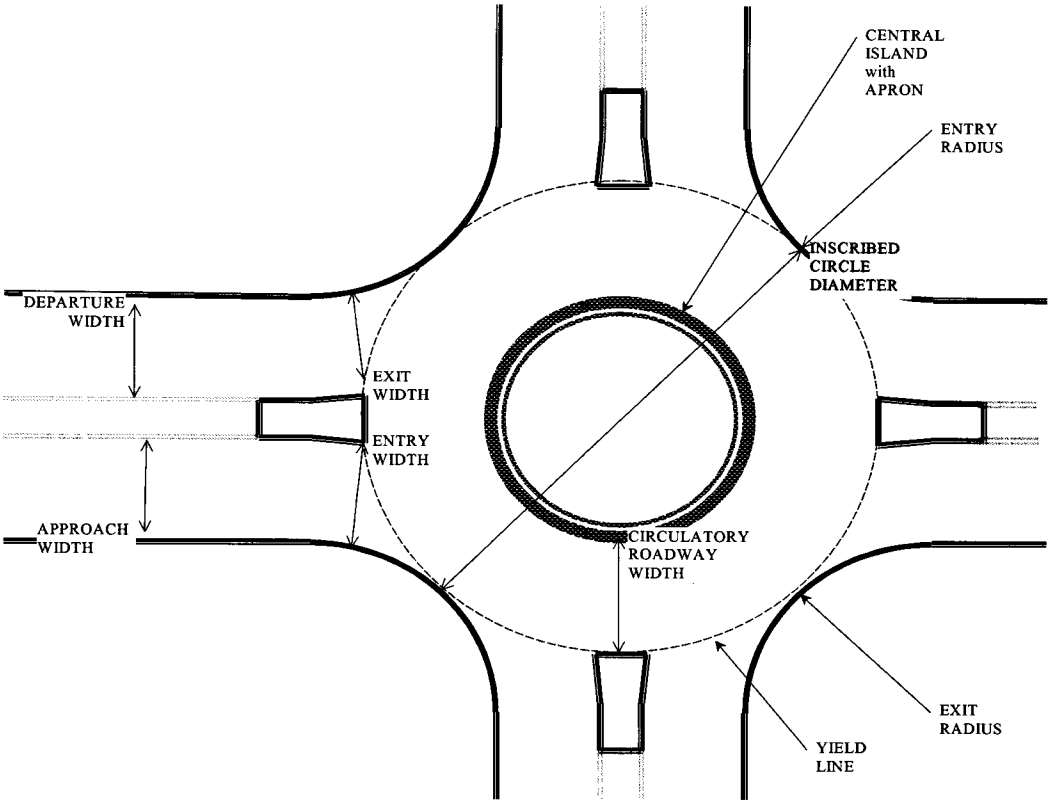


Figure 5 Basic Geometric Elements of a Roundabout

Drivers approaching a roundabout must slow to a speed that will allow them to safely interact with other users of the roundabout, and to negotiate the roundabout. The design approach speed for the proposed roundabout is 15 mph, which is governed by:

- Approach roadway width,
- Roadway curvature, and
- Approach volume.

The size of the **inscribed circle** affects the driver's path, which in turn determines the speed at which drivers travel around the roundabout. Roundabouts fit into two general classes: those with a small inscribed circle diameter (less than 50 feet), and those with a diameter greater than 50 feet. The inscribed circle diameter has relatively little effect on capacity for diameters less than 50 feet.

Geometric elements that affect entry capacity include:

- Approach half-width,
- Entry width,
- Entry angle, and
- Average effective flare length

The entry radius has little effect on capacity, provided it is 65 feet or more. The use of perpendicular entries (70 degrees or more) and small entry radii (less than 50 feet) will reduce capacity.

Thus, the geometric elements of a roundabout, together with the volume of traffic desiring to use the roundabout at a given time, determine the efficiency with which a roundabout operates.

Table 2: Proposed Geometric Dimensions of the Seminole Roundabout

Inscribed Circle Dia	Central Island Dia	Entry lane width	Circulatory Roadway Width	Entry radius
96′	60′	12′-17′	18′	40′-60′

3.5.2 Roundabout Capacity Defined

The capacity of each entry to a roundabout is the maximum rate at which vehicles can reasonably be expected to enter the roundabout from an approach during a given period of time, under prevailing traffic and roadway (geometric) conditions.

The capacity of the entire roundabout is not considered, as it depends on many terms. The capacity of each entry or approach is computed as a function of traffic on the other (conflicting) approaches, the interaction of these traffic streams, and the intersection geometry.

Approach capacity is the capacity provided at the yield line.

Different size vehicles have different capacity impacts; as shown in Table 3 passenger cars are used as the basis for comparison.

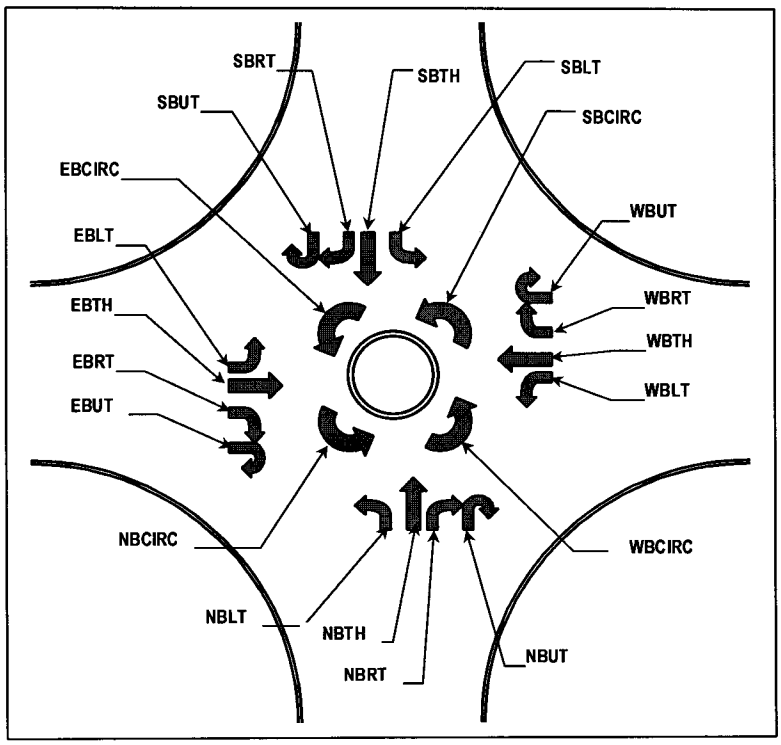


Figure 6: Traffic Flow Parameters

Table 3 Conversion Factors for Passenger Car Equivalents

Vehicle Type	Passenger Car Equivalent (PCE)
Car	1.0
Single-unit truck or bus	1.5
Truck with trailer	2.0
Bicycle or motorcycle	0.5

Entry flow and circulating flow for each approach are the volumes of interest for roundabout capacity analysis, rather than turning movement volumes. For proposed or planned four-legged roundabouts, Equation 1 can be applied to determine conflicting (circulating) flow rates, shown graphically in Figure 6.

Equation 1 Circulating Volumes as a Function of Turning Movement Volumes

$$V_{EBCIRC} = V_{WBLT} + V_{SBLT} + V_{SBTH} + V_{NBUTurn} + V_{WBUTurn} + V_{SBUTurn}$$

$$V_{WCIRC} = V_{EBLT} + V_{NBLT} + V_{NBTH} + V_{SBUTurn} + V_{EBUTurn} + V_{NBUTur}$$

$$V_{NBCIRC} = V_{EBLT} + V_{EBLT} + V_{SBTH} + V_{WBUTurn} + V_{SBUTurn} + V_{EBUTur}$$

$$V_{SBCIRC} = V_{WBLT} + V_{WBLT} + V_{NBTH} + V_{EBUTurn} + V_{NBUTurn} + V_{WBUTur}$$

Refer to Appendix A for calculated roundabout capacity for the intersection approaches.

3.6 Performance of Alternative Control Modes

Since the intersection conditions do not warrant a traffic signal alternative, the performance of the proposed roundabout is compared to AWSC as shown in Table 4. **These performace measures indicate that the rounabout has higher capacity and lower delay than the AWSC**. Thus vehicles will move through a proposed roundabout faster than in the case of the existing conditions with AWSC.

Table 4: Comparison of Performance

Performance Measure	**Roundabout Alternative**	**AWSC Alternative**
Delay (sec/veh)		
Overall	*14.5*	*22.7*
Critical Movement	*18.7*	*29.8*
Level of Service		
Overall	*B*	*C*
Critical Movement	*C*	*D*
Approach Capacity (veh/hr)		
Northbound	*659*	*580*
Southbound	*654*	*557*
Eastbound	*621*	*518*
Westbound	*595*	*305*
Critical v/c Ratio	*0.72*	*0.79*

3.7 Contraindicating Factors

Contraindication factors are conditions at the intersection that might reduce the effectiveness of a roundabout. Experience to date has shown that there are a few conditions under which roundabouts may not perform well enough to be considered an appropriate form of control at some intersections. A number of these factors are analyzed for the intersection as listed below:

- Physical or geometric complications that make it impossible or uneconomical to construct the roundabout. *(None)*
- Proximity of generators of significant traffic that might have difficulty negotiating the roundabout. *(A fire station is located at this intersection; analysis done using AUTO-TURN indicates that when a roundabout is installed at this location, emergency vehicles will be able to negotiate, and operate through the intersection without difficulty). Refer to the* ***conceptual layouts*** *in Appendix A, which indicate Single Unit Truck movements around the roundabout. Emergency vehicle traffic signal controls are considered for installation at this intersection to allow safe entrance of the Fire Trucks*
- Proximity of other traffic control devices that would require preemption, such as railroad tracks, drawbridges, etc. *(None)*
- Proximity of bottlenecks that would routinely back up traffic into the roundabout. *(None)*
- Problems of grades or unfavorable topography that may limit visibility or complicate construction. *(None)*
- Intersections of a major arterial and a minor arterial or local road where an unacceptable delay to the major road is created. *(None)*
- Heavy pedestrian movements that would have trouble crossing the road because of traffic volumes. *(None)*
- Isolated intersections located within a coordinated signal network. *(None)*
- Roadways with reversible lanes for morning and afternoon peak periods. *(None)*
- Routes where large combination vehicles or over-dimensional vehicles will frequently use the intersection and insufficient space is available. *(None)*
- Locations where vehicles exiting the roundabout would be interrupted by downstream traffic control that could create queues backing up into the roundabout. *(None)*
- Areas with a large number of cyclists. *(None)*

The existence of one or more of these factors does not necessarily preclude the installation of a roundabout. However, the presence of any contraindication suggests that special attention should be given to the design and operation to ensure that problems do not arise.

4 Physical Impacts to the Intersection

The locations of surface utilities and services at the intersection are such that no significant impacts would occur as a result of the proposed roundabout installation. However, relocations of utilities, trees, mailbox, and newspaper stand, adjustment to drainage structures and probably installation of conflict structures would be necessary during construction of the project. Further, there are a few driveways close to the intersection that might need to be modified to maintain access to adjacent properties.

5 Emergency Vehicle Traffic Control Signal

Installation of Emergency vehicle traffic control signal for safe entrance of emergency vehicles into the roundabout is considered for the intersection. The signal to be equipped with pre-emption controls would allow all motorized vehicles to stop and give right of way to fire trucks assigned to the station located at the intersection. The signal should be designed based on provisions in the MUTCD 2003 and the Florida Intersection Design Guide 2002.

Subject to final design, the following alternative traffic signal control elements are proposed as suitable to blend with the proposed roundabout design:

- All the five approaches of the intersection must be installed with signal heads post-mounted located to the right of the entry lanes; may also have additional posts located at the central island.
- The entrance to the Fire Station must be installed with a signal head post-mounted located at the right corner of the driveway.
- All six signals above must be interconnected and equipped with a single control panel with activation push-button located in the Fire House.

In addition to signal installation, emergency vehicle sign (W11-8) and a supplemental emergency signal ahead plaque (W11-12P) must be placed in advance of the control signals on all approaches to warn motorists of the conditions.

6 Conclusion

A properly designed modern roundabout is generally safer than a signalized intersection for vehicles because they are traveling at slower speeds. Where there is no signal, a driver cannot run the red light, which they usually do at high speed. A crash from running a red light usually results in a "T-bone" or an angle crash that often cause more sever injuries. On the other hand most crashes in a roundabout are side-swipe at lower speeds in which the injuries are usually less severe.

Roundabouts are also generally safer for pedestrians and cyclists because they cross behind the first vehicle at the yield line rather than in front of the stop bar. In addition, the "splitter islands" provide a refuge for pedestrians, so they need only to look for vehicles approaching from one direction at a time as they cross.

In addition, the performance measures indicate that a roundabout will perform better compared to the existing AWSC in terms of moving traffic efficiently and for overall level of service of the intersection. Thus on the average vehicles will move faster through the intersection when a roundabout is installed compared to the existing conditions.

Analysis of vehicle movements using AUTO-TURN shows that Emergency Vehicles/ Fire Trucks can still be able to move through the intersection without any problems when a roundabout is installed.

Based on the operational analysis provided in this study, it is determined that the installation of a roundabout at this intersection is feasible.

7 Preliminary Construction Cost Estimates

The cost estimates are conceptual only and may vary depending on site survey of existing profile and final design elements considered for this project. Assumptions made for this estimates include but are not limited to the following:

- There will be roadway re-construction and re-profiling within the intersection up to extents of about 60′ to 280′ on approach lanes.
- The curb and gutter within the limits of construction will be replaced.
- The Apron and Crosswalks will be constructed with brick pavers.
- There will be raised concrete splitter islands.
- Driveways and sidewalks within the limits will be replaced/ repaired.
- Asphalt base will be used for accelerated construction.
- Drainage facilities in the project limits will be replaced/ repaired.
- Utilities may be relocated.
- The central island (excluding the apron) will be landscaped.
- Other roadway facilities to be provided within the project limits include lighting, emergency traffic signal control, signing and pavement marking, and irrigation.
- No additional right-of-way requirement is anticipated.

The detailed cost estimate is presented in Appendix B, with a summary shown below.

Table 5: Summary of Cost Estimates

Description	**Cost**
Roadway	*$335,000.00*
Contract conditions	*$40,000.00*
20% Contingency	*$75,00.00*
Engineering Design/ Permitting	*$55,000.00*
CEI Cost	*$25,000.00*
Total	***$530,000.00***

Traffic Count Data

Malone and Associates, Inc.
(904) 992-8072

File Name : Seminole SB and Plaza EB and WB
Site Code : 00003000
Start Date : 12/10/2003
Page No : 1

Groups Printed- Vehicles

	Seminole Road Southbound					Plaza Road Westbound					Northbound					Plaza Road Eastbound					
Start Time	Thru to Seminole SB	Thru to Sherry SB	Left to Plaza EB	Right to Plaza WB	App. Total	Thru to Plaza WB	Left to Seminole SB	Left to Sherry SB	Right to Seminole NB	App. Total	Right	Thru	Left	Peds	App. Total	Right to Sherry SB	Thru to Plaza EB	Left to Seminole NB	Right to Seminole SB	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	73	29	2	16	120	0	9	0	0	9	0	0	0	0	0	13	1	2	5	21	150
07:15 AM	67	26	0	10	103	5	2	0	2	9	0	0	0	0	0	14	1	4	5	24	136
07:30 AM	57	33	2	11	103	2	3	1	1	7	0	0	0	0	0	17	2	10	7	36	146
07:45 AM	54	47	0	18	119	4	1	2	0	7	0	0	0	0	0	21	2	10	10	43	169
Total	251	135	4	55	445	11	15	3	3	32	0	0	0	0	0	65	6	26	27	124	601
08:00 AM	43	38	2	12	95	5	1	1	1	8	0	0	0	0	0	30	4	8	10	52	155
08:15 AM	55	37	0	17	109	4	2	1	0	7	0	0	0	0	0	33	3	10	13	59	175
08:30 AM	48	38	3	21	110	6	0	1	0	7	0	0	0	0	0	11	10	17	8	46	163
08:45 AM	38	37	2	23	100	3	1	1	0	5	0	0	0	0	0	13	5	21	6	45	150
Total	184	150	7	73	414	18	4	4	1	27	0	0	0	0	0	87	22	56	37	202	643
09:00 AM	45	22	2	20	89	3	2	0	0	5	0	0	0	0	0	10	3	15	7	35	129
09:15 AM	46	16	1	19	82	4	1	0	0	5	0	0	0	0	0	12	4	13	8	37	124
09:30 AM	46	30	5	12	93	6	3	2	2	13	0	0	0	0	0	4	2	8	7	21	127
09:45 AM	46	28	2	13	89	4	3	0	0	7	0	0	0	0	0	9	3	17	7	36	132
Total	183	96	10	64	353	17	9	2	2	30	0	0	0	0	0	35	12	53	29	129	512
10:00 AM	44	19	0	15	78	1	1	0	2	4	0	0	0	0	0	10	4	19	6	39	121
10:15 AM	46	10	1	17	74	1	2	0	2	5	0	0	0	0	0	4	4	15	9	32	111
10:30 AM	27	15	3	21	66	1	2	0	1	4	0	0	0	0	0	3	3	16	8	30	100
10:45 AM	35	17	1	20	73	3	2	1	2	8	0	0	0	0	0	7	5	27	9	48	129
Total	152	61	5	73	291	6	7	1	7	21	0	0	0	0	0	24	16	77	32	149	461
11:00 AM	35	16	0	10	61	4	4	3	2	13	0	0	0	0	0	8	4	13	7	32	106
11:15 AM	43	24	2	16	85	3	1	0	1	5	0	0	0	0	0	14	3	18	6	41	131
11:30 AM	43	17	1	11	72	3	3	1	0	7	0	0	0	0	0	10	6	30	5	51	130
11:45 AM	45	16	2	12	75	4	0	1	1	6	0	0	0	0	0	13	3	24	7	47	128
Total	166	73	5	49	293	14	8	5	4	31	0	0	0	0	0	45	16	85	25	171	495
12:00 PM	34	18	1	16	69	3	2	2	1	8	0	0	0	0	0	6	4	17	9	36	113
12:15 PM	36	22	3	12	73	3	2	0	1	6	0	0	0	0	0	13	7	29	6	55	134
12:30 PM	35	21	0	16	72	2	0	0	2	4	0	0	0	0	0	11	6	18	9	44	120
12:45 PM	32	18	1	10	61	8	1	0	3	12	0	0	0	0	0	13	5	22	9	49	122
Total	137	79	5	54	275	16	5	2	7	30	0	0	0	0	0	43	22	86	33	184	489
01:00 PM	24	15	1	17	57	6	4	1	0	11	0	0	0	0	0	9	6	15	7	37	105
01:15 PM	36	15	0	12	63	3	5	2	0	10	0	0	0	0	0	11	2	17	10	40	113
01:30 PM	26	7	2	14	49	4	3	1	1	9	0	0	0	0	0	17	10	18	9	54	112
01:45 PM	37	15	3	12	67	1	3	1	1	6	0	0	0	0	0	5	5	27	15	52	125
Total	123	52	6	55	236	14	15	5	2	36	0	0	0	0	0	42	23	77	41	183	455
02:00 PM	28	16	2	9	55	2	0	0	4	6	0	0	0	0	0	15	6	23	6	50	111
02:15 PM	35	14	2	14	65	1	4	4	3	12	0	0	0	0	0	6	10	31	4	51	128
02:30 PM	34	22	2	18	76	4	1	1	2	8	0	0	0	0	0	16	8	21	4	49	133
02:45 PM	29	21	2	22	74	3	2	1	0	6	0	0	0	0	0	28	4	24	11	67	147
Total	126	73	8	63	270	10	7	6	9	32	0	0	0	0	0	65	28	99	25	217	519
03:00 PM	47	19	0	18	84	7	1	1	0	9	0	0	0	0	0	17	4	31	8	60	153
03:15 PM	41	20	3	11	75	8	0	1	1	10	0	0	0	0	0	14	2	22	12	50	135
03:30 PM	45	7	1	19	72	6	1	2	1	10	0	0	0	0	0	15	3	27	11	56	138
03:45 PM	39	23	3	29	94	1	3	1	0	5	0	0	0	0	0	14	7	29	6	56	155
Total	172	69	7	77	325	22	5	5	2	34	0	0	0	0	0	60	16	109	37	222	581
04:00 PM	46	10	2	17	75	6	2	1	2	11	0	0	0	0	0	9	6	34	7	56	142
04:15 PM	47	16	1	15	79	8	1	0	1	10	0	0	0	0	0	13	6	29	6	54	143
04:30 PM	26	8	2	16	52	4	4	0	6	14	0	0	0	0	0	25	14	33	5	77	143
04:45 PM	37	11	1	15	64	3	2	0	3	8	0	0	0	0	0	14	6	40	9	69	141
Total	156	45	6	63	270	21	9	1	12	43	0	0	0	0	0	61	32	136	27	256	569
05:00 PM	36	13	1	11	61	0	2	1	2	5	0	0	0	0	0	21	9	44	11	85	151
05:15 PM	42	14	0	12	68	2	1	2	1	6	0	0	0	0	0	8	5	31	6	50	124
05:30 PM	29	22	0	19	70	3	4	1	2	10	0	0	0	0	0	10	5	33	9	57	137
05:45 PM	36	13	1	7	57	4	1	3	0	8	0	0	0	0	0	14	5	37	10	66	131
Total	143	62	2	49	256	9	8	7	5	29	0	0	0	0	0	53	24	145	36	258	543
06:00 PM	32	19	0	9	60	6	4	0	1	11	0	0	0	0	0	8	5	42	7	62	133
06:15 PM	28	18	0	8	54	2	2	0	1	5	0	0	0	0	0	10	3	40	4	57	116
06:30 PM	25	24	0	12	61	1	1	1	1	4	0	0	0	0	0	11	5	31	2	49	114
06:45 PM	29	14	0	19	62	2	0	0	0	2	0	0	0	0	0	8	9	16	4	37	101
Total	114	75	0	48	237	11	7	1	3	22	0	0	0	0	0	37	22	129	17	205	464

