DATE: 4/20/99 AGENDA ITEM # 16
( ) APPROVED ( ) DENIED
( ) CONTINUED TO

TO: JAMES L. APP, CITY MANAGER

FROM: JOHN R. McCARTHY, DIRECTOR OF PUBLIC WORKS

SUBJECT: SPRING STREET AND NIBLICK ROAD INTERSECTION CONSTRUCTION ALTERNATIVES

DATE: APRIL 20, 1999

Needs: For the City Council to consider construction alternatives for the intersection of Niblick & Spring Street and related improvements.

Facts:

1. With the passage of Measure D, the final plans were bid for the addition of two lanes, sidewalk and bikeways on the Niblick Bridge.

2. The City Council expressed a desire to consider a "free flow" intersection design at the intersection of Spring and Niblick as an option to the planned standard signalized intersection.

3. Construction work has started on the bridge expansion. The contractor projects as little as 12 months to complete the expansion. It is imperative to determine the intersection configuration i.e. standard intersection vs. free-flow (roundabout).

4. This decision must be made soon so as to not slow the contractor on the bridge construction, thereby creating costly delays.

Analysis and Conclusion:

BACKGROUND

The City of Paso Robles has been pursuing the expansion of the Niblick Bridge since 1991. The expansion includes the widening of the bridge to 4 lanes with addition of a sidewalk on the north side and bike lanes on each side of the widened bridge. Additionally, the Niblick/Spring intersection will be modified as planned to accommodate two eastbound lanes, two westbound left turn lanes, one westbound through lane and one right turn lane.

The Council wanted the opportunity to investigate a "free flow" intersection design in place of a standard intersection design with traffic signals. Therefore, the bid was broken out to highlight those items of work relative to the intersection modifications. The total bid cost for the standard signalized intersection is $358,729.

STANDARD WIDENED INTERSECTION OPTION, TRAFFIC SIGNALS AND SIX LANES OFF THE BRIDGE

The current bridge plans call for an enlarged intersection with a number of enhancements over the existing configuration. The west end of the bridge with have 6 lanes with 2 left turn only lanes, 1 through lane, one right turn only lane, and 2 eastbound through lanes. (see attached exhibit).

The freeway off ramp will be widened to include a right turn only lane in addition to two northbound through lanes and one left turn lane.

Spring St. will have 2 left turn lanes onto the bridge, one through lane and one through and right turn combination lane.

First St. would again be opened up to accommodate east and west traffic.

Parking would be eliminated along Spring St. on the east side and two lanes of traffic would be established and then merged into one near 4th St.

"FREE FLOW" INTERSECTION OPTION

The City Council wanted to evaluate a "free flow" (roundabout) type intersection alternative that incorporates a series of right turn movements with no stop or yield. There are examples in Vail, Colorado and Carlsbad, California.

Peter Doctors, of the engineering firm of Ourston & Doctors, has previously submitted a proposal regarding the feasibility of such an intersection at Niblick and Spring Street. He has concluded that such a design would be beneficial and provide for increased traffic flow at the intersection. Mr. Doctors anticipates the installation would decrease the average backup length on the 101 off ramp, and the Niblick Bridge.

The base cost for construction of this alternative intersection is estimated at $764,000 by Mr. Doctors for a two lane bridge arrangement. No estimate is currently available for a four lane roundabout facility, although it would not be surprising to anticipate a range of 900,000 to 1,000,000 dollars. Considering the deduction of the standard intersection costs at $358,729, and subject to the receipt of competitive bids, this would mean an increase to the project costs of approximately $650,000.

The attached Council report of 9/2/97 provides additional data for this type of alternate intersection design.

FREE RIGHT TURN LANE OPTIONS

A Council comment has come up regarding free right turn movements off the freeway northbound to the bridge and from the bridge, traveling westbound to Spring St. In a "true" free right turn lane, vehicles would proceed on a right turn which flows into an exclusive lane heading another direction. An example of this would be a freeway ramp going onto a freeway where the vehicle does not have to merge, but has an open lane to continue on.

The geometrics of the Niblick intersection are such that a free right turn at these locations would not be a true free right turn. Vehicles would still need to yield to oncoming vehicles that may be entering from other directions. For example, when two lanes of traffic are turning left onto the bridge from Spring Street, a vehicle coming off the freeway northbound and wanting to go east on the bridge, would need to yield to oncoming turning traffic before completing its right turn.

Therefore, the concept of a "free" right turn is in reality only a "wider" right turn than the turn lane that is currently planned for the intersection. There may be some merit in providing a wider right turn lanes at the intersections, but the value of having a free right turn will not be fully realized and cannot be fully realized unless another lane is added to the bridge. Similarly in the case of the right turn onto Spring St., another lane would need to be added thereby creating the need to purchase additional right of way and impact the apartment complex currently at that corner.

SPRING STREET MEDIAN ISLAND

As part of the overall Spring Street design plan approved by the City Council, a median island was constructed on Spring Street between 1st St. and 3rd St. Spring Street is designated as an arterial street on the City General Plan. This island is constructed with concrete curb and is landscaped. The median island separates the opposing volumes of traffic ,on Spring St. within those blocks. Some have questioned the need for the islands in this location.

Median islands separate heavy traffic movements to prevent conflicts, regulate left turn movements and reduce the potential for head-on collisions. Additionally, islands add an open green space element to large asphalt areas.

160-02

The American Association of State Highway Officials, which published the Geometric Design of Highways, states "A median is a highly desirable element on all arterials carrying four or more lanes."

In the specific example on Spring Street, the removal of the island and location of the adjacent driveways from 1st to 3rd, may cause additional traffic problems with turning traffic into and out of the adjacent driveways.

REDUCTION OF SPRING STREET ISLAND WIDTH

The question has surfaced as to reducing the width of the island at this location. The reason being to provide additional width for through traffic. The current width of the median varies. However, the reason for the existing width is to protect the left turn movements from through traffic. Traveling northbound on Spring, the median cannot be reduced in width because it would then be narrower than the left turn pocket into 3rd St. thereby exposing left turn vehicles to potential rear end collisions. The same holds true for the southbound movement. Although currently, the area seems wide, once the bridge is expanded, another left turn lane will be installed, thereby utilizing the remaining space that may seem at this time, unnecessary.

BRIDGE ENHANCEMENTS

There were other bridge enhancement features that were previously reviewed, but not included. The bridge entry portals ($100,000) were not included, nor the decorative sidewalk showing a pioneer horse and wagon scene centered on the City Logo ($25,000); see attached sketches. Attached are pictures of the treatments which will be presented at the meeting for your consideration.

The landscape final landscape design and treatment has not been completed pending the final decision by the Council on the final intersection configuration. Once the configuration is finalized, the landscape treatment will then be completed.

PROJECT SCHEDULE IMPLICATIONS

The project schedule for the Niblick Bridge expansion, is very aggressive and allows for little flexibility. Good weather may expedite the construction of the bridge project, and the sooner the Council makes a decision on the intersection, the sooner the work can begin. The attached schedule shows the steps needed to plan, design and construct an alternate intersection design.

Should the Council decide to implement a "free flow "design for the intersection, the Council could take the following actions:

1. Retain Ourston & Doctors' engineering firm to prepare a preliminary design on the 4 lane "free flow" design.
2. City Council to review preliminary design and authorize final design.
3. Retain an engineering firm to prepare final civil detailed design and specifications for a "free flow" design to accommodate the 4 lane bridge.
4. Let a contract and construct the "free flow" design.

Policy Reference: None.

Fiscal Impact: The standard intersection construction costs are estimated at $358,729, and is included in the current contract price for the bridge widening. This is the amount that would be deleted from the contract should a "free-flow" intersection be directed by the Council. Estimated cost of a 2 lane "free flow" intersection design is $794,000. More detailed plans are needed to make better cost estimates to

accommodate a four lane bridge. No hard estimates can be provided at this time without additional engineering work. Very rough estimates would indicate that the "free-flow" alternative would cost the City $500,000 to $700,000 in addition to the current budget of $358,729.

Options:

A. For the City Council to 1) direct staff to retain the existing "standard" intersection design per the contract; 2) retain the median island on Spring Street; and 3) identify additional bridge entry features.

B. For the City Council to 1) direct staff to install a "free flow" roundabout type intersection design at this location; 2) authorize hiring a consultant to complete the preliminary design for Council approval; 3) retain the median island on Spring Street; and 4) not add any additional improvements.

C. Amend, modify, or reject the above options.

DATE: 09/02/97 AGENDA ITEM # 11.
( ) APPROVED ( ) DENIED
( ) CONTINUED TO _____

TO: JAMES L. APP, CITY MANAGER

FROM: JOHN R. McCARTHY, DIRECTOR OF PUBLIC WORKS

SUBJECT: IMPROVEMENT ALTERNATIVES FOR NIBLICK BRIDGE AND SPRING STREET INTERSECTION

DATE: SEPTEMBER 2, 1997

Needs: For the City Council to review various alternatives regarding Niblick Bridge widening and intersection improvements at Niblick/First/Spring.

Facts:

1. The City has been pursuing the widening of the Niblick Bridge to four lanes since 1991.

2. The City Council requested in the 1997 funding from SLOCOG for a feasibility report to study the concept of a roundabout (traffic circle) at the intersection of Niblick/First/Spring as a possible alternative to construction of the Niblick Bridge expansion.

