Construction Control:

A
Method of Determining
Traffic Alternatives

by

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I Introduction

This paper describes the application of microcomputer software to assist in developing and updating a maintenance of traffic plan necessitated by a proposed construction project's removal of an arterial from a highway network.

Transportation planning software is utilized to estimate the likely traffic flow impacts on neighboring facilities in a defined area both with and without the arterial as part of the highway system. Traffic Operations software is used to provide additional information of intersection performance within the subarea.

The result of these analyses and other complementary techniques are a definition of the problem areas and a preferred alternative route to avoid the construction project.

II Purpose

The purpose of this paper is to assist the Construction Engineer in determining traffic alternatives around a construction project.

The Traditional Method that is used to determine a traffic route around a project is by visual sighting and selection in the field. This method of choice is fine for a rural area where the transportation network is simple and there is light traffic movement. But, in today's urban areas, the transportation network is very complex and conditions change often during the day.

The method of using field judgement is utilized often in today's projects. This may not be satisfactory. The results show in the increased occurrence of traffic jams and the frustration of the public attempting to use the designated detours. Other results are the increased costs and time delays caused by the attempt of the project to share the same corridor as the motorists.

If proper planning were done, an analysis of the surrounding area would show the driving force that makes people choose their path to a destination. The tools needed to accomplish this are used by transportation system planners today.

III Method of Approach

Each urban area has a network and a trip table. The network is a system of links and nodes that describes a transportation system. Usually the larger the urban area is the more complex the network system. The trip table is a matrix of the number of vehicle trips from one geographical area to another within the urban area. Both are the products of the urban transportation systems planning process.

The first step that needs to be accomplished is to locate the project within the urban area and identify the subarea of influence around that project. This tends to be a judgmental determination that can be confirmed by trial and error testing. Usually, the subarea is somewhat larger than the area of the project.

The second step is to "cut-out" or "window" the subarea from the urban network and its trip table. This windowing process yields a network and trip tables depicting urban area trips truncated at the point they cross the subarea boundary. The goal of windowing a subarea is to save time and cost by applying analyses to only that subarea.

The third step is updating the network to reflect a finer level of detail, and the trip table is expanded to reflect smaller geographical areas than in the urban area. This increase in detail is necessary in order to more accurately model changes in traffic flow as a result of the small geographic scale change in the highway network.

The fourth step is to calibrate the subarea traffic assignment. Calibration is a procedure used to estimate the parameters of a model or to adjust a model to replicate actual measured conditions. Calibration is a general term and does not imply that a particular technique has to be applied. Trial and Error is a form of calibration.

The fifth step is to create the subarea network alternatives and then assigning the traffic to the alternatives.

The sixth step is to analyze each of the alternatives. This will show the effects on traffic between each of the alternatives. Plotting each of the alternatives either using volume bands or posting the simulated volumes will provide a quick visual of the effects. A more detailed analysis of the assignment results may identify link or intersection specific problems which may have been created or resolved. This analysis and its results provide a more realistic pattern of street system performance changes in which to develop a alternative route to avoid the construction project.

