

**Lee County Board Of County Commissioners
Agenda Item Summary**

Blue Sheet No. 20030310

1. REQUESTED MOTION:

ACTION REQUESTED: Approve the recommendation of the County's traffic engineering consultant and staff for access management on Bonita Beach Road (between Oakland Drive and Imperial Street) that would install a new traffic signal on Bonita Beach Road at Quinn Street; configure the median opening at Downs Avenue/Home Depot Access to only allow left-turn movements from Bonita Beach Road to the north and south; and, allow an opening in the median at the eastern access point of the Flamingo Flea Market to only permit a southbound left-turn onto Bonita Beach Road. Additionally, approve the recommendation that a traffic signal can be installed at the eastern access point of the Flamingo Flea Market provided that the parties involved in ownership or management pay all costs for the design and construction of the traffic signal.

WHY ACTION IS NECESSARY: At the Joint Meeting of the Board of County Commissioners and the Bonita Springs City Council, the Board of County Commissioners asked that these issues be brought back to a regular Board of County Commissioner's meeting for consideration.

WHAT ACTION ACCOMPLISHES: Establishes an access management plan for Bonita Beach Road from Imperial Boulevard to Oakland Drive to be used in conjunction with the planned widening of Bonita Beach Road.

**2. DEPARTMENTAL CATEGORY:
COMMISSION DISTRICT #**

A9A

3. MEETING DATE:

04-01-2003

4. AGENDA:

CONSENT
 ADMINISTRATIVE
 APPEALS

 PUBLIC
 WALK ON
 TIME REQUIRED:

**5. REQUIREMENT/PURPOSE:
(Specify)**

STATUTE
 ORDINANCE
 ADMIN.
 CODE
 OTHER

6. REQUESTOR OF INFORMATION:

A. COMMISSIONER _____
 B. DEPARTMENT Transportation
 C. DIVISION _____

 BY: Scott M. Gilbertson, P. E.
 Director

7. BACKGROUND: The Lee County Department of Transportation is in the design phase of a project to widen Bonita Beach Road to six lanes from I 75 to Imperial Street. The issue of access management is a part of the design phase and a point of discussion between the City of Bonita Springs and the County. The County's traffic engineering design consultant as a part of their scope of services has reviewed the issues and developed recommendations as to how to best address the traffic issues on both a short term and long term basis for this segment of Bonita Beach Road. Their report is attached for your review and information.

8. MANAGEMENT RECOMMENDATIONS:

9. RECOMMENDED APPROVAL:

A Department Director	B Purchasing or Contracts	C Human Resources	D Other	E County Attorney	F Budget Services				G County Manager
<i>3/17/03</i>				<i>3/18/03</i>	OA <i>RK 3/18</i>	OM <i>afm 3/18</i>	Risk <i>afm 3/18/03</i>	GC <i>afm 3-18-03</i>	<i>3-17-03</i>

10. COMMISSION ACTION:

APPROVED
 DENIED
 DEFERRED
 OTHER

Rec. by CoAtty
 Date *3/18/03*
 Time *9:40 am*
 Forwarded To:
3/18/03 10:30 AM

RECEIVED BY
 COUNTY ADMIN. *PM*
3-18-03
11:30
 COUNTY ADMIN.
 FORWARDED TO:
3/18/03

TINDALE

OLIVER and Associates, Inc.

March 5, 2003

Mr. Dan Craig, P.E.
Pittman-Hartenstein and Associates, Inc.
12701 World Plaza Lane, Bldg. 80
Fort Myers, Florida 33907

Subject: Further Analyses of Signalization of Quinn, Downs, or Both

Dear Dan,

In accordance with my recent e-mails, we have undertaken additional traffic flow analyses for Bonita Beach Road to assist in determining a suitable placement of a traffic signal to serve existing and planned development along Bonita Beach Road between Imperial Road and I-75. We tested signal locations at Quinn Street, Downs Drive, and at both locations, and a fourth option of opening the median and signalizing the eastern Flea Market driveway. In this letter, the assumptions made and the results of our analyses are summarized.

We have based our recommendations on the premise that for a signal to be installed, it must provide a clear advantage to the operation or safety of the roadway, preserve opportunities for maintaining good traffic signal progression on Bonita Beach Road, and provide for effective access service to adjacent land uses.

In our initial traffic data collection, no turning movement counts were undertaken at any intersections between Imperial Street and Oakland Drive, as neither the Albertson's site nor the Home Depot site had been developed. This analysis is based on traffic count data undertaken by Lee County on December 21, 2002, the Saturday before Christmas; machine traffic counts of Downs Drive, the Home Depot driveway, Quinn Street, and the "Albertson's" site driveway, undertaken by Metro Transportation Group; observations we made on Saturday, January 25, 2003; and a count "several years ago" reported by the flea market manager that indicated 2,200 cars entering the site on a Saturday during the peak season. Based on this data, we have estimated a peak hour traffic demand of 682 vehicles per hour (vph) during the Saturday lunch peak hour. This number was derived by multiplying the 2,200 vph reported volume times two to cover outbound, Metro's machine counts that indicate 14.1 percent of the daily traffic during the Saturday mid-day peak, plus 10 percent growth. Based on a conversation with the flea market manager, the pre-Christmas shopping period is slow at flea markets, and higher volumes occur beginning in early to mid-January. To verify this estimate, we sent a technician down to observe on Saturday, January 25, 2003, which resulted in peak hour volumes similar to the estimate.

We also applied traffic generation estimates based on the ITE Trip Generation manual to approved developments on the south side of Bonita Beach Road. We understand additional smaller commercial developments are planned on the north side of Bonita Beach Road at Quinn Street.

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Traffic volumes from expected developments were assigned in consideration of expected traffic control measures on the relevant road network, as follows:

- Recognition that the western driveway to Albertson's will allow only a right-turn in/right-turn out movement when Imperial Street is improved, increasing dependence on the driveways to Bonita Beach Road,
- Recognition that U-turns will be prohibited in the west-to-east direction at the Imperial Street at Bonita Beach Road intersection due to heavy north-to-east right turns,
- Recognition that north-to-west and south-to-east left turns will be prohibited at unsignalized median openings on Bonita Beach Road between Imperial Street and I-75, and
- Recognition of the specific access scenario tested.

The proposed measures will promote safe and effective traffic flow on Bonita Beach Road, which is expected to carry an AADT of 41,300 vehicles in 2025, and a peak season daily volume of 45,900.

The initial assigned traffic volumes are illustrated in Appendix A; however, as the various scenarios described below were tested, traffic volumes in some scenarios were adjusted to reduce volumes where severe congestion was estimated to available, alternative, less congested routes. Thus, volumes reflected in the computer analysis data files may differ slightly from those published in Appendix A.

We evaluated seven traffic conditions using the traffic operational analysis software suite Synchro and Sim-Traffic. The seven conditions included signalization at Quinn Street only, at Downs Drive only, and at both Quinn Street and Downs Drive for the Saturday noon flea market/Home Depot peak and for a representative peak hour period with the flea market inactive. In addition, we evaluated a scenario with Quinn Street and the eastern flea market driveway signalized for the Saturday mid-day peak period. The analyses were undertaken using a signal cycle length of 100 seconds, where Synchro found an optimal coordinated timing plan, and using a signal cycle length of 150 seconds, which matches the cycle length currently in use at the I-75/Bonita Beach Road interchange. The 100-second cycle length would be suitable for non-peak season or non-peak hour operations, while the 150-second cycle would be used for peak season and peak hour conditions. The results of the analyses are summarized in Table 1 and graphic summaries of excerpts of the analyses are provided in Appendices B and C for the 100 second and 150 second cycle length scenarios, respectively.

From these analyses, we made the following observations:

With traffic signals at both Quinn Street and Downs Drive, Synchro was unable to optimize signal timings with a meaningful traffic signal "progression band" for the westbound direction of travel for either time period in the 100 second cycle length scenarios, ensuring higher delays and more stops in that scenario. In contrast, in the scenarios with only one traffic signal (at either Quinn Street or at Downs Drive), relatively good progression in both directions is possible. For the longer, 150 second cycle length, with the additional cycle length, two-way progression is possible, but the scenarios with

Table 1
Summary of Analyses

Scenario	Cycle Length	Eastbound Band (sec)	Westbound Band (sec)	Bonita Beach Road			Total Network		
				Delay/Veh (sec)	Stops/Veh	Average Speed (mph)	Delay/Veh (sec)	Stops/Veh	Average Speed (mph)
Flea Market Active									
Signal at Quinn St. Only	100 sec.	26	36	51.1	0.96	18	79.5	1.56	19
Signal at Downs St. Only	100 sec.	28	17	61.3	1.14	21	79.9	1.58	19
Signal at Quinn St. and Downs St.	100 sec.	20	0	62.8	1.18	16	93.8	1.70	18
Signals at Quinn St. and Flea Market East Drive	100 sec.	26	20	53.4	1.12	18	79.2	1.64	19
Flea Market Inactive									
Signal at Quinn St. Only	100 sec.	27	37	36.1	0.77	22	58.6	1.28	22
Signal at Downs St. Only	100 sec.	25	36	39.5	0.80	21	60.2	1.30	22
Signal at Quinn St. and Downs St.	100 sec.	23	5	41.1	0.92	20	61.4	1.40	21
Flea Market Active									
Signal at Quinn St. Only	150 sec.	35	49	56.1	0.85	17	90.8	1.40	18
Signal at Downs St. Only	150 sec.	35	36	75.9	1.13	19	100.3	1.56	17
Signal at Quinn St. and Downs St.	150 sec.	39	40	61.0	0.95	17	108.4	1.47	17
Signals at Quinn St. and Flea Market East Drive	150 sec.	41	39	55.1	0.98	18	84.2	1.45	19
Flea Market Inactive									
Signal at Quinn St. Only	150 sec.	39	40	54.0	0.88	19	80.0	1.32	19
Signal at Downs St. Only	150 sec.	37	45	59.3	0.90	18	86.1	1.39	19
Signal at Quinn St. and Downs St.	150 sec.	38	35	54.2	0.93	18	80.7	1.35	19

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two signals and a signal at Downs only seem to perform worse than the scenarios with a signal at Quinn only or signals at Quinn and the eastern Flea Market driveway.