Grand Total	1907	970	65	723	3665	169	99	42	57	367	0	0	0	0	0	617	239	1078	366	2300	6332
Apprch %	52.0	26.5	1.8	19.7		46.0	27.0	11.4	15.5		0.0	0.0	0.0	0.0		26.8	10.4	46.9	15.9		
Total %	30.1	15.3	1.0	11.4	57.9	2.7	1.6	0.7	0.9	5.8	0.0	0.0	0.0	0.0	0.0	9.7	3.8	17.0	5.8	36.3	

	Seminole Road Southbound					Plaza Road Westbound					Northbound					Plaza Road Eastbound					
Start Time	Thru to Seminole SB	Thru to Sherry SB	Left to Plaza EB	Right to Plaza WB	App. Total	Thru to Plaza WB	Left to Seminole SB	Left to Sherry SB	Right to Seminole NB	App. Total	Right	Thru	Left	Peds	App. Total	Right to Sherry SB	Thru to Plaza EB	Left to Seminole NB	Right to Seminole SB	App. Total	Int. Total
Peak Hour From 07:00 AM to 06:45 PM - Peak 1 of 1																					
Intersection	07:45 AM																				
Volume	200	160	5	68	433	19	4	5	1	29	0	0	0	0	0	95	19	45	41	200	662
Percent	46.2	37.0	1.2	15.7		65.5	13.8	17.2	3.4		0.0	0.0	0.0	0.0		47.5	9.5	22.5	20.5		
08:15 Volume	55	37	0	17	109	4	2	1	0	7	0	0	0	0	0	33	3	10	13	59	175
Peak Factor																					0.946
High Int.	07:45 AM					08:00 AM					6:45:00 AM					08:15 AM					
Volume	54	47	0	18	119	5	1	1	1	8	0	0	0	0	0	33	3	10	13	59	
Peak Factor					0.910					0.906										0.847	

Malone and Associates, Inc.
(904) 992-8072

File Name : Seminole SB and Plaza EB and WB
Site Code : 00003000
Start Date : 12/10/2003
Page No : 1

Groups Printed- Trucks 3 Axles +

	Seminole Road Southbound					Plaza Road Westbound					Northbound					Plaza Road Eastbound					
Start Time	Thru to Seminole SB	Thru to Sherry SB	Left to Plaza EB	Right to Plaza WB	App. Total	Thru to Plaza WB	Left to Seminole SB	Left to Sherry SB	Right to Seminole NB	App. Total	Right	Thru	Left	Peds	App. Total	Right to Sherry SB	Thru to Plaza EB	Left to Seminole NB	Right to Seminole SB	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
07:45 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	3
08:00 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
08:30 AM	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	2	0	2	4
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	2
Total	0	0	0	1	1	0	1	0	1	2	0	0	0	0	0	1	0	5	0	6	9
09:00 AM	3	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	6
09:15 AM	2	0	0	3	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
09:30 AM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	5
09:45 AM	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3
Total	8	1	0	4	13	0	0	0	0	0	0	0	0	0	0	0	0	4	2	6	19
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
01:00 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
01:15 PM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3
01:30 PM	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	5
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	6	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	9
02:00 PM	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	6
02:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:30 PM	1	0	0	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
02:45 PM	0	1	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	7	1	0	5	13	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	14
03:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
03:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:45 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	2	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4
04:00 PM	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
05:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Grand Total	27	2	0	15	44	0	1	0	1	2	0	0	0	0	0	1	0	17	2	20	66
Apprch %	61.4	4.5	0.0	34.1		0.0	50.0	0.0	50.0		0.0	0.0	0.0	0.0		5.0	0.0	85.0	10.0		
Total %	40.9	3.0	0.0	22.7	66.7	0.0	1.5	0.0	1.5	3.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	25.8	3.0	30.3	

	Seminole Road Southbound					Plaza Road Westbound					Northbound					Plaza Road Eastbound					
Start Time	Thru to Seminole SB	Thru to Sherry SB	Left to Plaza EB	Right to Plaza WB	App. Total	Thru to Plaza WB	Left to Seminole SB	Left to Sherry SB	Right to Seminole NB	App. Total	Right	Thru	Left	Peds	App. Total	Right to Sherry SB	Thru to Plaza EB	Left to Seminole NB	Right to Seminole SB	App. Total	Int. Total
Peak Hour From 07:00 AM to 06:45 PM - Peak 1 of 1																					
Intersection	09:00 AM																				
Volume	8	1	0	4	13	0	0	0	0	0	0	0	0	0	0	0	0	4	2	6	19
Percent	61.5	7.7	0.0	30.8		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	66.7	33.3		
09:00 Volume	3	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	6
Peak Factor																					0.792
High Int.	09:15 AM					6:45:00 AM					6:45:00 AM					09:30 AM					
Volume	2	0	0	3	5	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	
Peak Factor					0.650															0.500	

Malone and Associates, Inc.
(904) 992-8072

File Name : Seminole and Sherry NB
Site Code : 00003001
Start Date : 12/10/2003
Page No : 1

Groups Printed- Vehicles

	Southbound					Westbound					Sherry Drive Northbound Northbound					Seminole Road Northbound Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Thru to Seminole NB	Left to Plaza WB	Left to Seminole SB	Right To Plaza EB	App. Total	Right to Plaza EB	Thru to Seminole NB	Left to Plaza WB	Right to Sherry SB	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	0	0	0	0	0	0	0	0	0	0	6	9	1	0	16	1	13	6	0	20	36
07:15 AM	0	0	0	0	0	0	0	0	0	0	5	4	0	0	9	0	24	3	0	27	36
07:30 AM	0	0	0	0	0	0	0	0	0	0	8	11	1	0	20	1	15	4	1	21	41
07:45 AM	0	0	0	0	0	0	0	0	0	0	9	12	1	0	22	0	23	4	1	28	50
Total	0	0	0	0	0	0	0	0	0	0	28	36	3	0	67	2	75	17	2	96	163
08:00 AM	0	0	0	0	0	0	0	0	0	0	18	19	1	1	39	0	21	3	0	24	63
08:15 AM	0	0	0	0	0	0	0	0	0	0	24	25	2	0	51	2	33	8	1	44	95
08:30 AM	0	0	0	0	0	0	0	0	0	0	21	13	1	0	35	1	20	2	0	23	58
08:45 AM	0	0	0	0	0	0	0	0	0	0	19	7	1	1	28	1	20	6	2	29	57
Total	0	0	0	0	0	0	0	0	0	0	82	64	5	2	153	4	94	19	3	120	273
09:00 AM	0	0	0	0	0	0	0	0	0	0	14	6	1	0	21	0	25	4	2	31	52
09:15 AM	0	0	0	0	0	0	0	0	0	0	11	8	2	1	22	1	22	1	0	24	46
09:30 AM	0	0	0	0	0	0	0	0	0	0	20	4	0	0	24	2	12	3	0	17	41
09:45 AM	0	0	0	0	0	0	0	0	0	0	15	1	0	0	16	0	17	4	2	23	39
Total	0	0	0	0	0	0	0	0	0	0	60	19	3	1	83	3	76	12	4	95	178
10:00 AM	0	0	0	0	0	0	0	0	0	0	15	5	1	1	22	1	29	2	1	33	55
10:15 AM	0	0	0	0	0	0	0	0	0	0	11	10	1	2	24	1	27	8	0	36	60
10:30 AM	0	0	0	0	0	0	0	0	0	0	14	6	0	1	21	1	20	7	1	29	50
10:45 AM	0	0	0	0	0	0	0	0	0	0	13	7	0	1	21	1	26	7	1	35	56
Total	0	0	0	0	0	0	0	0	0	0	53	28	2	5	88	4	102	24	3	133	221
11:00 AM	0	0	0	0	0	0	0	0	0	0	13	6	4	0	23	1	21	6	1	29	52
11:15 AM	0	0	0	0	0	0	0	0	0	0	22	4	1	0	27	1	28	8	2	39	66
11:30 AM	0	0	0	0	0	0	0	0	0	0	21	8	1	1	31	2	23	5	1	31	62
11:45 AM	0	0	0	0	0	0	0	0	0	0	19	6	3	1	29	3	29	9	2	43	72
Total	0	0	0	0	0	0	0	0	0	0	75	24	9	2	110	7	101	28	6	142	252
12:00 PM	0	0	0	0	0	0	0	0	0	0	19	8	0	3	30	0	27	7	1	35	65
12:15 PM	0	0	0	0	0	0	0	0	0	0	18	7	0	2	27	0	31	5	0	36	63
12:30 PM	0	0	0	0	0	0	0	0	0	0	15	6	0	1	22	2	27	8	0	37	59
12:45 PM	0	0	0	0	0	0	0	0	0	0	16	8	1	0	25	2	22	2	1	27	52
Total	0	0	0	0	0	0	0	0	0	0	68	29	1	6	104	4	107	22	2	135	239
01:00 PM	0	0	0	0	0	0	0	0	0	0	26	8	1	1	36	0	35	4	1	40	76
01:15 PM	0	0	0	0	0	0	0	0	0	0	11	13	0	1	25	1	30	5	0	36	61
01:30 PM	0	0	0	0	0	0	0	0	0	0	26	8	1	0	35	1	20	7	1	29	64
01:45 PM	0	0	0	0	0	0	0	0	0	0	11	7	3	1	22	1	30	8	0	39	61
Total	0	0	0	0	0	0	0	0	0	0	74	36	5	3	118	3	115	24	2	144	262
02:00 PM	0	0	0	0	0	0	0	0	0	0	16	4	0	0	20	0	23	5	1	29	49
02:15 PM	0	0	0	0	0	0	0	0	0	0	18	11	1	1	31	3	22	4	1	30	61
02:30 PM	0	0	0	0	0	0	0	0	0	0	19	4	2	1	26	2	33	7	1	43	69
02:45 PM	0	0	0	0	0	0	0	0	0	0	30	18	5	1	54	1	21	5	3	30	84
Total	0	0	0	0	0	0	0	0	0	0	83	37	8	3	131	6	99	21	6	132	263
03:00 PM	0	0	0	0	0	0	0	0	0	0	28	24	2	0	54	4	29	5	1	39	93
03:15 PM	0	0	0	0	0	0	0	0	0	0	30	13	2	1	46	2	32	3	4	41	87
03:30 PM	0	0	0	0	0	0	0	0	0	0	32	11	2	3	48	0	30	8	3	41	89
03:45 PM	0	0	0	0	0	0	0	0	0	0	32	7	1	2	42	6	23	6	2	37	79
Total	0	0	0	0	0	0	0	0	0	0	122	55	7	6	190	12	114	22	10	158	348
04:00 PM	0	0	0	0	0	0	0	0	0	0	28	12	0	0	40	7	25	13	0	45	85
04:15 PM	0	0	0	0	0	0	0	0	0	0	29	21	0	2	52	0	42	11	1	54	106
04:30 PM	0	0	0	0	0	0	0	0	0	0	24	13	0	1	38	2	34	6	0	42	80
04:45 PM	0	0	0	0	0	0	0	0	0	0	33	6	1	1	41	2	32	9	1	44	85
Total	0	0	0	0	0	0	0	0	0	0	114	52	1	4	171	11	133	39	2	185	356
05:00 PM	0	0	0	0	0	0	0	0	0	0	36	12	1	5	54	3	44	4	2	53	107
05:15 PM	0	0	0	0	0	0	0	0	0	0	39	11	2	0	52	0	40	2	1	43	95
05:30 PM	0	0	0	0	0	0	0	0	0	0	27	12	0	2	41	4	29	4	0	37	78
05:45 PM	0	0	0	0	0	0	0	0	0	0	36	12	1	4	53	2	39	8	1	50	103
Total	0	0	0	0	0	0	0	0	0	0	138	47	4	11	200	9	152	18	4	183	383
06:00 PM	0	0	0	0	0	0	0	0	0	0	34	12	1	1	48	1	44	13	0	58	106
06:15 PM	0	0	0	0	0	0	0	0	0	0	33	4	0	0	37	2	58	8	0	68	105
06:30 PM	0	0	0	0	0	0	0	0	0	0	32	10	0	1	43	2	41	11	1	55	98
06:45 PM	0	0	0	0	0	0	0	0	0	0	31	9	0	0	40	1	32	3	1	37	77
Total	0	0	0	0	0	0	0	0	0	0	130	35	1	2	168	6	175	35	2	218	386

Grand Total	0	0	0	0	0	0	0	0	0	0	1027	462	49	45	1583	71	1343	281	46	1741	3324
Apprch %	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		64.9	29.2	3.1	2.8		4.1	77.1	16.1	2.6		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.9	13.9	1.5	1.4	47.6	2.1	40.4	8.5	1.4	52.4	

	Southbound					Westbound					Sherry Drive Northbound Northbound					Seminole Road Northbound Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Thru to Seminole NB	Left to Plaza WB	Left to Seminole SB	Right To Plaza EB	App. Total	Right to Plaza EB	Thru to Seminole NB	Left to Plaza WB	Right to Sherry SB	App. Total	Int. Total
Peak Hour From 07:00 AM to 06:45 PM - Peak 1 of 1																					
Intersection	05:45 PM																				
Volume	0	0	0	0	0	0	0	0	0	0	135	38	2	6	181	7	182	40	2	231	412
Percent	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		74.6	21.0	1.1	3.3		3.0	78.8	17.3	0.9		
06:00 Volume	0	0	0	0	0	0	0	0	0	0	34	12	1	1	48	1	44	13	0	58	106
Peak Factor																					0.972
High Int.	6:45:00 AM					6:45:00 AM					05:45 PM					06:15 PM					
Volume	0	0	0	0	0	0	0	0	0	0	36	12	1	4	53	2	58	8	0	68	
Peak Factor															0.854					0.849	

Malone and Associates, Inc.
(904) 992-8072

File Name : Seminole and Sherry NB
Site Code : 00003001
Start Date : 12/10/2003
Page No : 1

Groups Printed- Trucks 3 Axles +

	Southbound					Westbound					Sherry Drive Northbound Northbound					Seminole Road Northbound Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Thru to Seminole NB	Left to Plaza WB	Left to Seminole SB	Right To Plaza EB	App. Total	Right to Plaza EB	Thru to Seminole NB	Left to Plaza WB	Right to Sherry SB	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	5
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	8	8
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	2	3
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	3
09:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	2	0	0	2	4
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	2	0	0	1	3	0	6	1	0	7	10
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	3	3
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
10:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	2	3
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	5	5
Total	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	8	2	1	12	13
11:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	3	2	0	5	7
11:45 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	3	1	0	0	4	0	3	2	0	5	9
12:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	3	0	0	3	4
12:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0	0	2	3
12:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	4	0	0	4	5
12:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	3	0	0	3	4
Total	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	12	0	0	12	16
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
01:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0	0	2	3
01:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0	2	3
Total	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	5	1	0	6	8
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	0	2	3
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	3	1	0	4	5
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
04:00 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	1	0	0	1	4
04:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	5	1	0	0	6	0	2	0	0	2	8
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
05:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	3	1	0	4	5
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1

Grand Total	0	0	0	0	0	0	0	0	0	0	18	4	0	1	23	1	56	9	1	67	90
Apprch %	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		78.3	17.4	0.0	4.3		1.5	83.6	13.4	1.5		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	4.4	0.0	1.1	25.6	1.1	62.2	10.0	1.1	74.4	

	Southbound					Westbound					Sherry Drive Northbound Northbound					Seminole Road Northbound Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Thru to Seminole NB	Left to Plaza WB	Left to Seminole SB	Right To Plaza EB	App. Total	Right to Plaza EB	Thru to Seminole NB	Left to Plaza WB	Right to Sherry SB	App. Total	Int. Total
Peak Hour From 07:00 AM to 06:45 PM - Peak 1 of 1																					
Intersection	12:00 PM																				
Volume	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	12	0	0	12	16
Percent	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
12:30 Volume	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	4	0	0	4	5
Peak Factor																					0.800
High Int.	6:45:00 AM					6:45:00 AM					12:00 PM					12:30 PM					
Volume	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	4	0	0	4	
Peak Factor															1.000					0.750	

Malone and Associates, Inc.
(904) 992-8072

File Name : Seminole and Sherry NB
Site Code : 00003001
Start Date : 12/10/2003
Page No : 1

Groups Printed- Pedestrians

	Seminole NB	Plaza EB	Seminole SB	Sherry NB	App. Total				Plaza WB	App. Total	Sherry Drive Northbound Northbound: Thru to Seminole NB	Left to Plaza WB	Left to Seminole SB	Right To Plaza EB	App. Total	Seminole Road Northbound Eastbound: Right to Plaza EB	Thru to Seminole NB	Left to Plaza WB	Right to Sherry SB	App. Total	Int. Total
Start Time																					
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	2	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
07:30 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
07:45 AM	4	0	0	4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Total	6	0	0	6	12	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	13
08:00 AM	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	4
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	1	0	0	2	3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4
Total	1	0	0	2	3	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	8
09:00 AM	2	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
09:15 AM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	2
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	0	0	2	4	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	6
10:00 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
10:15 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	2	3	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
11:30 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	1	0	2	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
01:00 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
01:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	1	0	0	2	3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	1	0	0	1	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	2
Total	1	0	0	1	2	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	5
03:00 PM	2	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	2	0	0	2	4	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	6
03:45 PM	2	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Total	6	0	0	6	12	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	14
04:00 PM	2	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	3	0	1	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Grand Total	21	0	5	29	55	0	0	0	14	14	0	0	0	0	0	0	0	0	0	0	69
Apprch %	38.2	0.0	9.1	52.7		0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	30.4	0.0	7.2	42.0	79.7	0.0	0.0	0.0	20.3	20.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	Southbound					Westbound					Sherry Drive Northbound Northbound					Seminole Road Northbound Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Thru to Seminole NB	Left to Plaza WB	Left to Seminole SB	Right To Plaza EB	App. Total	Right to Plaza EB	Thru to Seminole NB	Left to Plaza WB	Right to Sherry SB	App. Total	Int. Total
Peak Hour From 07:00 AM to 06:45 PM - Peak 1 of 1																					
Intersection	07:15 AM																				
Volume	6	0	0	6	12	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	17
Percent	50.0	0.0	0.0	50.0		0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		
07:45 Volume	4	0	0	4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Peak Factor																					0.531
High Int.	07:45 AM					08:00 AM					6:45:00 AM					6:45:00 AM					
Volume	4	0	0	4	8	0	0	0	4	4											
Peak Factor					0.375					0.313											

Signal Warrant Analysis

24 HOUR MACHINE COUNTS

DATE: December 10, 2003 (Wednesday) CITY: Atlantic Beach

LOCATION: Seminole Rd, Sherry Dr & The Plaza COUNTY: Duval

	Sherry Dr	Seminole Rd			The Plaza			
BEGIN TIME	NB	NB	SB	SUBTOTAL	EB	WB	SUBTOTAL	TOTAL
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	67	101	446	547	126	32	158	705
8:00 AM	153	128	415	543	208	29	237	780
9:00 AM	86	102	366	468	135	30	165	633
10:00 AM	89	145	291	436	149	21	170	606
11:00 AM	114	147	293	440	171	31	202	642
12:00 PM	108	147	276	423	185	30	215	638
1:00 PM	120	150	242	392	186	36	222	614
2:00 PM	132	136	283	419	218	32	250	669
3:00 PM	191	159	328	487	223	34	257	744
4:00 PM	177	187	274	461	256	43	299	760
5:00 PM	201	187	258	445	258	29	287	732
6:00 PM	168	219	237	456	205	22	227	683
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
TOTAL	1,606	1,808	3,709	5,517	2,320	369	2,689	8,206

CHAPTER 4C. TRAFFIC CONTROL SIGNAL NEEDS STUDIES

Section 4C.01 Studies and Factors for Justifying Traffic Control Signals

Standard:

An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location.

The investigation of the need for a traffic control signal shall include an analysis of the applicable factors contained in the following traffic signal warrants and other factors related to existing operation and safety at the study location:

Warrant 1, Eight-Hour Vehicular Volume.
Warrant 2, Four-Hour Vehicular Volume.
Warrant 3, Peak Hour.
Warrant 4, Pedestrian Volume.
Warrant 5, School Crossing.
Warrant 6, Coordinated Signal System.
Warrant 7, Crash Experience.
Warrant 8, Roadway Network.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

Support:

Sections 8D.07 and 10D.05 contain information regarding the use of traffic control signals instead of gates and/or flashing light signals at highway-railroad grade crossings and highway light rail transit grade crossings, respectively.

Guidance:

A traffic control signal should not be installed unless one or more of the factors described in this section are met.

A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.

A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.

The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the above signal warrants.

Engineering judgment should also be used in applying various traffic signal warrants to cases where approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics dictate whether an approach should be considered as one lane or two lanes. For example, for an approach with one lane for through and right-turning traffic plus a left-turn lane, engineering judgment could indicate that it should be considered a one-lane approach if the traffic using the left-turn lane is minor. In such a case, the total traffic volume approaching the intersection should be applied against the signal warrants as a one-lane approach. The approach should be considered two lanes if approximately half of the traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn vehicles.

Similar engineering judgment and rationale should be applied to a street approach with one lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered.

At a location that is under development or construction and where it is not possible to obtain a traffic count that would represent future traffic conditions, hourly volumes should be estimated as part of an engineering study for comparison with traffic signal warrants.

