

FINAL REPORT

I-10 CORRIDOR REFINEMENT STUDY 16TH STREET/BUCKEYE ROAD TO BASELINE ROAD

ARIZONA DEPARTMENT
OF TRANSPORTATION



Submitted by

DMJM

in association with

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Benjamin J. Berrill
5/19/88

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SCOPE OF STUDY

SCOPE OF STUDY

The overall objectives of this comprehensive corridor study are two-fold:

- To develop a rehabilitation plan which not only corrects the existing geometric and operational deficiencies, but will also accommodate future traffic requirements; and
- To prepare a phased construction plan for rehabilitation within the framework of a long range plan.

The limits of the project, shown in Figure 1 include:

- I-10 from Buckeye Road to Baseline Road.
- I-17 from 16th Street to the I-10 Interchange.
- Superstition Freeway (SR 360) from the I-10 Interchange to Priest Drive.
- Hohokam Freeway (SR 143) from University Drive to I-10.

The I-10 Corridor Refinement Study employs a systems approach which is comprised of the following three integrated phases:

- I. Analysis of Future Operations.
- II. Development of Alternative Improvement Schemes.
- III. Refinement of Selected Alternatives and Development of Construction Phasing Plans.

The following report documents the work completed in Phase III of the project. As an introduction to this, a brief summary of the preceding project, I-10

STUDY AREA

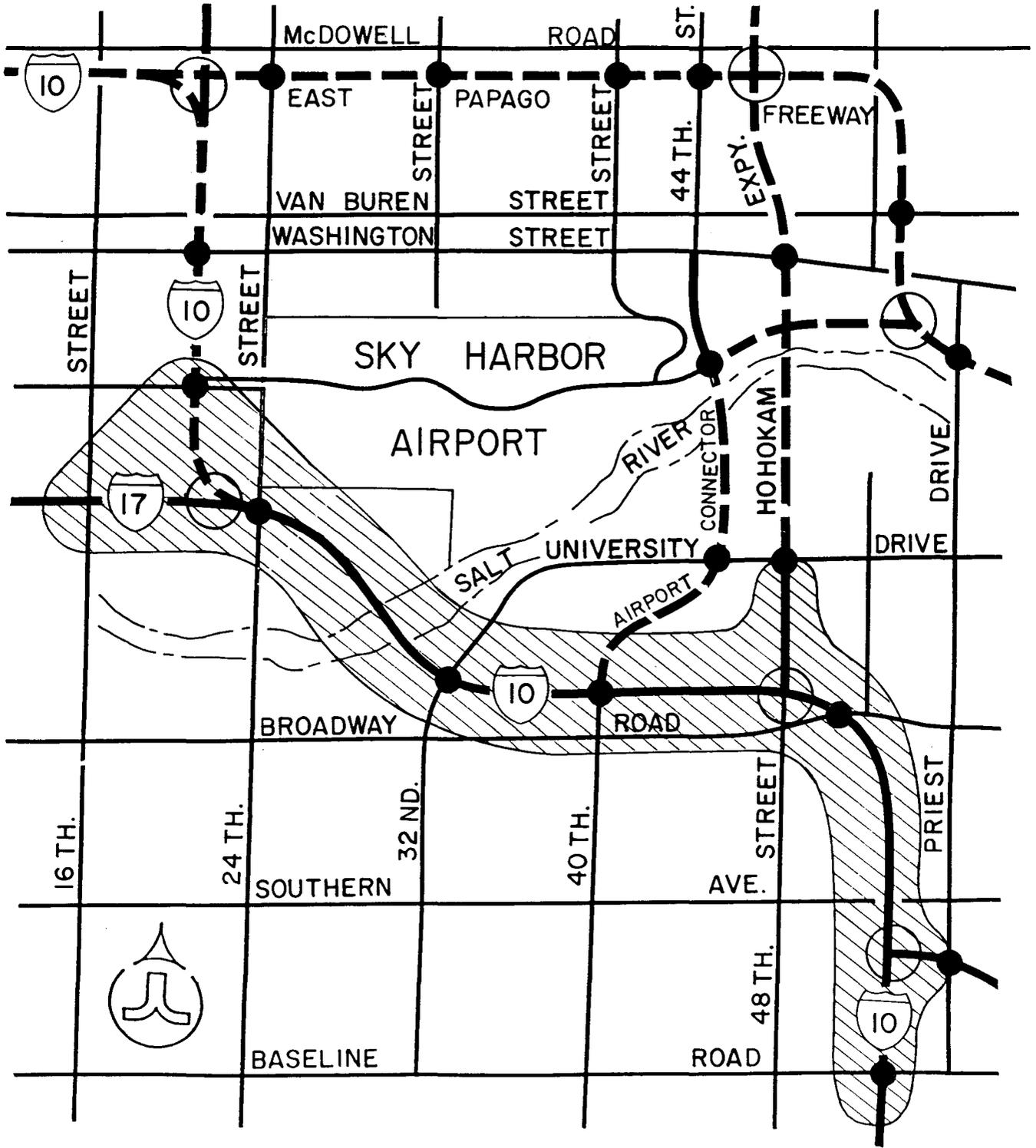


FIGURE 1

Corridor Study, is presented. Also included are summaries of the first two phases of this project: Phase I Report (Analysis of Future Operations); and Phase II Report (Development of Alternatives Improvement Schemes).

SUMMARY OF I-10 CORRIDOR STUDY

The limits of the original I-10 Corridor Study were from 40th Street to Baseline Road. A summary of the four phases of that project follows.

Analysis and Evaluation of Existing Facility

The first phase included a detailed inventory and evaluation of the existing geometric and operational features and performance measures of the freeway system, a determination of the 1985 peak hour traffic volumes, and levels of service provided on the freeway segments and ramps.

Virtually all freeway segments are performing at or near capacity, due in part to an inadequate number of lanes. Most of the ramps on the system are also operating at or near capacity, due primarily to the high density of vehicles in lane one on the freeway mainline. The addition of mainline freeway lanes would not, in itself, resolve the existing or future operational problems. A modification of interchanges will be necessary in order to correct the deficiency in lane balance and ramp sequence, and to eliminate critical weaving sections.

Specific deficiencies, other than the inadequate number of lanes on I-10 which have the most profound effect on capacity, safety, and operations include: the inadequate design of exit and entrance ramps; the sequencing of consecutive loop ramps on mainline I-10 at 48th Street and Broadway Road; the lane drop at the westbound I-10 exit to Broadway Road; and the geometric deficiencies at the major system interchange of I-10 with the Superstition Freeway (SR 360).

Development of Alternative Improvement Schemes

The second report documented the work accomplished in the development of alternative improvement schemes for rehabilitating the corridor facilities.

Three basic corridor improvement concepts were developed. These concepts are shown schematically in Figure 2 and described in the following:

Concept A - Provides additional lanes on the freeway mainline, increasing the capacity of the I-10 corridor.

Concept B - Constructs a two lane C-D road adjacent to I-10, between the Superstition Freeway and the Hohokam Freeway.