3. SLOCOG authorized funding in the amount of $25,000.00 for the City to pursue a study by the engineering firm of Ourston & Doctors.

4. A feasibility study was prepared by the consultant presenting two alternatives for roundabouts.

5. Discussion at the July 1, 1997, City Council meeting raised additional questions regarding intersection and bridge improvements by Council members and a request was made for staff to come back with additional data.

Analysis and Conclusion:

BACKGROUND

The City of Paso Robles has been pursuing the expansion of the Niblick Bridge since 1991, in response to continued development east of the Salinas River. This expansion includes the widening of the bridge to 4 lanes with addition of sidewalk and bike lanes. Environmental impact studies were done and a new environmental impact report was prepared for the expansion project. Additional environmental studies were prepared as required by both NEPA and CEQA. The City contracted with Moffat and Nichol Engineering to prepare the final design plans for the expansion of the Niblick Bridge from 2 lanes to 4 lanes. Those plans were completed in 1996 at a cost of $350,000.00. The appropriate permits

were obtained from the Army Corps of Engineers, SP Railroad, Fish & Game, Caltrans, and other agencies as necessary to expand the Bridge.

In December of 1996, the City Council requested a roundabout feasibility study be reviewed for the purposes of determining if a roundabout could be an alternative to widening Niblick Bridge in the short term.

Two roundabout options were presented on July 1, 1997, by consultant Peter Doctors to the City Council. Alternative No. 1 is a modern roundabout design set within the existing right-of-way of the intersection with an estimated cost of $1.1 million. Alternative No. 2 is the same basic design as Alternative No. 1, but has a wider right turn lane off the freeway and requires bridge modifications. The estimated cost for Alternative No. 2 is $2.0 million.

Subsequent to the presentation of the roundabout design alternatives, the City Council requested additional analysis on an intersection modification plan proposed by Councilman Baron. This plan proposes to close off First Street east bound, eliminated northbound left turn and provided for a continuous south bound green light.

Another alternative regarding a west bound grade separated overhead of bridge traffic going to south bound Highway 101 was brought forth by staff, but has been rejected for purposes of this report due to topographic and monetary constraints.

This report will compare and analyze the remaining four alternatives. Those alternatives are:

A. Roundabout Alternative No. 1 Design;
B. Roundabout Alternative No. 2 Design;
C. Baron Alternative;
D. Bridge Widening to four lanes.

BRIDGE CAPACITY vs. INTERSECTION CAPACITY

There are two concepts that need to be distinctly separated in any discussion regarding capacity considerations of the Niblick Bridge. These concepts relate to the capacity of the existing two lane bridge itself, as compared to the capacity of the intersection of Niblick/First/Spring/101 ramps. Both are important to overall traffic flow. Both have different constraints on traffic volumes. This section of the report will deal with the capacity of the existing two lane bridge without taking into account any traffic flow restrictions at the intersection, which will be addressed later.

Restrictions of capacity (traffic flow) over the Salinas River on the Niblick Bridge can be caused by either; 1) intersection restrictions due to waiting time (Niblick/First/Spring); or 2) physical bridge capacity limitations. Regardless of the conditions (configuration) of the intersection, the bridge itself would no longer be able to support additional traffic beyond 1800-1900 vehicles per lane, per hour. This is a well documented traffic capacity constraint. Traffic volumes of 1800 vehicles per hour represent a 70% increase over the existing peak hour traffic flow per lane of 1057 vehicles per hour.

Based on recognized peak hour traffic generation for residential development, it is estimated that approximately 1100 additional dwelling units in the southeast area of town would generate enough traffic during the peak hours to cause the bridge to fail in terms of its carrying capacity regardless of the configuration. In other words, 1100 new dwelling units would cause the bridge itself to be the capacity problem, not the intersection.

If one were to make an assumption that approximately 100 new dwelling units per year would be built on the east side and utilize this bridge, it would mean that in 11 years an expansion of the bridge itself (adding more lanes) would be necessary.

There are a number of other factors, such as commercial development and alternative routes, which could divert traffic from going over the Niblick bridge, however, for purpose of this report the 11 year time frame will be used as a benchmark reference number.

Associated Transportation Engineers have reviewed in detail the bridge capacity and the traffic intersection efficiencies. They concluded that the City must consider the construction of an additional two lanes for the bridge. Intersection improvements alone, while helping in the short term, will not be an adequate long term solution. (See attached ATE letter)

INTERSECTION IMROVEMENTS - NIBLICK/FIRST/SPRING

The second element to the capacity issue is the intersection performance at Niblick and Spring Street. Currently, this intersection is operating at a level of service "E" (forced flow) during the p.m. peak hour.

There are four intersection improvement scenarios that are considered in this report. Below is a brief description of these intersection alternatives:

1. Roundabout Alternative 1: (basic design)

   The Roundabout 1 design was presented at the July 1, 1997, meeting by consultant Peter Doctors. That report is attached. The concept would be to install a modern roundabout design at the intersection and eliminate the

current traffic signal and intersection geometry. The roundabout concept provides for continuous traffic flow through the intersection.

The question was asked by the City Council as to whether the design would need modification if the bridge were expanded to four lanes in the future? Mr. Doctors responded to this in a supplementary document. The short answer is yes, the roundabout would need modification to function properly with a four lane bridge. Also, he does not recommend building a larger roundabout to function with the two lane bridge (report attached).

2. Roundabout Alternative 2: (extended right turn from freeway to bridge)

   The Roundabout 2 would provide for an additional free flowing right turn lane that would require some modification to the bridge structure. This alternative would provide for additional increased capacity. The basic operation of the roundabout remains the same.

3. Baron Plan - Intersection Modification Closing First Street:

   This proposed modification would include the elimination of First Street traffic east bound. The east bound movement would be totally closed to traffic, and traffic would have to be diverted to Second Street. However, west bound traffic would be allowed as would south bound right turns. The original proposal included elimination of the north bound left turn of the freeway, and construction of a physical barrier for the most westerly south bound through lane.

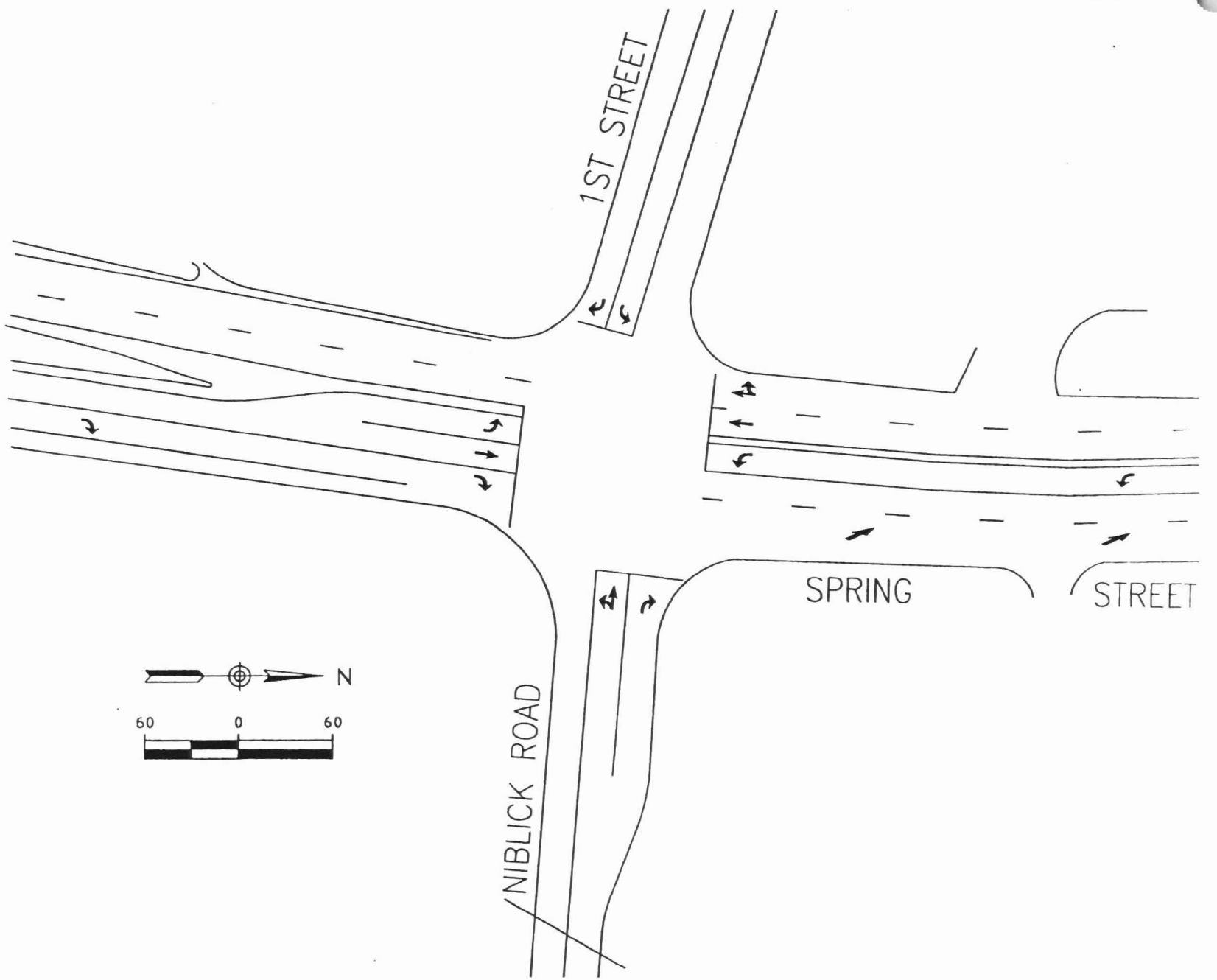
   Further analysis has determined that it would not be necessary to have the physical barrier in, nor eliminate the left turn lane. Both of those movements could be permitted with no overall decrease to the efficiency to the intersection or its capacity.