For signal warrant analysis, a location with a wide median should be considered as one intersection.

Option:
Engineering study data may include the following:
A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour traffic volume.
B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles), during each 15-minute period of the 2 hours in the morning and 2 hours in the afternoon during which total traffic entering the intersection is greatest.
C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Paragraph B above and during hours of highest pedestrian volume. Where young, elderly, and/or persons with physical or visual disabilities need special consideration, the pedestrians and their crossing times may be classified by general observation.
D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons with disabilities, including requests from persons with disabilities for accessible crossing improvements at the location under study. These persons may not be adequately reflected in the pedestrian volume count if the absence of a signal restrains their mobility.
E. The posted or statutory speed limit or the 85th-percentile speed on the uncontrolled approaches to the location.
F. A condition diagram showing details of the physical layout, including such features as intersection geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to nearest traffic control signals, utility poles and fixtures, and adjacent land use.
G. A collision diagram showing crash experience by type, location, direction of movement, severity, weather, time of day, date, and day of week for at least 1 year.

The following data, which are desirable for a more precise understanding of the operation of the intersection, may be obtained during the periods specified in Paragraph B above:
A. Vehicle-hours of stopped time delay determined separately for each approach to be consistent with the Peak Hour Warrant.
B. The number and distribution of acceptable gaps in vehicular traffic on the major street for entrance from the minor street.
C. The posted or statutory speed limit or the 85th-percentile speed on controlled approaches at a point near to the intersection but unaffected by the control.
D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average weekday or like periods of a Saturday or Sunday.
E. Queue length on stop-controlled approaches.

Use the following worksheets, within this Workbook, to enter engineering study data:

24-Hr	record **24-hour Machine Counts**
8-Hr TMC	record **Summary of Vehicle Movements**
Peds	record **Pedestrian Movements Summary**
Collision	prepare **Collision Diagram**
Crash	record **Crash Summary**
Condition	prepare **Condition Diagram**

Major Street:	Seminole Rd.	**Approach Lanes:**	1	**Engineer:**	SAA
Minor Street:	The Plaza	**Approach Lanes:**	1	**Date:**	02/27/04
City:	City of Atlantic Beach	**County:**	Duval		

GUIDANCE: The combination of Conditions A and B should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Major Street 85% Speed > 40 mph	Yes	No X	**Isolated Community < 10,000 Population**	Yes	No	X

STANDARD: These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

WARRANT NO.1 - EIGHT-HOUR VEHICULAR VOLUME, Condition A Minimum Vehicular Volume

SUPPORT: The Minimum Vehicular Volume, Condition A is intended for application where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

STANDARD: The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or

Warrant Satisfied YES ____ NO X

b. (80% Volume Met) YES X NO ____

***OPTION:** If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h (40 mph), or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.*

a: In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.

The vehicles per hour given in both of the **100 percent** columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection. In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the

Requirements	Minimum Vehicles/Hr. (80% in brackets) 100% a	70% c	100%	70%	HOUR (Start Time) 7:00 AM	8:00 AM	9:00 AM	11:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	MET YES	NO
Approach Lanes	1			>=2										
Both Approaches on Major Street	500 (400)	350 (280)	600 (480)	420 (336)	547	543	468	440	487	461	445	456	X	X
AND Highest Approach on Minor Street	150 (120)	105 (84)	200 (160)	140 (112)	126	208	135	171	223	256	258	205	X	X

c: These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

a **Basic minimum hourly volume**

b **Used for combination of Conditions A and B after adequate trial of other remedial measures.**

c **May be used when the major street speed exceeds 40 MPH or in an isolated community with a population of less than 10,000.**

WARRANT NO.1 - EIGHT-HOUR VEHICULAR VOLUME, Condition B Interruption of Continuous Traffic

SUPPORT: The Interruption of Continuous Traffic, Condition B, is intended for application where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

STANDARD: The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the volume-volume minor-street approaches, respectively, to the intersection; and

Warrant Satisfied YES ____ NO X

b. (80% Volume Met) YES ____ NO X

***OPTION:** If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h (40 mph), or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.*

a: In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.

The vehicles per hour given in both of the **80 percent** columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Requirements	Minimum Vehicles/Hr. (80% in brackets) 100% a	70% c	100%	70%	HOUR (Start Time) 7:00 AM	8:00 AM	9:00 AM	11:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	MET YES	NO
Approach Lanes	1			>=2										
Both Approaches on Major Street	750 (600)	525 (420)	900 (720)	630 (504)	547	543	468	440	487	461	445	456		X X
AND Highest Approach on Minor Street	75 (60)	53 (42)	100 (80)	70 (56)	126	208	135	171	223	256	258	205	X X	

c: These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

AND	YES	NO
A traffic signal will NOT seriously disrupt progressive traffic flow on major street		X

Major Street: Seminole Rd.	**Approach Lanes:**	**1**	**Engineer: SAA**
Minor Street: The Plaza	**Approach Lanes:**	**1**	**Date: 02/27/04**
City: City of Atlantic Beach	**County: Duval**		

Major St. 85% Speed > 40 mph Yes ___ No X

Isolated Community < 10,000 Population Yes ___ No X

WARRANT NO. 2 FOUR-HOUR VEHICULAR VOLUME

STANDARD: The need for a traffic control signal shall be considered if an engineering study finds that, for **each of any 4 hours** of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes, **see tables below.** On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.

SUPPORT: The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

NOT APPLICABLE: ___ **WARRANT SATISFIED: YES** ___ **NO** X

APPROACH LANES : MAJOR STREET **1** MINOR STREET **1**

HOUR	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	MET? Y/N
MAJOR STREET												
NB Direction	101	128	102	145	147	147	150	136	159	187	187	
SB Direction	446	415	366	291	293	276	242	283	328	274	258	
Both Directions	**547**	**543**	**468**	**436**	**440**	**423**	**392**	**419**	**487**	**461**	**445**	N
MINOR STREET												
EB Direction	126	208	135	149	171	185	186	218	223	256	258	N
WB Direction												

Four-Hour Vehicular Volume

1 lane and 1 lane		2 or more lanes and 1 lane		2 or more lanes and 2 or more lanes	
VPH on the major street	VPH on the minor street	VPH on the major street	VPH on the minor street (Higher volume approach)	VPH on the major street	VPH on the minor street (Higher volume approach)
1400	80	1400	80 or 115*	1400	115
1300	80	1300	90 or 115*	1300	115
1200	80	1200	100 or 115*	1200	145
1100	80	1100	120	1100	165
1000	100	1000	150	1000	200
900	120	900	175	900	240
800	150	800	200	800	275
700	180	700	250	700	340
600	220	600	290	600	390
500	260	500	340	500	460
400	310	400	390	400	Not available
Total of both approaches	Higher volume approach	Total of both approaches	Higher volume approach	Total of both approaches	Higher volume approach

NOTE: 115 VPH applies as the lower threshold volume for a minor street approach with 2 or more lanes and 80 VPH applies as the lower threshold volume for a minor street approaching with 1 lane.

OPTION: *If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h (40 mph) or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.*

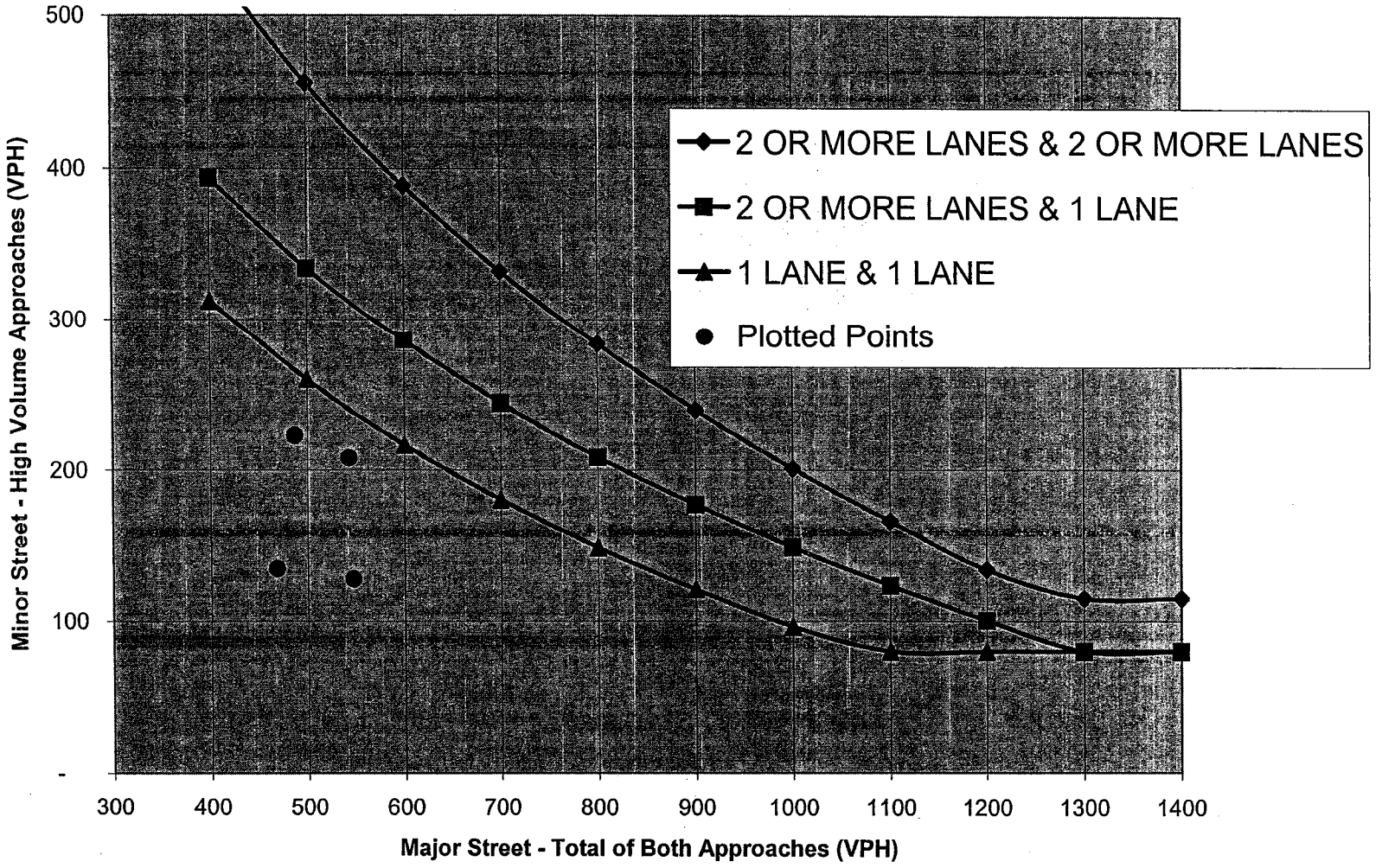
Four-Hour Vehicular Volume (70% Factor)

USE?: N

1 lane and 1 lane		2 or more lanes and 1 lane		2 or more lanes and 2 or more lanes	
VPH on the major street	VPH on the minor street	VPH on the major street	VPH on the minor street (Higher volume approach)	VPH on the major street	VPH on the minor street (Higher volume approach)
1000	60	1000	60 or 80*	1000	80
900	60	900	65 or 80*	900	80
800	60	800	80	800	105
700	70	700	100	700	140
600	90	600	130	600	175
500	125	500	165	500	225
400	160	400	215	400	290
300	205	300	265	300	Not available
Total of both approaches	Higher volume approach	Total of both approaches	Higher volume approach	Total of both approaches	Higher volume approach

NOTE: 80 VPH applies as the lower threshold volume for a minor street approach with 2 or more lanes and 60 VPH applies as the lower threshold volume for a minor street approaching with 1 lane.

Figure 4C-1 Warrant 2 - Four-Hour Vehicular Volume



Major Street:	Seminole Rd.	**Approach Lanes:**	1	**Engineer:** SAA	
Minor Street:	The Plaza	**Approach Lanes:**	1	**Date:**	02/27/04
City:	City of Atlantic Beach	**County:**	Duval		
Major St. 85% Speed > 40 mph	Yes	No	X	*Isolated Community < 10,000 Population*	Yes	No	X

WARRANT NO. 3 PEAK HOUR

SUPPORT: The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

NOT APPLICABLE ___X___ WARRANT SATISFIED YES _____ NO ___X___

STANDARD: This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

APPROACH LANES : MAJOR STREET 1 MINOR STREET 1

	APPROACH LANES	1	2	FIELD DATA	MET YES		MET NO
	MINOR STREET DELAY (ONE DIRECTION ONLY)	> 4 VEH-HRS	> 5 VEH-HRS	0 VEH-HRS	?		
AND	MINOR STREET VOL. (SAME DIRECTION)	100 VPH	150 VPH	256 VPH	Y		

AND

	4 OR MORE APPROACHES	3 APPROACHES	FIELD DATA	MET YES		MET NO
TOTAL INTERSECTION VOLUME	800 VPH	650 VPH	937 VPH	Y		

STANDARD: The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:
A. If **all three** of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:
1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, **and**
2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, **and**
3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes: see tables below

HOUR	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	MET? Y/N
MAJOR STREET												
NB Direction	101	128	102	145	147	147	150	136	159	187	187	
SB Direction	446	415	366	291	293	276	242	283	328	274	258	
Both Directions	547	543	468	436	440	423	392	419	487	461	445	Y
MINOR STREET												
EB Direction	126	208	135	149	171	185	186	218	223	256	258	N
WB Direction												

Peak Hour Volume

1 lane and 1 lane		2 or more lanes and 1 lane		2 or more lanes and 2 or more lanes	
VPH on the major street	VPH on the minor street	VPH on the major street	VPH on the minor street (Higher volume	VPH on the major street	VPH on the minor street (Higher volume
1800	100	1800	100 or 150*	1800	150
1700	100	1700	100 or 150*	1700	150
1600	100	1600	120 or 150*	1600	170
1500	100	1500	145 or 150*	1500	180
1400	120	1400	155	1400	220
1300	130	1300	190	1300	250
1200	150	1200	220	1200	285
1100	175	1100	250	1100	340
1000	200	1000	285	1000	370
900	245	900	325	900	425
800	285	800	360	800	475
700	325	700	420	700	540
600	360	600	460	600	590
500	420	500	Not available	500	Not available
Total of both approaches	Higher volume approach	Total of both approaches	Higher volume approach	Total of both approaches	Higher volume approach

NOTE: 150 VPH applies as the lower threshold volume for a minor street approach with 2 or more lanes and 100 VPH applies as the lower threshold volume for a minor street approaching with 1 lane.

OPTION: If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h (40 mph) or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3.

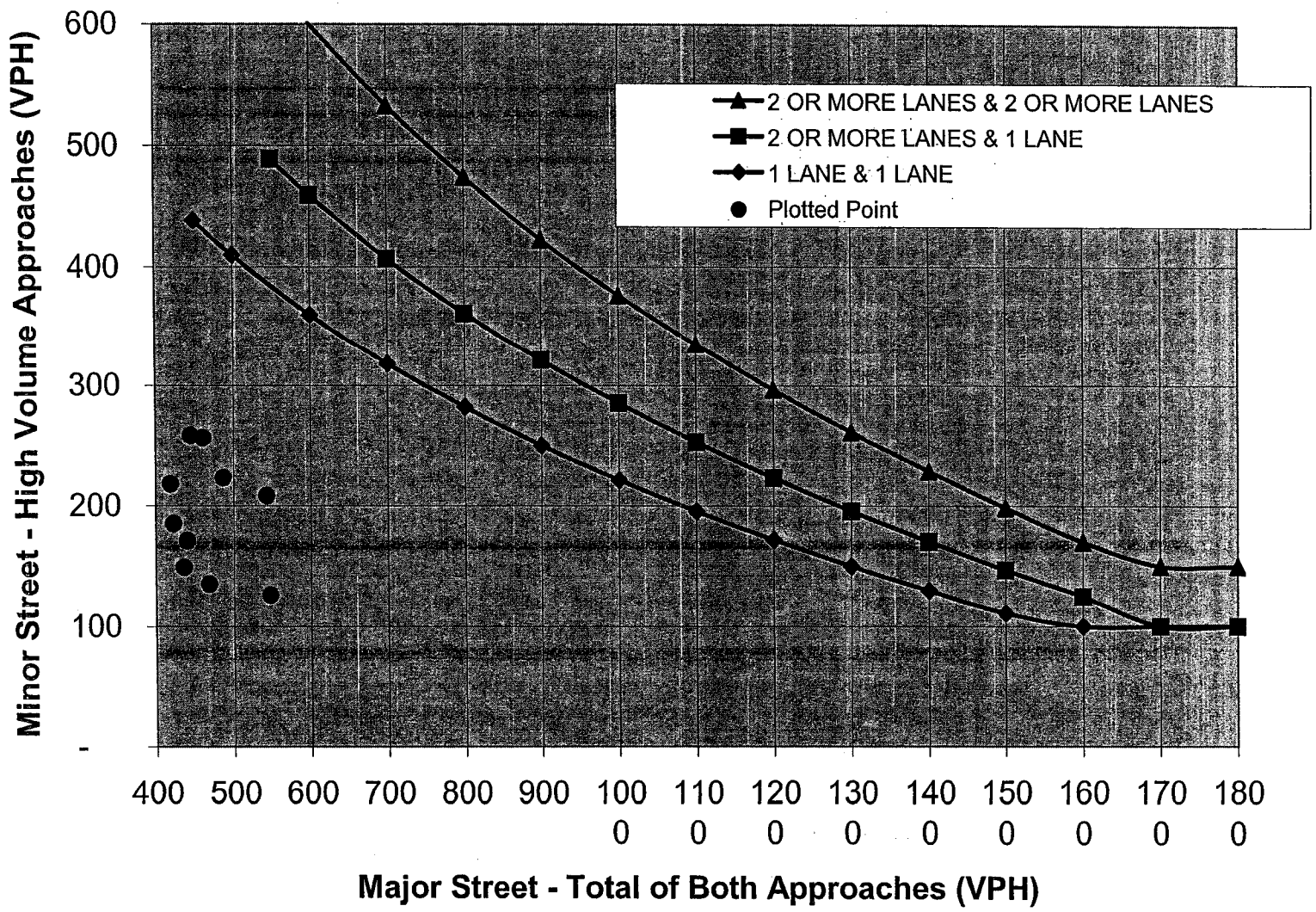
Peak Hour Volume (70% Factor)

USE?: N

1 lane and 1 lane		2 or more lanes and 1 lane		2 or more lanes and 2 or more lanes	
VPH on the major street	VPH on the minor street	VPH on the major street	VPH on the minor street (Higher volume	VPH on the major street	VPH on the minor street (Higher volume
1300	75	1300	75 or 100*	1300	100
1200	75	1200	80 or 100*	1200	100
1100	75	1100	100	1100	120
1000	80	1000	120	1000	150
900	100	900	140	900	175
800	120	800	160	800	225
700	145	700	200	700	260
600	170	600	245	600	315
500	220	500	280	500	370
400	260	400	340	400	Not available
Total of both approaches	Higher volume approach	Total of both approaches	Higher volume approach	Total of both approaches	Higher volume approach

NOTE: 100 VPH applies as the lower threshold volume for a minor street approach with 2 or more lanes and 75 VPH applies as the lower threshold volume for a minor street approaching with 1 lane.