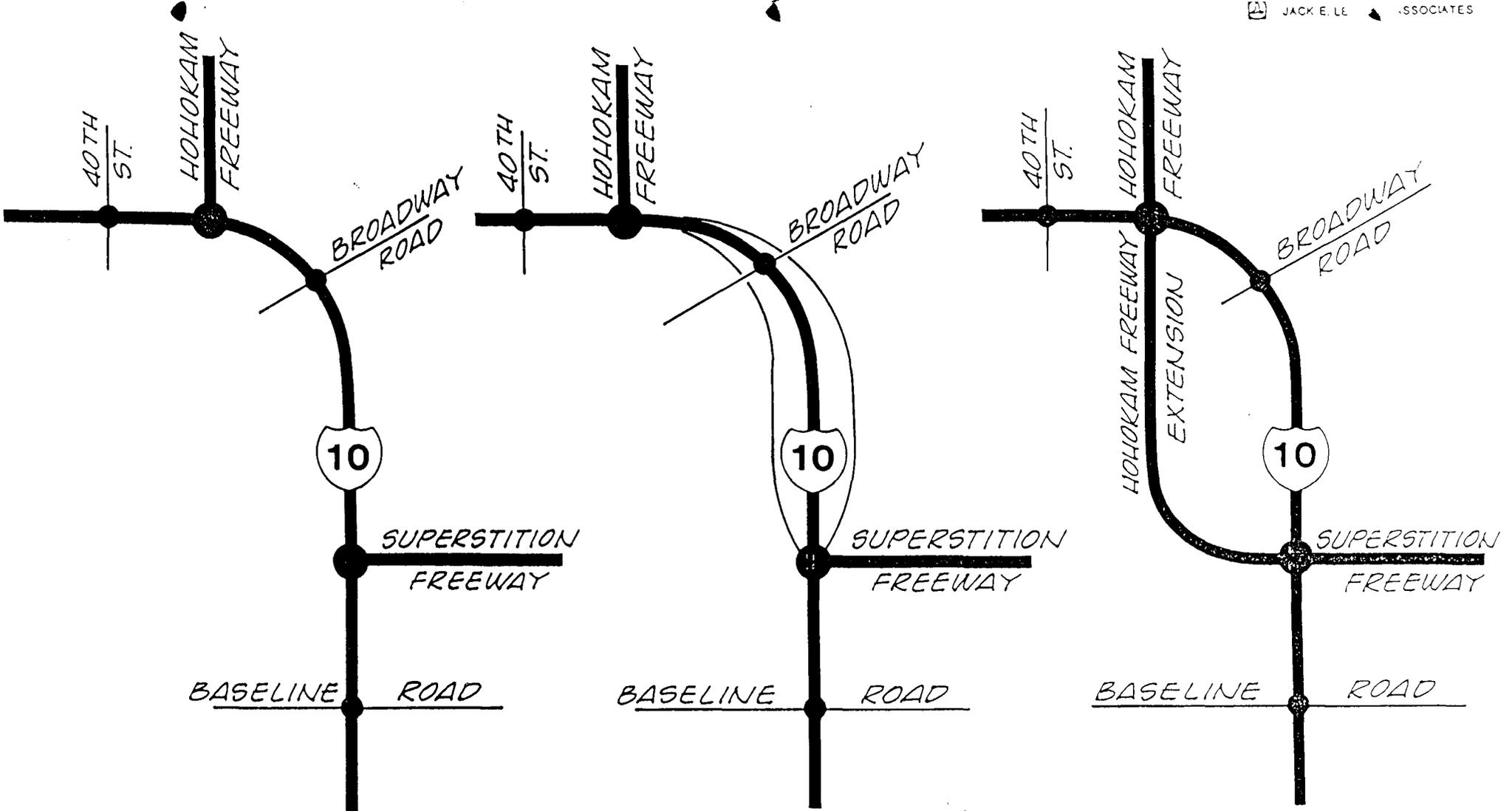
Concept C - Develops the 48th Street corridor as a freeway link between the Hohokam Freeway and the Superstition Freeway.

From the alternatives evaluation it was apparent that Alternative B demonstrated a number of attributes which were significantly better than the other alternatives. Alternative B provides additional lane capacity and improved levels of service over Alternative A. Further, it eliminates the excessive lane changing in the critical section of I-10 between the Superstition and Hohokam Freeways, thus providing a high level of operation and safety that is not found in either the existing configuration or in Alternative A. While Alternative C has attributes similar to those described for Alternative B, it is significantly more expensive, environmentally sensitive, and is not adaptable to a reasonable level of traffic maintenance during construction or to phased development. Consequently, it was recommended that Alternative B be considered the most viable alternative for further refinement in Phase III. ADOT Management concurred in this recommendation following a presentation of the Phase II study results on January 23, 1986.

Refinement of Selected Alternates

The third report documented the work accomplished in the refinement of the selected alternative for rehabilitating the corridor facilities. The major areas addressed in this report included:

- Refinement of functional plans on photo bases at 1" = 200' scale.



CONCEPT A
SINGLE ROADWAY

CONCEPT B
C-D ROADS

CONCEPT C
ADDITIONAL
CORRIDOR

CONCEPT ALTERNATIVES

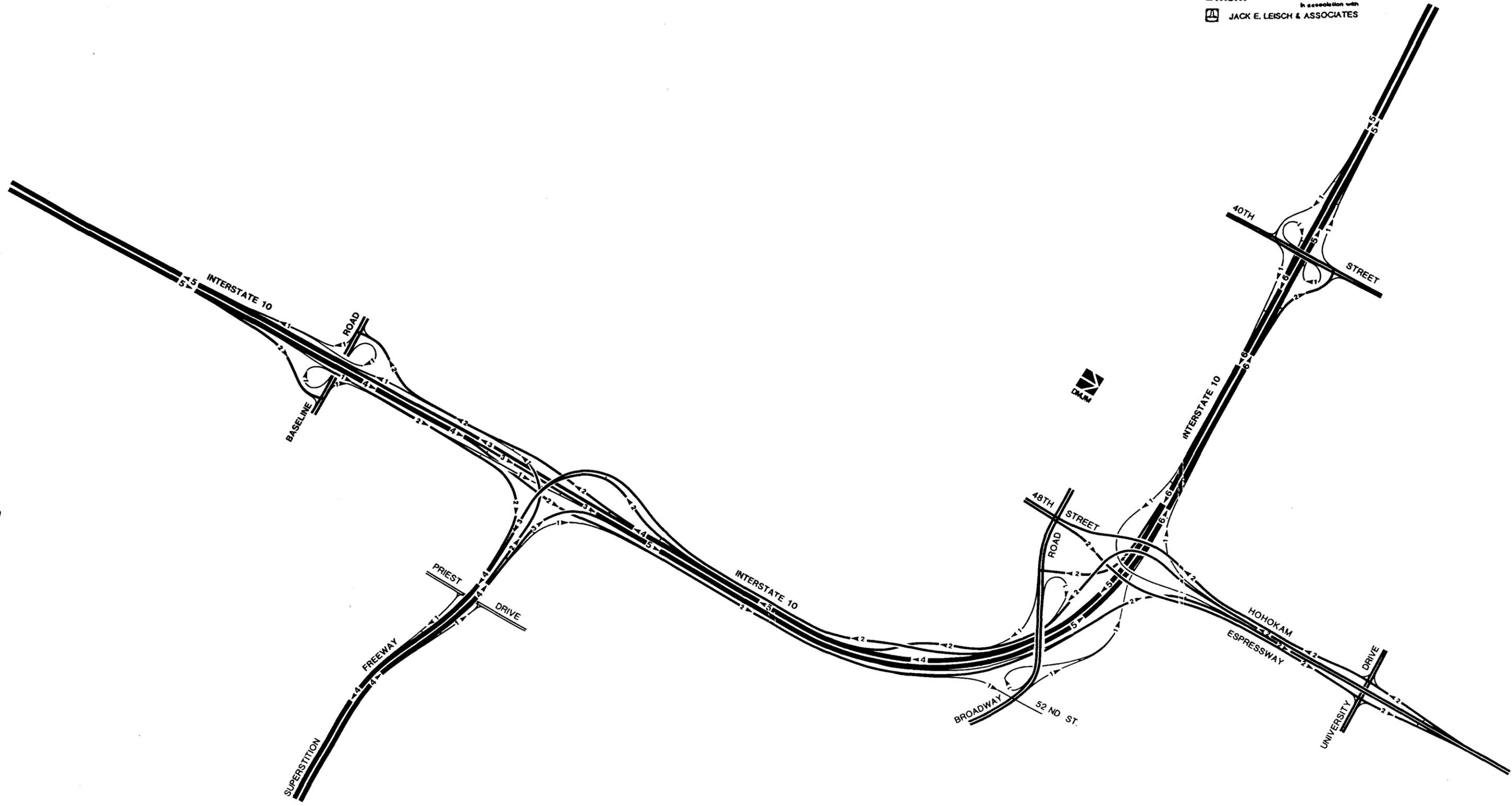
- Alternative interchange analyses at the 40th Street and Baseline Road T.I.'s (separate report).
- An evaluation of the existing and future hydrologic/hydraulic characteristics of I-10 from 40th Street to Baseline Road; the Hohokam Freeway from Broadway Road to the Tempe Drain; Broadway Road from 48th Street to Priest Drive; and the Superstition Freeway from I-10 to Rural Road. In order to determine future stormwater collection and discharge system needs on I-10, the Superstition Freeway, and the Hohokam Freeway, the existing systems were located and analyzed in relation to the ultimate plan. Fifty year runoff values and culvert and storm sewer capacities were analyzed to identify potential flooding areas, and to help determine future culvert and storm sewer needs. A preliminary drainage cost estimate was prepared for the ultimate plan (separate report).
- A variety of alternative, near-term improvements were developed which are consistent with the long-rang goals of the ultimate plan (separate report). While the ultimate plan provides a comprehensive, long-term plan for addressing the corridor's future transportation needs, it clearly is beyond the near-term funding capability of ADOT. For this reason, ADOT requested that a plan be developed for implementing near-term, logical construction projects which would be consistent with the long-range goals of the ultimate plan.

Utilities Analysis

A comprehensive survey of existing utilities was conducted within the study area. Critical areas were highlighted for ADOT attention. Contact persons and unit relocation costs were presented (separate report).

Development of Improvement Plan

The final phase included the development of 1" = 100' functional plans and profiles for the ultimate plan and construction sequencing plans for the systematic improvement of the I-10 corridor within the framework of the ultimate plan. A schematic representation of the ultimate plan is shown in Figure 3. The major elements addressed in this report include:



ULTIMATE PLAN

Ultimate Plan

Current topo maps were obtained to develop the refined 1" = 100' functional plans and profiles for the ultimate plan. Geometric criteria was refined in this phase and all plans reflect geometric control. Major adjustments were made to the design in the vicinity of the Hohokam/I-10 Freeway system interchange. These adjustments provide for maintaining the I-10 centerline around the Broadway Road curve.