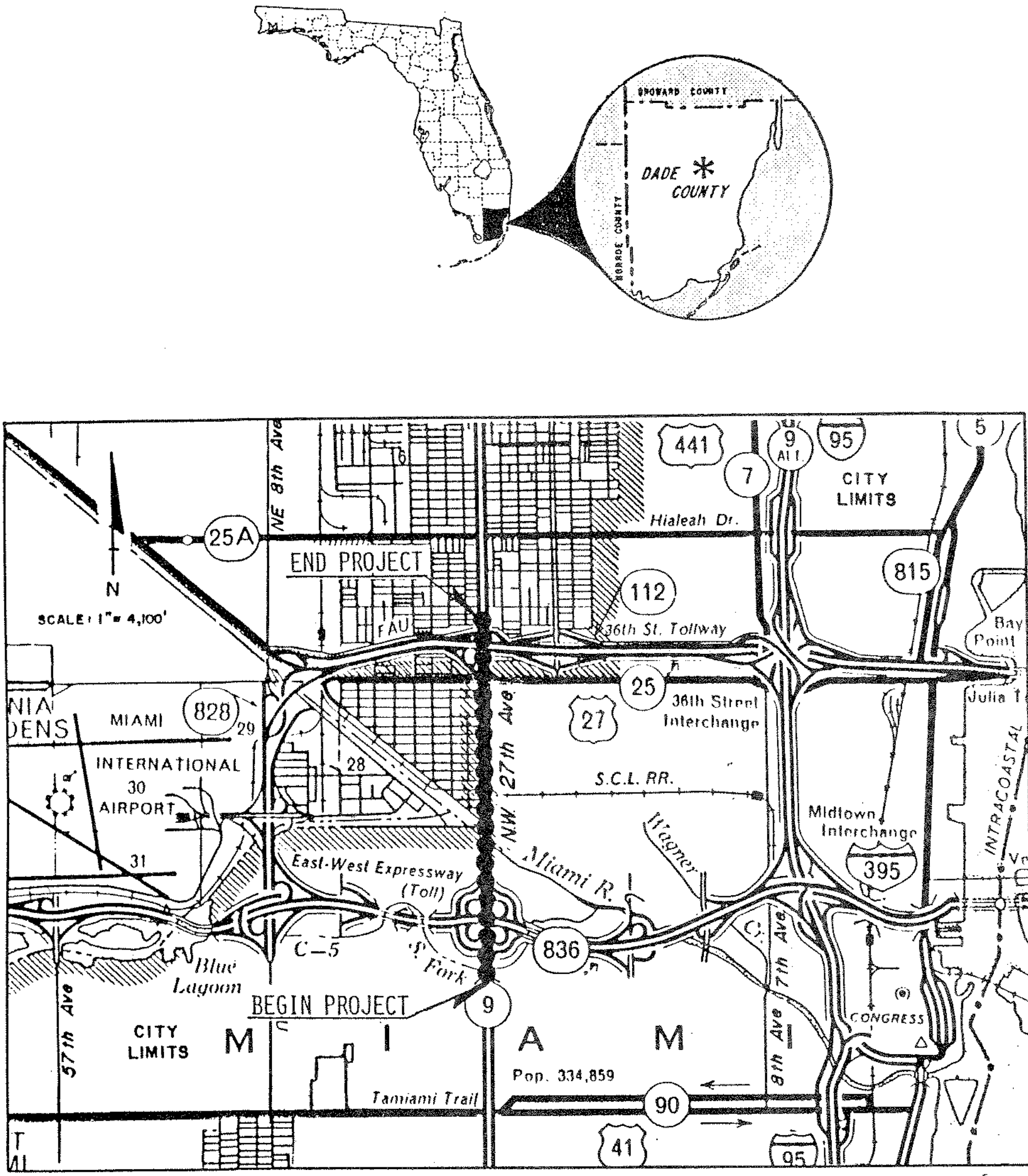
IV Test - Description

The Test case used is a arterial that had a Preliminary Engineering Report just completed. The description is as follows.

State Road 9 is an important north-south roadway facility, locally known as N.W. 27th Avenue, that extends from Coconut Grove northward through fringe commercial, residential and suburban sections across Dade County into Broward County. From a functional standpoint N.W. 27th Avenue is classified as a major arterial facility intended to mainly serve through traffic on long trips and therefore designed to carry the highest traffic volumes. The proposed improvements involve the upgrading of N.W. 27th Avenue from generally a four lane divided facility into a six lane urban divided facility from just south of N.W. 11th Street at the southern terminus to N.W. 42nd Street at the northern end, an approximate distance of 2.18 miles. See Project Location Map, Figure 1.

Major alternatives for the improvement of N.W. 27th Avenue included a western corridor, the existing corridor, and an eastern corridor. After evaluating the social economic and environmental effects of each alternative, as well as the engineering and traffic service features, the existing corridor was selected as the preferred.

Existing traffic counts and future traffic projections indicate heavy vehicular usage especially south of the Miami River Canal Crossing. Without implementation of the project several existing signaled intersections (i.e. N.W. 11th Street, N.W. 14th Street, and N.W. 20th Street) would reach intolerable traffic conditions in the near future.