   This alternative requires only minor adjustments to the traffic signal equipment and minor physical improvements to the streets themselves.

4. Intersection Improvements & Bridge Widening to 4 Lanes:

   This alternative would keep the same general operation of the intersection but with the addition of 2 through lanes in the east/west direction, a double left turn lane from the bridge onto the freeway, double right turn lane from the freeway offramp east bound to the bridge, and a double left turn lane from Spring Street east bound to the bridge.

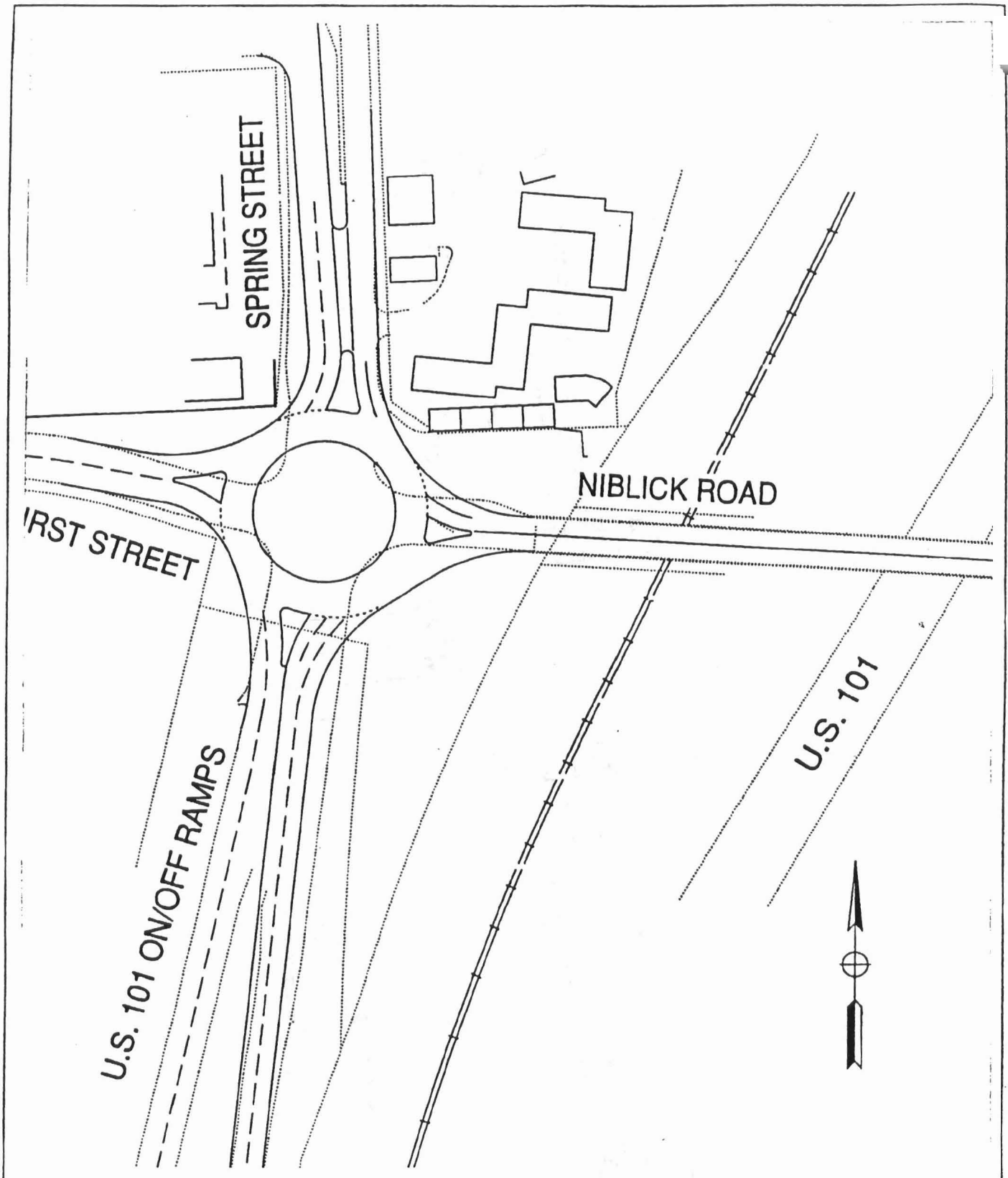
The attached diagrams show the layout of each alternative.