While a signal at Downs Drive only does not provide as good an operation as a signal installed at Quinn only, if the County chooses to install a signal at Downs Drive, the inadequate flea market approach to Bonita Beach Road should be improved. The driveway exit from the flea market at Downs Drive is poorly configured. With inadequate "throat" depth, and a 90 degree turn required to access the throat, it is effectively a one-lane approach that will not feed traffic fast enough to work efficiently. Serving the flea market would require a disproportionate amount of green time that will detract from the capacity and efficiency of Bonita Beach Road. In addition, if vehicles exiting the flea market block the northbound lane of Downs Drive, motorists seeking to drive north on Downs Drive will be trapped and block the flea market entrance. In traffic flow simulation analyses this was evidenced by the flea market exit being heavily queued. If Downs Drive were signalized, this approach must be improved, but we are unsure how that can be accomplished as the flea market building prevents access between its parking lot and Downs Drive. The inadequate capacity and congestion in the "throat" of Downs Drive resulted in gridlock conditions in the traffic flow simulations.

With the signal at Quinn Street only, access to the land uses on the south side of the road are well-served, but the heavy left turn to the north into the flea market is not well served, it backs up and sends the network into gridlock. With the signal at Downs only, the westbound to southbound left turns at Quinn and the eastbound to northbound left turns at Downs cannot fit into the short distance between the two intersections, and gridlock results. With signals at both locations, the same "interlocking" left turns remain a problem. Thus, the key operational issue seems to be the flea market access.

A solution that may be possible is to open the median opposite the eastern flea market driveway to allow vehicles to exit toward the Interstate at that location, while vehicles entering the flea market would continue to do so at Downs Drive. This strategy would eliminate the conflict between flea market traffic entering the site from the west and flea market traffic exiting the site to go east. It would allow an approach throat of reasonable length to be developed in the flea market parking lot, and the signal serving it could operate in a "rest-in-green" mode for Bonita Beach Road, turning green only when traffic approaches from the flea market parking lot (e.g. only on weekends) and need not have a leg (or user) on the south side. Examination of the time-space diagrams seems to indicate the flea market's east driveway is well-suited to preserve two-way progression, as indicated in the seventh time-space diagram scenarios attached to this letter.

In conclusion, there are disadvantages to installing traffic signals at both Quinn Street and Downs Drive and thus we do not recommend a scenario with traffic signals at both Quinn Street and Downs Drive. It detracts from progression opportunities and the smooth flow of traffic, adds a capital, operational, maintenance, and safety cost to the public, increases delay from 10 to 20 percent on Bonita Beach Road, and introduces issues with left turn lane design between Quinn Street and Downs

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Drive. A signal at only Quinn Street serves the development on the south side of Bonita Beach Road effectively, and preserves better operating conditions for the network and Bonita Beach Road. A signal only at Downs Drive will work less effectively than one at Quinn Street because it fits more poorly in the progression bands, and the flea market approach will not be well-served. It will increase delay on Bonita Beach Road Road by 5 to 15 percent. Finally, access to the flea market can be improved, and Bonita Beach Road operations can be preserved, by opening the median at the eastern flea market driveway to permit south to east left turns.

Should you have any questions regarding the above information, please contact me. Analysis files for distribution to interested parties are attached to this letter.

Very Truly Yours,

TINDALE-OLIVER AND ASSOCIATES, INC,



William E. Oliver, P.E., PTOE
Senior Vice-President

enclosures

cc: Mr. Don DeBerry, Lee County Transportation
Ms. Nicole Maxey, Lee County Transportation
Mr. John Davis, Lee County Traffic Engineering with attachments
Mr. Ted Treesh, Metro Transportation Group with attachments
Mr. Ron Talone, David Plummer and Associates, Inc. with attachments

Appendix A

Traffic Volume Estimates

Scenarios:

Flea Market Active – Signal at Quinn

Flea Market Active – Signal at Downs

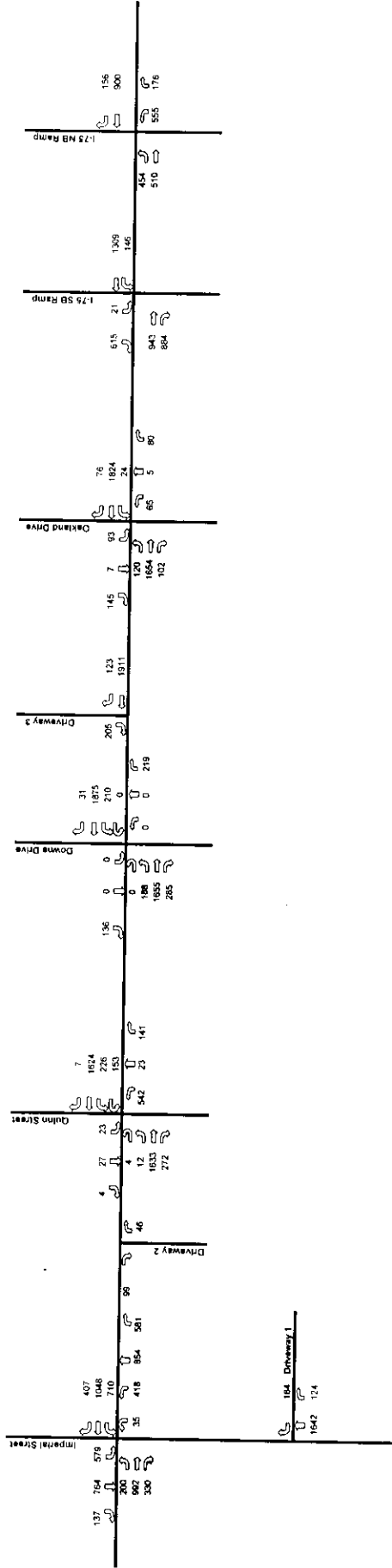
Flea Market Active – Signal at Quinn and Downs