Figure 4C-3 Warrant 3 - Peak Hour



Stop Control Warrant Summary
& Level of Service

Major Street: Seminole Rd.				Minor Street The Plaza	
City: Atlantic Beach				County: Duval	
Major Street	85% Speed >	40 mph	Yes		No X
Isolated Community <	10,000	Population	Yes		No X
Number of Approach Lanes:		Major Street 1		Minor Street 1	

	Warrant No.3	Warrant No.2
	Intended for application where there are high vehicular and pedestrian volumes.	Intended for application where there is an accident problem, as indicated by five or more reported accidents of a type susceptible of correction by a multi-way stop installation.
Is Warrant Satisfied?	**Yes X No**	**Yes No**
Is 70% Volume Met?	**Yes No**	**Yes No**

	Warrant is satisfied when total vehicular volume (all approaches) averages 500 vph for any 8 hours of an average day, AND combined vehicular & pedestrian volume averages 200 units/hour for same 8 hours, with average minor street delay of at least 30 minutes per vehicle during maximum hour.					Warrant is satisfied when there are five or more susceptible-type accidents within a 12-month period.			
Requirements	**Total**	**Major street, both approaches (70%)**		**Minor Street, both approaches (70%)**		**Right Angle**	**Left Turn**	**Right Turn**	**Total**
100%		500		200					
70%		350	Pedestrians	140	Pedestrians				
7:00 AM	705	547	10	158	10				
8:00 AM	780	543	10	237	10				
9:00 AM	633	468	10	165	10				
10:00 AM	606	436	10	170	10				
11:00 AM	642	440	10	202	10				
12:00 PM	638	423	10	215	10				
1:00 PM	614	392	10	222	10				
2:00 PM	669	419	10	250	10				
3:00 PM	744	487	10	257	10				
4:00 PM	760	461	10	299	10				
5:00 PM	732	445	10	287	10				

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	SAA
Agency/Co.	GAI Consultants
Date Performed	1/13/2004
Analysis Time Period	PM

Site Information

Intersection	Seminole at Plaza & Sherry
Jurisdiction	City of Atlantic Beach
Analysis Year	2024

Project ID

East/West Street: *Plaza*

North/South Street: *Seminole Rd.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume	171	40	111	13	26	15
%Thrus Left Lane	50			50		

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume	117	319	21	8	258	79
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.95		0.95		0.95		0.95	
Flow Rate	338		55		480		362	
% Heavy Vehicles	2		2		2		2	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.5		0.2		0.3		0.0	
Prop. Right-Turns	0.3		0.3		0.0		0.2	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	6.49		6.49		6.49		6.49	

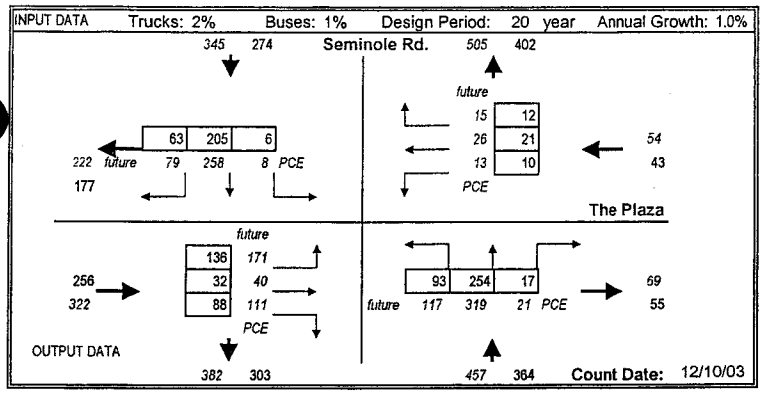
Departure Headway and Service Time

hd, initial value	3.20		3.20		3.20		3.20	
x, initial	0.30		0.05		0.43		0.32	
hd, final value	6.49		6.49		6.49		6.49	
x, final value	0.61		0.11		0.81		0.62	
Move-up time, m	2.0		2.0		2.0		2.0	
Service Time	4.5		4.5		4.5		4.5	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity	518		305		580		557	
Delay	19.09		11.39		29.77		18.54	
LOS	C		B		D		C	
Approach: Delay	19.09		11.39		29.77		18.54	
LOS	C		B		D		C	
Intersection Delay	22.74							
Intersection LOS	C							

Roundabout Capacity Analysis

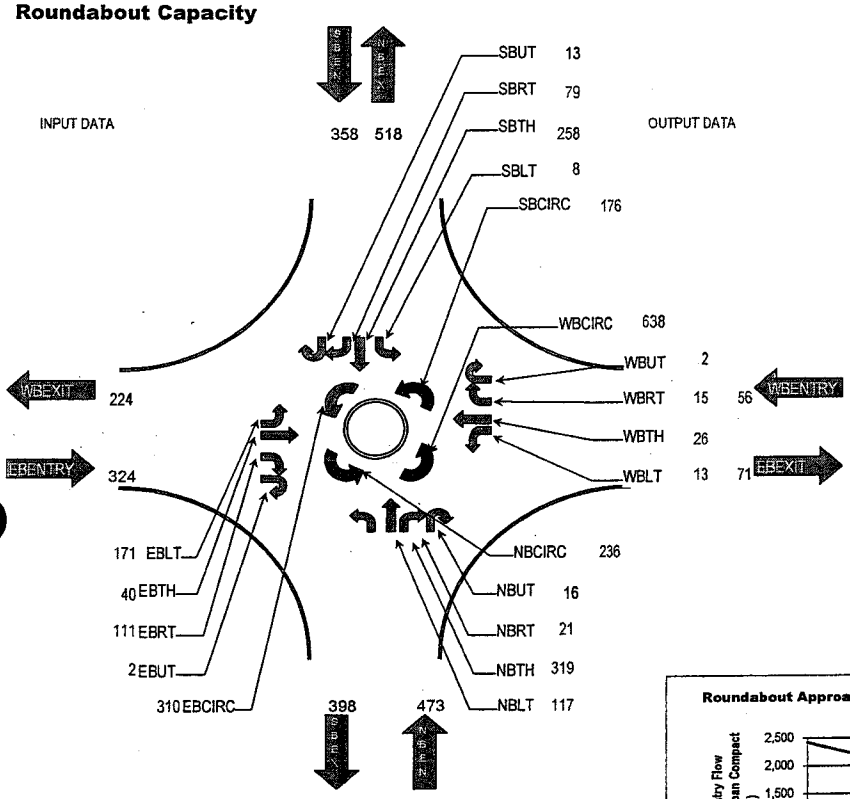


Vehicle Type	Passenger Car Equivalent (PCE)
Car	1.0
Single-unit truck or bus	1.5
Truck with trailer	2.0
Bicycle or motorcycle	0.5

CIRCULATION VOLUMES

EBCIRC = WBLT+SBLT+SBTH+NBUT+WBUT+SBUT
WBCIRC = EBLT+NBLT+NBTH+SBUT+EBUT+NBUT
NBCIRC = EBLT+EBTH+SBLT+WBUT+SBUT+EBUT
SBCIRC = WBLT+WBTH+NBLT+EBUT+NBUT+WBUT

Roundabout Capacity



Flow Direction	Circulating	Max	Entry	Max
Northbound	236	1800	473	1200
Southbound	176		358	
Eastbound	310		324	
Westbound	638		56	

Single-lane Entry Flow, Qe = 1212 - 0.5447Qc (Circulating Flow)

Double-lane Entry Flow, Qe = 1212 - 0.5447Qc (Circulating Flow)

Southbound

Circulatory Flow (PCE)	Max 1-Ln Entry Flow	Max 2-Ln Entry Flow	Calculated Entry Flow	Calculated Exit Flow
176	1116	2298	358	518

Westbound

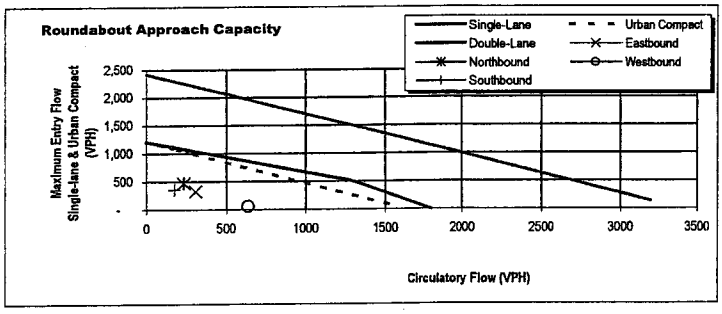
Circulatory Flow (PCE)	Maximum Entry Flow	Max 2-Ln Entry Flow	Calculated Entry Flow	Calculated Exit Flow
638	864	1967	56	71

Northbound

Circulatory Flow (PCE)	Maximum Entry Flow	Max 2-Ln Entry Flow	Calculated Entry Flow	Calculated Exit Flow
236	1083	2255	473	398

Eastbound

Circulatory Flow(PCE)	Maximum Entry Flow	Max 2-Ln Entry Flow	Calculated Entry Flow	Calculated Exit Flow
310	1043	2202	324	224



Roundabouts should be designed to operate at no more than 85% of their estimated capacity. Beyond this threshold, delays and queues vary significantly from their mean values.
The capacity forecast shown in the chart is valid for single-lane roundabouts with inscribed circle diameters of 80 to 180 feet and for double-lane roundabouts with inscribed cycle diameters of 130 to 200 feet.
Circulating flow should not exceed **1800 VPH at any point in a single-lane roundabout. Exit flows exceeding 1200 VPH** may indicate the need for a double-lane exit.

Speed-Curve Relationship

Recommended Max. Entry Design Speed	
15 mph	Mini-Roundabout
15 mph	Urban Compact
20 mph	Urban Single Lane
25 mph	Urban Doulble Lane
25 mph	Rural Single lane
30 mph	Rural Double Lane

	Inscribed Circle radius	Central Island radius	
Single-lane:	48 feet	32 feet	*from "Geometry" tab*
Double-lane:	100 feet	51 feet	

Speed-Curve Relationship

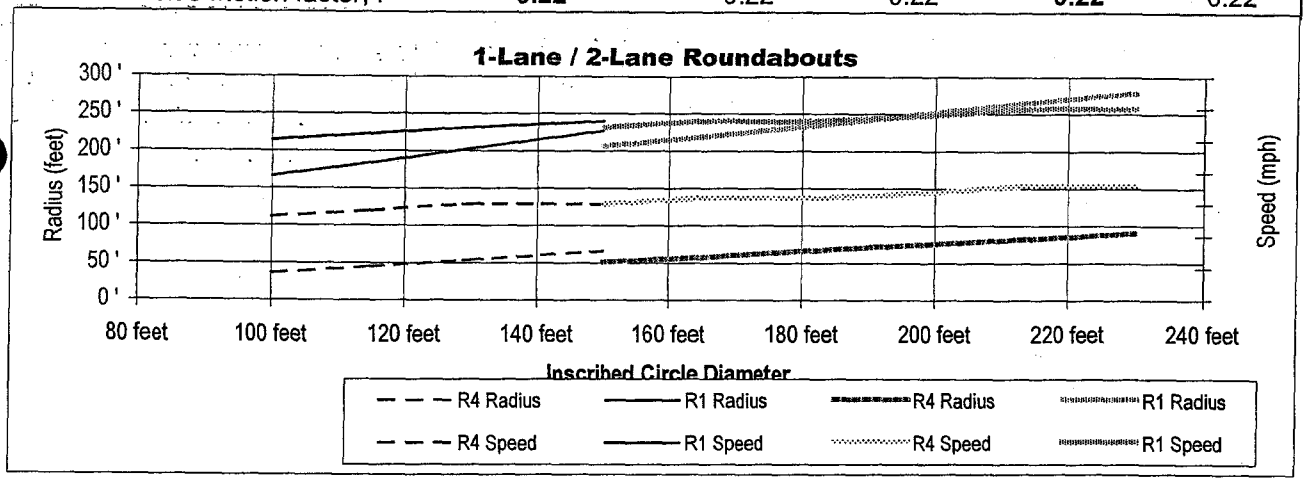
$$V = \sqrt{15R(e+f)}$$

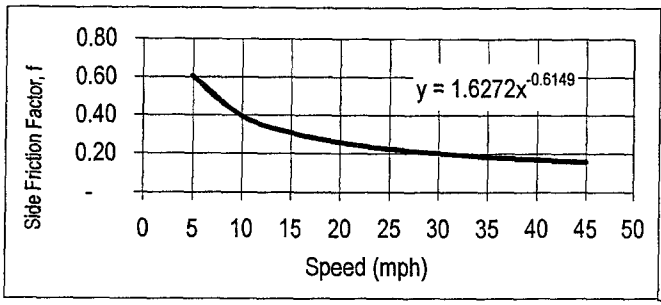
V = Design Speed, mph
R = radius, ft
e = superelevation, ft/ft
f = side friction factor

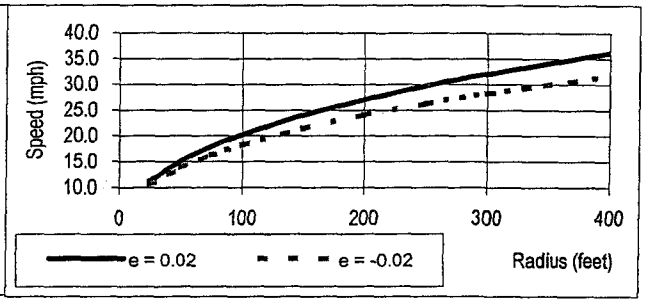
Single-lane Roundabout	**Inscribed Dia:**	**96 '**		**Entry Design Speed =**	**15 mph**
Curve:	R1	R2	R3	R4	R5
Calculated Radius =	**146 '**	106 '	146 '	**37 '**	106 '
Calculated Design Speed =	**27 mph**	**20 mph**	**24 mph**	**13 mph**	**23 mph**
Superelevation (ft/ft), e =	0.02	-0.02	0.02	-0.02	0.02
side friction factor, f =	**0.31**	0.27	0.25	**0.31**	0.31
insert Radius or Speed:	83 '	*19 mph*	*21 mph*	*15 mph*	50 '

Red Calculated Design Speed indicates greater than 12 mph differential between entry speed and circulating speed

Double-lane Roundabout	**Inscribed Dia:**	**200 '**		**Entry Design Speed =**	**25 mph**
Curve:	**R1**	R2	R3	**R4**	R5
Calculated Radius =	**252 '**	252 '	252 '	**76 '**	252 '
Calculated Design Speed =	**30 mph**	28 mph	30 mph	**15 mph**	30 mph
Superelevation (ft/ft), e =	**0.02**	-0.02	0.02	**-0.02**	0.02
side friction factor, f =	**0.22**	0.22	0.22	**0.22**	0.22







Geometric Elements

Maximum Circulating Flow: 236 pce/h *from "Capacity" tab*

Maximum Entry Flow: 473 pce/h

Input Data		
	Single-Lane	Double-Lane
Approach Width =	14.0 feet	26.0 feet
Inscribed Circle Diameter (D) =	96 feet	200 feet
Entry Angle (EA) =	-15 degrees	0 degrees
Entry Radius (R) =	60 feet	50 feet
Entry Width (e) =	12.0 feet	22.0 feet
Circulating Flow (Qc) =	236 pce/h	236 pce/h
Circulating Roadway Width	18.0 feet	24.0 feet
Entry Capacity (Qe) =	**659 pce/h**	**1251 pce/h**

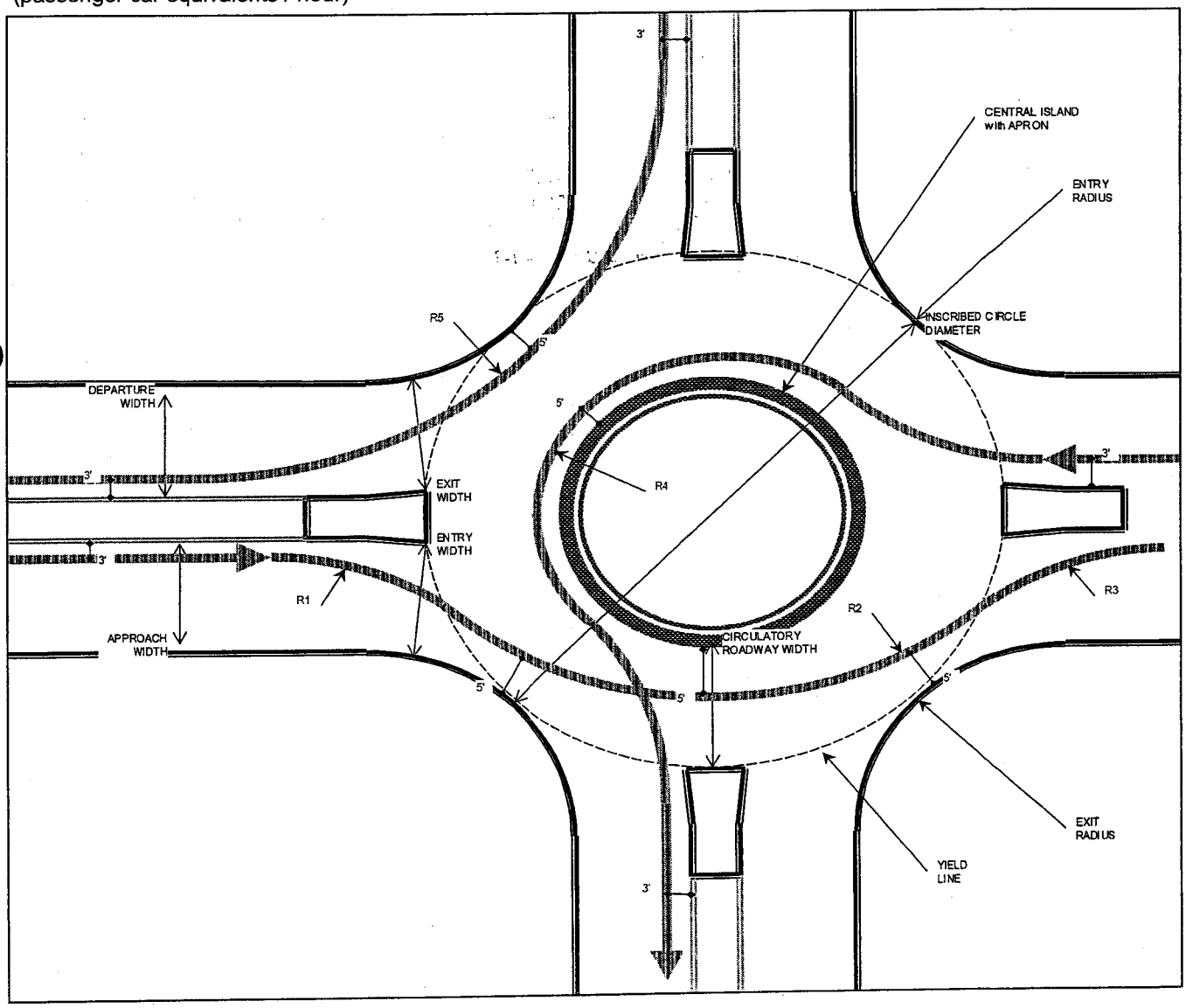
Qe = k(F-fcQc), for fcQc < F

Qe = 0, for fcQc > F

(passenger car equivalents / hour)

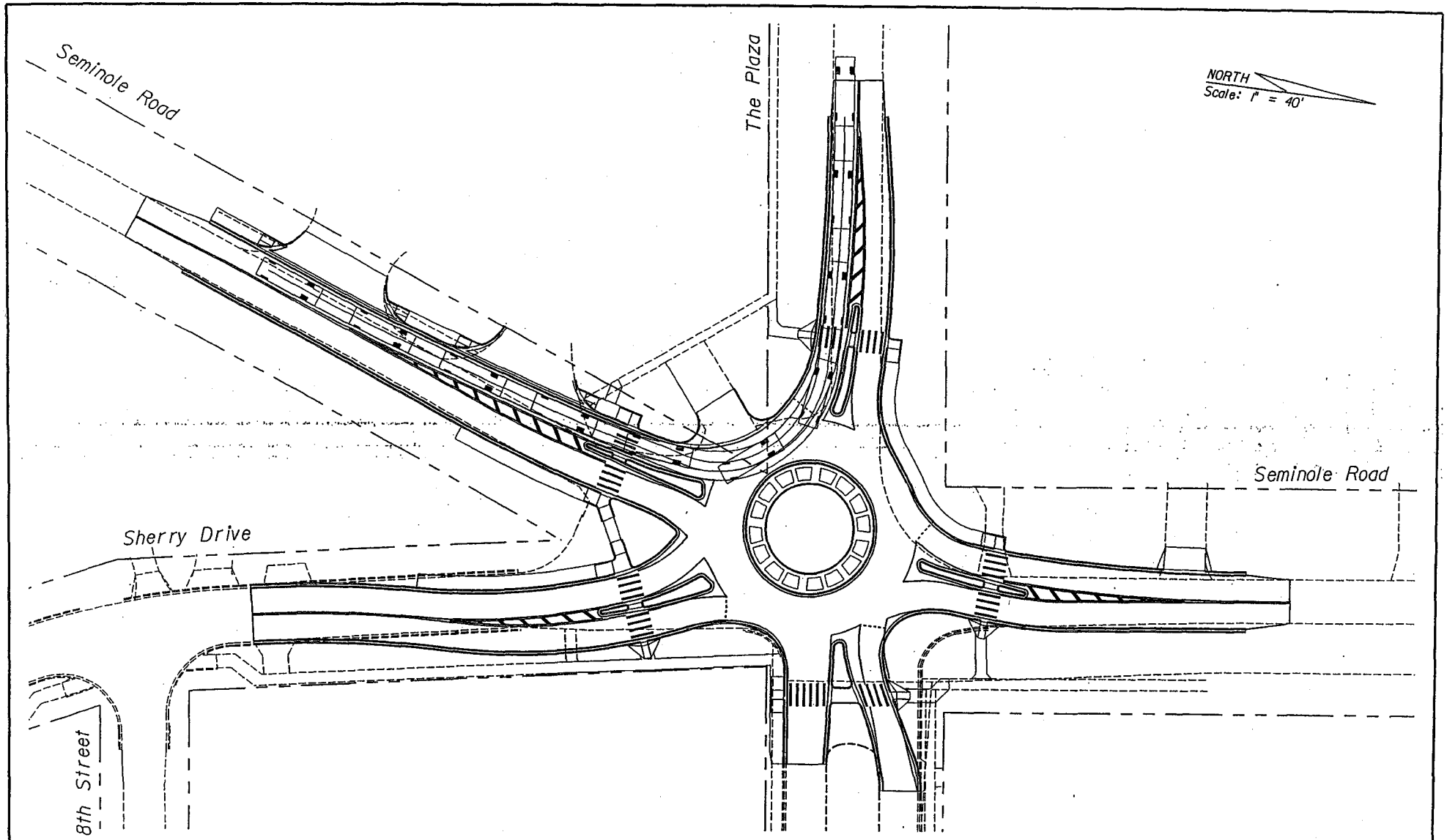
Recommended Inscribed Circle Diameter

Single-lane Roundabout	Central Island Diameter
100 feet	64 feet
115 feet	79 feet
130 feet	94 feet
150 feet	114 feet
Double-lane Roundabout	**Central Island Diameter**
150 feet	102 feet
165 feet	117 feet
180 feet	132 feet
200 feet	152 feet
215 feet	167 feet
230 feet	182 feet



Summary of Calculated Capacity				
	Plaza WB	Plaza EB	Seminole SB	Seminole/ Sherry NB
Circulating Flow	638 pce/h	310 pce/h	176 pce/h	236 pce/h
Entry Flow	56 pce/h	324 pce/h	358 pce/h	473 pce/h
Approach Width	17.0 feet	14.0 feet	13.0 feet	14.0 feet
Entry Radius	50 feet	60 feet	40 feet	60 feet
Entry Width	15.0 feet	17.0 feet	16.0 feet	12.0 feet
Capacity	595 pce/h	621 pce/h	654 pce/h	659 pce/h

Auto-Turn Output



Designed
Drawn
Checked
P.E.