ASSOCIATED
TRANSPORTATION
ENGINEERS

EXISTING LANE LAYOUT

FIGURE 1



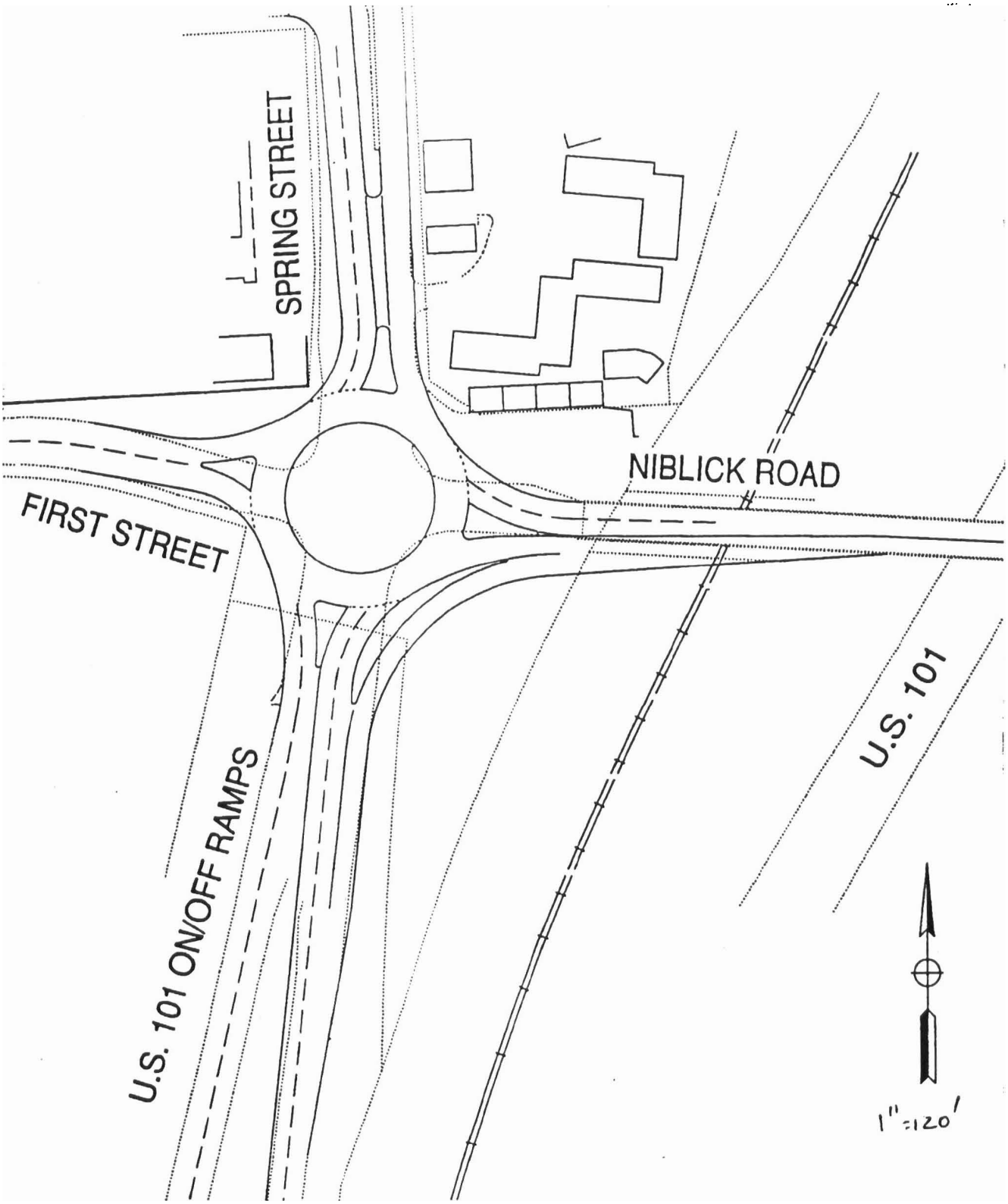
Ourston & Doctors

MODERN ROUNDABOUT INTERCHANGES
5290 Overpass Road #212 Santa Barbara, CA 93111

Near Term Alternative #1

Niblick Bridge Roundabout
Paso Robles, California

16-10



Ourston & Doctors

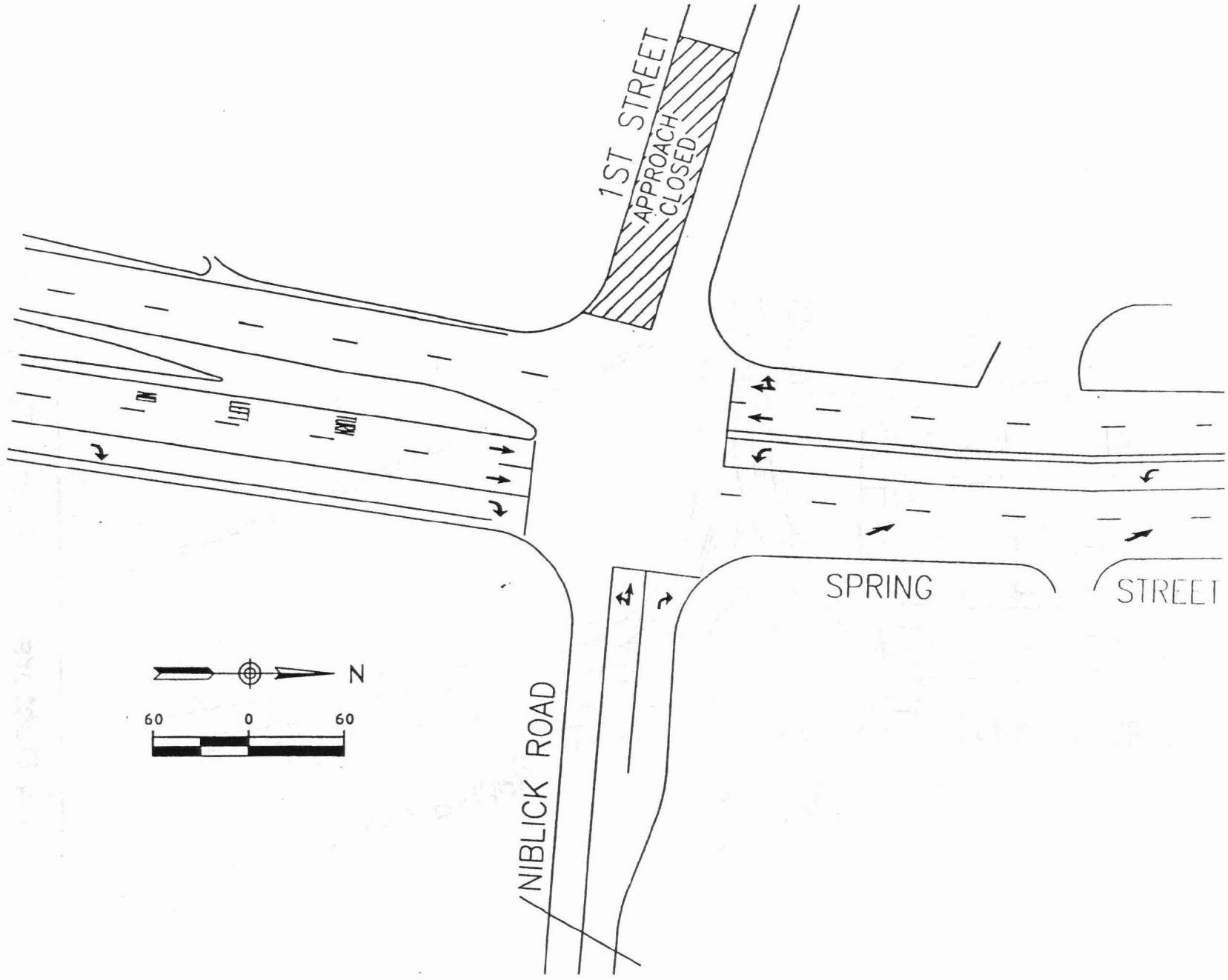
MODERN ROUNDABOUT INTERCHANGES
5290 Overpass Road #212 Santa Barbara, CA 93111

Long Term Alternative #2

Niblick Bridge Roundabout
Paso Robles, California

16-11

11-7



ASSOCIATED
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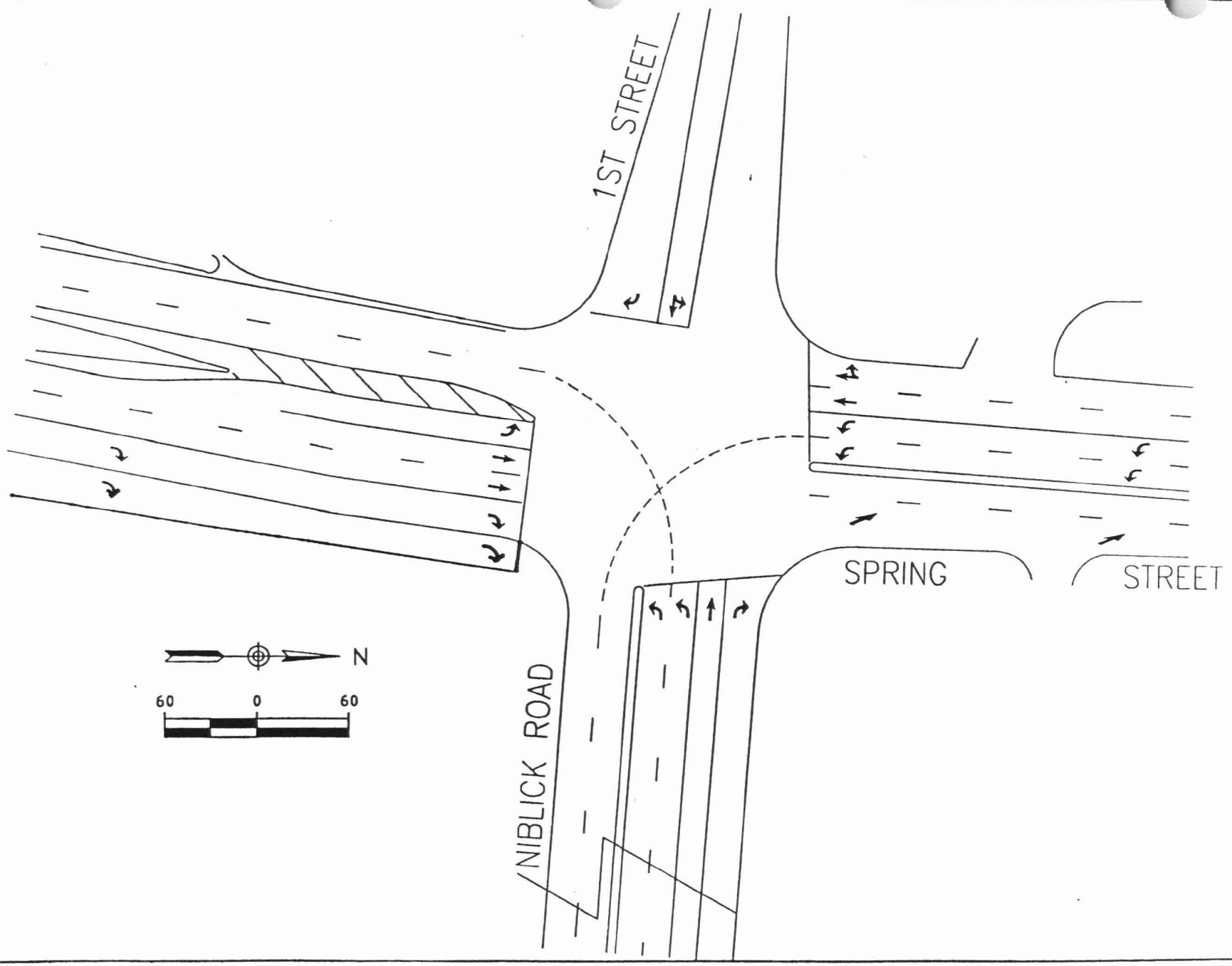
ENGINEERS

PROPOSED MODIFICATION "A" "BAROL"

FIGURE 3



ASSOCIATED
TRANSPORTATION
ENGINEERS

PROPOSED BRIDGE WIDENING

FIGURE 2

CAPACITY COMPARISONS AND ESTIMATED COSTS

For each of the intersection alternatives there are varying geometrics that would allow increased capacity to the intersection. The table below compares each alternative with the associated capacity increase through the intersection as well as estimated cost of the improvements. Please note that the capacity increases are based on reaching level of service "E", which is basically failure of the intersection.