PROJECT LOCATION MAP

FIGURE NO. 1

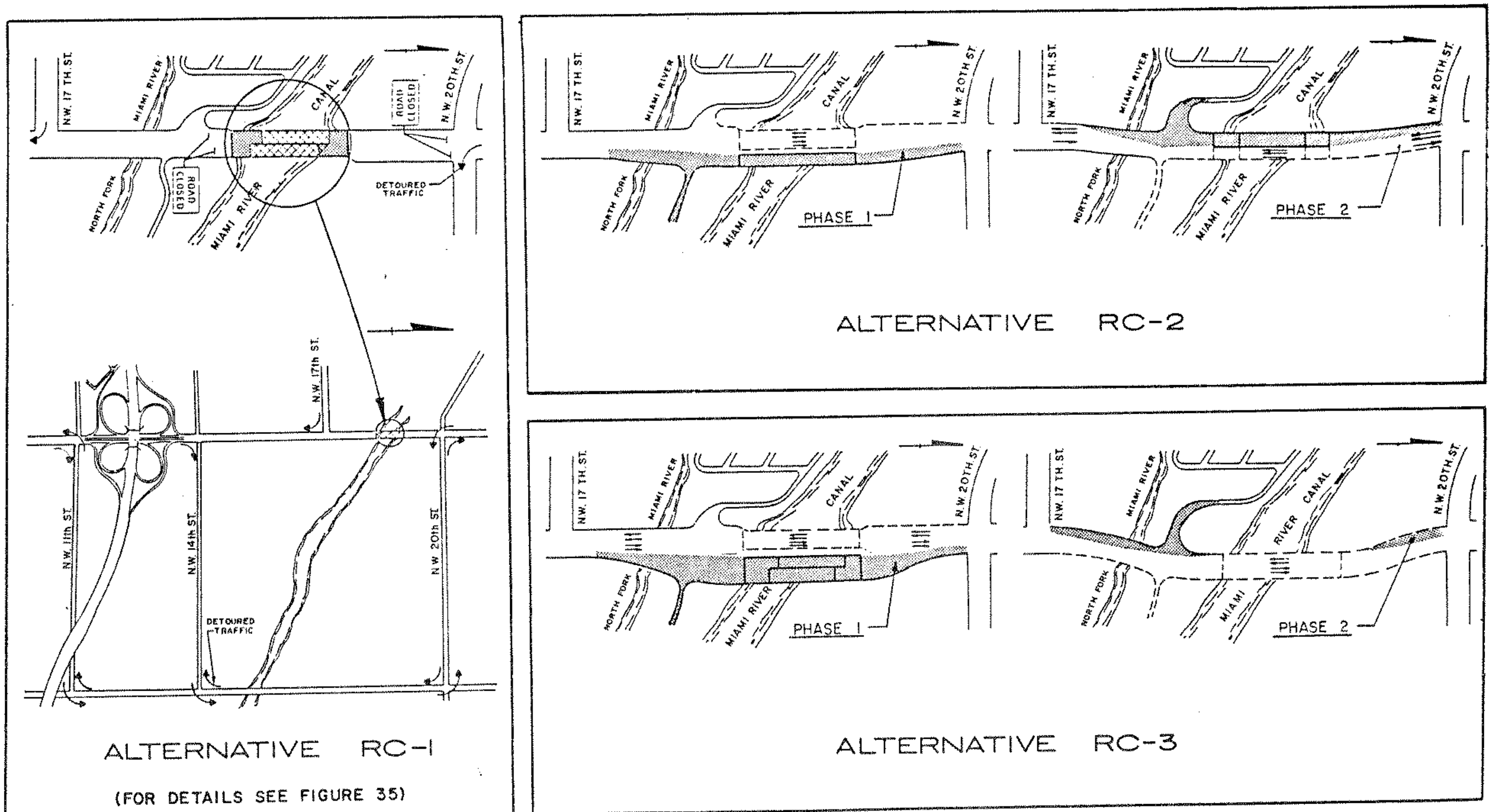
Several maintenance of traffic schemes (see Figure 2) during the construction of both the Miami River Canal Crossing and the rest of the project were considered and evaluated. Serious social and economic disruptions would result from the removal of the existing N.W. 27th Avenue bascule structure without provision of parallel facility to accommodate the heavy river crossing traffic.

V Results

The steps described under the Methods of Approach were utilized to produce simulated traffic volumes in a subarea. This subarea, see Figure 3, was developed from the Miami Metropolitan Planning Organization 1986 calibrated highway networks and trip tables.