Released For Construction

By

CITY OF Atlantic Beach - Florida

1290 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.
10199 Southside Boulevard, Suite 103 Jacksonville, Florida 32256
Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.:

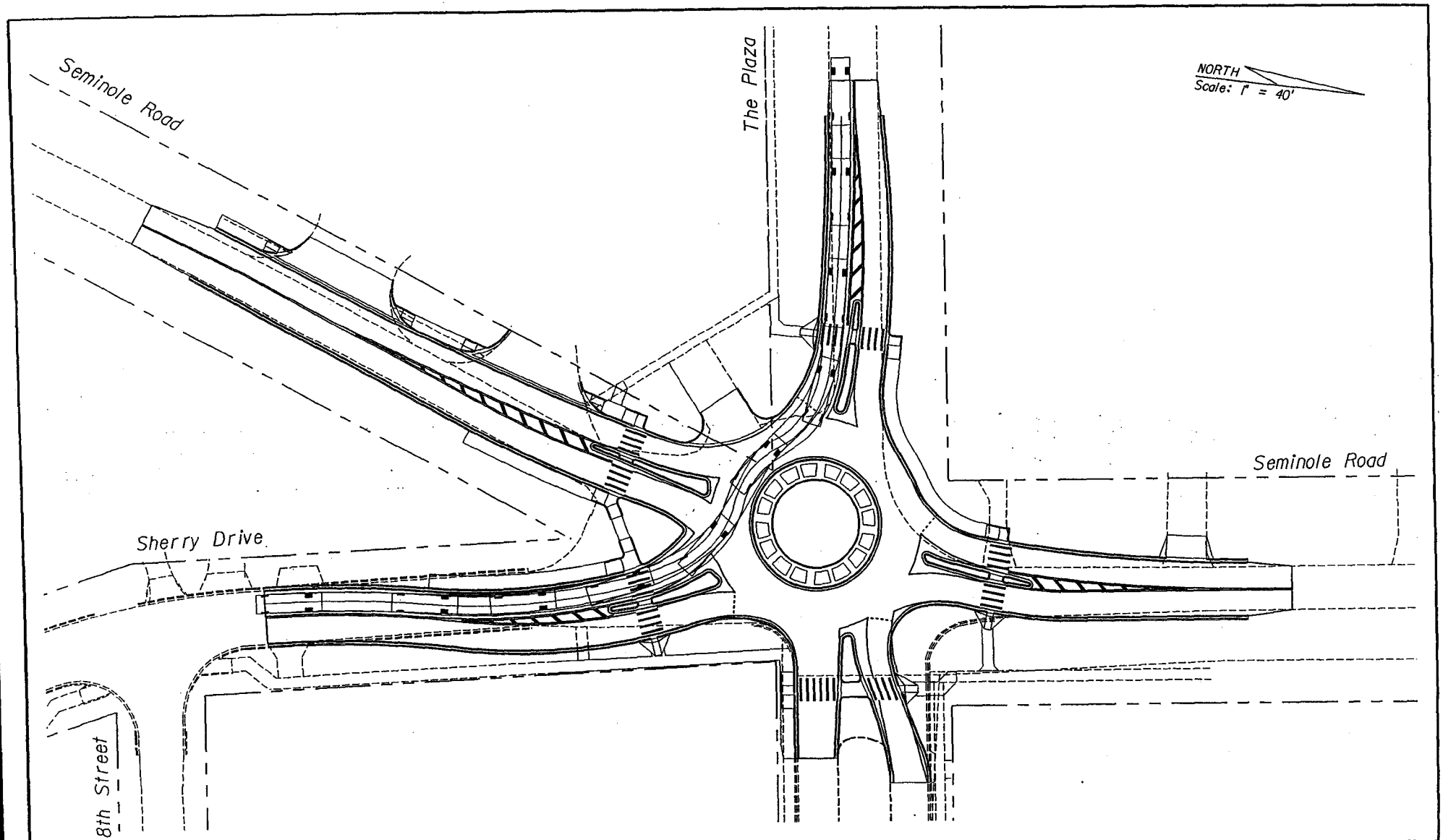
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

Sheet ____ of ____

23 FEB 104 15:37:58 j:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_atll.dgn



Designed RR
Drawn PP
Checked RR
P.E. RR

Released For Construction

By

This Drawing is the property of City of Atlantic Beach and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.

CITY OF Atlantic Beach - Florida

1398 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.

10199 Southside Boulevard, Suite 105 Jacksonville, Florida 32256
Ph: 904.363.1118 Fax: 904.363.1113 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.:

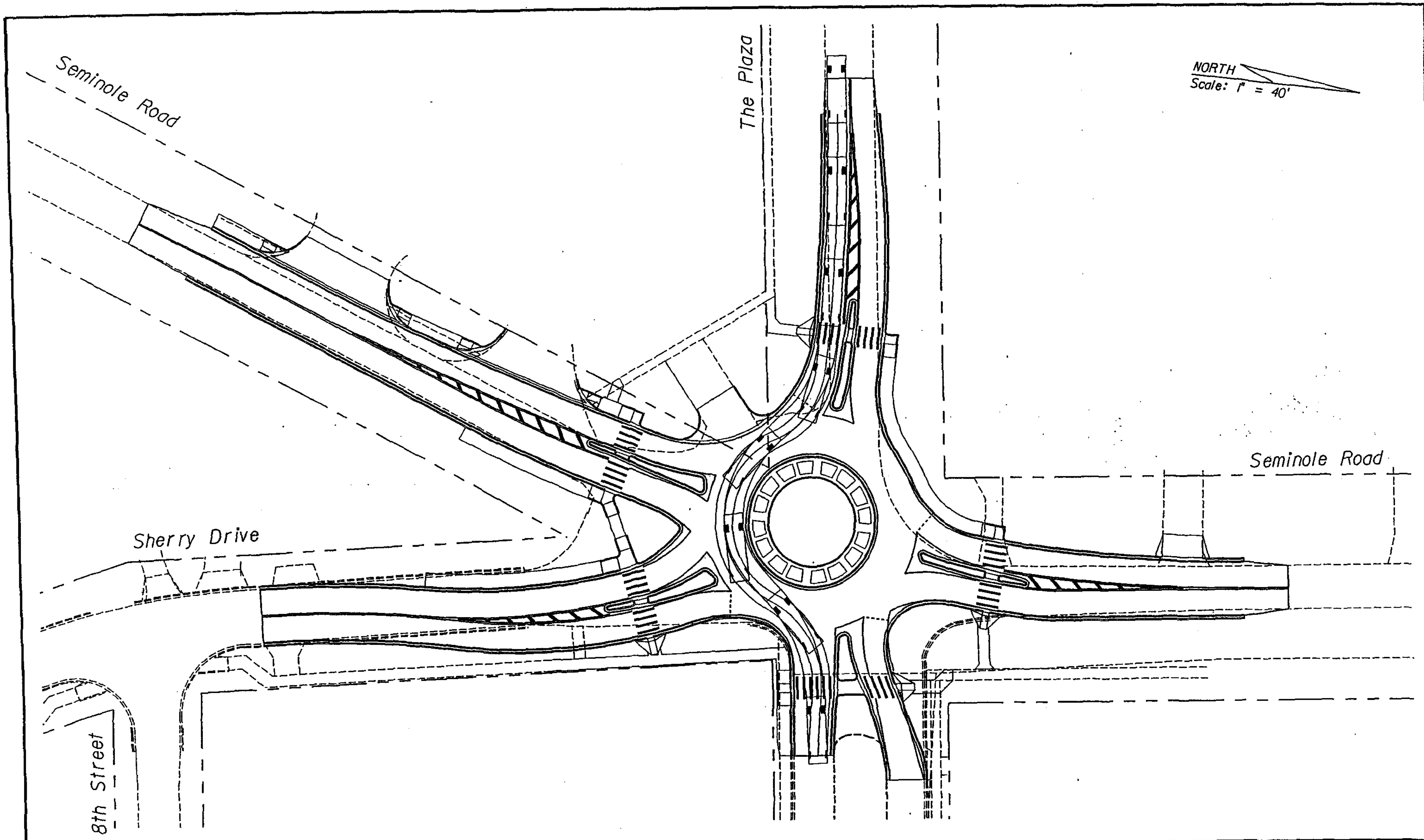
Drawing

Scale: 1" = 40'

Date: DEC 15, 2003

Sheet ____ of ____

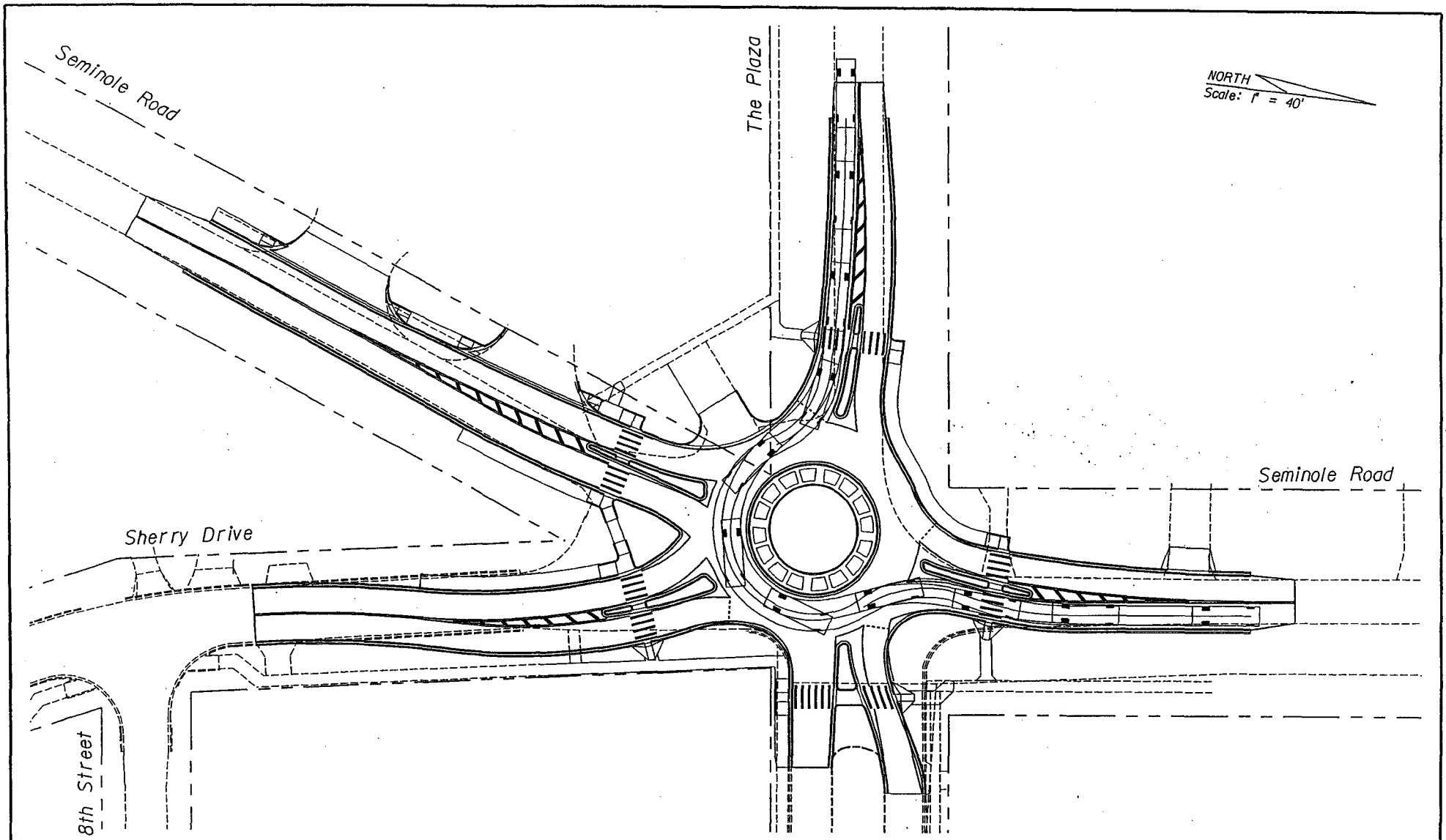
23 FEB 04 15:38:00 J:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_at12.dgn



Designed xx Drawn xx Checked xx P.E. xx	Released For Construction By ____ This Drawing is the property of City of Atlantic Beach, and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.	CITY OF Atlantic Beach - Florida 1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834	**SEMINOLE ROAD** **Roundabout Study**	**CONCEPTUAL LAYOUT** gai Consultants, Inc. 10199 Southside Boulevard, Suite 103 Jacksonville, Florida 32256 Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com

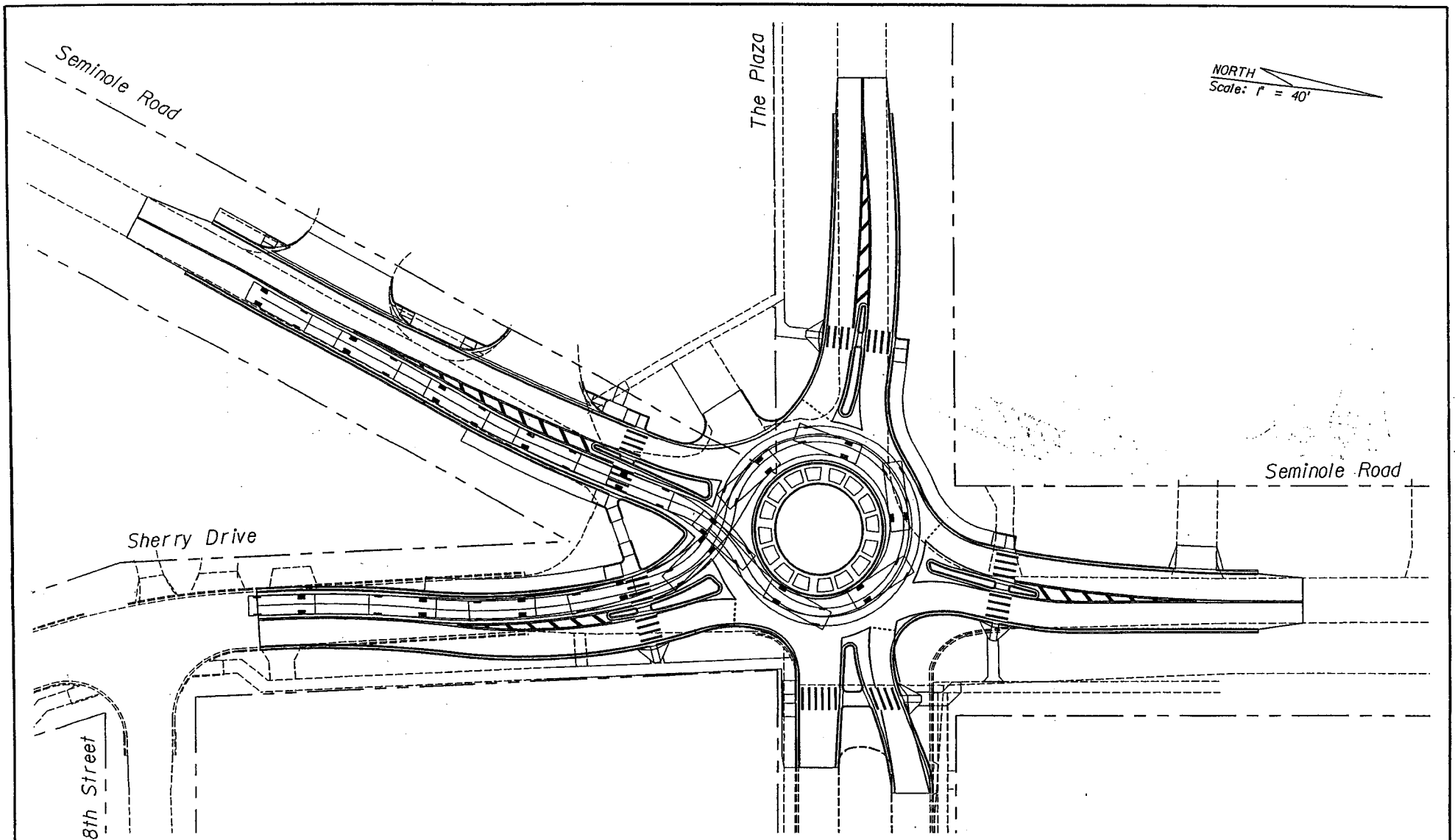
No.	Date	Revision	By	Reg. Engineer	Project No.:	Drawing
					Scale: 1" = 40'	
					Date: DEC 15, 2003	Sheet ____ of ____

23 FEB 04 15:38:02 J:\proj\1980 to 2003\03086\cadd\dwg\sem_rnd_all3.dgn



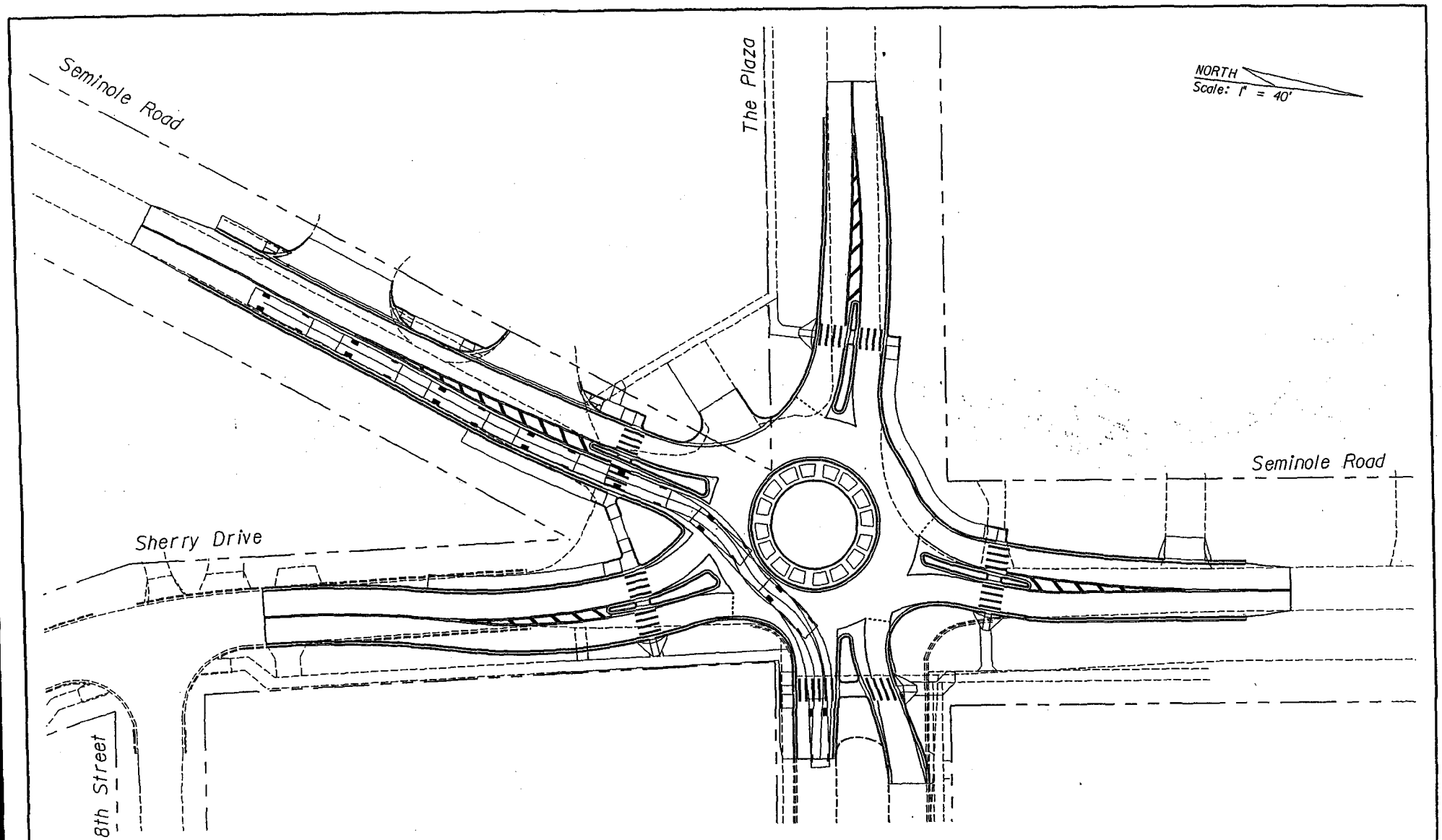
Designed: xx Drawn: xx Checked: xx P.E.: xx	Released For Construction By This Drawing is the property of City of Atlantic Beach, and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.	CITY OF Atlantic Beach - Florida 1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834	**SEMINOLE ROAD** **Roundabout Study**	**CONCEPTUAL LAYOUT** gai Consultants, Inc. 10199 Southside Boulevard, Suite 101 Jacksonville, Florida 32256 Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com	No. Date Revision By	Reg. Engineer Project No.: Scale: 1" = 40' Date: DEC 15, 2003 Drawing Sheet ____ of ____

23 FEB 04 15:38:03 J:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_all4.dgn



Designed xx Drawn xx Checked xx P.E. xx	Released For Construction By This Drawing is the property of City of Atlantic Beach, and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.	CITY OF Atlantic Beach - Florida 1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834	**SEMINOLE ROAD** **Roundabout Study**	**CONCEPTUAL LAYOUT** gai Consultants, Inc. 10199 Southside Boulevard, Suite 195 Jacksonville, Florida 32256 Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com	No. Date	Revision	By	Reg. Engineer	Project No.: Scale: 1" = 40' Date: DEC 15, 2003	Drawing Sheet ___ of ___

23 FEB 04 15:38:05 J:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_alt1.dgn



Designed
Drawn
Checked
P.E.