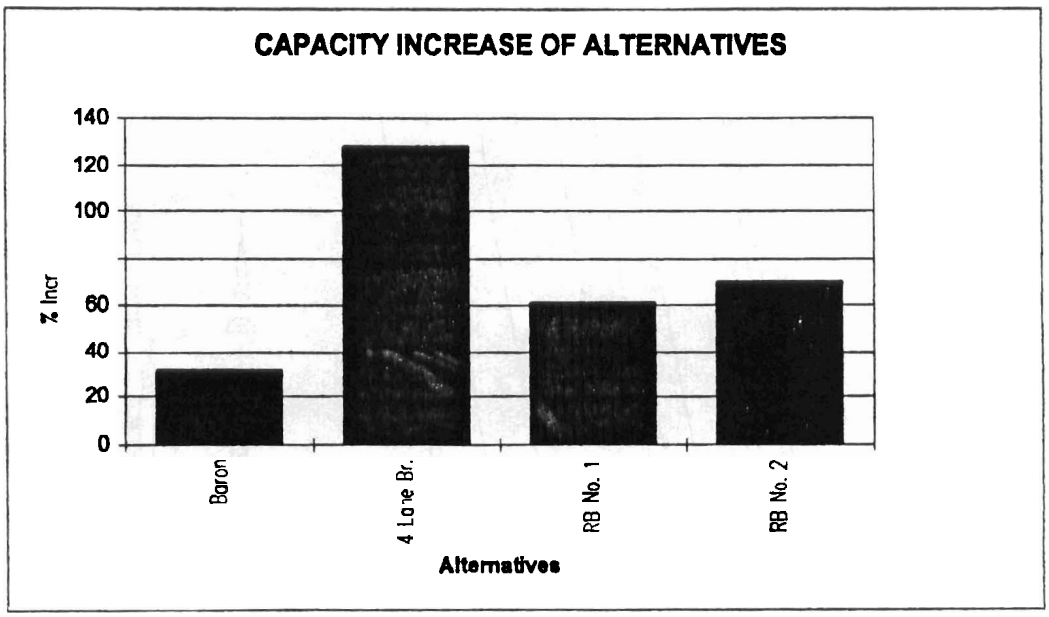
TABLE 1
CAPACITY AND COSTS

ALTERNATIVE	*CAPACITY INCREASE	ESTIMATED COSTS
Roundabout Alternative 1 (basic design)	61%	$1,100,000.00
Roundabout Alternative 2	98%**	$2,000,000.00
Baron Plan A - Intersection Modification Closing 1st Street	32%	$10,000.00
Intersection Improvements & Bridge Widening to 4 Lanes (double right turn off freeway)	128%	$11,000,000.00

* Capacity is percentage increase from existing peak hour volumes.

** This number cannot be achieved since the bridge itself becomes the capacity restraint at 70% volume increase.

The graph below shows the relative capacity increases for the listed alternatives. Note that Roundabout No. 2 was decreased to 70% as the practical limit of the two lane bridge at peak hour.



It is often useful to compare estimated dwelling unit construction and its traffic generation potential as another relational element. Table 2 below estimates the useful life of each alternative based on an average dwelling unit buildout of 100 units per year. The amount of 100 units is arbitrary and is used for comparative purposes. It is assumed these units are located in the southeast portion of the City and would utilize the Niblick bridge.

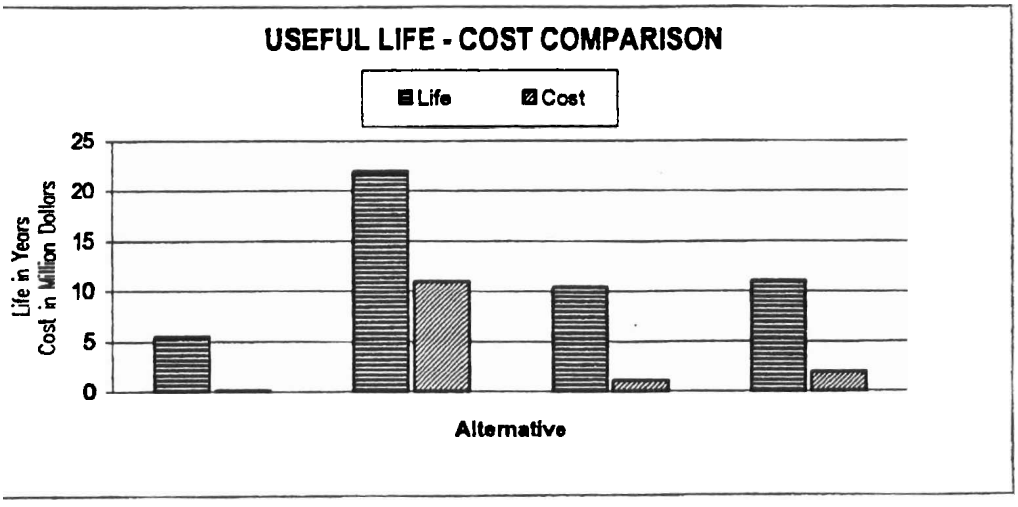
TABLE 2
USEFUL LIFE COMPARISON

ALTERNATIVE	TOTAL EST. UNITS to LOS 'E' (failure)	EST. USEFUL LIFE IN YEARS (based on 100 units per year)
Roundabout Alternative 1 (basic design)	1040	10.4
Roundabout Alternative 2	2900	11*
Baron Plan A - Intersection Modification Closing 1st Street	546	5.5
Intersection Improvements & Bridge Widening to 4 Lanes (double right turn off freeway)	2180	22
Bridge Capacity Benchmark 2 lane capacity 1800 vehicles per hour, per lane	1100	11

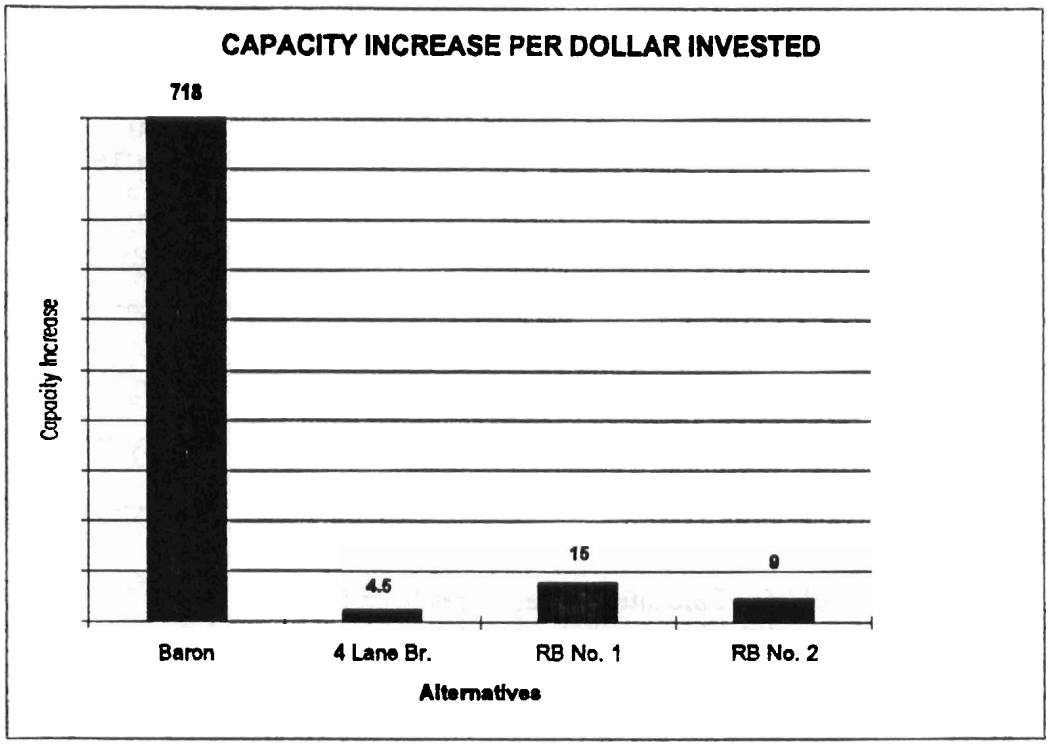
* Two lane bridge is constraint at 70% increase.

Useful life of the alternatives varies from 5.5 to 22 years. The Baron plan has the shortest life, however, also the lowest cost. Roundabout No. 1 has a ten year estimated life and Roundabout No. 2 an eleven year life. The City could not take full advantage of alternative No. 2 since the bridge capacity limits that alternative. Failure of the bridge itself occurs at approximately eleven years, or 1100 dwelling units adding vehicles to the peak hour traffic.

The graph below compares the estimated useful life of each alternative with the related estimated construction costs.



Capacity, estimated dwelling units and expected useful life do not tell the whole story regarding these alternatives. Another factor to be considered is the relationship of dollars invested in any particular alternative to the capacity increase received for that investment. To more clearly illustrate the relationship to capacity purchased per dollar invested, the graph below was developed.