Mainline Signing

A recommended signing plan was developed to effectively service the ultimate plan. The signing plan included a single-line representation of the proposed improvements and provided mainline signing only.

Alternative Interchange for Analyses

Refined evaluations of alternative interchange configurations were conducted for the 40th Street T.I. and the Baseline Road T.I. The evaluations benefited from new information made available in the 1986 Southeast Phoenix Sub-Regional Traffic Impact Study conducted by DMJM.

Drainage

After review of the Phase III drainage report by ADOT and the City of Tempe, an addendum was prepared which reflected new information and provided expanded information on specific drainage areas and alternative solutions.

Right-of-Way

An assessment of the right-of-way acquisition necessary to implement the ultimate plan was developed for the entire corridor.

Construction Sequencing

Three phased improvement plans were developed which were intended to systematically improve the I-10 corridor within the framework of the ultimate plan. Maintenance of traffic and construction staging concepts were developed for each phase.

Cost Estimate

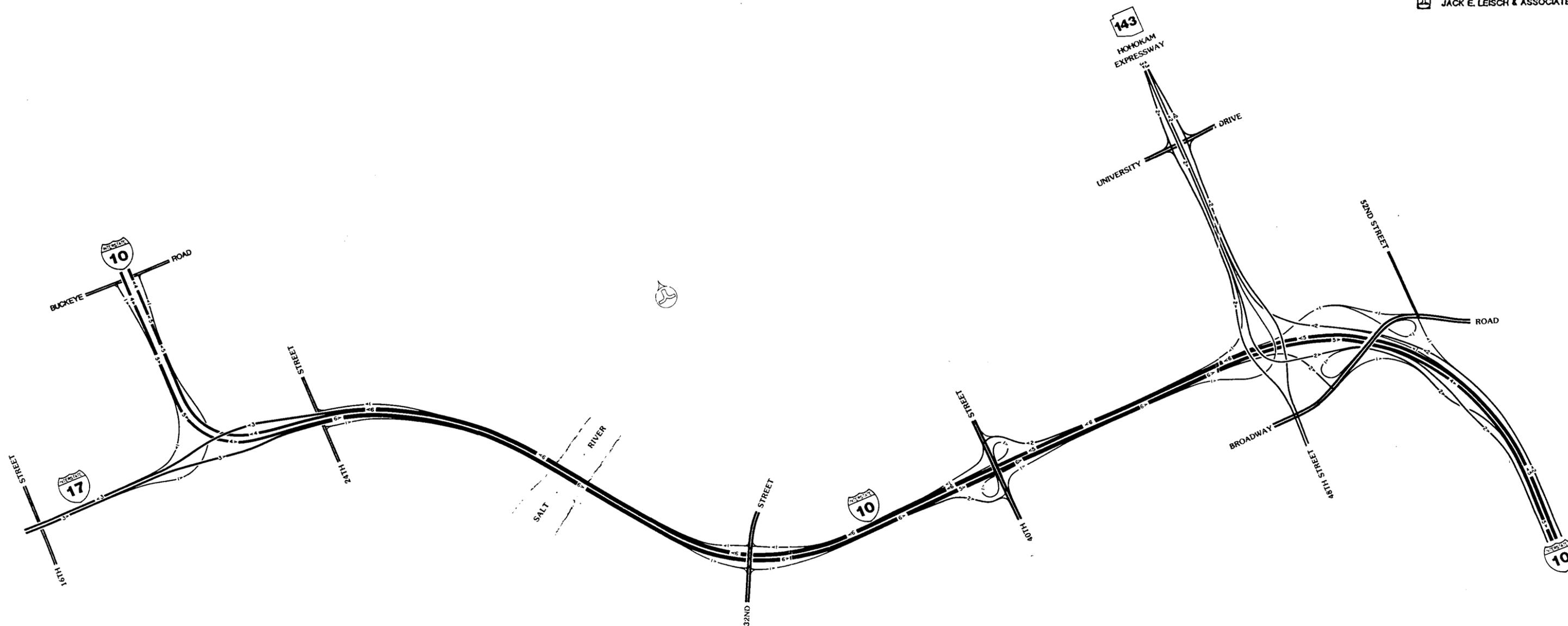
Based on the refined design, cost estimates were prepared for each of the three phased improvement plans.

SUMMARY OF I-10 CORRIDOR REFINEMENT STUDY

Following the submission of the final I-10 Corridor Study report, DMJM/JEL completed a planning study of the I-17/I-10 interchange. Since only concept sketches of the C-D Road System were presented, it raised questions regarding the need for and the feasibility of such a system, and the compatibility of the concept with the Ultimate Plan developed for I-10 between 40th Street and Baseline Road. To resolve these questions, DMJM was directed to initiate the I-10 Corridor Refinement Study. A summary of Phase I and Phase II of that study follows.

Analysis of Future Operations

Phase I of the study evaluated the design year operational and geometric features of the I-10 Corridor. The evaluation was based on the programmed improvements for I-10 between Buckeye Road and 40th Street and the recommended improvements (C-D Road System) between 40th Street and Baseline Road. A "single line" sketch of the I-10 Corridor, showing the programmed and proposed improvements, is shown in Figure 4. This assessment formed the basis for determining the adequacy of the planned improvements to accommodate the forecasted design year traffic. Recommendations were developed regarding the need for additional improvements and/or the extension of the collector-distributor road system on I-10 from the Hohokam Freeway to the I-17 interchange.



PROGRAMMED AND PROPOSED IMPROVEMENTS

I-10 CORRIDOR REFINEMENT STUDY

FIGURE 4

Design Year Traffic and Level of Service

MAG Traffic forecasting Model 2005-34 was used as the primary basis for the traffic assignments in this study. The programmed section of I-10 from the I-10/I-17 interchange to 40th Street would operate at capacity (LOS E) in the year 2005 based on the land use projections used in the traffic model. Assuming that planned improvements on the section of I-10 between 40th Street and Baseline Road are completed over a time frame of 15 to 20 years, this section would accommodate a higher traffic demand than the programmed section of I-10 to the west. By the year 2005, the section of I-10 east of the Hohokam Freeway is projected to operate in the LOS range of C to D while most of the segments of I-10 west of the Hohokam Freeway would be operating at capacity (LOS E). Likewise, sections of I-17 and I-10 west and north of the I-17/I-10 interchange would be operating in the LOS range of C to D.