Released For Construction

By

This Drawing is the property of City of Atlantic Beach and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.

CITY OF Atlantic Beach - Florida

1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5934

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.

10199 Southside Boulevard, Suite 103 Jacksonville, Florida 32256
Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.:

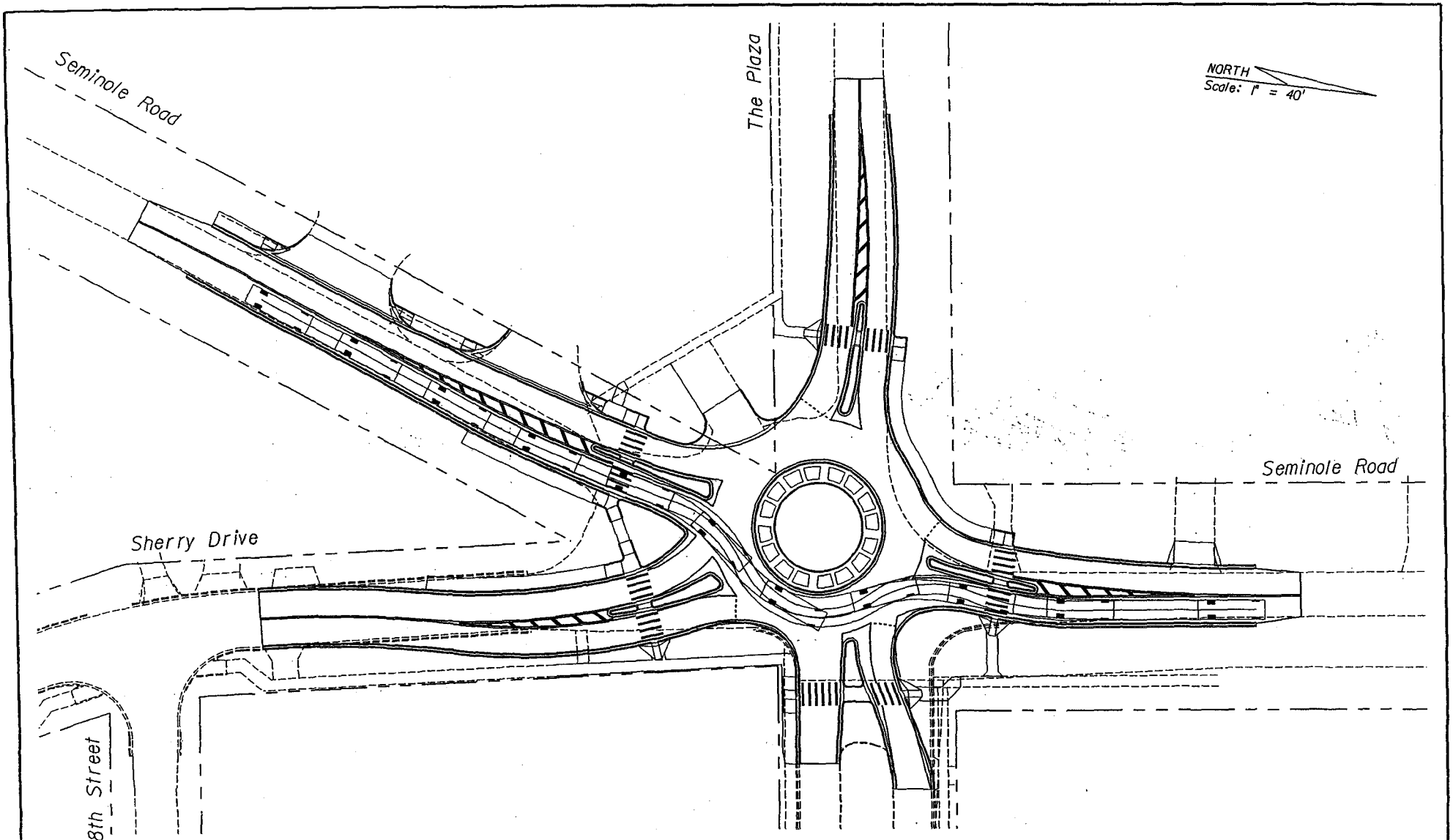
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

Sheet ____ of ____

23 FEB 04 15:38:07 j:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_a122.dgn



Designed: xx
Drawn: xx
Checked: xx
P.E.: xx

Released For Construction

By

This Drawing is the property of City of Atlantic Beach, and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.

CITY OF Atlantic Beach - Florida

1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.

10199 Southside Boulevard, Suite 103 Jacksonville, Florida 32256
Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.:

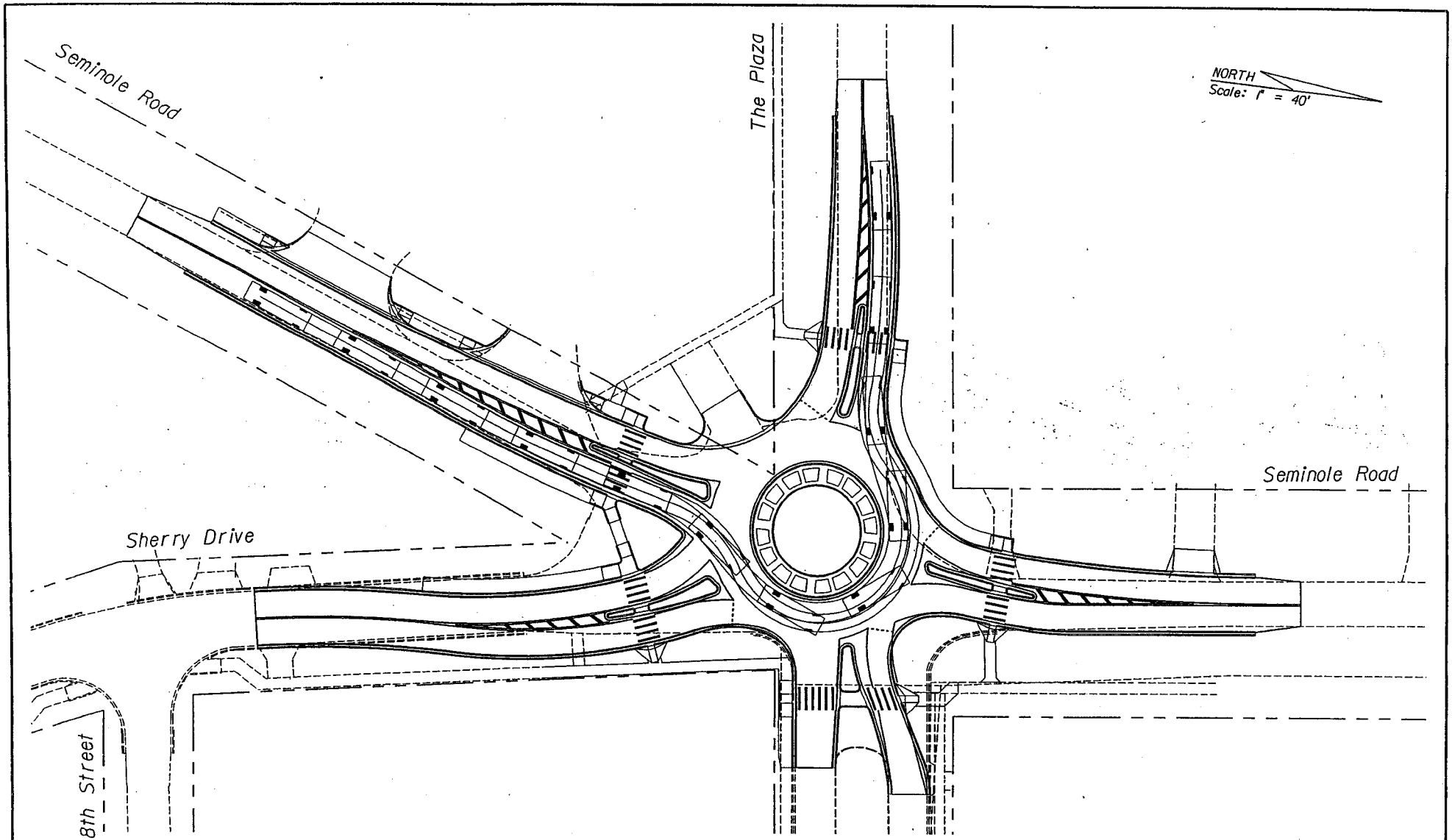
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

Sheet ____ of ____

23 FEB 04 15:38:08 J:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_at23.dgn



Designed: xx
Drawn: yy
Checked: zz
P.E.: xx

Released For Construction

By _____

CITY OF Atlantic Beach - Florida

1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5836

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.
10199 Southside Boulevard, Suite 103 Jacksonville, Florida 32256
PH: 904.363.1120 Fax: 904.363.1125 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.: 03086

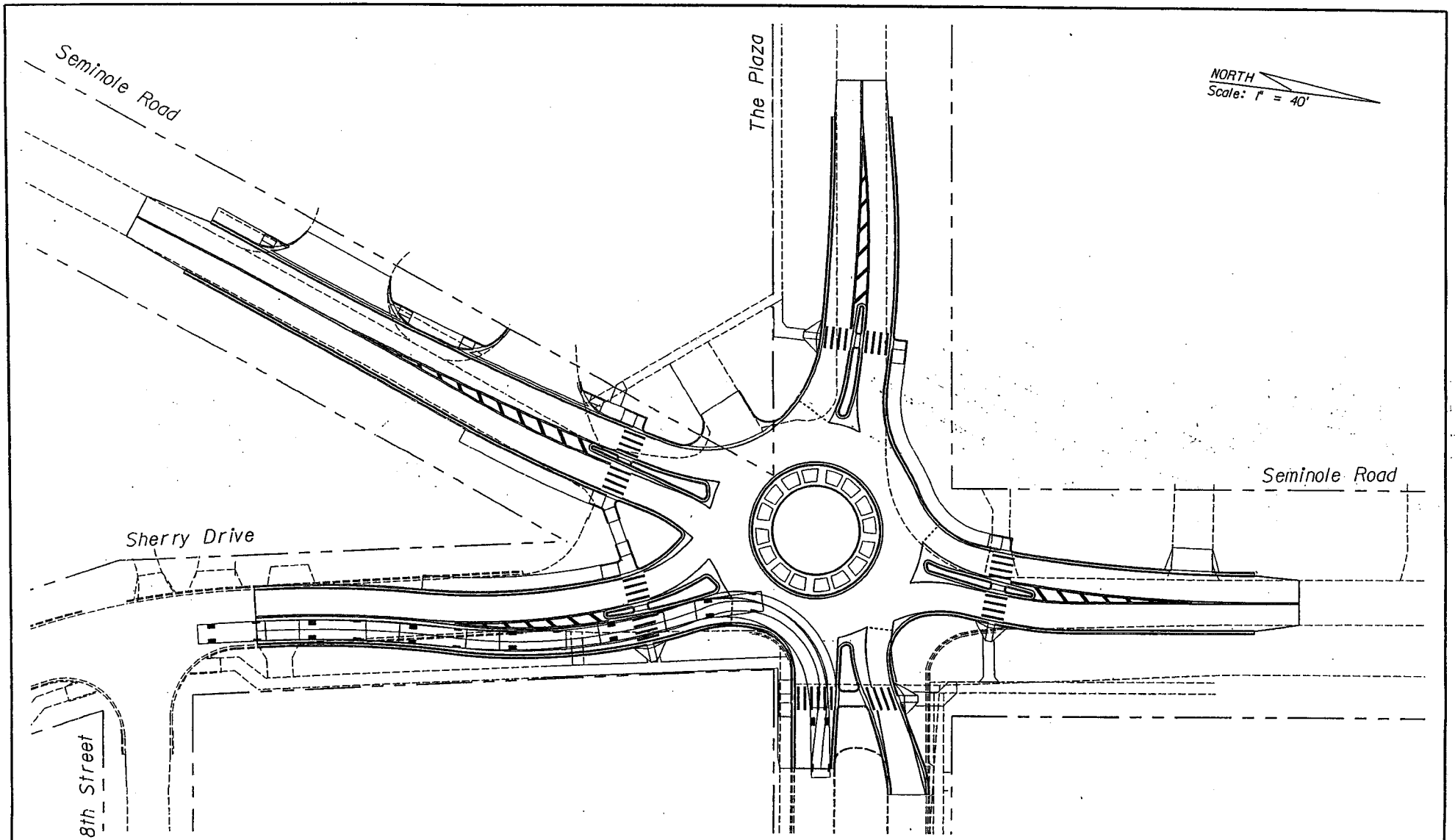
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

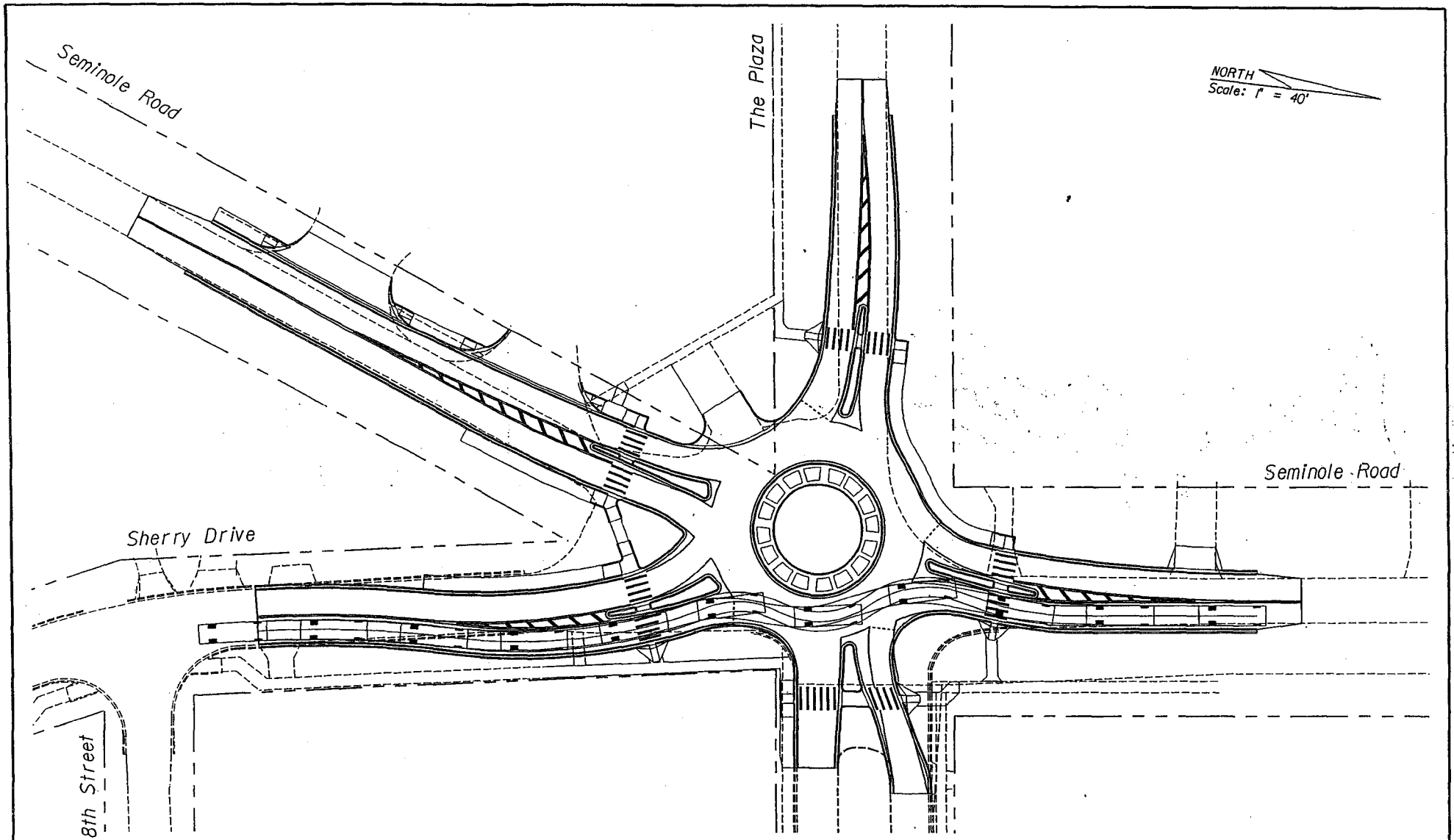
Sheet ____ of ____

23 FEB 104 15:38:10 J:\proj\1980 to 2003\03086\cadd\dwg\sem_rnd_at24.dgn



Designed: xx	Released For Construction	CITY OF Atlantic Beach - Florida	**SEMINOLE ROAD** Roundabout Study	CONCEPTUAL LAYOUT		Project No.:	Drawing
Drawn: xx	By:			gai Consultants, Inc.			
Checked: xx	This Drawing is the property of City of Atlantic Beach, and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.	1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834		10199 Southside Boulevard, Suite 105 Jacksonville, Florida 32256 Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com		Scale: 1" = 40'	
P.E. xx					No. Date Revision By	Reg. Engineer	Date: DEC 15, 2003 Sheet ____ of ____

23 FEB 104 15:38:12 j:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_at31.dgn



Designed: xx
Drawn: xx
Checked: xx
P.E.: xx

Released For Construction

By

This Drawing is the property of City of Atlantic Beach, and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.

CITY OF Atlantic Beach - Florida
1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5814

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.
10199 Southside Boulevard, Suite 105 Jacksonville, Florida 32256
Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.:

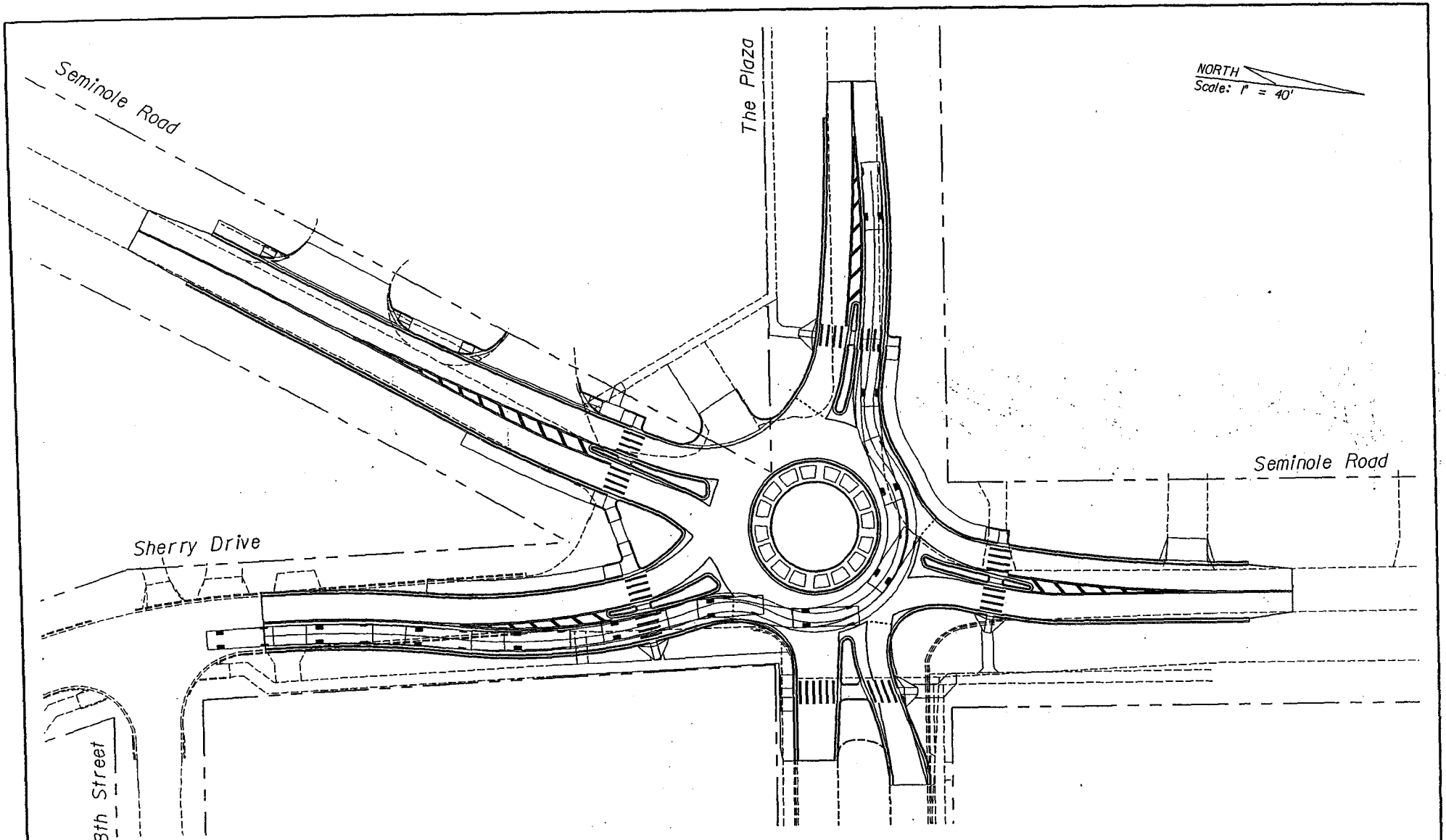
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

Sheet ____ of ____

23 FEB 104 15:38:13 J:\proj\1980 to 2003\03086\cadd\dwg\sem_rnd_at32.dgn



Designed
Drawn
Checked
P.E.