The network was then edited to remove the River Crossing and produce the network as shown in Figure 4. The subarea vehicle trip table was assigned to both networks using the calibrated traffic assignment program.

Figures 5 & 6 show the subarea with simulated traffic volumes depicted by bandwidths. The patterns shown suggest that a major portion of the traffic occurs below the river crossing. Also the trips that occur above the crossing found either another path to travel or they traveled in another direction to satisfy the trip.



RIVER CROSSING MAINTENANCE OF TRAFFIC ALTERNATIVES

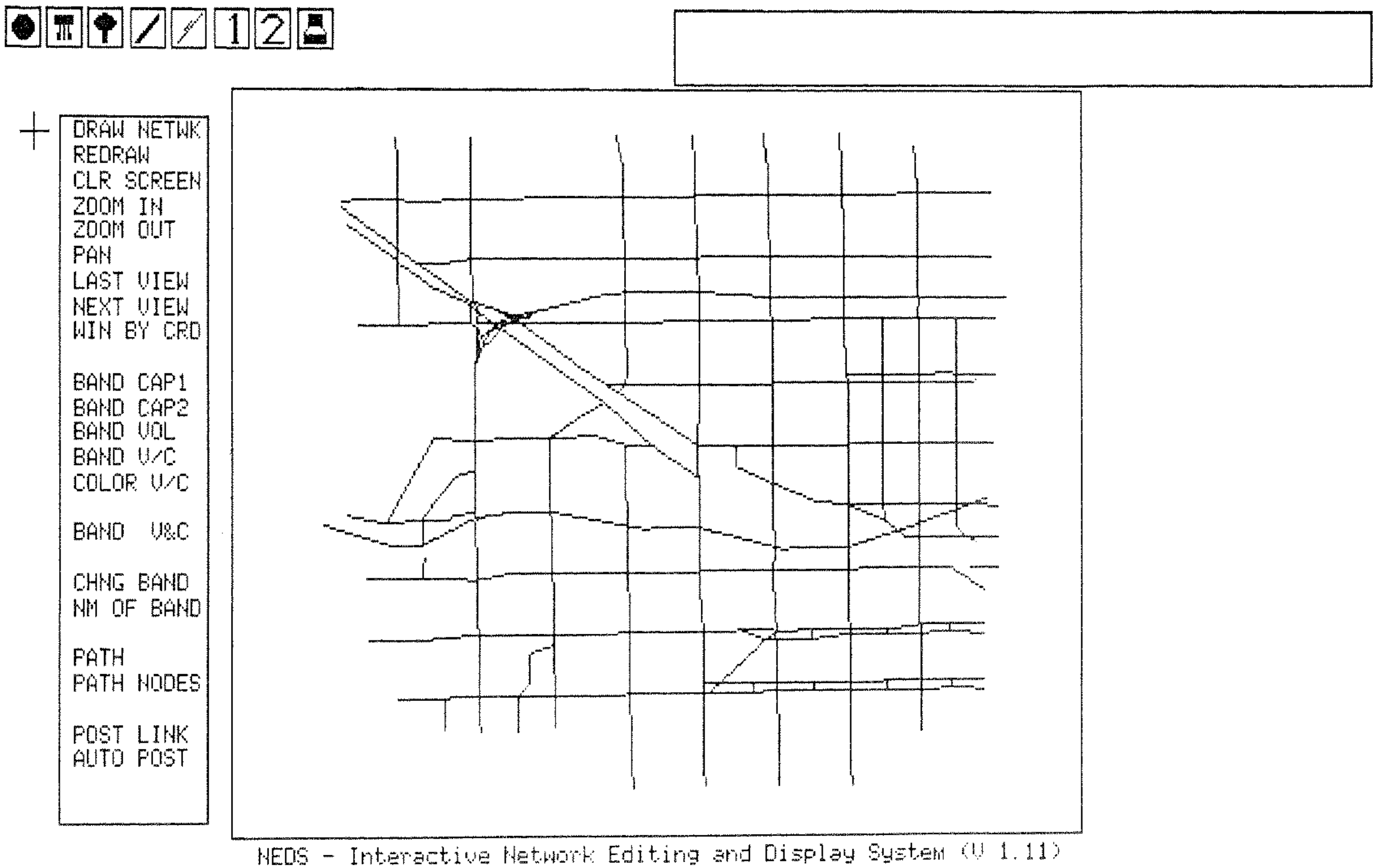
9

FLORIDA DEPT. OF TRANSPORTATION
STATE PROJECT NO. 87240-1522
S.R. 9 FROM N.W. 11th ST. TO N.W. 42nd. ST.