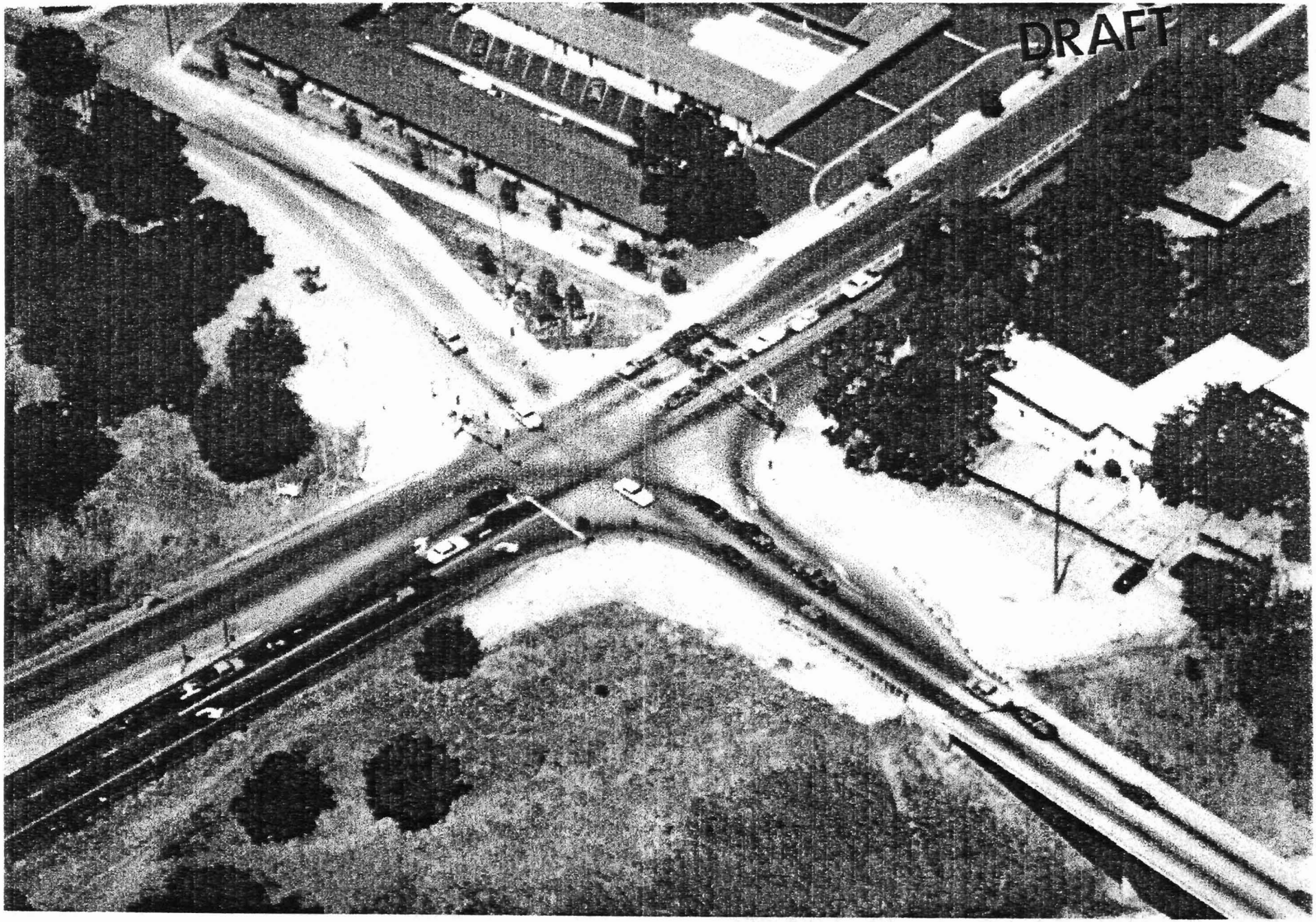


The obvious conclusion from the chart is that the Baron Alternative is the "best" in terms of return on investment. The remaining three alternatives are similar when comparing peak hour vehicle capacity per dollar invested in improvements. However, to see the complete picture, one must also look back to Table 2 showing the estimated "life" of the investment.

Table 2 shows that the Baron Alternative has an estimated "life" of only 5.5 years. The roundabouts have a better life expectancy of 10 and 11 years and the four lane bridge project the best life expectancy at 22 years.

One may conclude from this information that the Baron Alternative is a cost-effective short term solution and the four lane bridge a good long term solution.

Based on the estimated "life" of the roundabout alternatives, they must be considered as an intermediate term solution to traffic since they have shorter expected service life. If growth occurs at a rate of more than 100 dwelling units in the southeast portion of the City per year, their estimated life would diminish. Conversely, should growth occur more slowly, a longer life span would result.



[redacted] NW VIEW

5/13/97 EXISTING CONDITION 06

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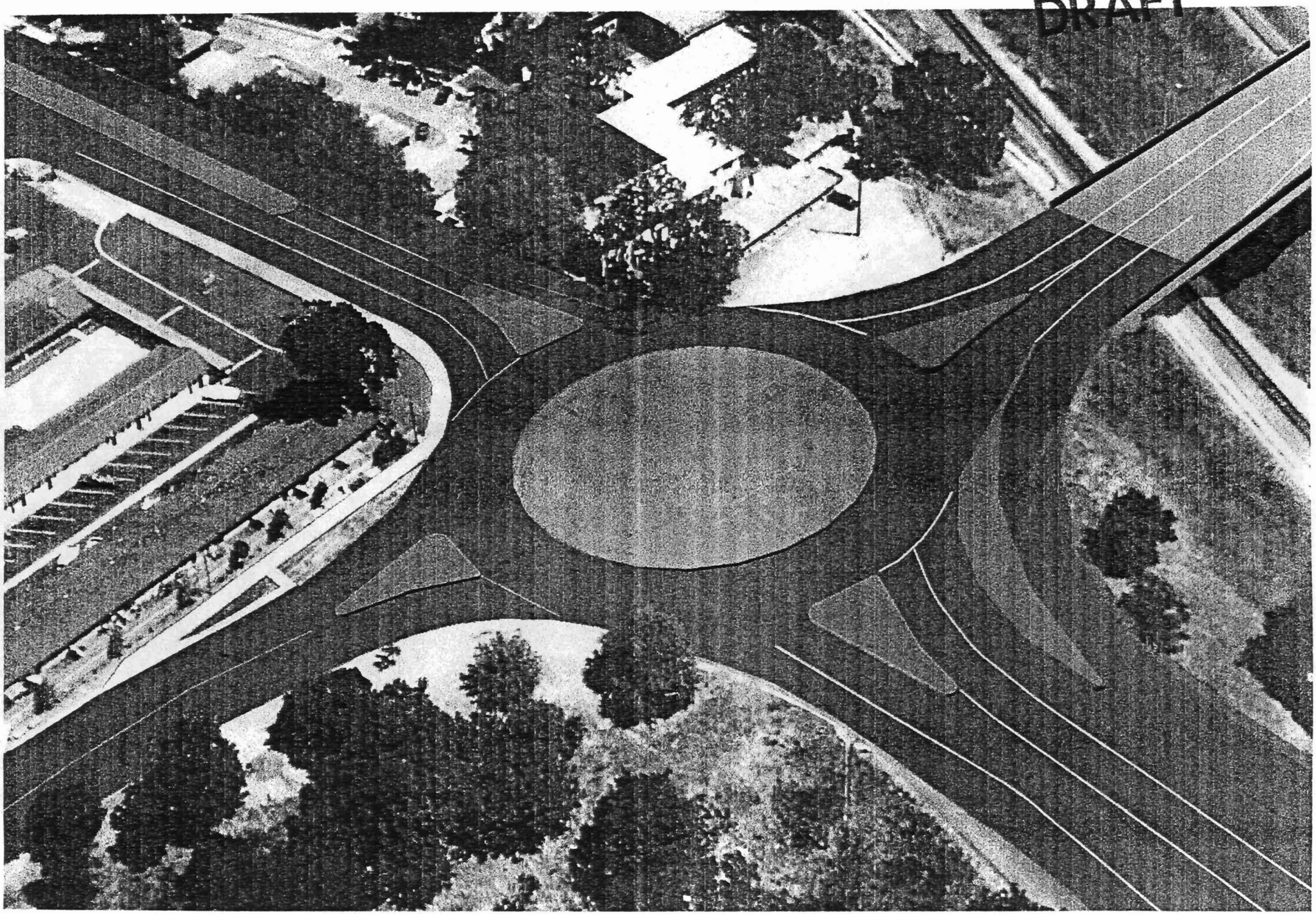