Flea Market Inactive – Signal at Quinn

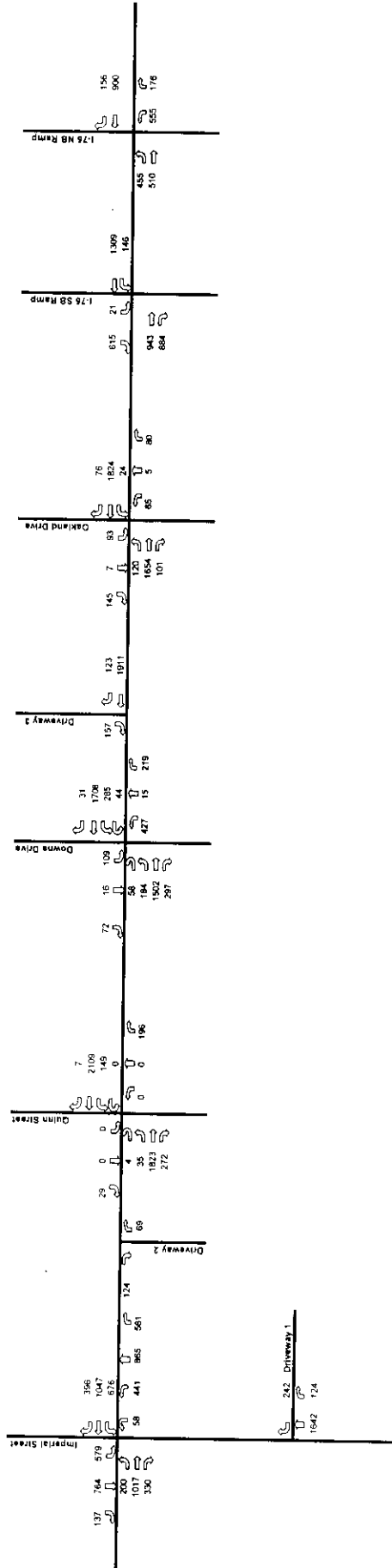
Flea Market Inactive – Signal at Downs

Flea Market Inactive – Signal at Quinn and Downs

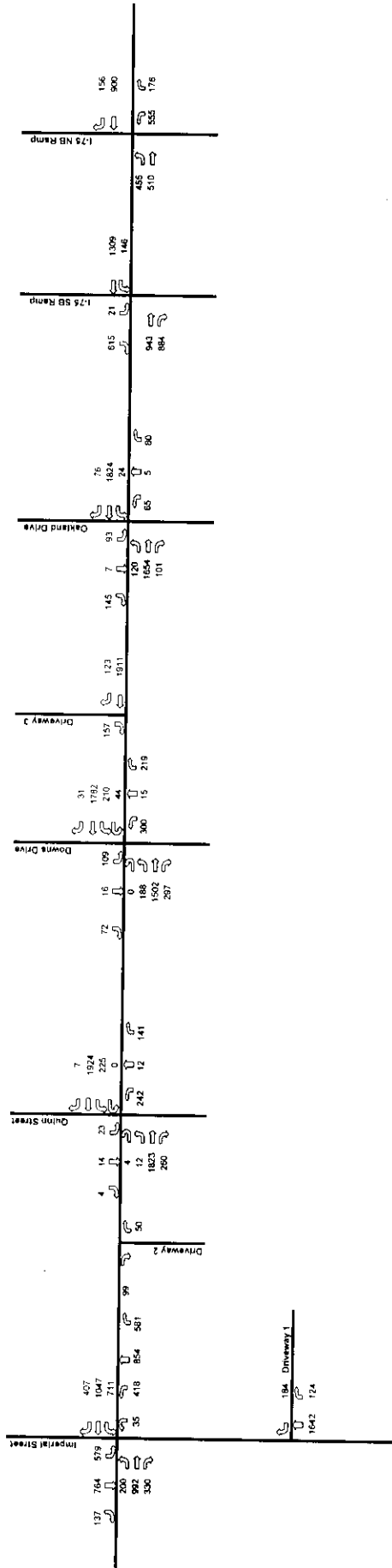
File Market Active
 2015 Mid-day Peak Hour with-development Traffic
 Signal at Quinn Street



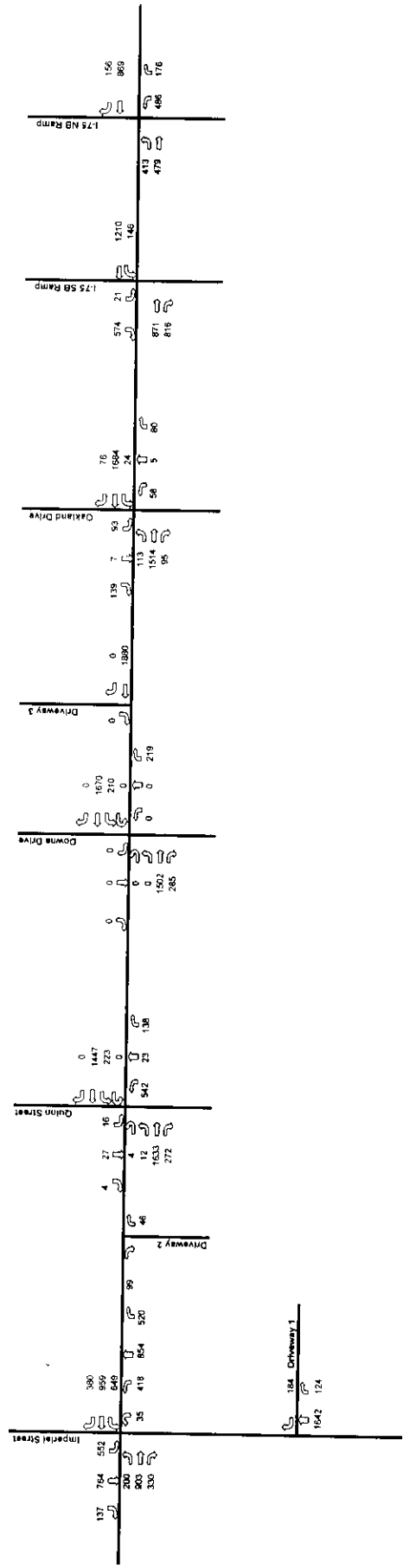
Flea Market Active
 2025 Mid-day Peak Hour with-development Traffic
 Signal at Down's Street



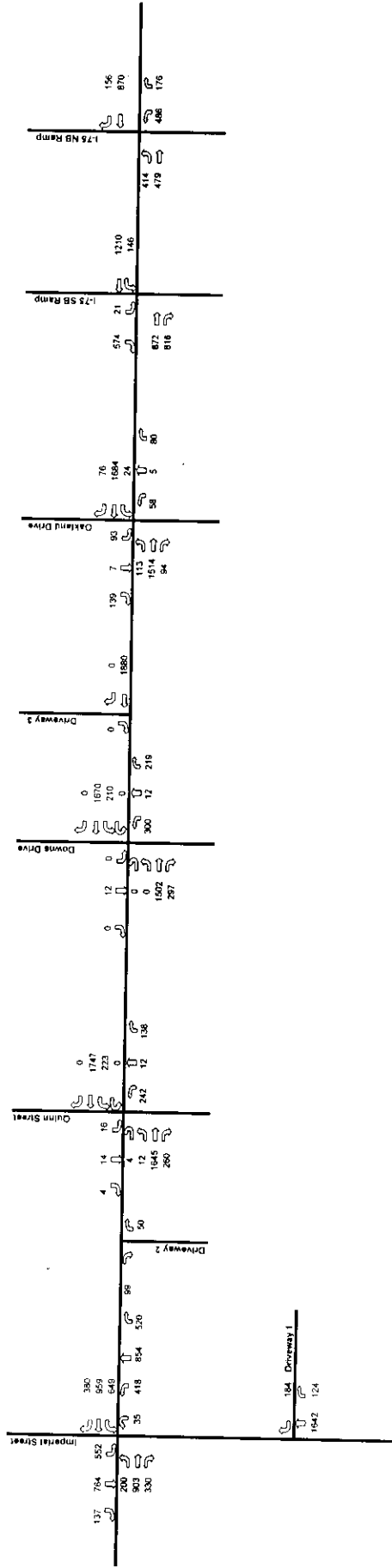
Flca Market Active
 2025 Mid-day Peak Hour with development Traffic
 Signal at both Quinn Street and Downs Street



Flea Market Inactive
 2025 Mid-day Peak Hour with-development Traffic
 Signal at Quinn Street



Flea Market Inactive
 2025 Mid-day Peak Hour with-development Traffic
 Signal at both Quinn Street and Downs Street

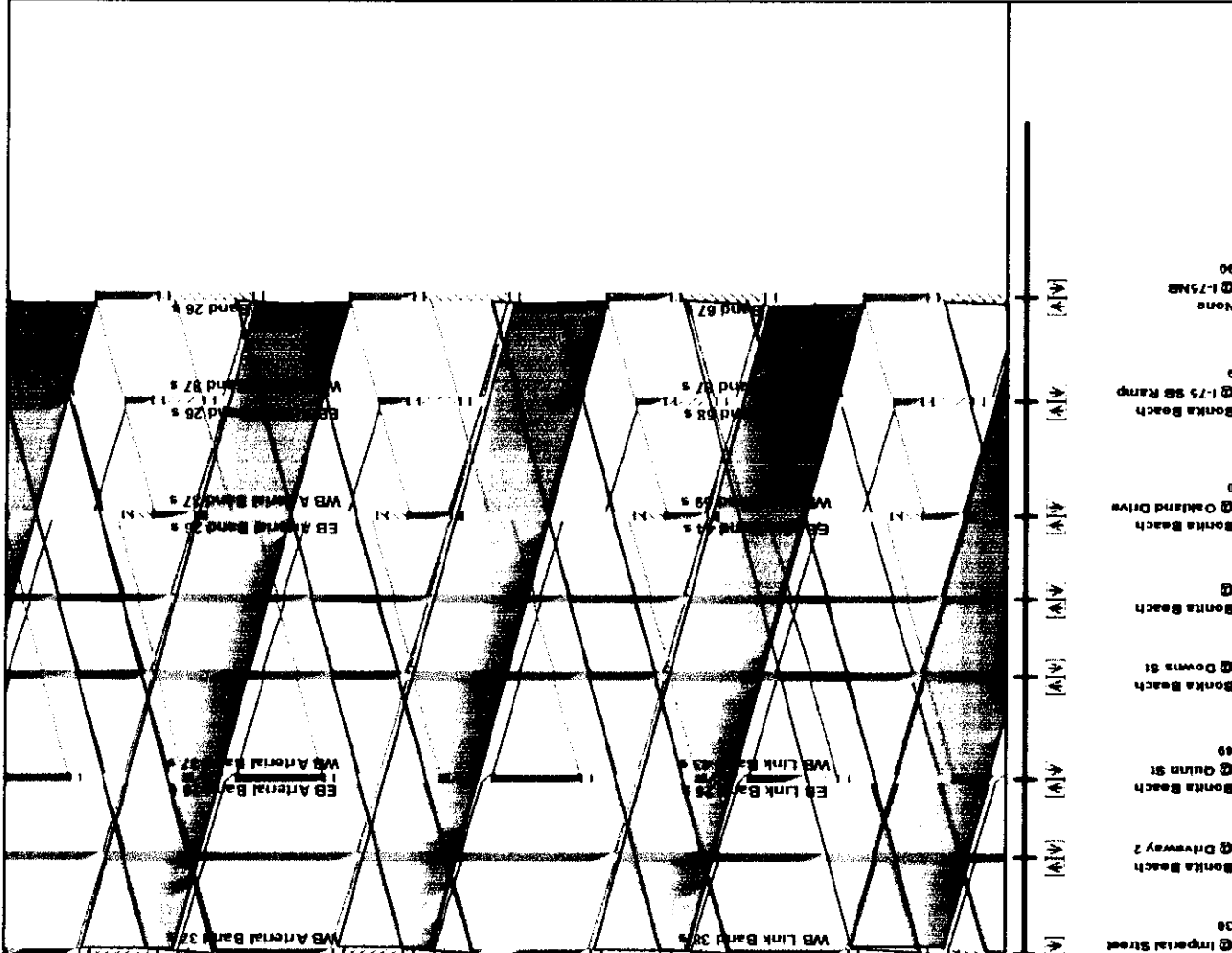


Appendix B

100 Second Cycle Time-Space Diagrams

Scenarios:

1. Flea Market Active – Signal at Quinn
2. Flea Market Active – Signal at Downs
3. Flea Market Active – Signal at Quinn and Downs
4. Flea Market Active – signal at Quinn and Flea Market East
5. Flea Market Inactive – Signal at Quinn
6. Flea Market Inactive – Signal at Downs
7. Flea Market Inactive – Signal at Quinn and Downs



**Scenario 1 – 100 sec Cycle
Flea Active
Signal at Quinn Only**

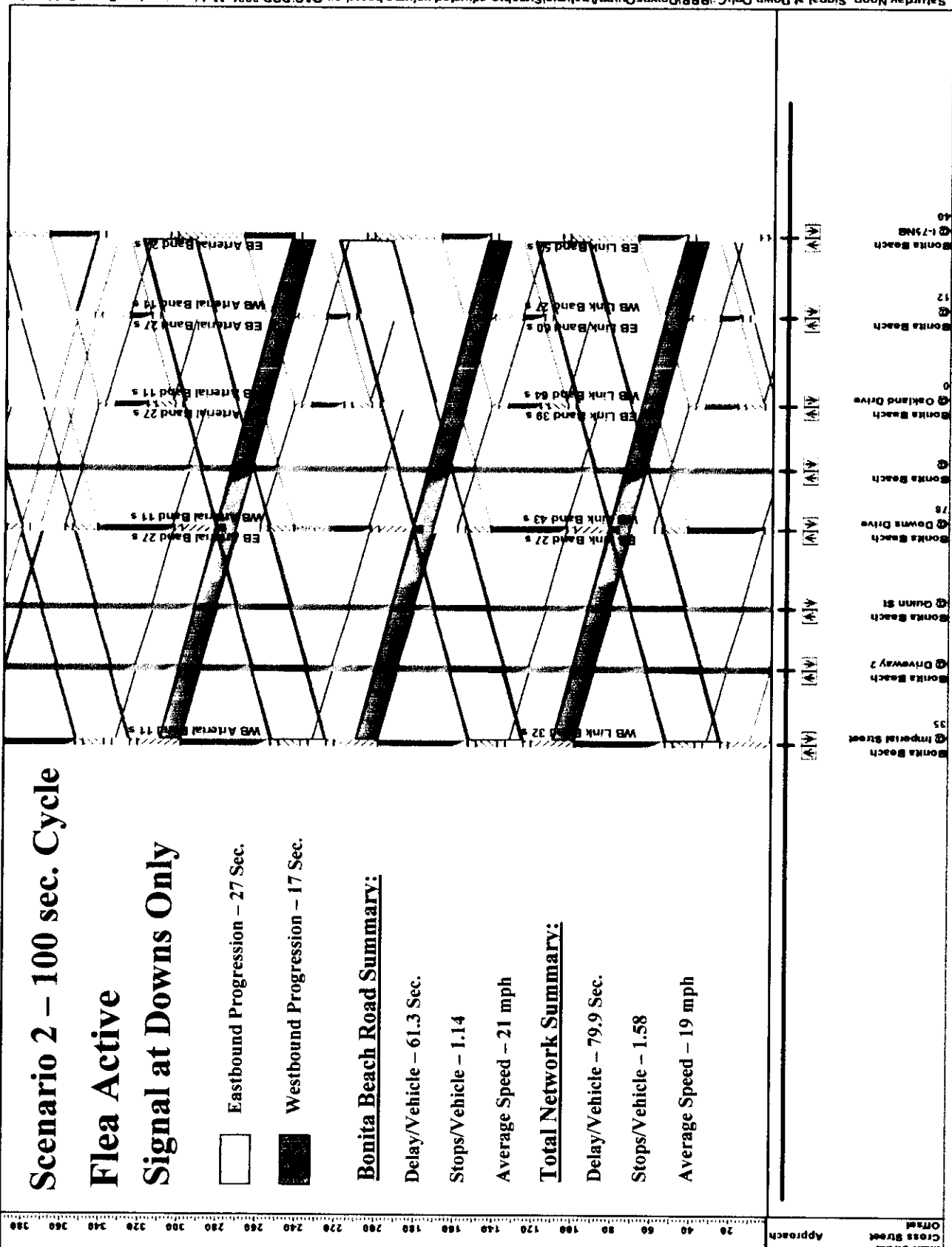
- Eastbound Progression – 26 Sec.
- Westbound Progression – 36 Sec.

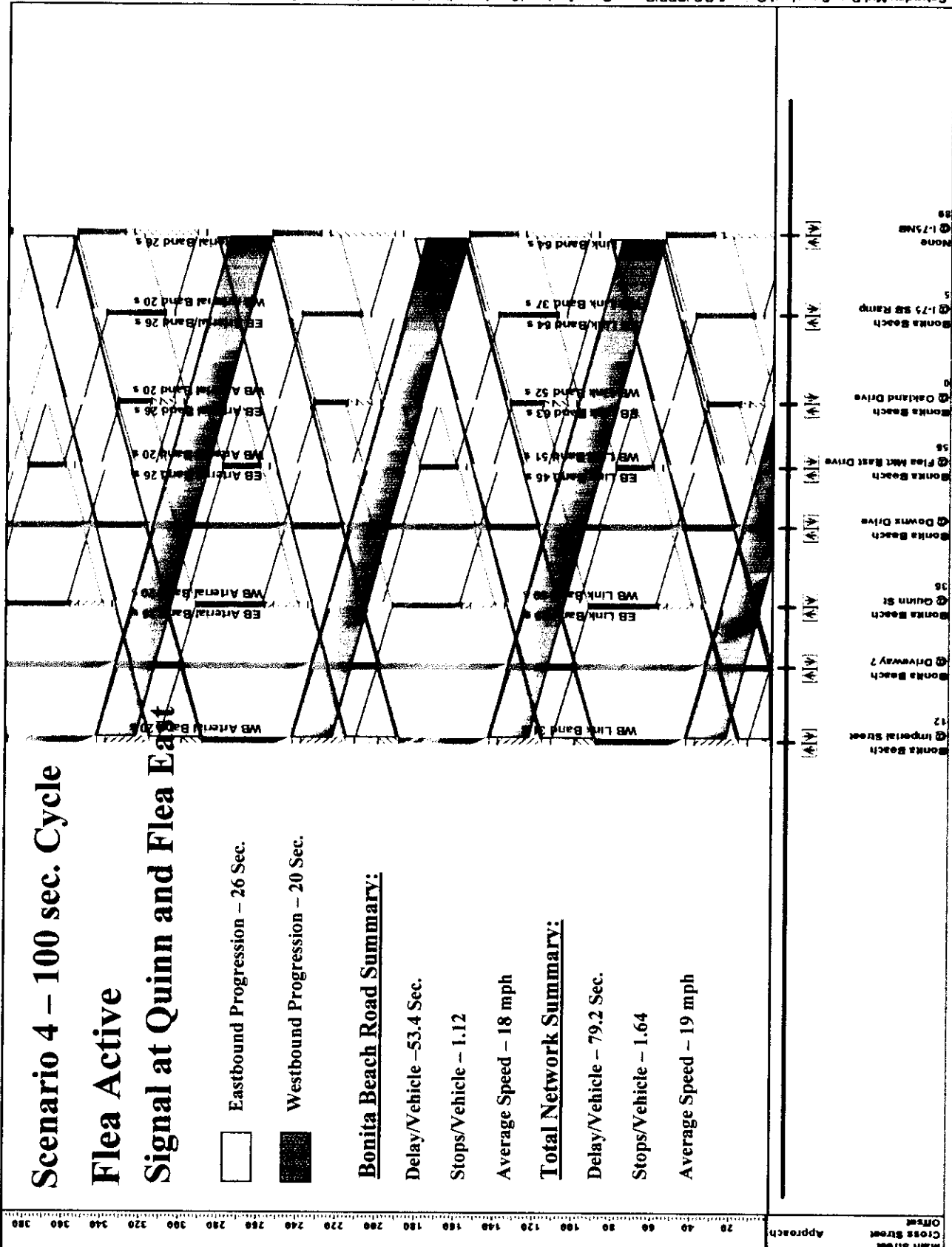
Bonita Beach Road Summary:

Delay/Vehicle – 51.1 Sec.
Stops/Vehicle – 0.96
Average Speed – 18 mph

Total Network Summary:

Delay/Vehicle – 79.5 Sec.
Stops/Vehicle – 1.56
Average Speed – 19 mph





Scenario 4 – 100 sec. Cycle

Flea Active

Signal at Quinn and Flea East

- Eastbound Progression – 26 Sec.
- Westbound Progression – 20 Sec.