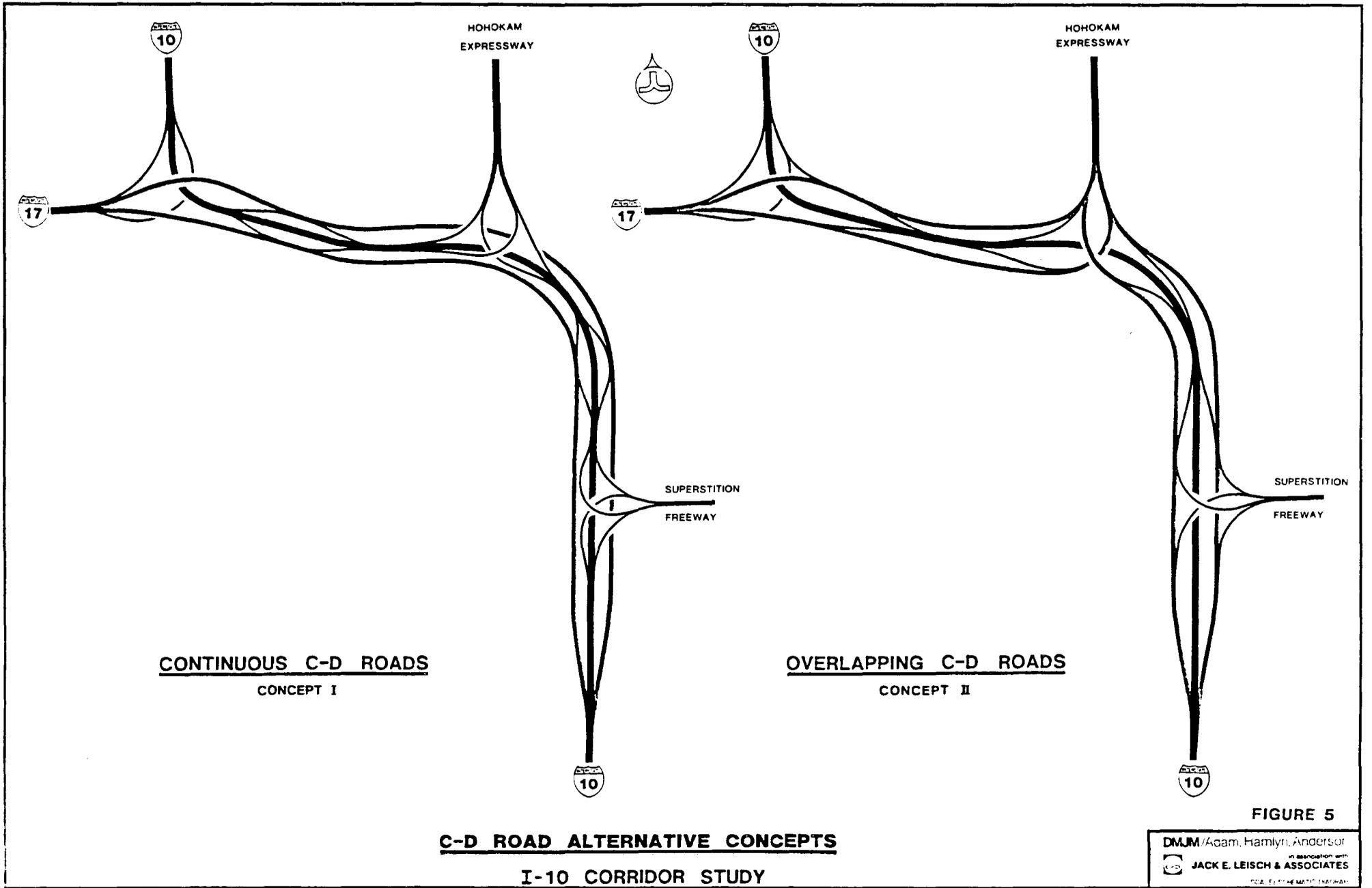
Recommendations for C-D Road System

The evaluation of the I-10 Corridor indicates the future need for the extension of the C-D road system west of the Hohokam Freeway. Two C-D road system concepts should be considered, as shown in Figure 5.

- Concept I - A continuous C-D road system extending on the I-10 Corridor from 16th Street to Baseline Road.
- Concept II - An overlapping C-D road system from 16th Street to Baseline Road which is discontinuous at the Hohokam Freeway.

This is a critical time in the planning process to develop and assess alternative improvement schemes, including collector-distributor roadways, which would correct future operational deficiencies in the section of I-10 west of the Hohokam Freeway. Such a process is necessary to:

1. Insure that the programmed improvement can be integrated into a balanced system with the planned section of I-10 east of the Hohokam Freeway.



CONTINUOUS C-D ROADS
CONCEPT I

OVERLAPPING C-D ROADS
CONCEPT II

C-D ROAD ALTERNATIVE CONCEPTS
I-10 CORRIDOR STUDY

FIGURE 5

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2. Determine the design of the 40th Street structure over I-10.
3. Determine the need to acquire and preserve the required right-of-way in the I-10 Corridor.
4. Extend the useful life of the facility beyond 2005.
5. Put this section of I-10 in balance with the remainder of the system.

Development of Alternative Improvement Schemes

In Phase II of the I-10 Corridor Refinement Study a series of single-line alternatives were developed at a scale of 1" = 400' as overlays to an aerial photographic base.

The five concept alternatives which were developed represent two categories:

- Alternatives C-1, C-2 and C-3 are based on a continuous C-D road system in the I-10 Corridor extending from the I-10/I-17 interchange to the Superstition Freeway; and
- Alternatives D-1 and D-2 are based on an overlapping C-D road system in the I-10 Corridor, extending from the I-10/I-17 interchange to the Superstition Freeway, but discontinuous at the Hohokam Freeway.

Summary of Features

A matrix summarizing the principle features of each of the alternatives is presented in Table 1. The following features which are tabulated are reviewed in detail in the discussion of the five alternatives.

Lane Arrangements for Core and C-D Roadways

- Continuous Lanes
- Basic Lanes
- Actual Number of Lanes (basic and auxiliary)

I - 10 CORRIDOR REFINEMENT STUDY
DESCRIPTION OF ALTERNATIVE CONCEPTS

TABLE 1

SEGMENT	SEGMENT	LANE ARRANGEMENT (C-D/CORE) EB/(C-D/CORE) WB			INTERCHANGES			TRANSFER ROADS TO 1, 2, 3, OR 4 DESTINATIONS				OPERATIONAL FLEXIBILITY	LEVEL OF SERVICE				COMMENTS		
		CONTINUOUS	BASIC	ACTUAL	LOCATION	TYPE	ACCESS	EB	WB	RB	WB		SEGMENT	CORE ROADWAY EB	CORE ROADWAY WB	C-D ROADWAY RB		C-D ROADWAY WB	
C-1	I-10/I-17 To University	1-3-3-1	2-5-5-2	2-6-6-2	Buckeye 24th Street	Half-Diamond	C-D	7	6	0	0	Complete/ Restricted	24th St. - University	D	D-E	C	C	● 3 Lane Exit West-bound to I-17.	
	University To Hohokam Exp.	1-3-3-1	2-5-5-2	3-5-5-3	University 40th Street	Diamond	C-D						University - 40th Street	C	C	C	D		● 3 Lane Exit East-bound to S.R. 360.
	Hohokam Exp. To S.R. 360	1-3-3-1	2-5-5-2	3-5-6-3	Hohokam Broadway	Directional	C-D						40th Street - Hohokam	C	C	C	D		● I-10 Eastbound ramp to SR360 @ 3rd Level.
C-2	I-10/I-17 To University	1-3-3-0	2-5-4-3	2-6-5-3	Buckeye 24th Street	None	-	8	4	1	0	Complete/ Restricted	24th St. - University	D	D-E	C	C	● EB Traffic to SR 360 partially assigned to C-D road @ Hohokam Expressway.	
	University To Hohokam Exp.	1-3-3-0	2-5-4-3	3-5-4-4	University 40th Street	Half-Diamond	C-D						University - 40th Street	C	C	C	D		● WB Traffic to I-17 partially assigned to C-D road @ Hohokam Expressway.
	Hohokam Exp. To S.R. 360	1-3-3-0	2-5-4-3	3-5-5-3	Hohokam Broadway	Directional	C-D/Core						40th Street - Hohokam	C	C	C	D-E		
C-3	I-10/I-17 To University	2-3-3-2	3-4-4-3	3-5-5-3	Buckeye 24th Street	None	-	7	2	3	1	Complete	24th St. - University	C	D-E	C	C	● EB I-17 to SR 360 routed on C-D road.	
	University To Hohokam Exp.	2-3-3-2	3-4-4-3	4-4-4-4	University 40th Street	Diamond	C-D						University - 40th Street	C	C	D	D		● WB SR 360 to I-17 routed on C-D road.
	Hohokam Exp. To S.R. 360	2-3-3-2	3-4-4-3	4-4-4-4	Hohokam Broadway	Directional	C-D/Core						40th Street - Hohokam	C	C	D	C		
D-1	I-10/I-17 To University	0-3-3-0	2-5-5-2	2-6-6-2	Buckeye 24th Street	Half-Diamond	C-D	8	4	1	0	Partial/ Interrupted	24th St. - University	D	D	C	D	● EB Traffic to SR 360 partially assigned to C-D road @ Hohokam Expressway.	
	University To Hohokam Exp.	0-3-3-0	2-5-5-2	3-5-5-3	University 40th Street	Diamond	C-D						University - 40th Street	C	C	D	D-E		● WB Traffic to I-17 partially assigned to C-D road @ Hohokam Expressway.
	Hohokam Exp. To S.R. 360	0-3-3-0	2-5-5-2	3-5-6-2	Hohokam Broadway	Directional	C-D						40th Street - Hohokam	C	C	D	D		
D-2	I-10/I-17 To University	0-3-3-0	2-5-5-2	2-6-6-2	Buckeye 24th Street	None	-	7	4	2	0	Partial/ Interrupted	24th St. - University	D	D	C	D	● EB Traffic to SR 360 partially assigned to C-D road @ Hohokam Expressway.	
	University To Hohokam Exp.	0-3-3-0	2-5-5-2	3-5-5-3	University 40th Street	Diamond	C-D						University - 40th Street	D	C	D	D-E		● WB Traffic to I-17 partially assigned to C-D road @ Hohokam Expressway.
	Hohokam Exp. To S.R. 360	0-3-3-0	2-5-5-2	3-5-6-2	Hohokam Broadway	Directional	C-D						40th Street - Hohokam	D	C	C	D		
					Baseline	Parcelo A	Core						Hohokam - Superstition	C-D	D-E	D	C	● WB Traffic to I-17 partially assigned to C-D road @ Hohokam Expressway.	

Service Interchanges

- Interchange Location
- Interchange Type
- Access Via Core or C-D Roadway

Number of Transfer Roadways Serving 1, 2, 3, or 4 Destinations

Operational Flexibility (Optional Use of Core Roadway vs. C-D road)

- Complete
- Complete/Restricted
- Partial/Interrupted

Level of Service

- Basic Freeway Segments (Core Roadways)
- Weaving Sections
- C-D Roadways

Comparative Assessment of Alternatives

The five selected alternatives were compared on the basis of operations, costs, ease of implementation, and environmental impacts. These four major categories were divided into ten characteristics for which each of the alternatives were assessed. Each of the characteristics were given a scale value, the sum of which is 100. The rating scale for each item ranges from 5 to 10, with 10 being the best. The maximum possible score for any alternative is 1,000. The results of this evaluation are shown in Table 2. Alternatives C-1 and C-3 received significantly higher ranking than the other alternatives.