FIGURE NO. 2

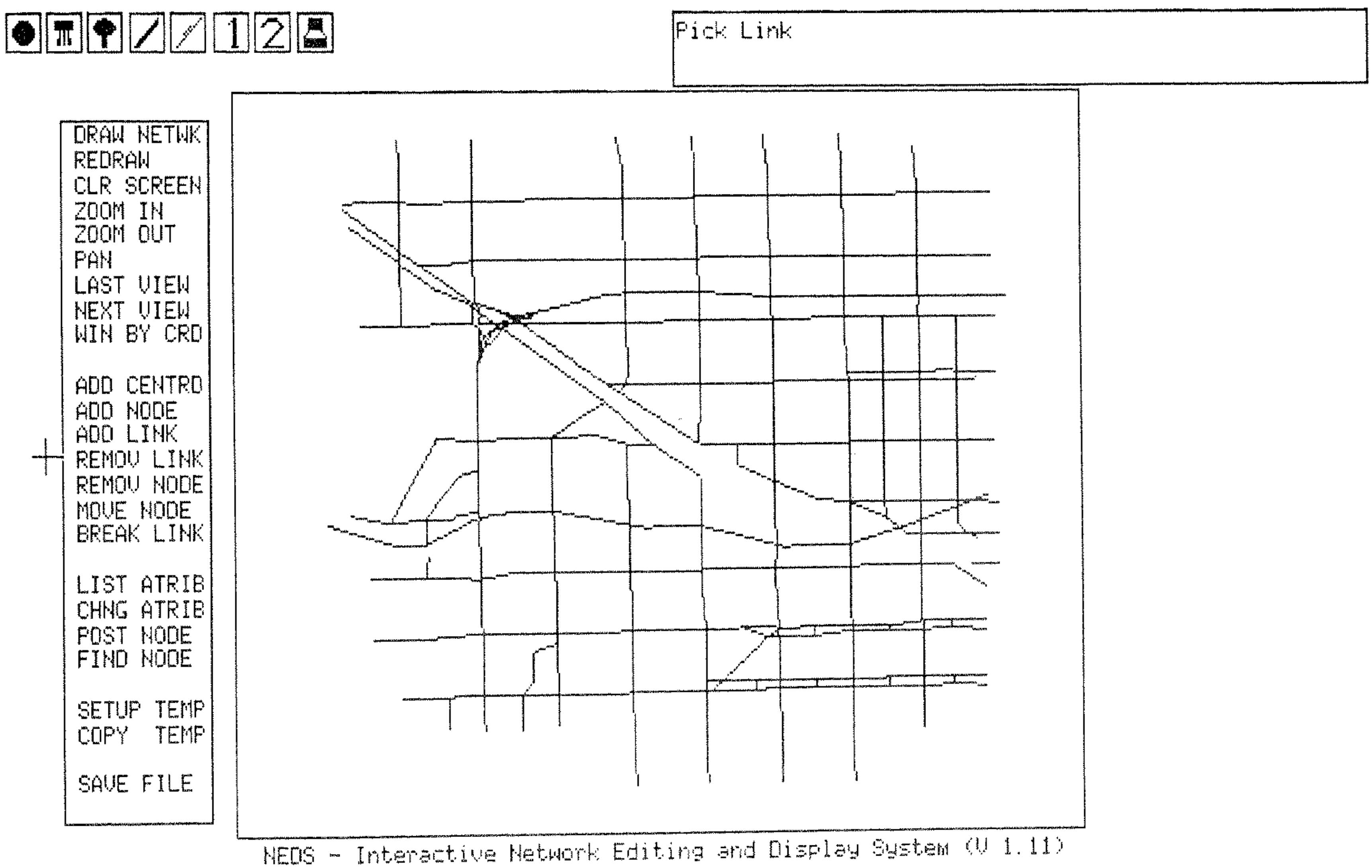
Subarea Network with River Crossing

Figure 3



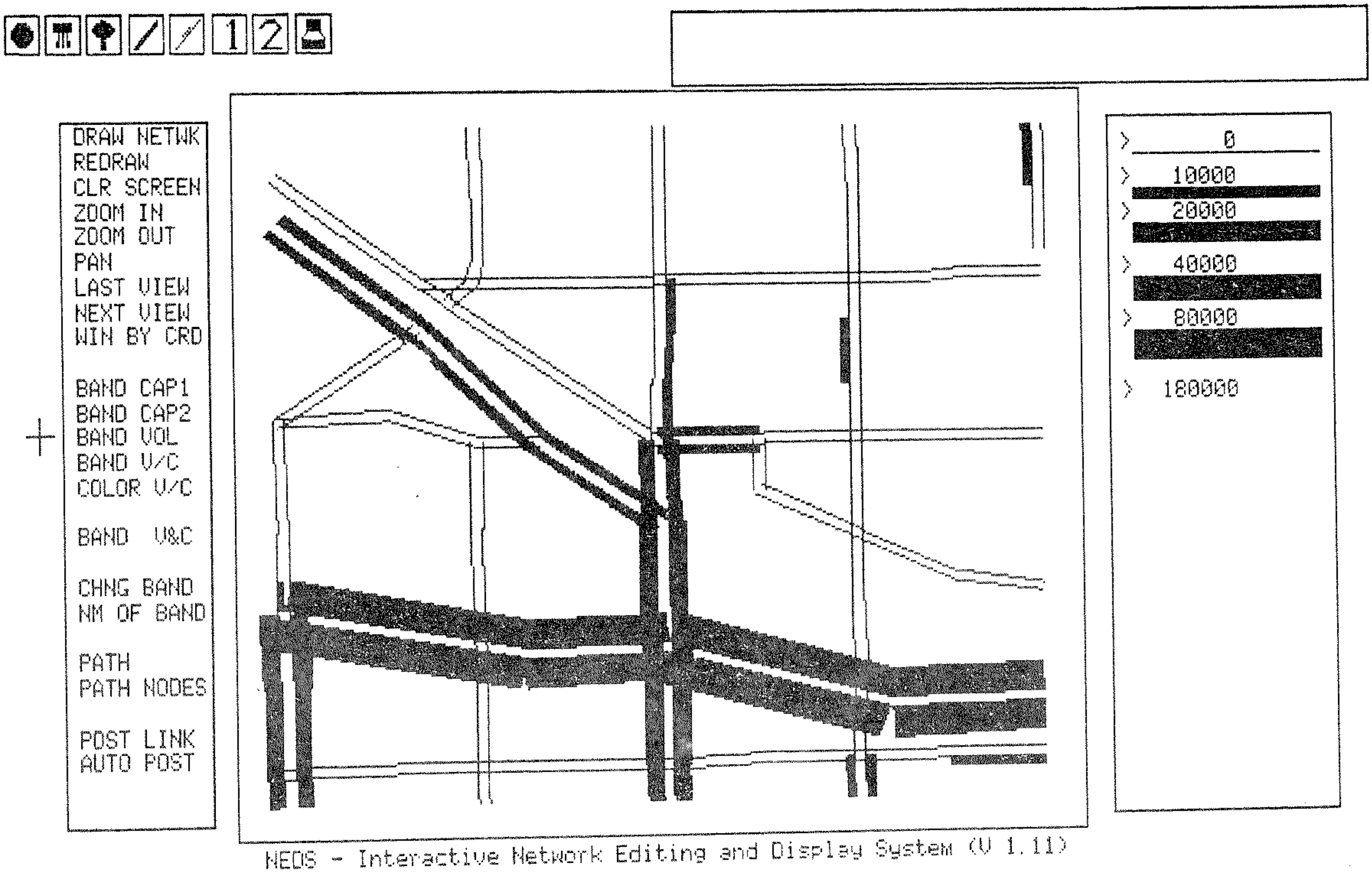
Subarea Network without River Crossing

Figure 4



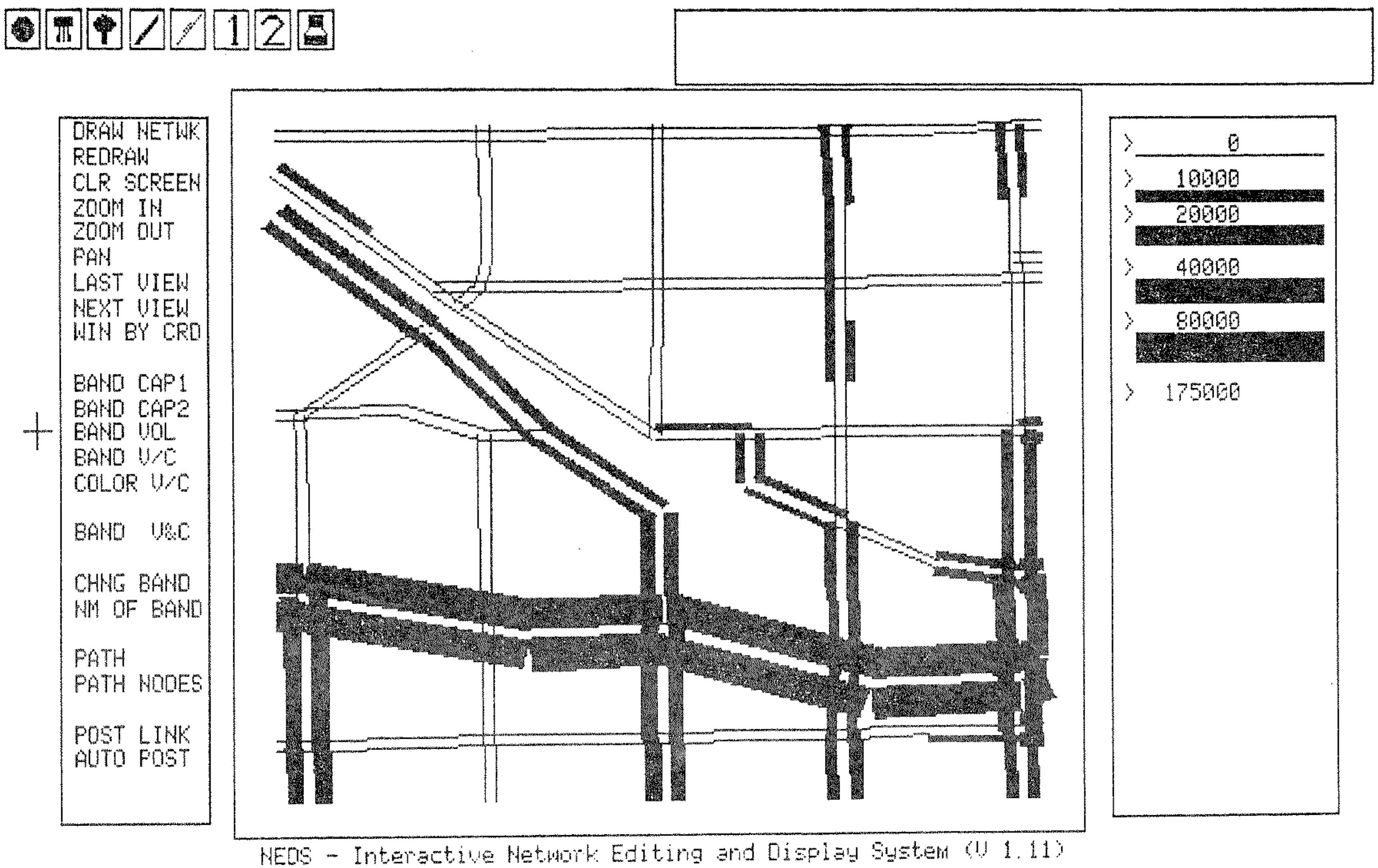
Subarea Network with River Crossing
Simulated Volumes in Bandwidths

Figure 5



Subarea Network without River Crossing
Simulated Volumes in Bandwidths

Figure 6



VI Conclusions

By extracting and increasing the detail of the subarea network and trip tables from the urban area, a subarea trip assignment with detailed calculations at selected intersections can be performed. This approach results in a more realistic re-routing of traffic in the subarea.

VII Recommendations

From the review of the data available, it is recommended that the planning of maintenance of traffic alternatives utilize the tools available in urban transportation planning to test various traffic schemes.