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5/13/97 NE VIEW

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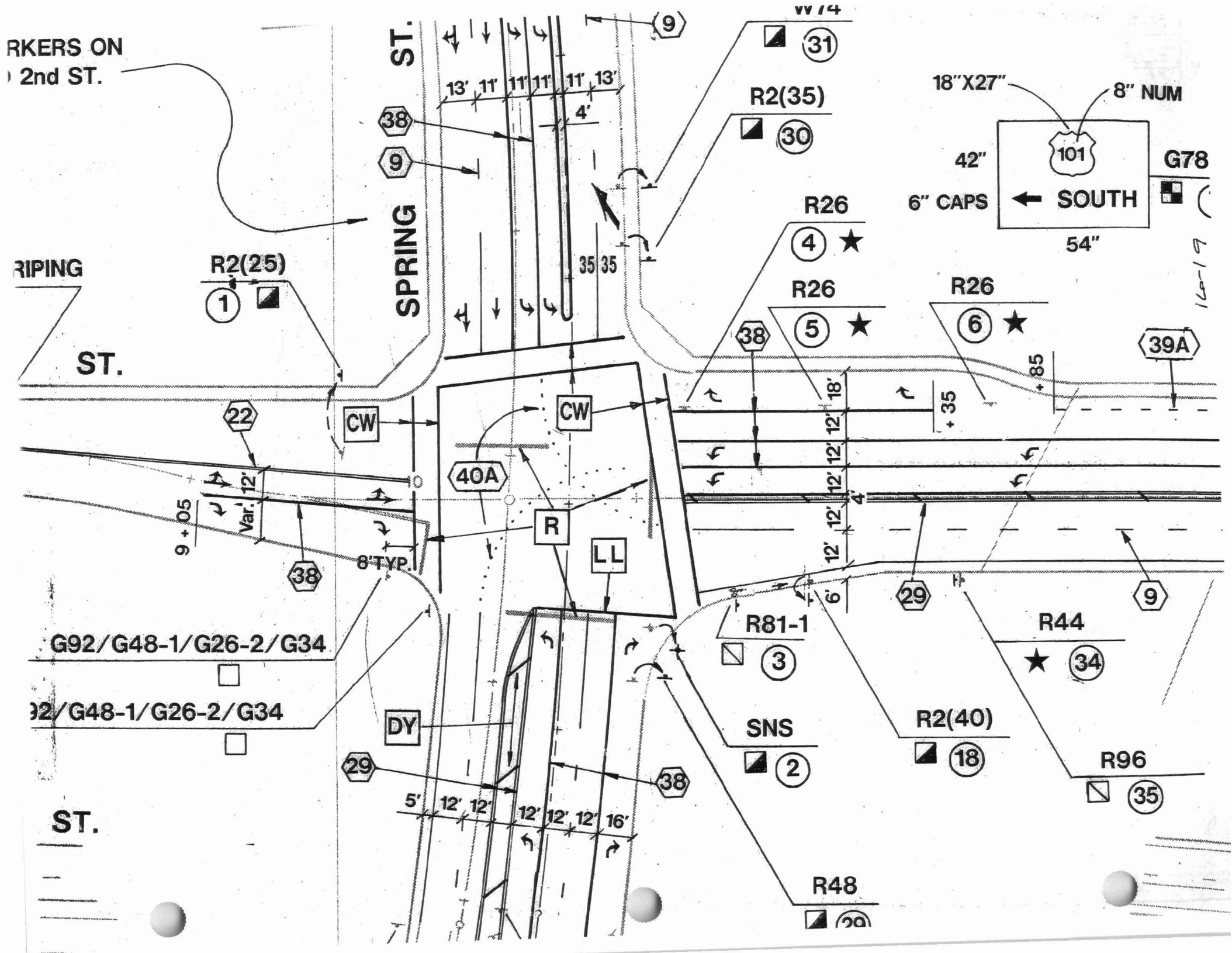
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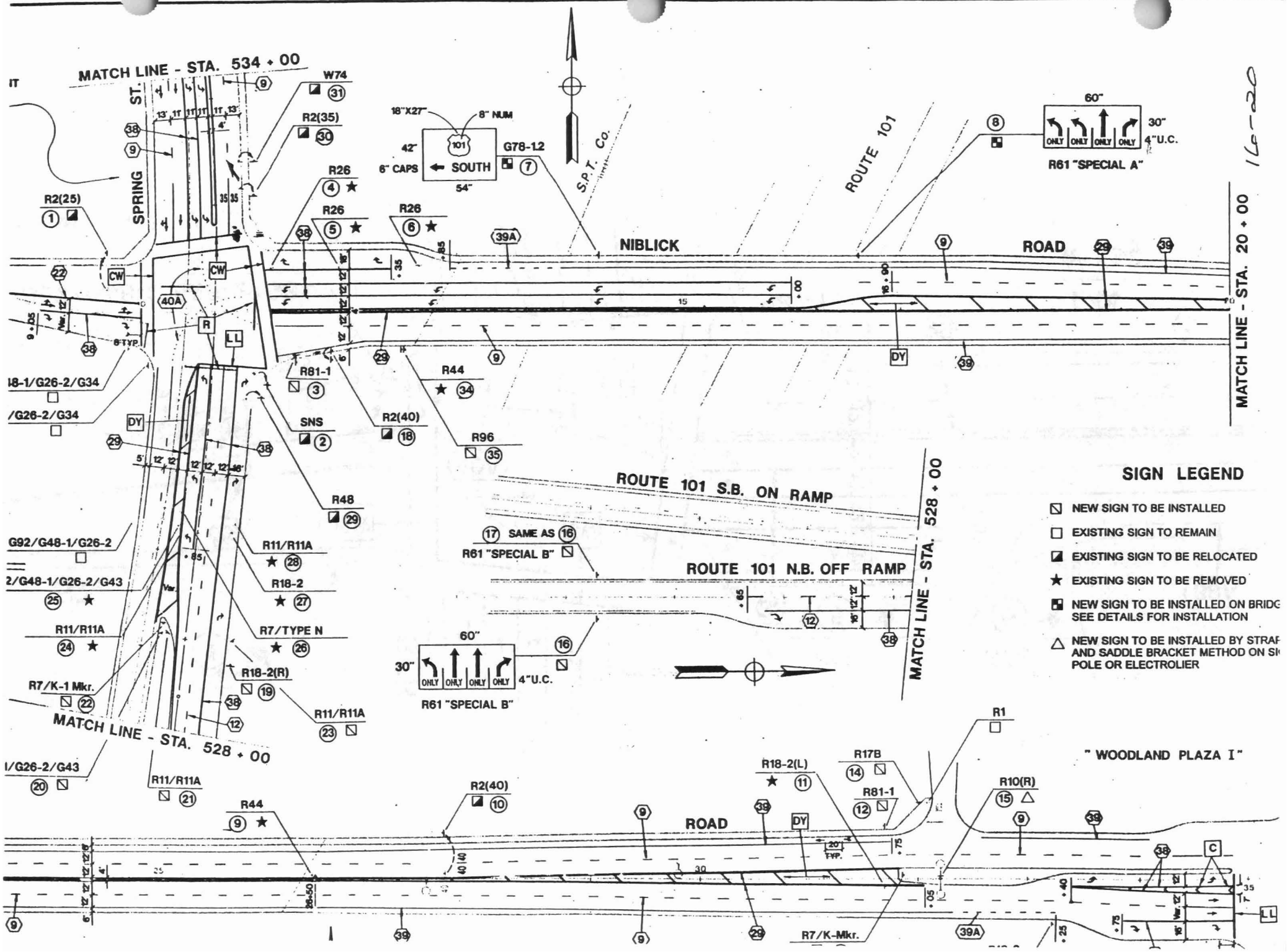
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101
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G78-12
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ROUTE 101
60"
30"
4"U.C.
ONLY
R61 "SPECIAL A"
NIBLICK
ROAD
MATCH LINE - STA. 20 + 00
R81-1
R44
R2(40)
R96
SNS
R48
R11/R11A
R18-2
R7/TYPE N
R18-2(R)
R7/K-1 Mkr.
R11/R11A
MATCH LINE - STA. 528 + 00
ROUTE 101 S.B. ON RAMP