Released For Construction

By

CITY OF Atlantic Beach - Florida

1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.
10199 Southside Boulevard, Suite 105 Jacksonville, Florida 32256
Ph: 904.363.1118 Fax: 904.363.1113 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.:

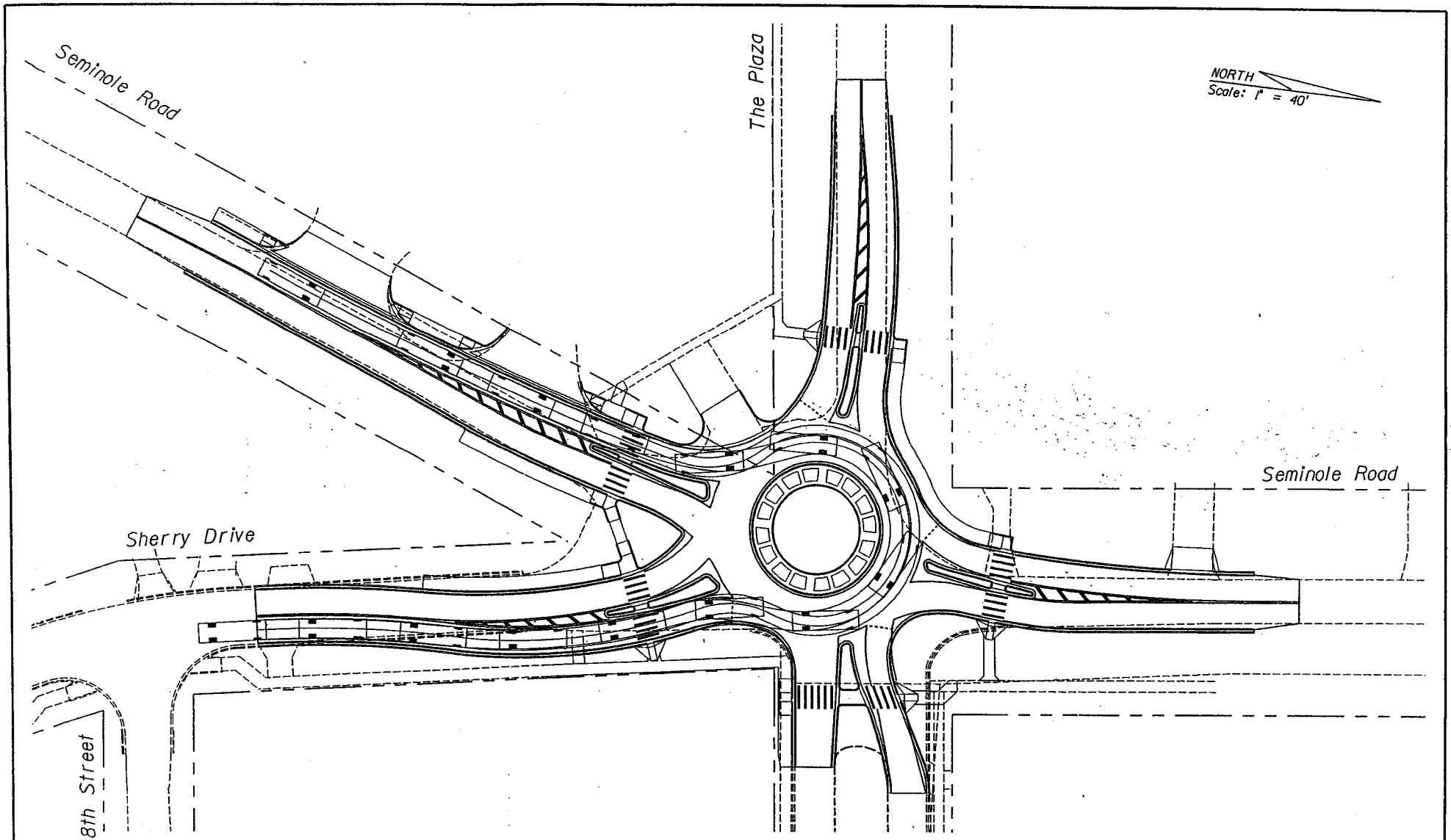
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

Sheet ____ of ____

23 FEB 104 15:38:15 J:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_at33.dgn



Designed
Drawn
Checked
P.E.

Released For Construction

By

CITY OF Atlantic Beach - Florida

1246 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.
10199 Southside Boulevard, Suite 103 Jacksonville, Florida 32256
Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.:

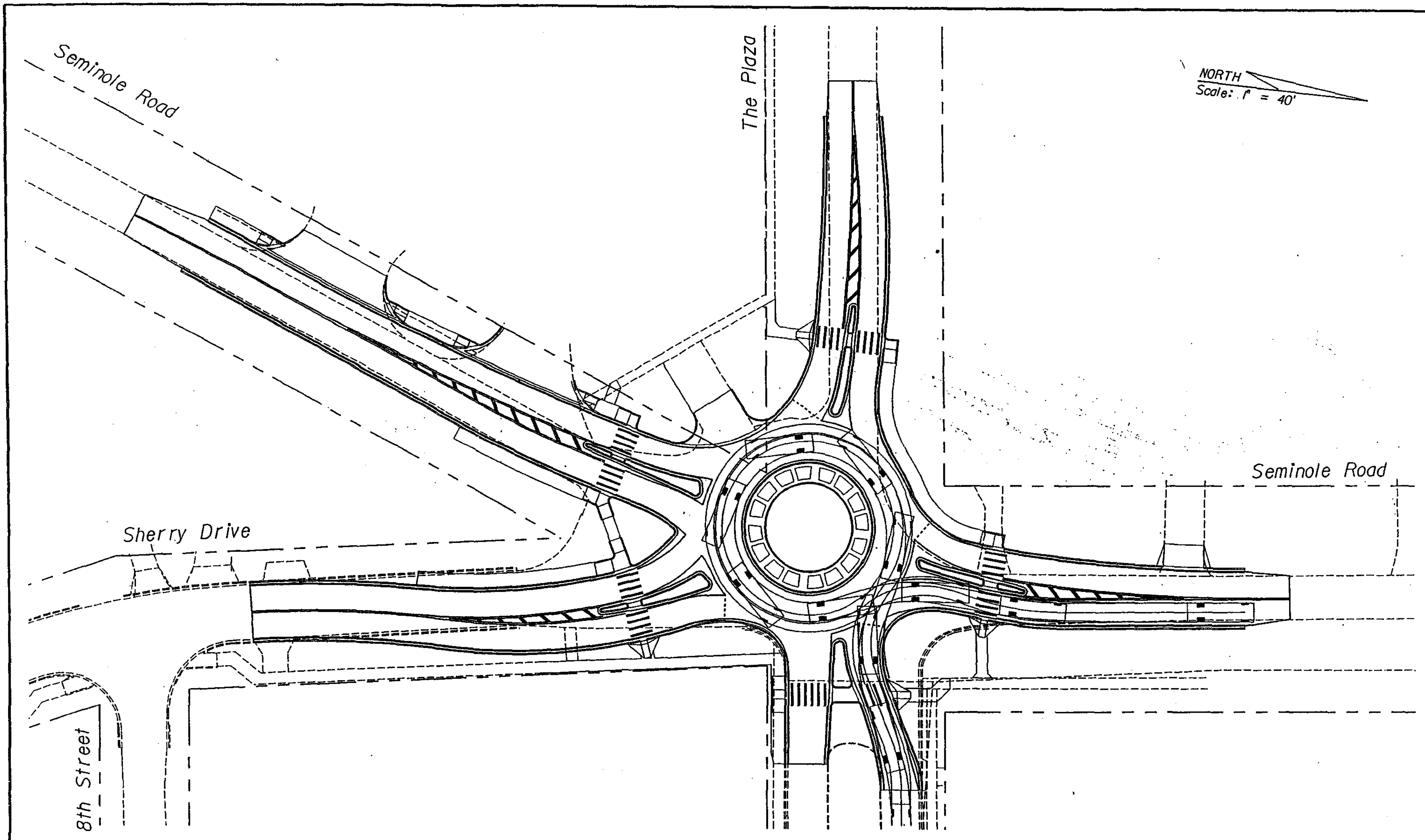
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

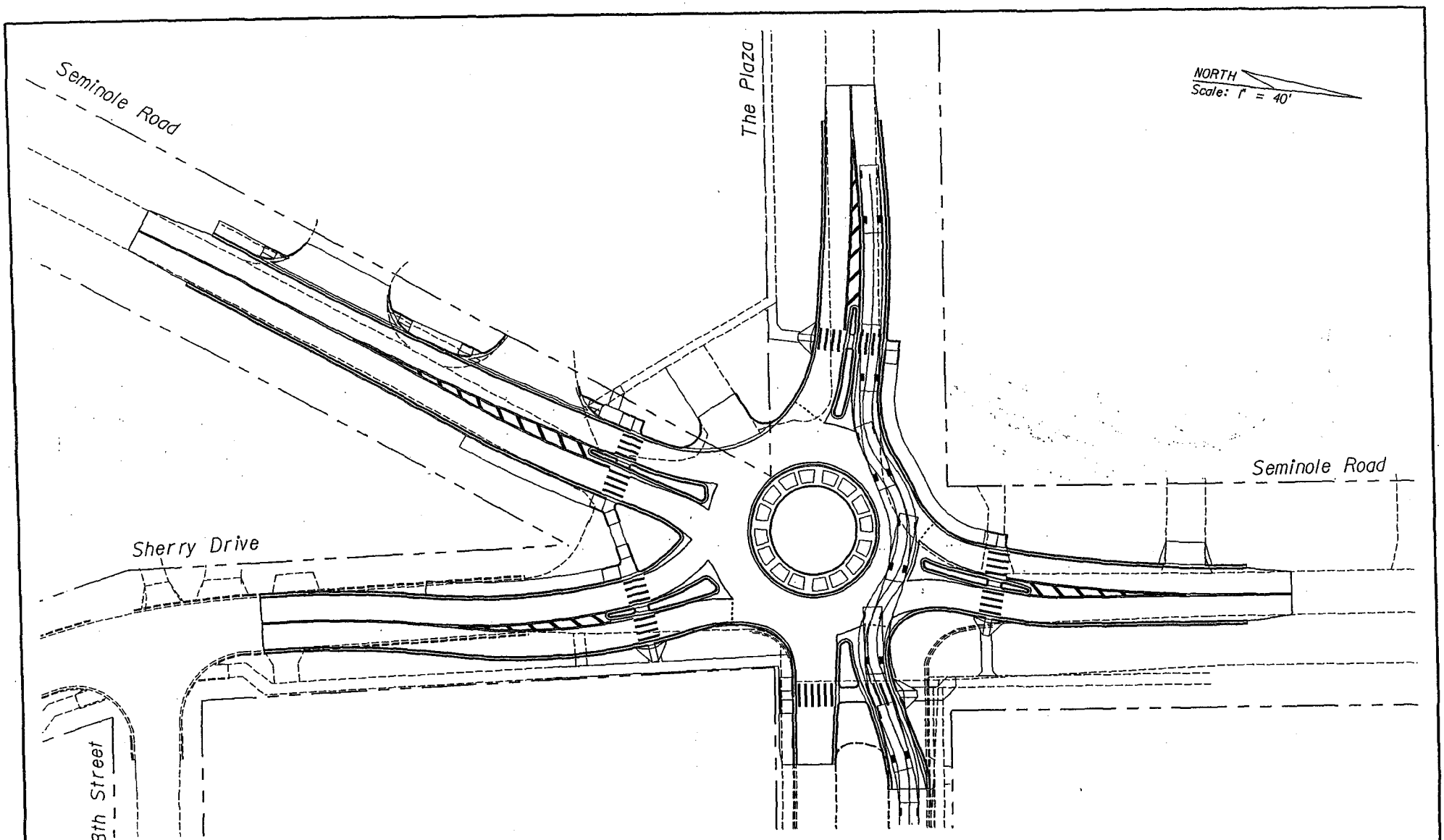
Sheet ____ of ____

23 FEB 04 15:38:17 J:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_al34.dgn



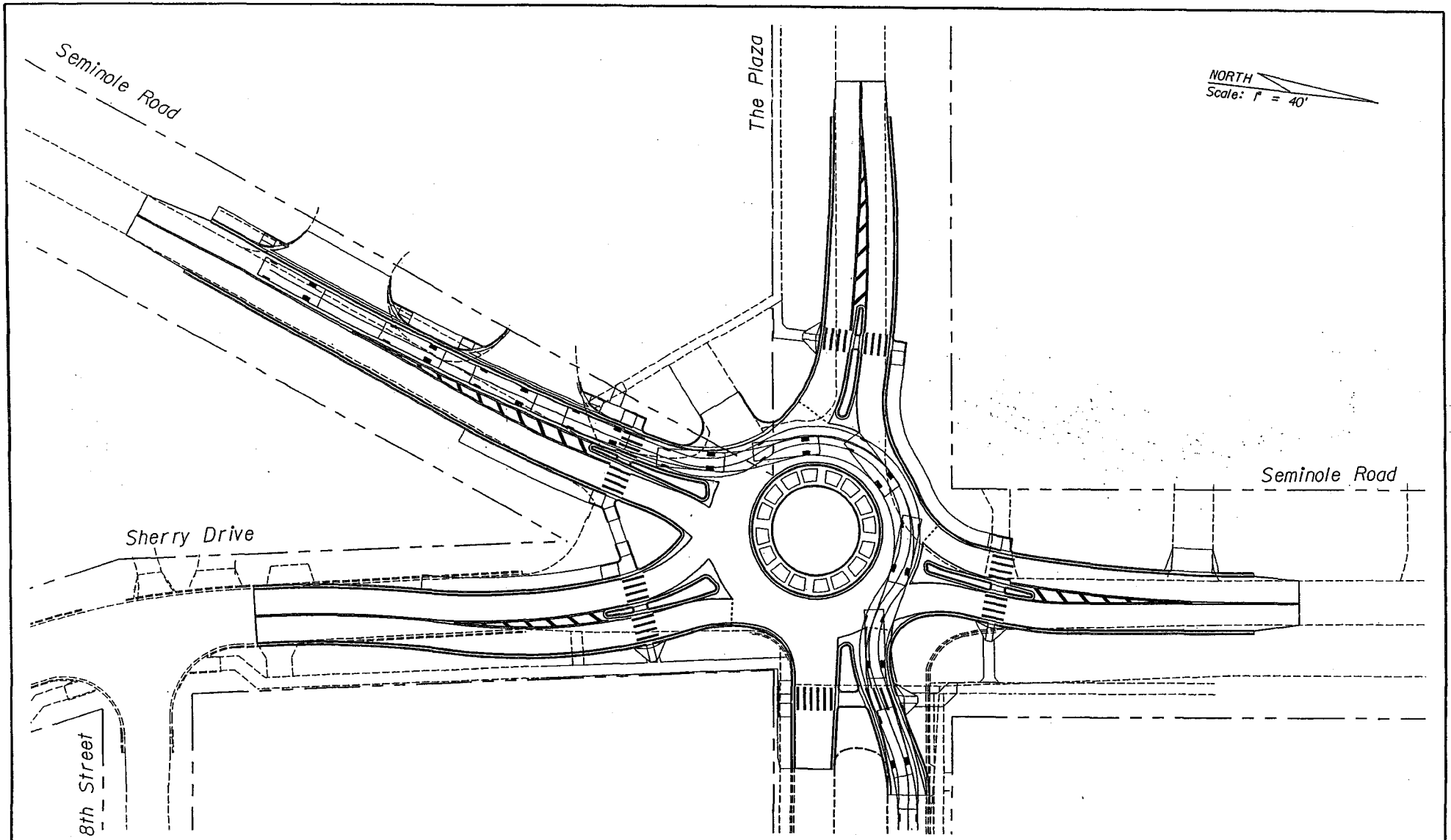
Designed	Released For Construction	CITY OF Atlantic Beach - Florida	SEMINOLE ROAD Roundabout Study	CONCEPTUAL LAYOUT	No.	Date	Revision	By	Reg. Engineer	Project No.:	Drawing
Drawn	By ______	1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834		gai Consultants, Inc. 10199 Southside Boulevard, Suite 103 Jacksonville, Florida 32256 Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com						Scale: 1" = 40'	
Checked	This Drawing is the property of City of Atlantic Beach and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.									Date: DEC 15, 2003	Sheet ____ of ____
P.E.											

23 FEB 04 15:38:18 J:\proj\1980 to 2003\03086\cadd\dwg\sem_rnd_al41.dgn



Designed: xx Drawn: xx Checked: xx P.E.: xx	Released For Construction By This Drawing is the property of City of Atlantic Beach and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.	CITY OF Atlantic Beach - Florida 1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834	**SEMINOLE ROAD** **Roundabout Study**	**CONCEPTUAL LAYOUT** gai Consultants, Inc. 10199 Southside Boulevard, Suite 105 Jacksonville, Florida 32256 Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com	No. Date Revision By Proj. Engineer Project No.: Scale: 1" = 40' Date: DEC 15, 2003 Drawing Sheet ___ of ___

23 FEB 104 15:38:20 J:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_al42.dgn



Designed
Drawn
Checked
P.E.

Released For Construction

By

CITY OF Atlantic Beach - Florida

1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.
10199 Southside Boulevard, Suite 101 Jacksonville, Florida 32256
Ph: 904.363.1110 Fax: 904.363.1113 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.:

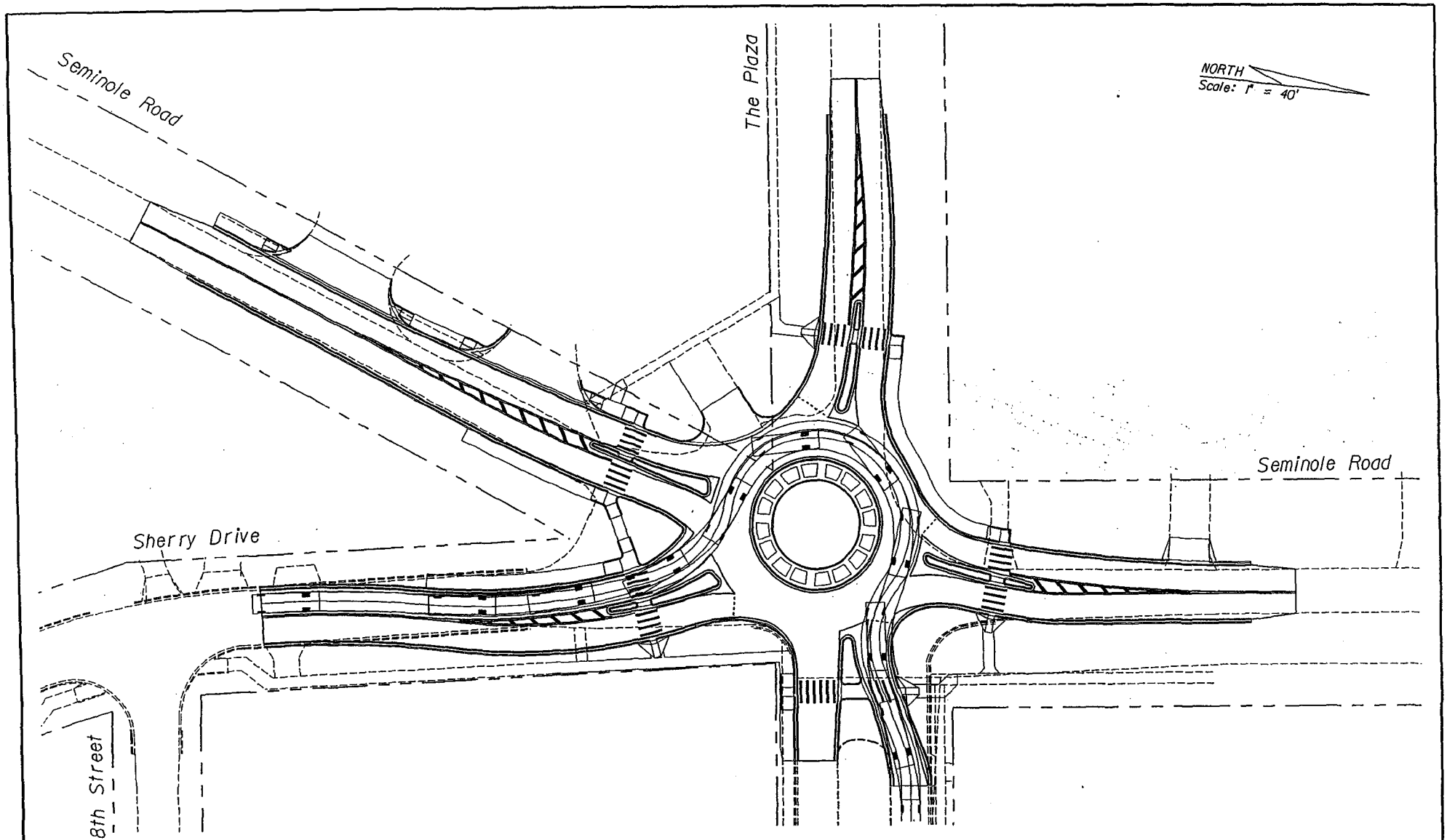
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

Sheet ____ of ____

23 FEB 104 15:38:22 J:\proj\980 to 2003\030B6\cadd\dwg\sem_rnd_al43.dgn



Designed: xx
Drawn: xx
Checked: xx
P.E.: xx

Released For Construction

By: _____

This Drawing is the property of City of Atlantic Beach, and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.

CITY OF Atlantic Beach - Florida

1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.