Bonita Beach Road Summary:

Delay/Vehicle – 53.4 Sec.
 Stops/Vehicle – 1.12
 Average Speed – 18 mph

Total Network Summary:

Delay/Vehicle – 79.2 Sec.
 Stops/Vehicle – 1.64
 Average Speed – 19 mph

Time-Space Diagram - Bonita Beach Arterial and Link-Link Bandwidths, 50th Percentile Green Times

Saturday Mid-Day, Signals at Quinn & Down Road, Downs Gunn Analysis, Synchro-adjusted volume based on Q&D BR 2025, Midday-signal at Flea East sys

Scenario 5 – 100 sec Cycle Flea Inactive Signal at Quinn Only

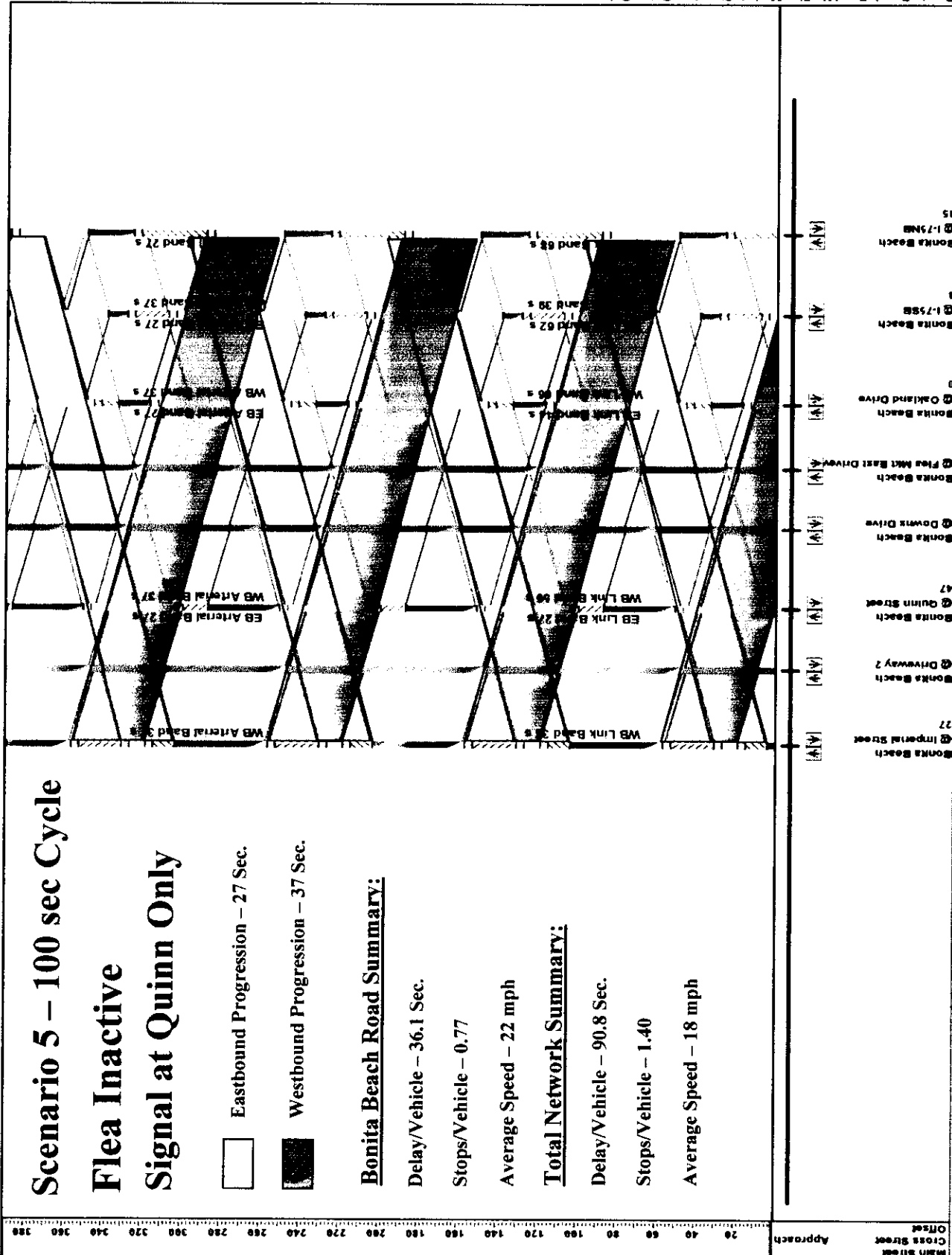
- Eastbound Progression – 27 Sec.
- Westbound Progression – 37 Sec.

Bonita Beach Road Summary:

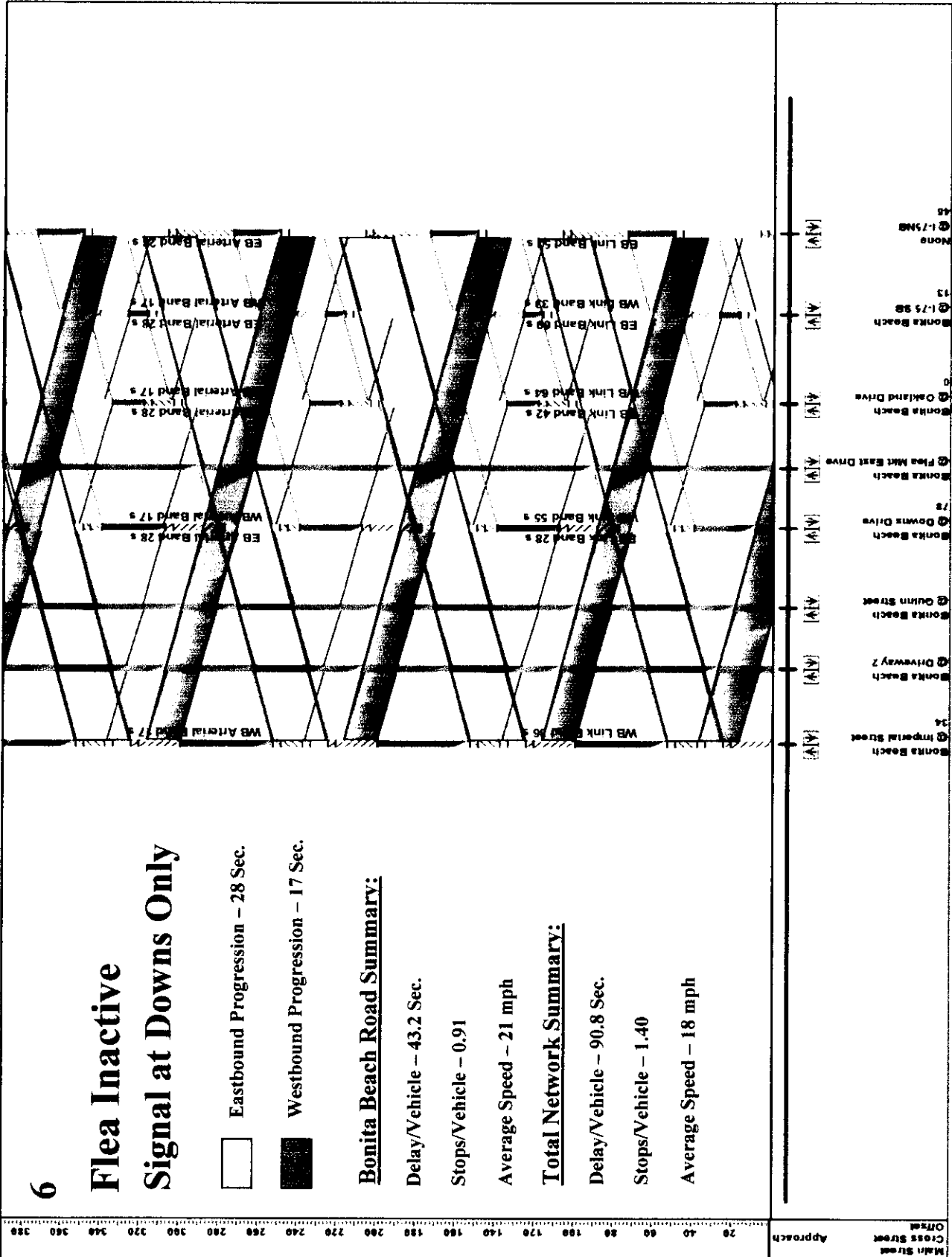
Delay/Vehicle – 36.1 Sec.
Stops/Vehicle – 0.77
Average Speed – 22 mph

Total Network Summary:

Delay/Vehicle – 90.8 Sec.
Stops/Vehicle – 1.40
Average Speed – 18 mph



Time-Space Diagram - Bonita Beach Arterial and Link-Link Bandwidths, 50th Percentile Green Times



6 Flea Inactive Signal at Downs Only

- Eastbound Progression – 28 Sec.
- Westbound Progression – 17 Sec.