SAME AS
R61 "SPECIAL B"
ROUTE 101 N.B. OFF RAMP
MATCH LINE - STA. 528 + 00
R11/R11A
R2(40)
R44
ROAD
R18-2(L)
R17B
R81-1
R1
R10(R)
" WOODLAND PLAZA I"
R7/K-Mkr.
SIGN LEGEND
NEW SIGN TO BE INSTALLED
EXISTING SIGN TO REMAIN
EXISTING SIGN TO BE RELOCATED
EXISTING SIGN TO BE REMOVED
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SEE DETAILS FOR INSTALLATION
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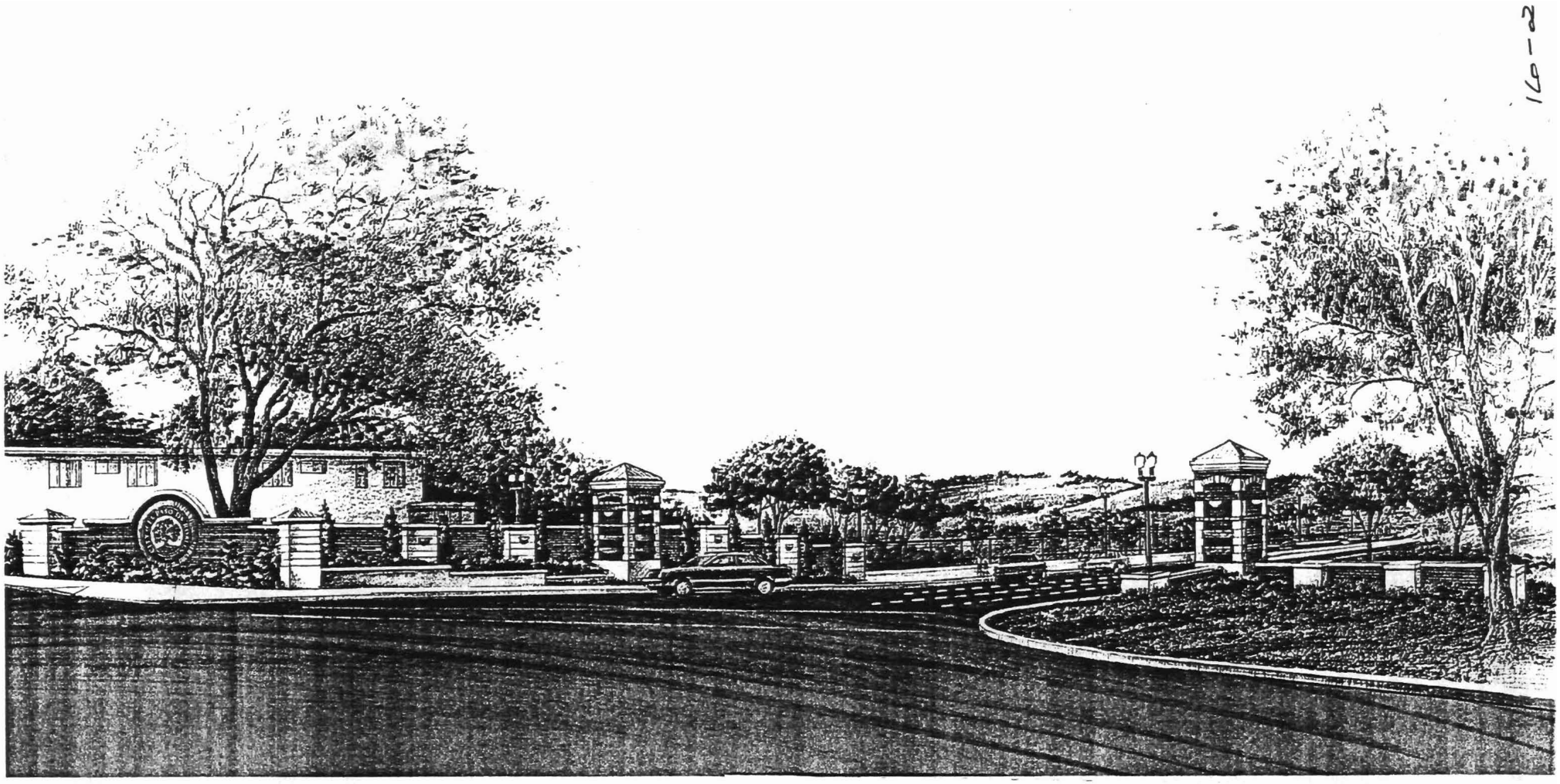
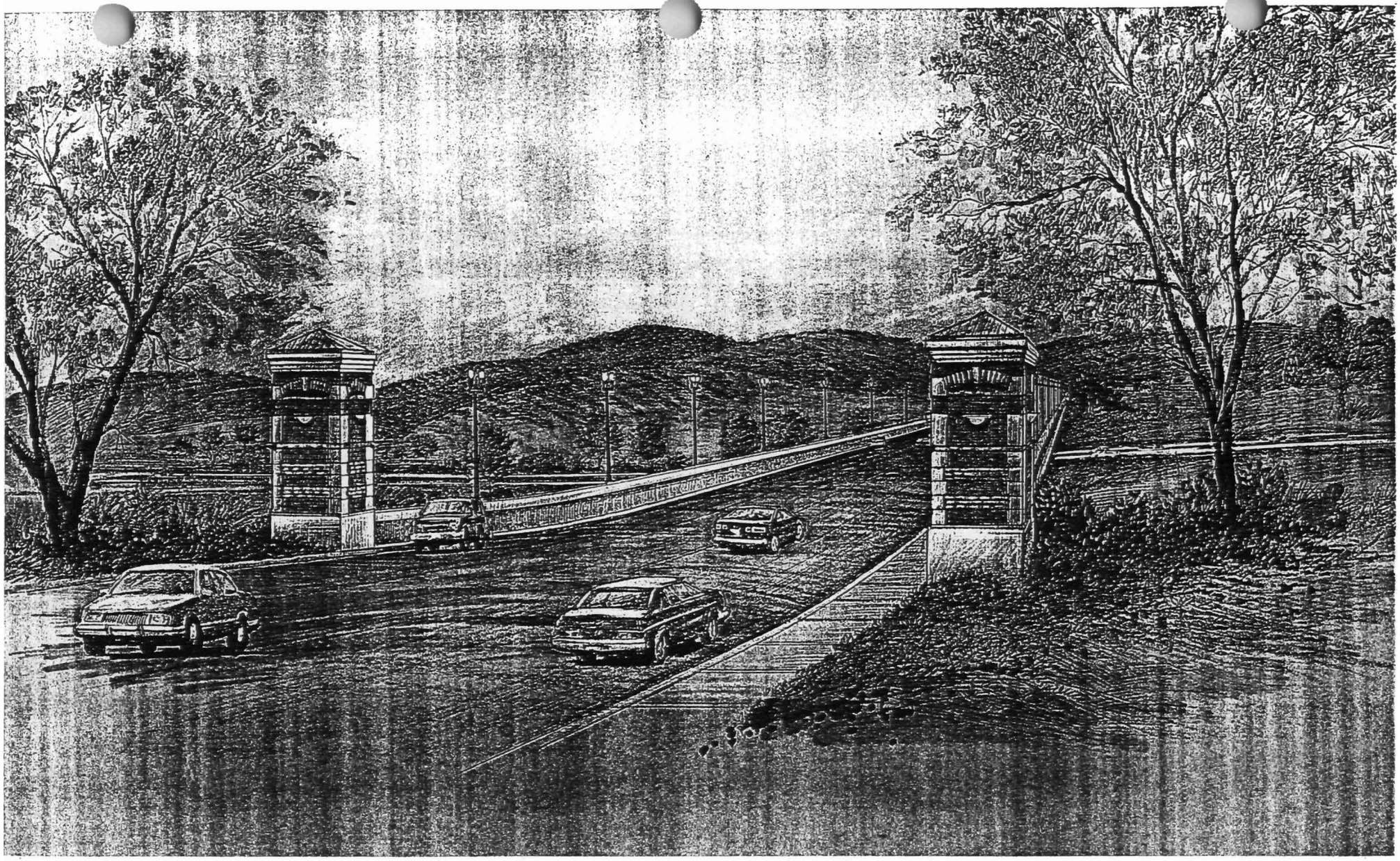
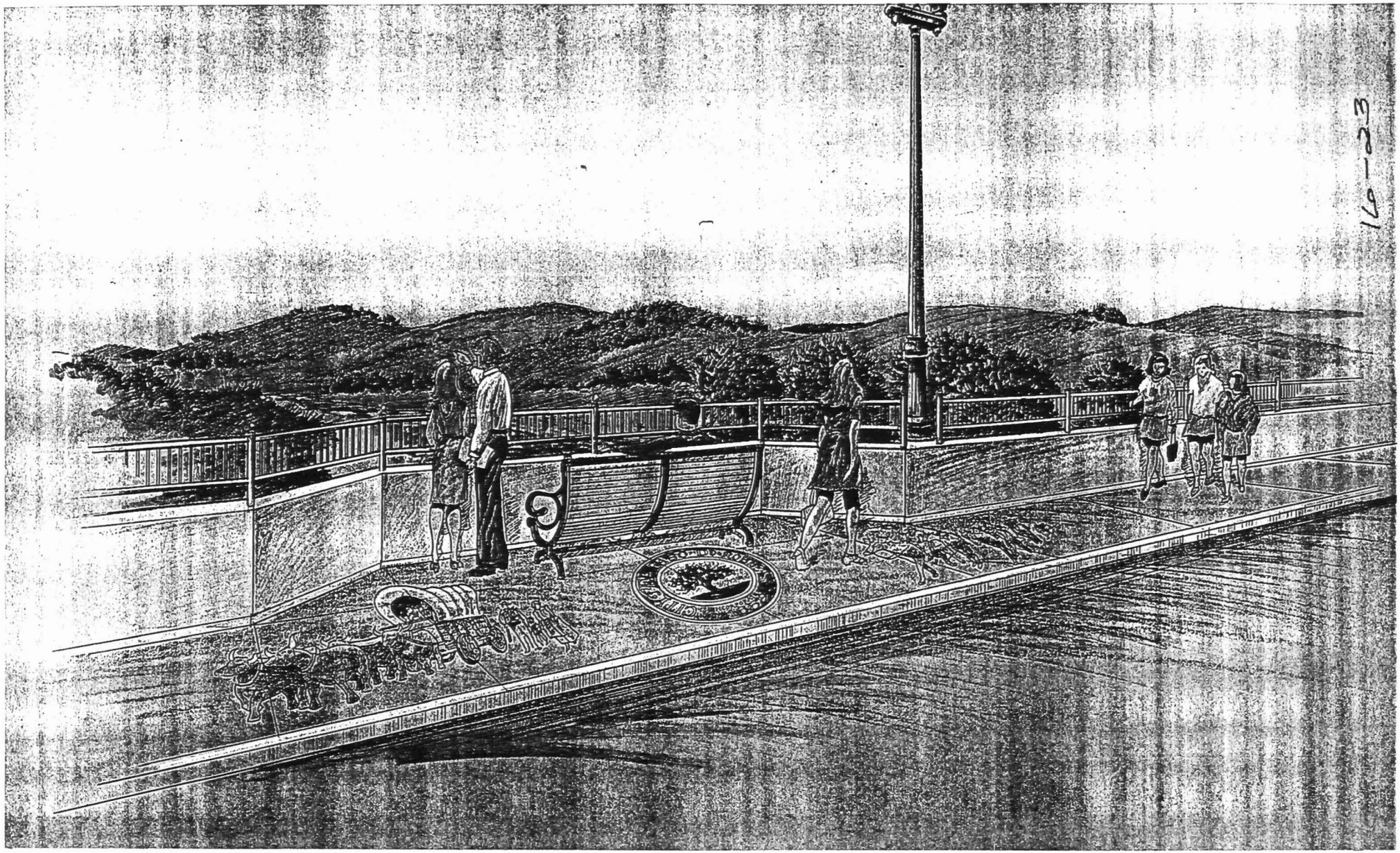


Bridge approach - west end



Bridge approach - east end



Salinas River Overlook (looking north)