A summary of the advantages and disadvantages of alternative C-1 and C-3 follows.

TABLE 2
I-10 CORRIDOR REFINEMENT STUDY
ALTERNATIVE RANKINGS

ALTERNATIVE	CONTINUOUS						DISCONTINUOUS				
	SCALE VALUE	Rating	C-1 Weighted Value	Rating	C-2 Weighted Value	Rating	C-3 Weighted Value	Rating	D-1 Weighted Value	Rating	D-2 Weighted Value
<u>OPERATIONAL (40)</u>											
CAPACITY/LOS	(10)	8	80	7	70	7	70	8	80	8	80
FLEXIBILITY	(10)	7	70	7	70	9	90	5	50	5	50
LANE CONTINUITY	(10)	8	80	7	70	9	90	6	60	6	60
GEOMETRIC ALIGNMENT	(5)	8	40	8	40	9	45	8	40	8	40
GUIDE SIGNING	(5)	9	45	8	40	7	35	8	40	8	40
<u>COSTS (25)</u>											
CONSTRUCTION	(15)	8	120	7	105	7	105	7	105	6	90
R.O.W.	(10)	7	70	6	60	7	70	7	70	7	70
<u>IMPLEMENTATION (25)</u>											
STAGING - CONSTRUCTION	(15)	9	135	7	105	8	120	8	120	8	120
MAINTENANCE OF TRAFFIC	(10)	9	90	7	70	8	80	8	80	8	80
<u>ENVIRONMENTAL (10)</u>											
IMPACT ON DEVELOPMENT	(10)	7	70	6	60	7	70	6	60	6	60
(POSSIBLE: 1000) TOTAL	(100)		790		690		775		705		690

ALTERNATIVE C-1

The principal advantages of Alternative C-1 are:

- No major reconstruction would be required at the I-10/I-17 system interchange.
- The cross section of the core roadways on I-10 would remain basically the same as the programmed segment between Buckeye Road and 40th Street and the recommended first phase improvements between 40th Street and the Superstition Freeway.
- The C-D road system could be constructed with minimum disruption to traffic flow on the I-10 core roadways.
- Three continuous lanes would be provided in each direction on the core roadways and one continuous lane in each direction on the C-D roadways.
- Complete, but partially restricted, operational flexibility would provide drivers the optional use of the core or C-D roadways.
- A reasonably uniform level of service (LOS C to D) would be provided on both the core and C-D roadway systems over the entire length of the corridor, with the exception of two segments of the core roadway, which would operate at LOS D to E.

A potential disadvantage of Alternative C-1 is the three-lane exit to the Superstition Freeway from eastbound I-10 and the three-lane exit to I-17 from westbound I-10. Operating experience on existing freeways, although limited, indicates that three-lane exits are subject to vehicular turbulence and potential backups in the traffic stream during high-volume conditions.

ALTERNATIVE C-3

The principal advantages of Alternative C-3 are:

- No major reconstruction would be required at the I-10/I-17 system interchange.
- Two-lane exits would be provided from the westbound I-10 core roadway to I-17 and from the eastbound core roadway to the Superstition Freeway.
- The ramp from eastbound I-10 to the Superstition Freeway, located at the second level of the interchange is best suited to the proposed phasing of construction of the I-10/Superstition Freeway system interchange.
- Complete and unrestricted operational flexibility would provide drivers the optional use of the core or C-D roadways.
- A reasonably uniform level of service (LOS C to D) would be provided on both the core and C-D roadway system over the entire length of the corridor, with the exception of two segments of the core roadway and two segments of the C-D road which would operate at LOS D or E.

One relative disadvantage of Alternative C-3, as compared to Alternative C-1, would be the necessity to implement changes in the programmed cross sections of the I-10 core roadways, which would increase construction and maintenance of traffic costs.

DRAINAGE/UTILITIES/STRUCTURES

Separate, stand alone, final reports were prepared for overall corridor drainage, utilities, bridges, and retaining walls. These reports are entitled:

- Final Drainage Report, Volume I
I-10 Corridor Study
16th Street/Buckeye Road to 48th Street

- Final Drainage Report, Volume II
I-10 Corridor Study
40th Street to Baseline Road

- Final Utilities Report
I-10 Corridor Study
16th Street/Buckeye Road to Baseline Road

- Bridge Structures, Concept Design
I-10 Corridor Study
16th Street/Buckeye Road to Baseline Road

This final report is accompanied by a 162 sheet plan set that presents functional plans, profiles, cross-sections, and proposed guide signing for Alternatives C-1 and C-3. Additionally, it includes functional plans for Projects 2, 4, 5, and 6 in Phase 1 and Projects 1 and 2 in Phase 2.

ALTERNATIVE DESCRIPTION

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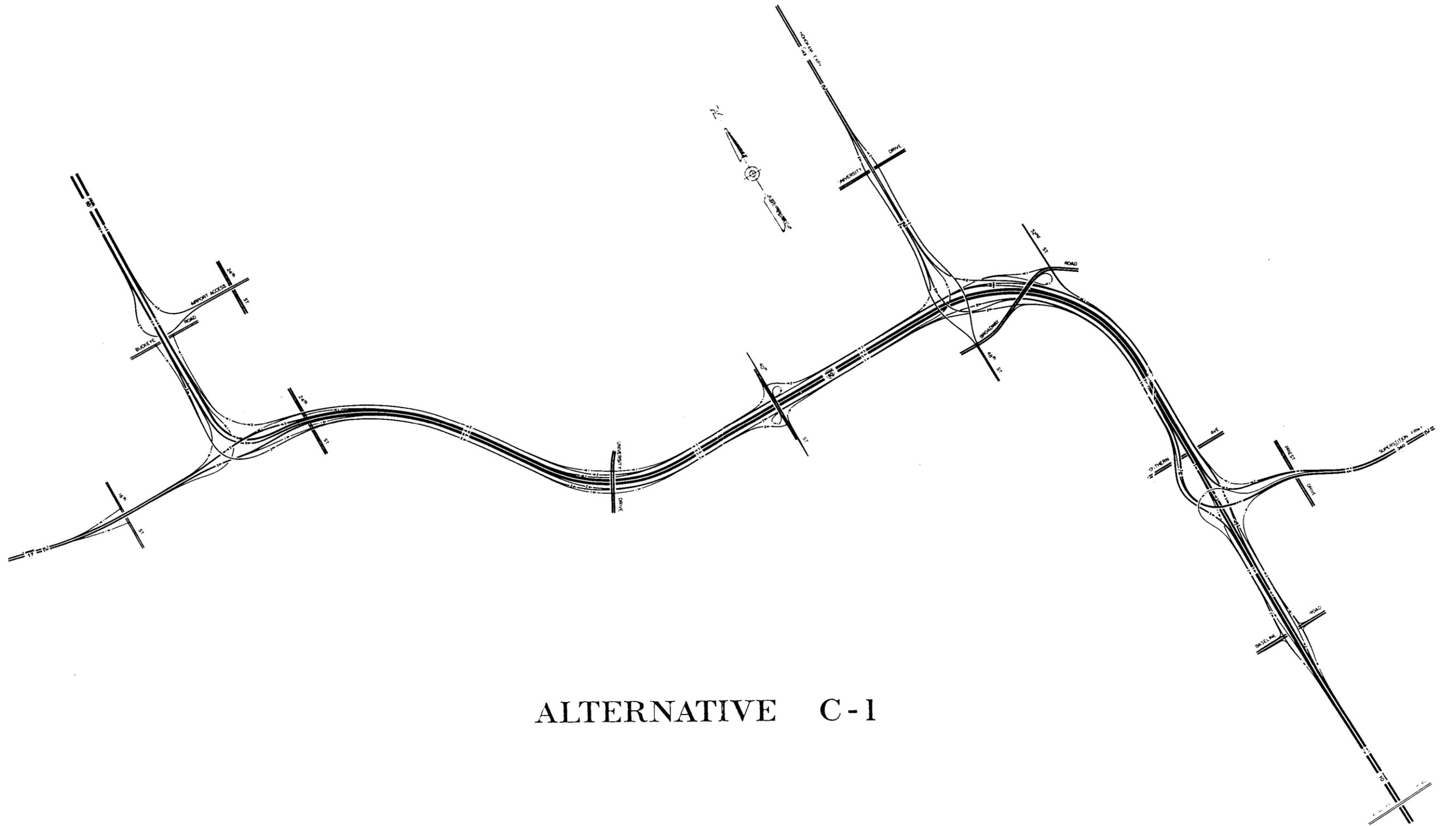
At the end of Phase II, two alternative concepts were selected for further refinement and development. The selected Alternatives C-1 & C-3 are detailed schematically in Figures 6 and 7, respectively. Both alternatives provide continuous C-D roads from the I-10/I-17 Interchange to the I-10/Superstition Freeway Interchange. A detailed description of each alternative follows:

ALTERNATIVE C-1

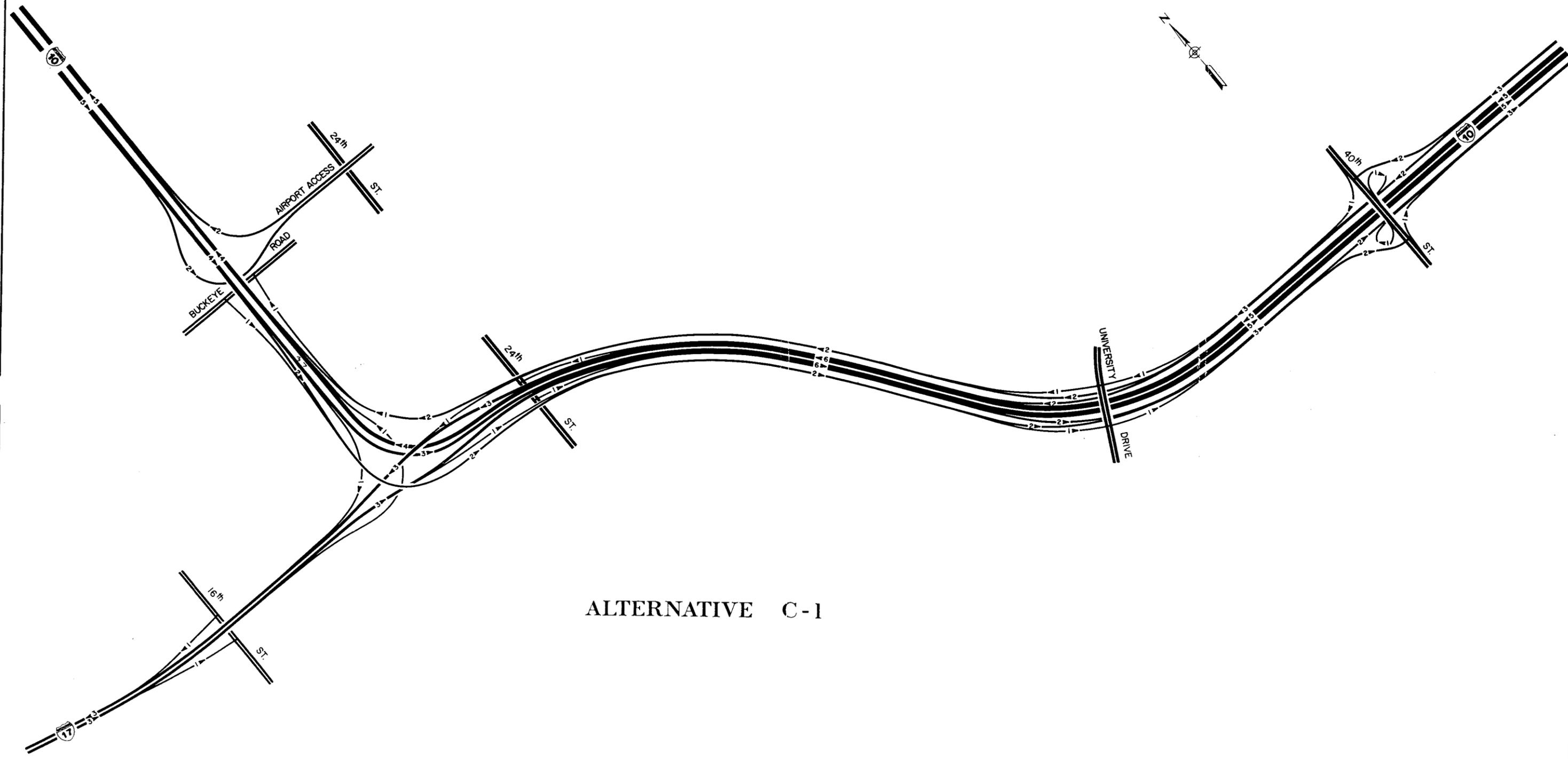
This alternative, shown schematically in Figures 8 and 9, was developed as a pure collector/distributor facility, with only local (interchanging) traffic using the C-D roads. With this scheme five basic lanes (one HOV lane and four general use lanes) are provided on the core roadway from the I-17 Interchange to the Superstition Freeway Interchange. With the strategic location of the transfer ramps a uniform level of service "D" is achieved on both the mainline and the C-D roads. This alternative is very compatible with the improvements currently under construction and the proposed Phase 1 improvements.

Mainline

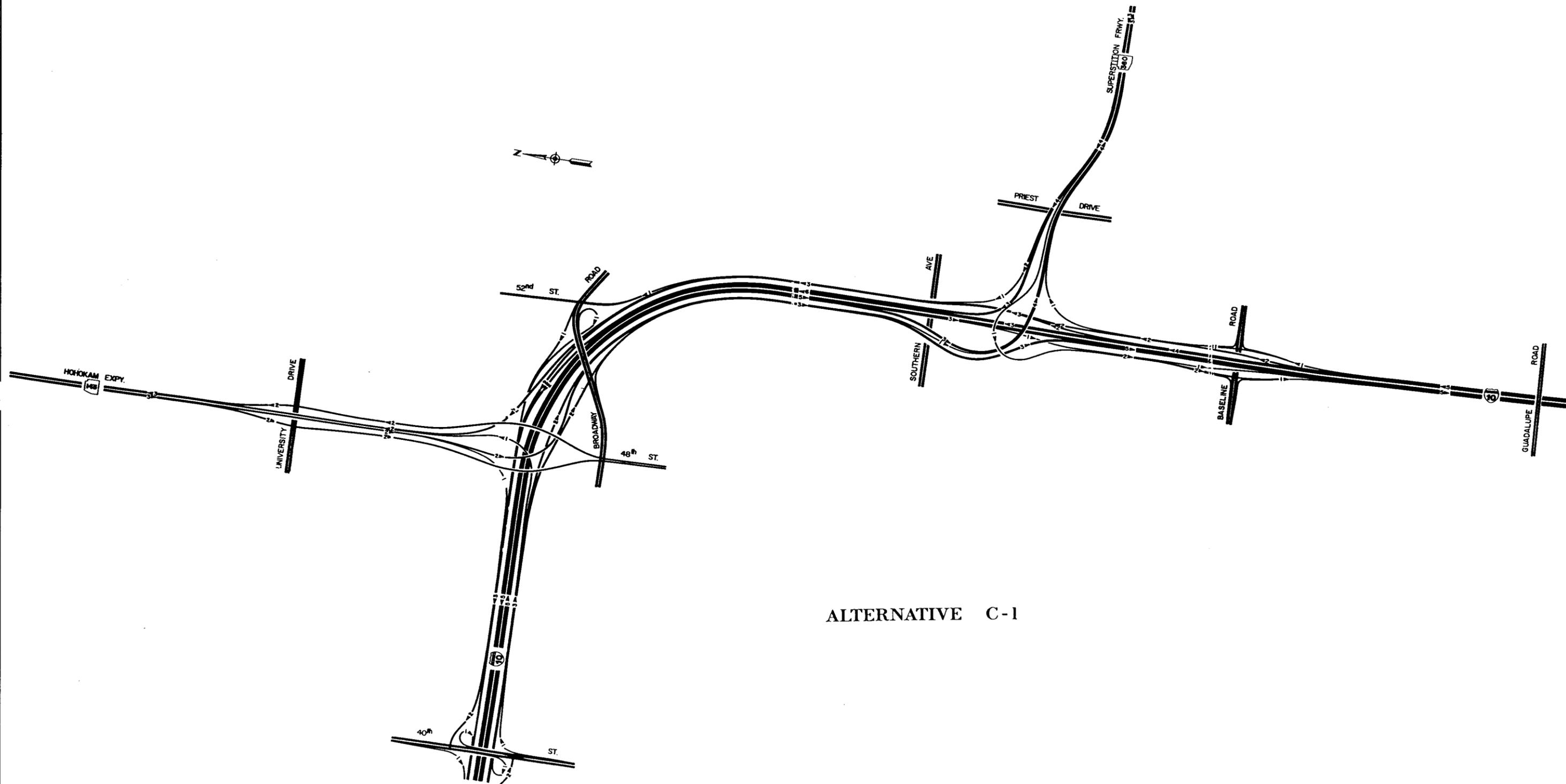
On Eastbound I-10 a two-lane transfer ramp is developed just in advance of the exit to northbound I-17. The transfer ramp reduces the mainline to three-lanes and provides access to University Drive and 40th Street. The three lane connection from southbound I-17 widens the mainline to six lanes. The single lane entrance ramp from 24th Street merges with the mainline and the six lanes continue eastward across the Salt River. A two-lane transfer ramp is developed within the University Drive Interchange, accessing the Hohokam Freeway and Broadway Road. After the diverge of the transfer ramp, the five basic lanes of eastbound I-10 continue uninterrupted to the Superstition Freeway Interchange. There they split, with three lanes exiting to the Superstition Freeway and three lanes continuing east. Just past the exit to the Superstition Freeway, there is a single lane exit to Baseline Road. The



ALTERNATIVE C-1



ALTERNATIVE C-1



ALTERNATIVE C-1

three-lane connection from the eastbound C-D road widens the mainline cross section to five lanes. The C-D road merge is followed by a single lane entrance ramp from the Superstition Freeway and a single lane entrance ramp from Baseline Road. The five-lane mainline cross section is extended to the project limit.