10199 Southside Boulevard, Suite 105 Jacksonville, Florida 32256
Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com

No.	Date	Revision	By	Eng. Engineer

Project No.: _____

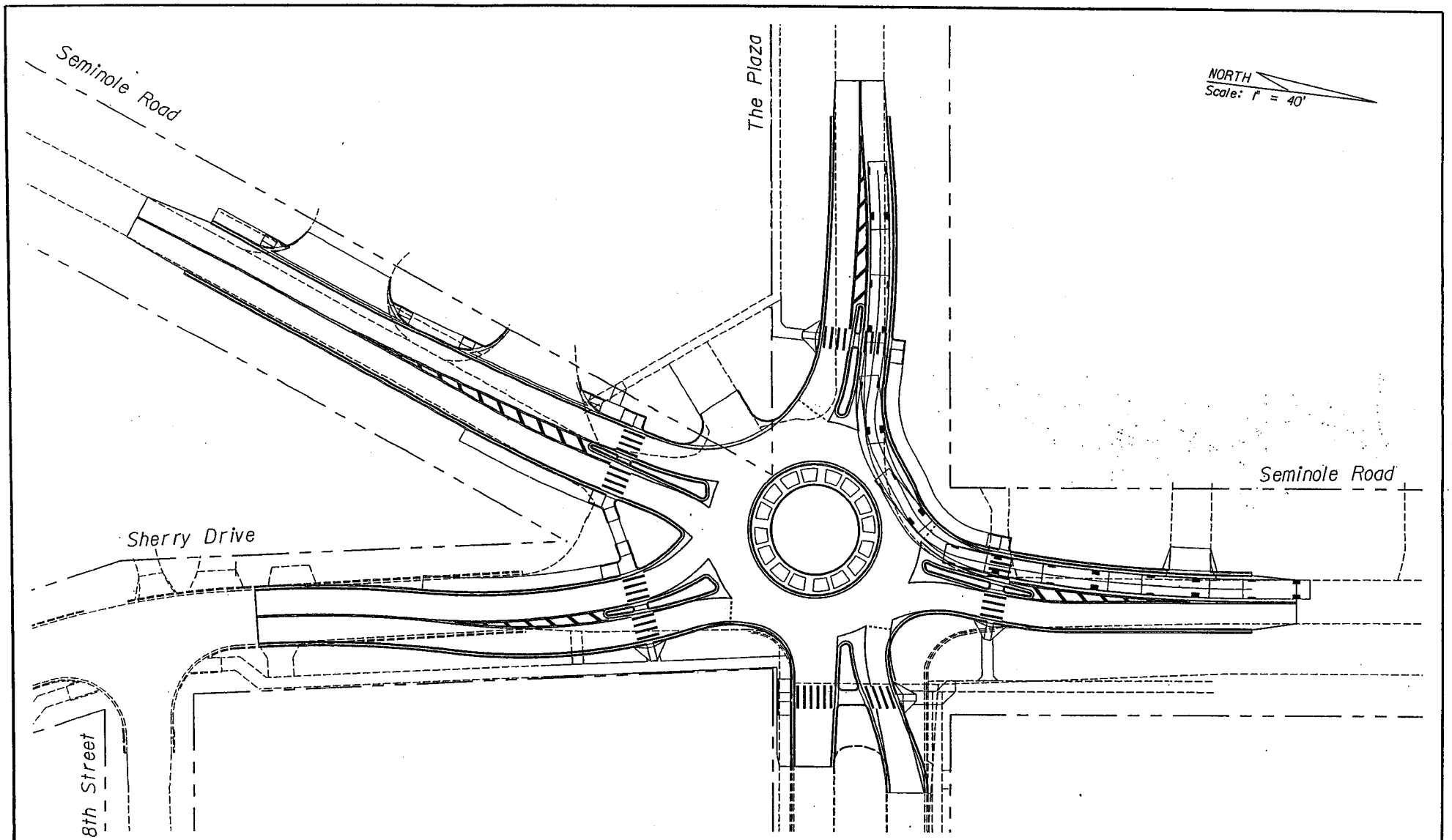
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing: _____

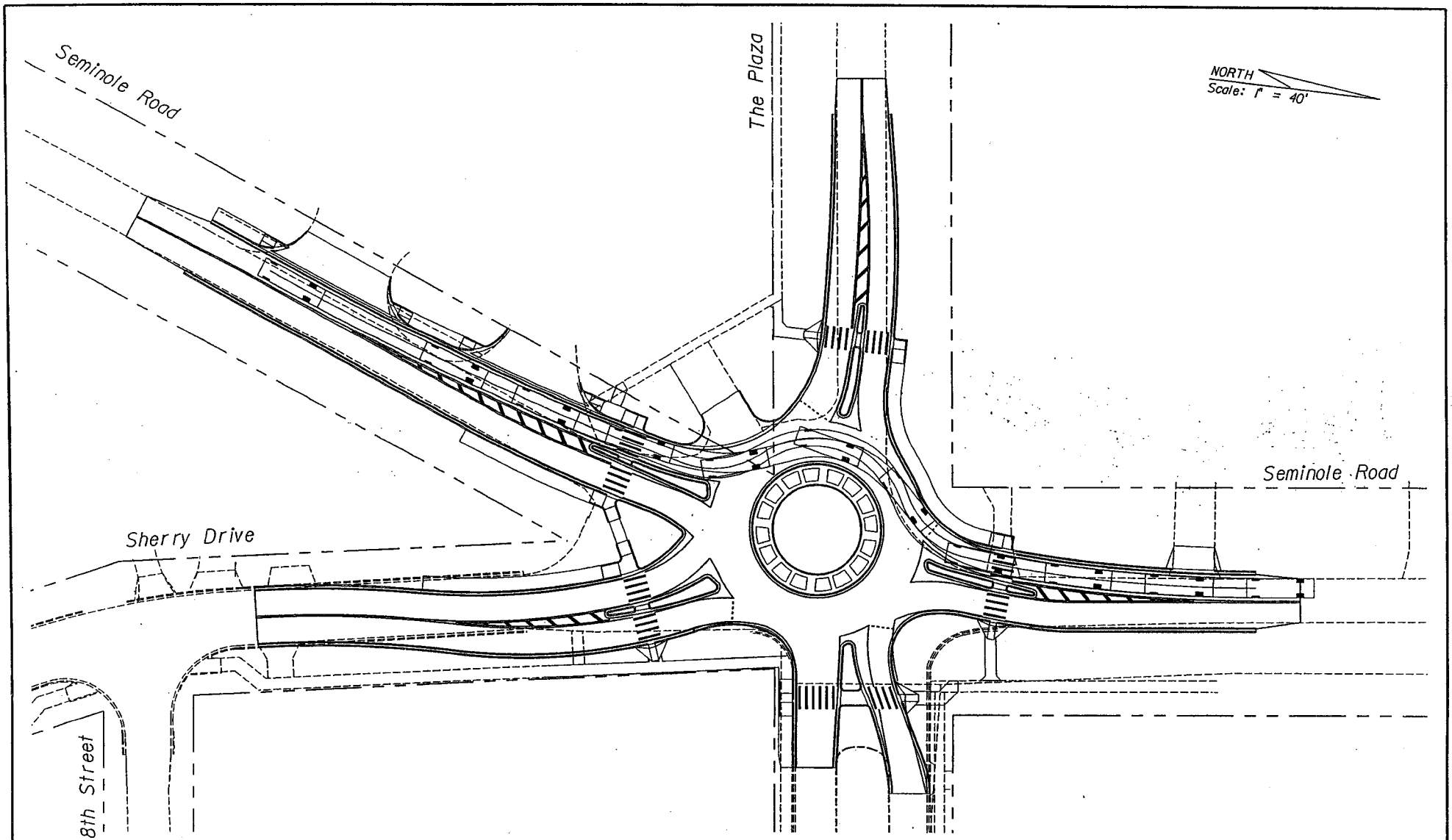
Sheet ____ of ____

23 FEB 04 15:38:23 J:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_at44.dgn



Designed: xx Drawn: xx Checked: xx P.E.: xx	Released For Construction By _____ This Drawing is the property of City of Atlantic Beach, and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.	CITY OF Atlantic Beach - Florida 1206 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834	**SEMINOLE ROAD** **Roundabout Study**	**CONCEPTUAL LAYOUT** gai Consultants, Inc. 10199 Southside Boulevard, Suite 105 Jacksonville, Florida 32256 Ph: 904.363.1120 Fax: 904.363.1115 www.gaiconsultants.com	No. Date Revision By	Reg. Engineer	Project No.:	Drawing
							Scale: 1" = 40' Date: DEC 15, 2003	Sheet ____ of ____

23 FEB 104 15:38:25 j:\proj\1980 to 2003\03086\cadd\dwg\sem_rnd_ol5l.dgn



Designed xx
Drawn xx
Checked xx
P.E. xx

Released For Construction

By

CITY OF Atlantic Beach - Florida

1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5814

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.
10199 Southside Boulevard, Suite 310 Jacksonville, Florida 32256
Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.:

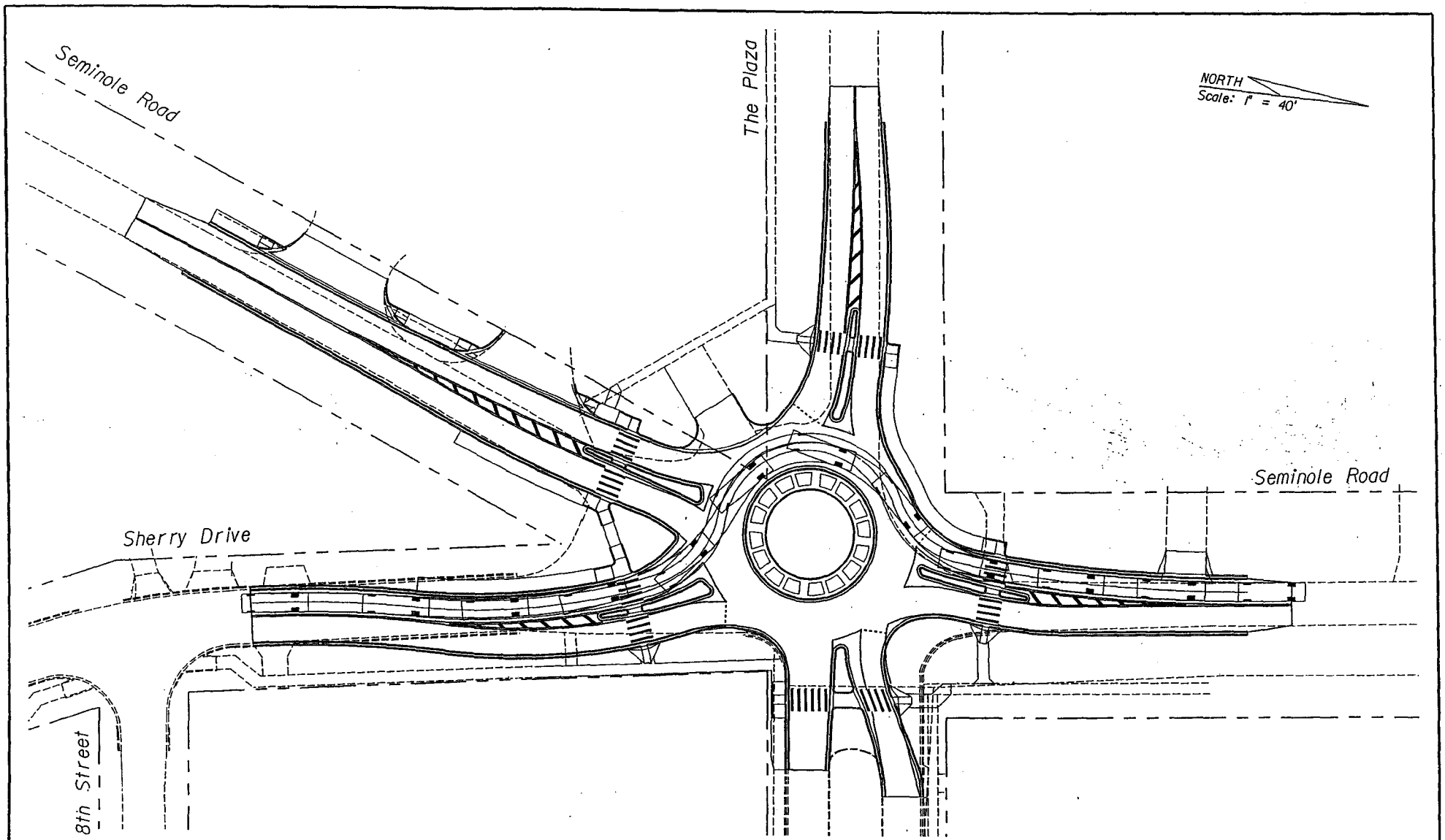
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

Sheet ____ of ____

23 FEB 104 15:38:27 J:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_of52.dgn



Designed: ns
Drawn: ns
Checked: ns
P.E.: ns

Released For Construction

By

CITY OF Atlantic Beach - Florida

1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.
10199 Southside Boulevard, Suite 103 Jacksonville, Florida 32256
Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.:

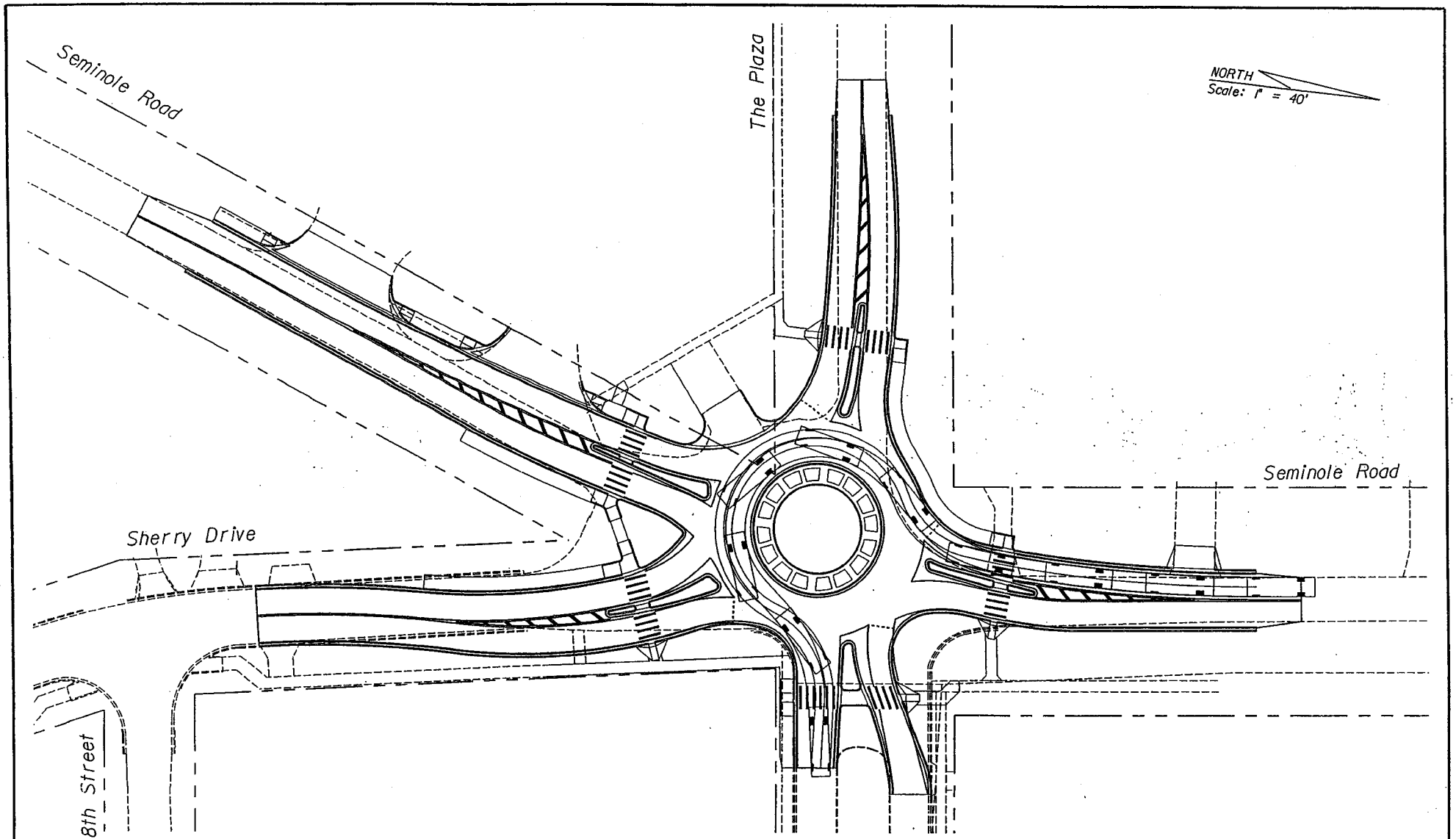
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

Sheet ____ of ____

23 FEB 104 15:38:29 J:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_al53.dgn



Designed: xx
Drawn: xx
Checked: xx
P.E.: xx

Released For Construction

By _____

CITY OF Atlantic Beach - Florida

3200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834

SEMINOLE ROAD
Roundabout Study

CONCEPTUAL LAYOUT

gai Consultants, Inc.
10199 Southside Boulevard, Suite 103 Jacksonville, Florida 32256
Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com

No.	Date	Revision	By

Reg. Engineer

Project No.: 03086

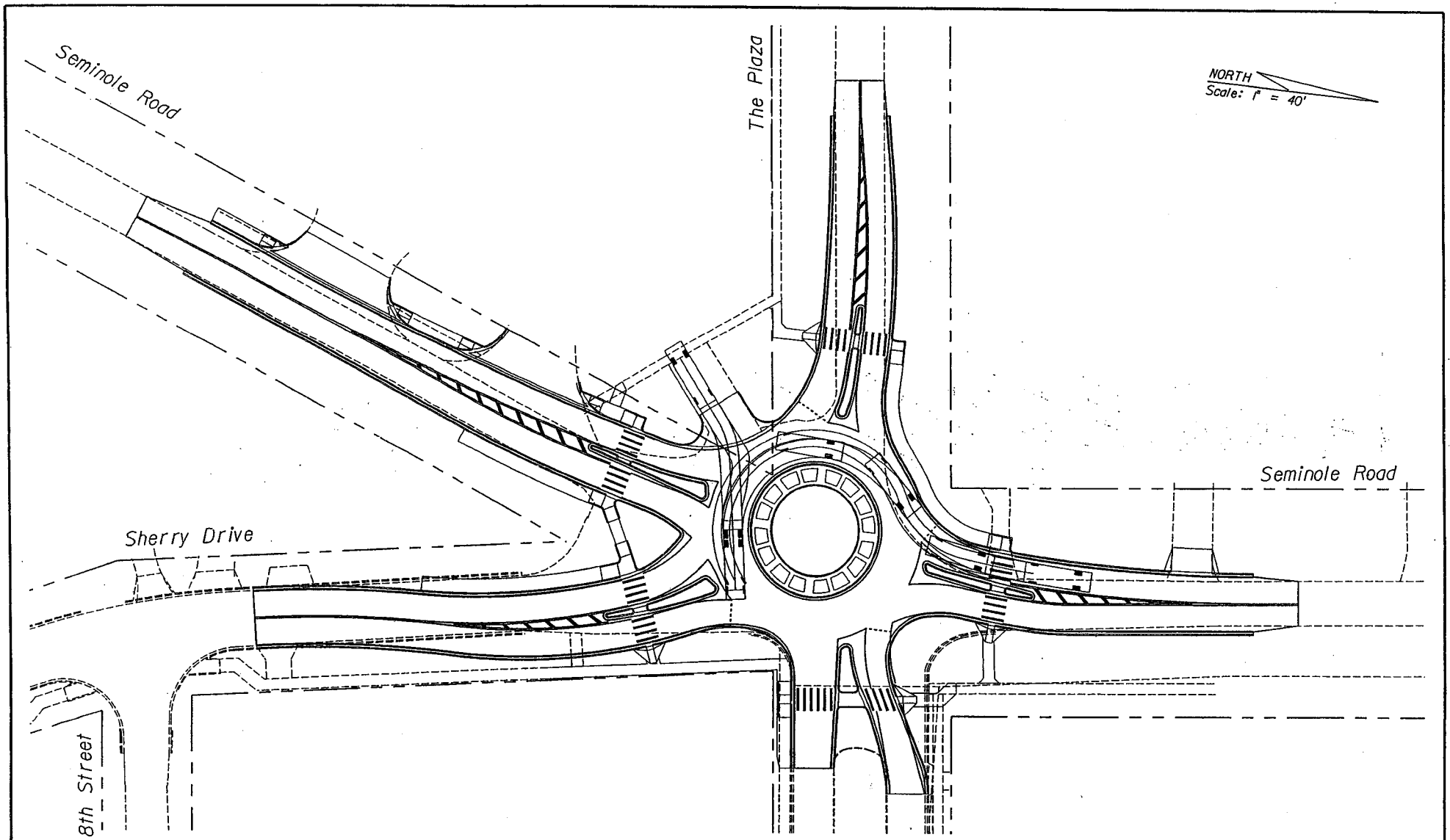
Scale: 1" = 40'

Date: DEC 15, 2003

Drawing

Sheet ____ of ____

23 FEB 104 15:38:30 j:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_al54.dgn



Designed: xx Drawn: xx Checked: xx P.E.: xx	Released For Construction By _____ This Drawing is the property of City of Atlantic Beach, and is not to be reproduced or copied in whole or in part. It is not to be used on any other project and is to be returned on request.	CITY OF Atlantic Beach - Florida 1200 SANDPIPER LANE ATLANTIC BEACH, FLORIDA 32233 904-247-5834	**SEMINOLE ROAD** **Roundabout Study**	**CONCEPTUAL LAYOUT** gai Consultants, Inc. 10199 Southside Boulevard, Suite 103 Jacksonville, Florida 32256 Ph: 904.363.1110 Fax: 904.363.1115 www.gaiconsultants.com	No. Date Revision By Reg. Engineer Project No.: 03086 Scale: 1" = 40' Date: DEC 15, 2003 Drawing Sheet ____ of ____

23 FEB 04 15:38:32 j:\proj\980 to 2003\03086\cadd\dwg\sem_rnd_a160.dgn