Bonita Beach Road Summary:

Delay/Vehicle – 43.2 Sec.
 Stops/Vehicle – 0.91
 Average Speed – 21 mph

Total Network Summary:

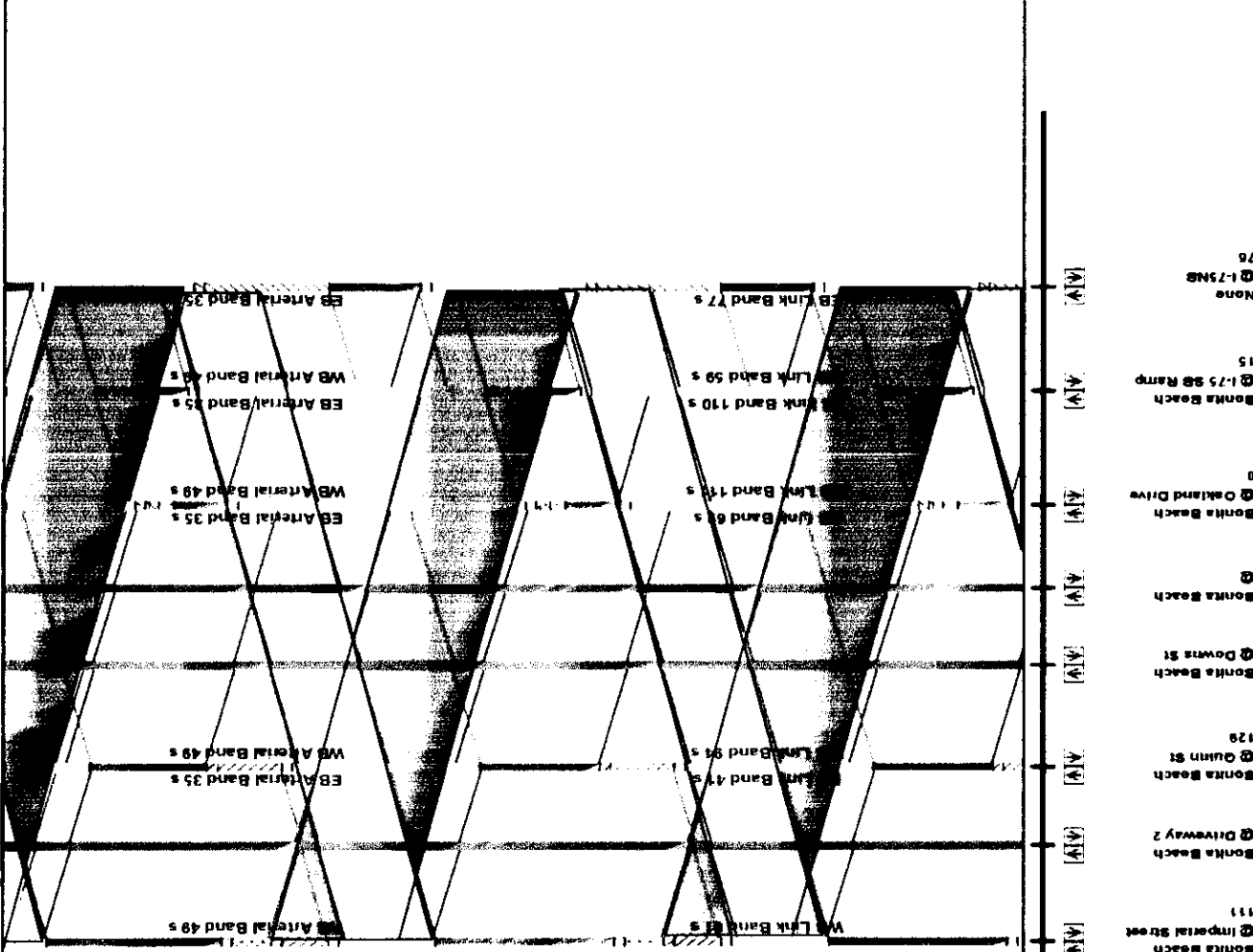
Delay/Vehicle – 90.8 Sec.
 Stops/Vehicle – 1.40
 Average Speed – 18 mph

Appendix C

150 Second Cycle Time-Space Diagrams

Scenarios:

1. Flea Market Active – Signal at Quinn
2. Flea Market Active – Signal at Downs
3. Flea Market Active – Signal at Quinn and Downs
4. Flea Market Active – signal at Quinn and Flea Market East
5. Flea Market Inactive – Signal at Quinn
6. Flea Market Inactive – Signal at Downs
7. Flea Market Inactive – Signal at Quinn and Downs



Scenario 1 – 150 sec Cycle Flea Active Signal at Quinn Only

- Eastbound Progression – 35 Sec.
- Westbound Progression – 49 Sec.

Bonita Beach Road Summary:

Delay/Vehicle – 56.1 Sec.
Stops/Vehicle – 0.85
Average Speed – 17 mph

Total Network Summary:

Delay/Vehicle – 90.8 Sec.
Stops/Vehicle – 1.40
Average Speed – 18 mph

Scenario 2 – 150 sec Cycle Flea Active Signal at Downs Only

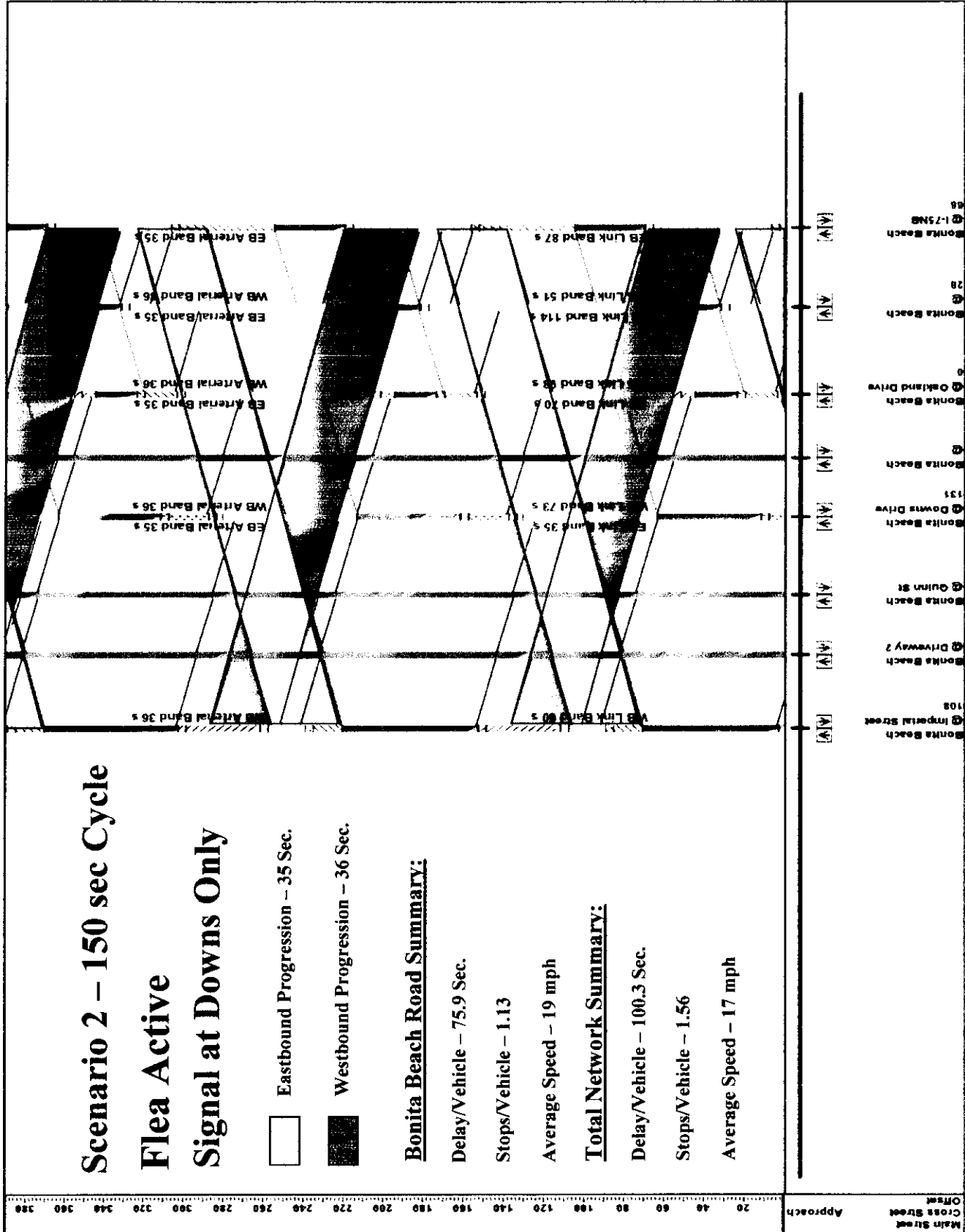
- Eastbound Progression – 35 Sec.
- Westbound Progression – 36 Sec.