As Westbound I-10 approaches Baseline Road, the mainline widens to five lanes. A single lane exit to Baseline Road is followed by a two-lane exit to the Superstition Freeway, which reduces the mainline to four lanes. Within the Superstition Freeway Interchange there is a two-lane transfer ramp to the C-D road which reduces the mainline cross section to three lanes (one HOV lane and two general use lanes). The transfer ramp provides access to Broadway Road and the Hohokam Freeway. The mainline widens to six lanes with the addition of the three-lane connection from the Superstition Freeway. A two-lane transfer ramp, which provides access to 40th Street and University Drive, is located under the Broadway Road structure. The five basic lanes of the mainline continue uninterrupted to University Drive where the two-lane transfer ramp adds an auxiliary lane. The three lane exit to I-17 reduces the mainline to four lanes.

The strategic location of the transfer ramps (which provide access to two exits at a time) and the five basic lanes of the mainline provide a uniform "D" level of service on the core roadway. With the exception of eastbound I-10 between Broadway Road and the Superstition Freeway, the cross sections of the mainline are the same as those currently under construction and those proposed for the Phase 1 Improvements. The only potential mainline operational problems are the three-lane exits to the Superstition Freeway and I-17. Limited operating experience indicates that existing three-lane exits are subject to excessive vehicle turbulence and potential backups in the traffic stream during high volume conditions.

C-D Roads

The two-lane eastbound C-D road begins with the merging of the two-lane exit Northbound from I-10 and the entrance ramp from Buckeye Road. Access from Buckeye Road to I-17 has been eliminated. After the C-D road passes over the mainline connections to I-17, a single lane ramp from I-17 merges on the left. The C-D road passes to the outside of the 24th Street entrance ramp before crossing the Salt River. The single exit ramp on the right to University Drive is followed on the left by the merge of the two-lane transfer ramp, which widens the C-D road to three lanes. The single lane entrance ramp from University Drive merges on the right. The two-lane exit ramp to 40th Street reduces the cross section of the C-D road to two lanes. The loop ramp from southbound 40th Street, which has been designed as an add lane, is followed by the merge of the northbound 40th Street entrance ramp. The double entrance design at 40th Street and the left hand exit to the Hohokam Freeway reduce the weaving conflicts along this segment of roadway. The cross section reduces to two lanes with the two-lane exit ramp to Broadway, but widens back to three lanes with the merge of the two-lane connection from the Hohokam Freeway. Just past the Hohokam entrance, a single lane from Broadway Road merges on the right. Before the C-D road joins the eastbound I-10 mainline, a single lane exit to the Superstition Freeway is developed on the left.

The westbound C-D road begins with the merging of the Baseline Road entrance ramp with the two-lane exit to the Superstition Freeway. After the single lane exit to the Superstition Freeway, the C-D road widens to two lanes with the merge of the two-lane transfer ramp. The merge of the transfer ramp is followed on the right by the merge of a single lane ramp connection from the Superstition Freeway. The single lane exit to Broadway Road is followed by a two-lane exit to the Hohokam Freeway, which reduces the cross section to two lanes. The merge of the two-lane transfer ramp on the left widens the C-D road back to three lanes. The merge of the transfer ramp is followed by single lane entrances from Broadway Road and the Hohokam Freeway. The two-lane exit to 40th Street reduces the C-D road cross section to two lanes. The C-D road widens back to three lanes with the entrance loop from northbound 40th Street. The southbound 40th Street entrance ramp merges on the right. Underneath the University Drive, structure the cross section of the C-D road reduces to two

lanes with the exit of the two-lane transfer ramp. Single lane diamond ramps provide access to University Drive. Approaching the I-10/I-17 Interchange, the C-D road splits, with a single lane connection to I-17 and a two-lane connection to I-10. Immediately past the diverge, the two-lane connection to I-10 narrows to one-lane. Before merging with the I-10 mainline, a single lane exit to Buckeye Road is developed on the right.

The two basic lanes, in combination with the location of the transfer ramps and the design and location of the interchange ramps, provide a uniform "D" level of service along the C-D road. The single lane transfer ramps from eastbound I-17 and westbound Superstition Freeway limit the operational flexibility of the C-D roads by restricting the number of vehicles which can enter the C-D roads at these major locations. Due to the restricted right-of-way and the close spacing of interchanges the westbound transfer ramp at University Drive is the only transfer ramp from the C-D road to the I-10 mainline. This causes vehicles entering the C-D at the extremities (eastbound at Buckeye and University and westbound at Baseline) to travel the full length of the corridor before joining the I-10 mainline. The sequencing of the westbound transfer ramps requires vehicles on the core roadway, whose destination is Buckeye Road, to exit the mainline at Broadway. The restricted right-of-way with the Superstition Freeway Interchange, and other operational constraints, prohibit a connection from the eastbound C-D road to Baseline Road.

With the implementation of the C-D roads access to the diamond ramps at Buckeye Road is from the C-D roads only.

Interchanges

Reconstruction of the I-10/I-17 Interchange is not required with the implementation of the C-D roads. The C-D road connection will be constructed to the outside and over the existing roadway. The implementation of the C-D roads will improve the operation of the interchange by providing for greater operational flexibility.

The half diamond interchange at 24th Street is the only location with direct access to I-10. As with the I-10/I-17 interchange, the C-D roads will be constructed to the outside of the existing roadways and will have no impact on the operation of the interchange.

In Phase 1, the half diamond interchange at University Drive will be converted to a full diamond interchange. When the C-D roads from University Drive to the Hohokam Freeway are implemented, however, the University Drive Interchange will have to be reconstructed. At that time, the cross section underneath the University Drive structure will be spread to allow for a pair of transfer ramps between the mainline and the C-D road.

The 40th Street Interchange has been reconfigured as a Parclo A Interchange. This design will provide the capacity needed to handle the traffic accessing Sky Harbor airport. The dual entrance design of the Parclo A Interchange will also reduce the weaving conflicts on the C-D road between the entering and exiting vehicles.

The Hohokam Freeway Interchange has been reconstructed as a three level "T" Interchange, with access to the north only. I-10 traffic desiring 48th Street south would have to use the Broadway Road Interchange. 48th Street has been realigned to the outside of the Hohokam Freeway and terminates at University Drive. With this design, access from I-10 to University Drive via the Hohokam Freeway has been eliminated.