Bonita Beach Road Summary:

Delay/Vehicle – 75.9 Sec.
Stops/Vehicle – 1.13
Average Speed – 19 mph

Total Network Summary:

Delay/Vehicle – 100.3 Sec.
Stops/Vehicle – 1.56
Average Speed – 17 mph



Time-Space Diagram - Bonita Beach Arterial and Link Link Bandwidths, 50th Percentile Green Times

Scenario 4 – 150 sec Cycle Flea Active Signal at Quinn and Flea East

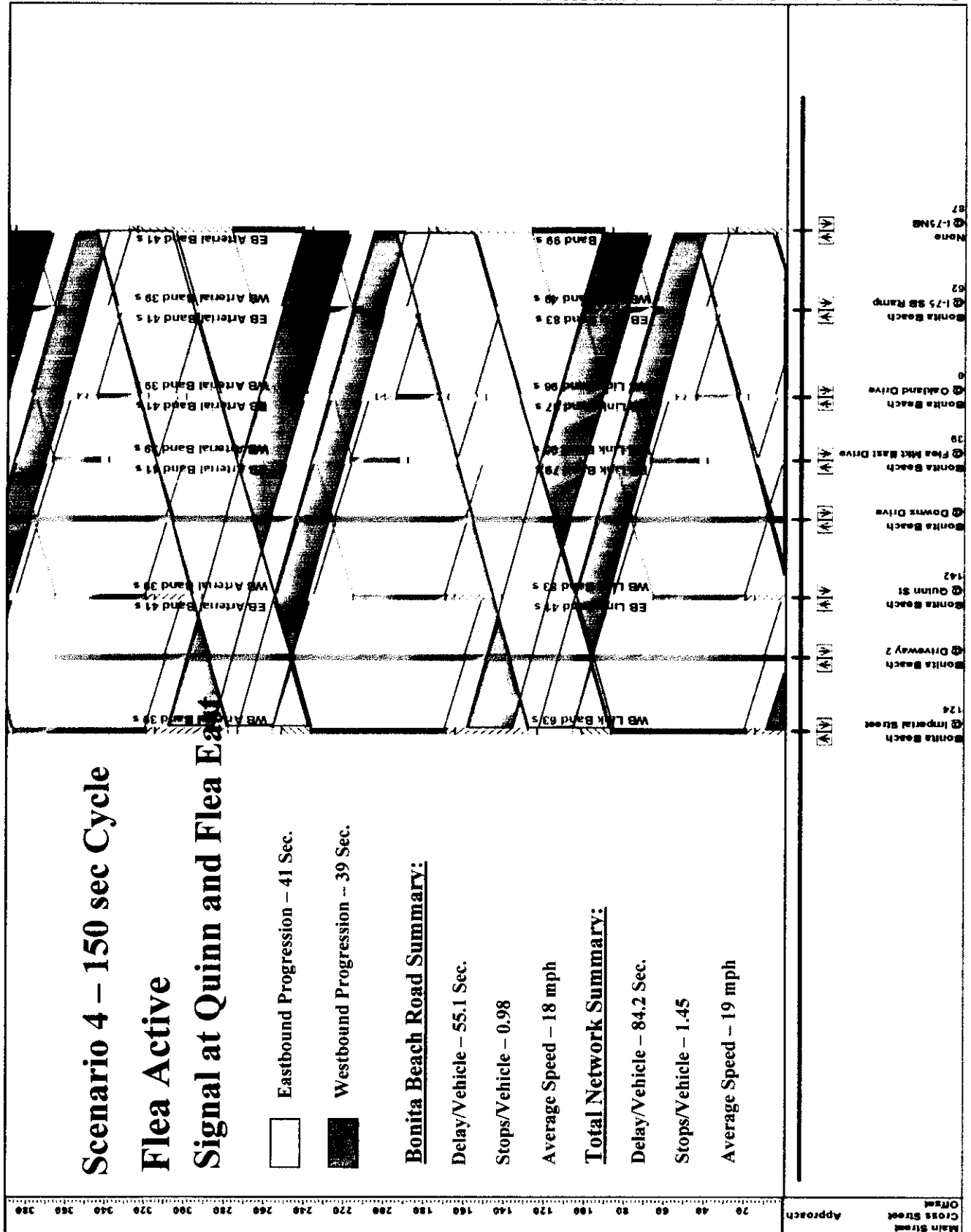
- Eastbound Progression – 41 Sec.
- Westbound Progression – 39 Sec.

Bonita Beach Road Summary:

Delay/Vehicle – 55.1 Sec.
Stops/Vehicle – 0.98
Average Speed – 18 mph

Total Network Summary:

Delay/Vehicle – 84.2 Sec.
Stops/Vehicle – 1.45
Average Speed – 19 mph



Approach
 Cross Street
 Main Street
 Off-Road

**Scenario 5 - 150 sec Cycle
 Flea Inactive
 Signal at Quinn Only**

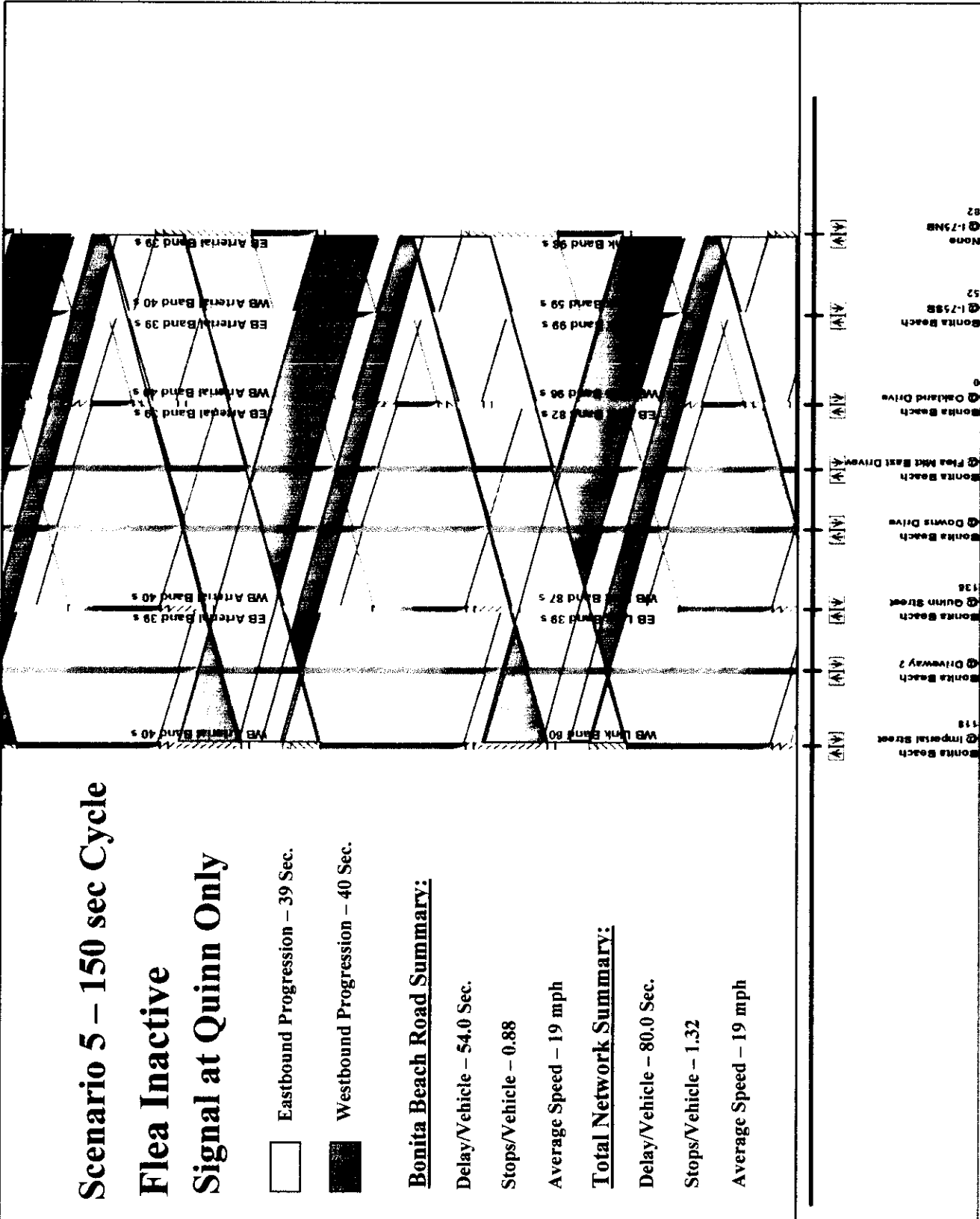
□ Eastbound Progression - 39 Sec.
 ■ Westbound Progression - 40 Sec.

Bonita Beach Road Summary:

Delay/Vehicle - 54.0 Sec.
 Stops/Vehicle - 0.88
 Average Speed - 19 mph

Total Network Summary:

Delay/Vehicle - 80.0 Sec.
 Stops/Vehicle - 1.32
 Average Speed - 19 mph



Off-street Approach
 Cross Street
 Main Street
 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380

Scenario 6 - 150 sec Cycle Flea Inactive Signal at Downs Only

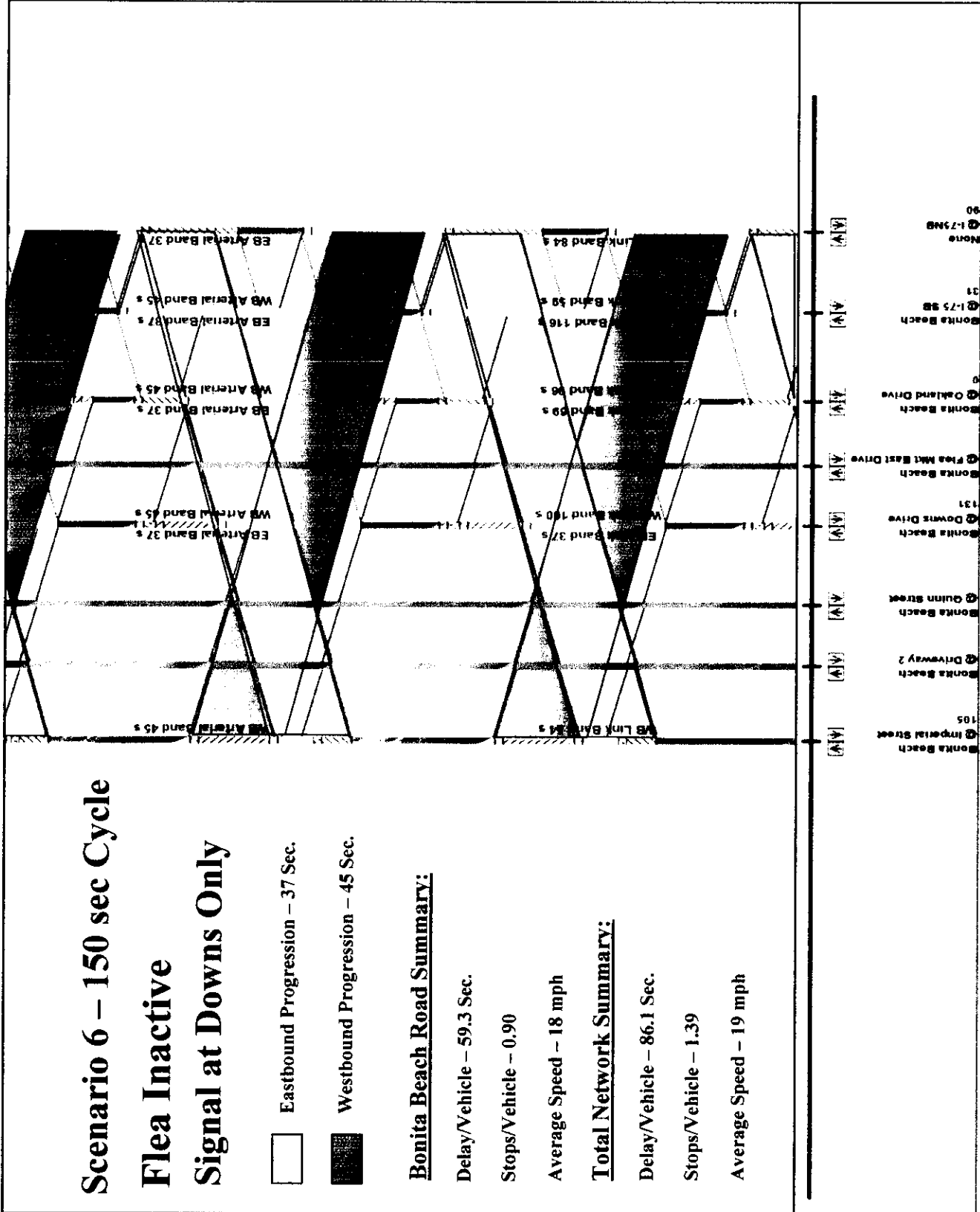
□ Eastbound Progression - 37 Sec.
 ■ Westbound Progression - 45 Sec.

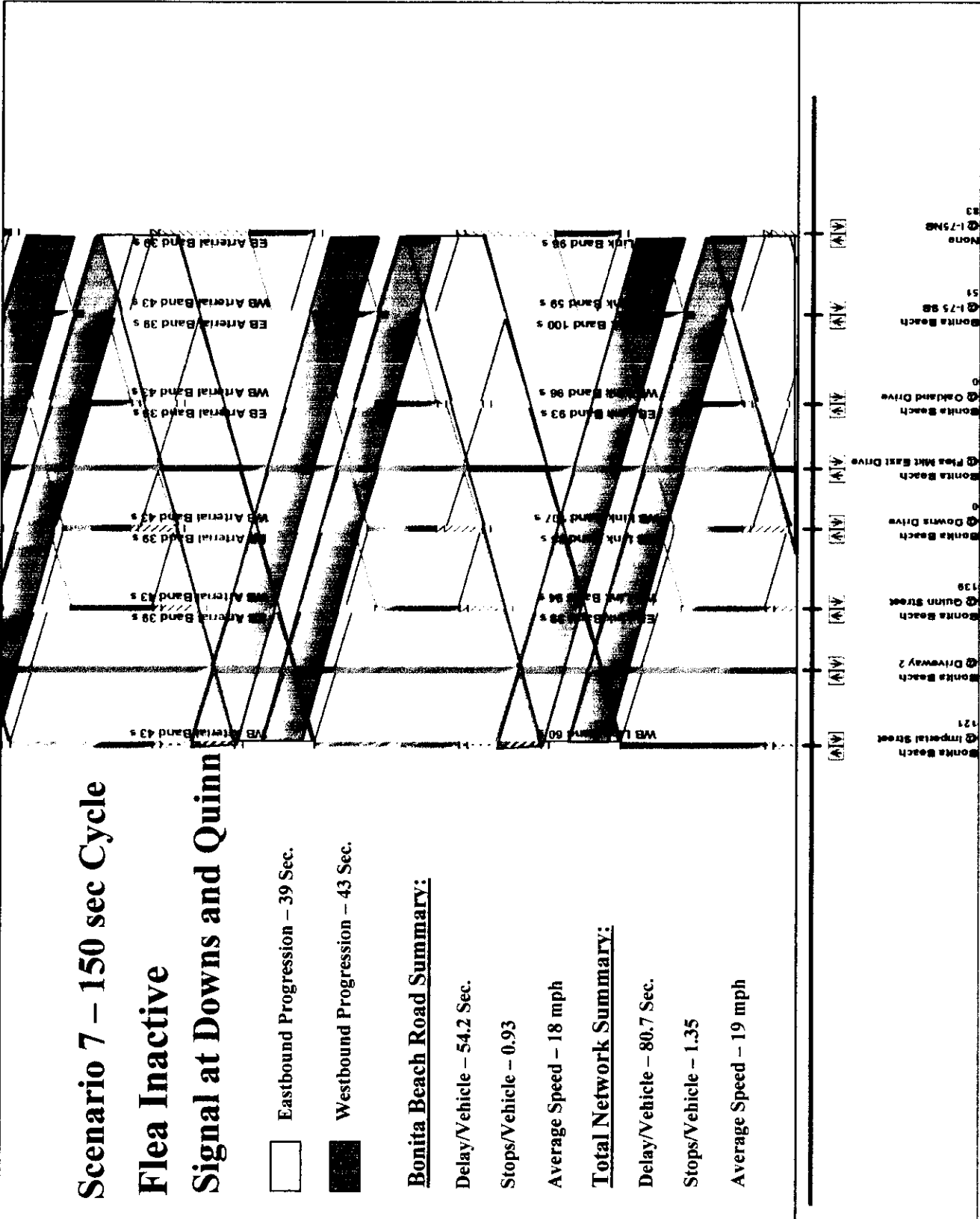
Bonita Beach Road Summary:

Delay/Vehicle - 59.3 Sec.
 Stops/Vehicle - 0.90
 Average Speed - 18 mph

Total Network Summary:

Delay/Vehicle - 86.1 Sec.
 Stops/Vehicle - 1.39
 Average Speed - 19 mph





**Scenario 7 - 150 sec Cycle
Flea Inactive
Signal at Downs and Quinn**

Eastbound Progression - 39 Sec.
 Westbound Progression - 43 Sec.

Bonita Beach Road Summary:

Delay/Vehicle - 54.2 Sec.
 Stops/Vehicle - 0.93
 Average Speed - 18 mph

Total Network Summary:

Delay/Vehicle - 80.7 Sec.
 Stops/Vehicle - 1.35
 Average Speed - 19 mph

- 121 Imperial Street
- 138 Quinn Street
- Downs Drive
- Plas Mkt East Drive
- 1-75 SB
- 1-75 NB
- 1-75 NB
- 1-75 NB