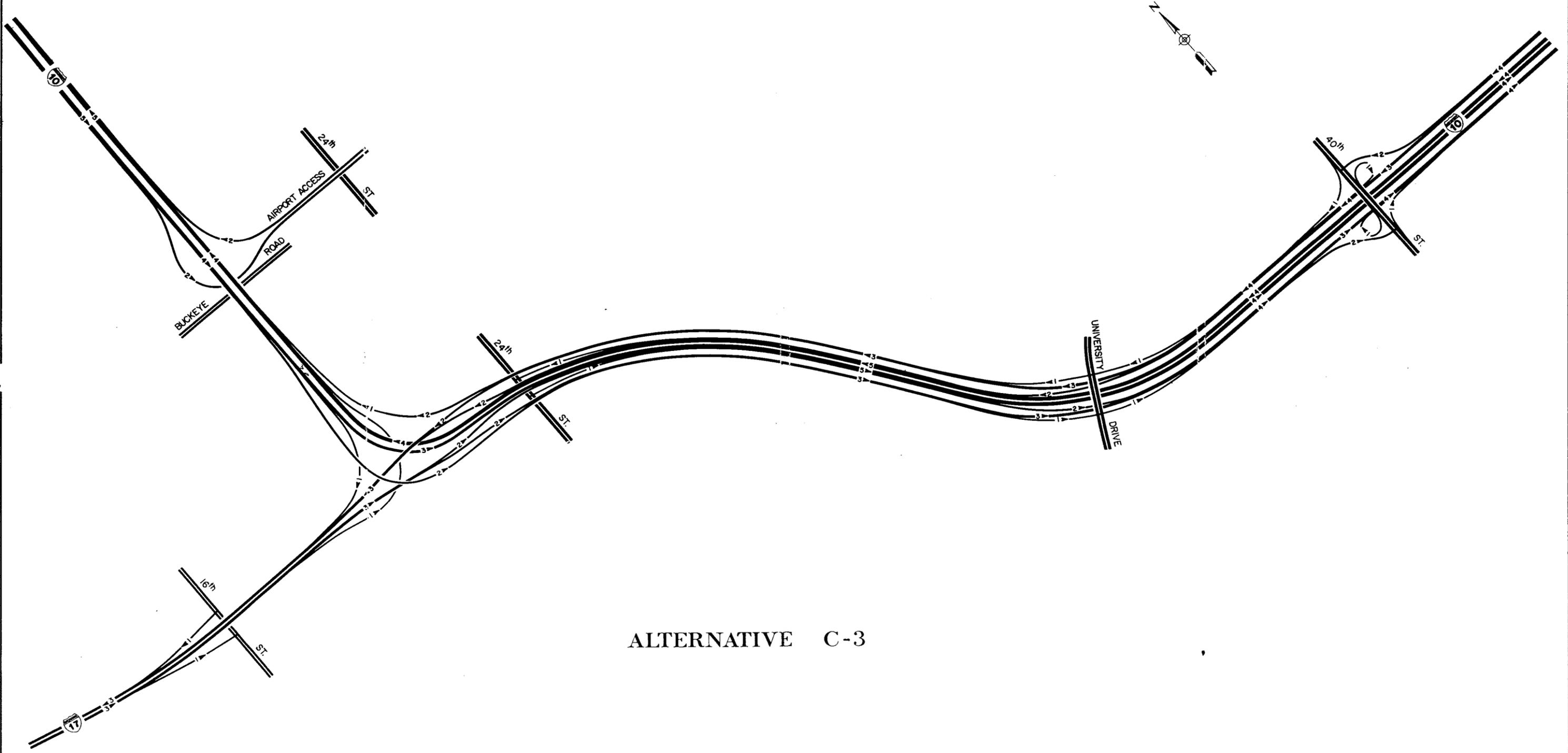
The Superstition Freeway Interchange has been redesigned as a three level "T" Interchange. Westbound, single lane connections to the C-D road have been provided in addition to the three-lane connection to the core roadway. Eastbound, the single lane exit from the C-D road adds to the three-lane mainline connection to provide four eastbound lanes across I-10. Westbound, approaching the I-10 Interchange, the Superstition Freeway has been widened to four lanes. A single lane exit to eastbound I-10 has been developed on the left. This is followed by a two-lane exit to the westbound C-D road on the right, which narrows to one lane before merging with the westbound C-D road.

After the C-D road exit, the westbound lanes continue around, passing over the westbound C-D roadway before joining with the three westbound lanes of I-10 to form a six-lane core roadway. The westbound Superstition to eastbound I-10 ramp crosses over the westbound C-D road, the I-10 mainline and the eastbound C-D road before joining with the exit to Baseline Road to form a two-lane C-D road. To facilitate maintenance of traffic during the reconstruction of the I-10/Superstition Interchange, the Superstition Freeway has been realigned to the south from west of Priest Road to the I-10 Interchange. The realignment of the Freeway, in combination with the replacement of the structures across Priest Drive, will allow the widening of Priest Drive and facilitate the construction of a half diamond interchange. The widening of the I-10 bridges across Southern Avenue has also been included in the Interchange improvements.

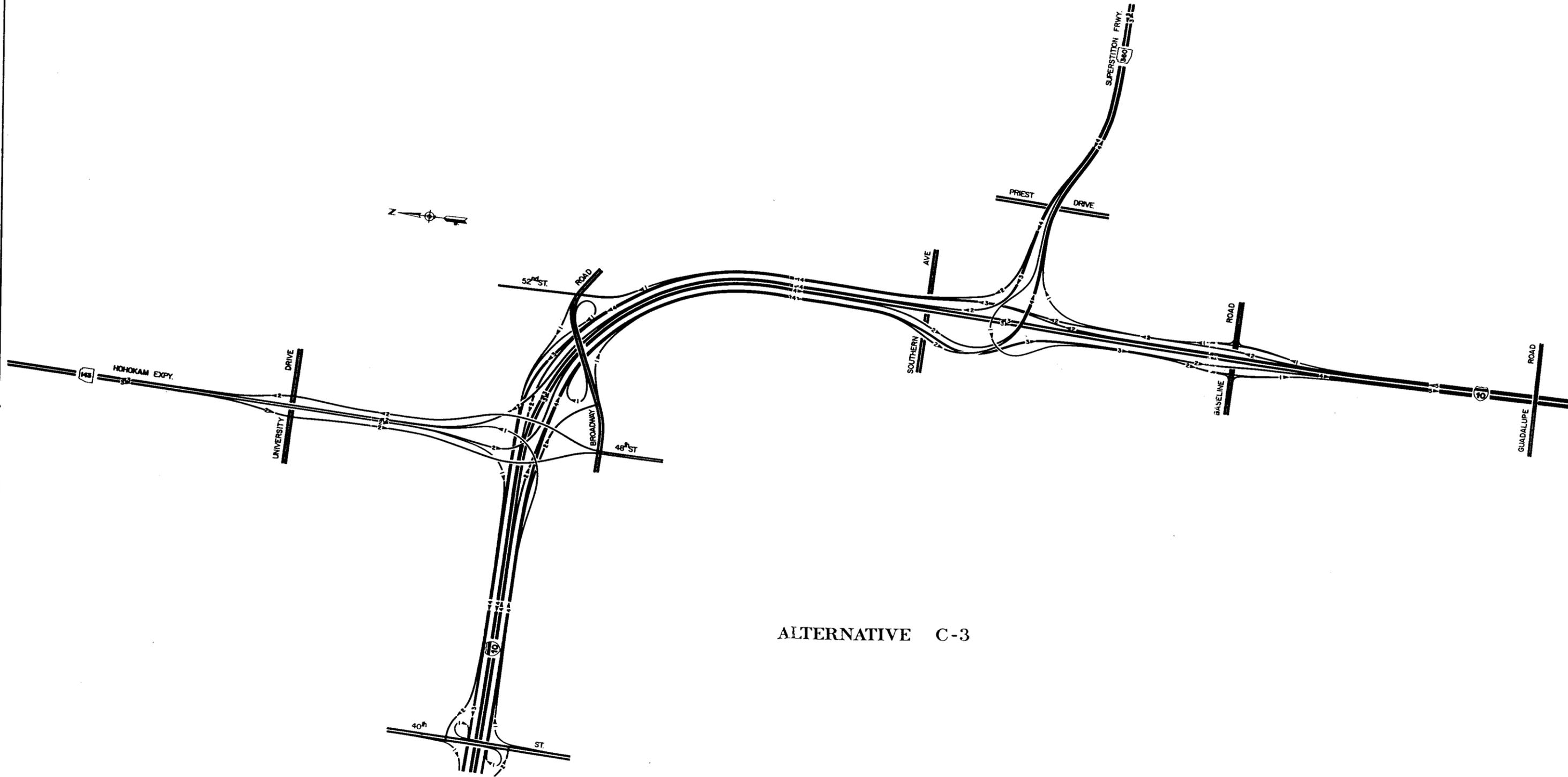
The Baseline Road Interchange has been totally reconstructed. The improvements include the replacement of the I-10 structures and the widening of Baseline Road. The single lane eastbound exit ramp joins with the westbound Superstition to eastbound I-10 ramp to form a two-lane C-D road. As the C-D road approaches Baseline Road, the C-D road splits, with a single lane exit on the left to eastbound I-10 and a two-lane ramp connection to Baseline Road. The single lane eastbound entrance ramp merges with the mainline after the connection from the Superstition Freeway. The westbound exit ramp to Baseline Road has been relocated further to the south to allow the mainline connection to the Superstition Freeway to exit prior to Baseline Road. The westbound entrance from Baseline Road joins with the C-D road before splitting into a two-lane connection to the westbound C-D road and a single lane connection to the Superstition Freeway.

ALTERNATIVE C-3

This Alternative, shown schematically in Figures 10 and 11 has been developed as the separation of overlapping routes. With this design, only the I-10 traffic is directed to the core roadway. The I-17/Superstition traffic, in addition to interchanging traffic, uses the collector distributor roadways.



ALTERNATIVE C-3



ALTERNATIVE C-3

This design splits the travel demand with approximately half of the peak hour traffic using the core roadway and half using the C-D roads.

The design provides four lanes (one HOV lane and four general use lanes) on I-10 between the I-17 Interchange and the Superstition Freeway and three basic lanes on the C-D road. There is one continuous lane on the C-D road which connects I-17 with the Superstition Freeway. While this Alternative balances the traffic demand and the number of lanes, it does not provide a uniform level of service. The level of service varies from "C" to "E", with the mainline weave between the Superstition Freeway and the Hohokam Freeway operating at level of service "E". The lane configuration that has been developed for this alternative is not very compatible with the improvements currently under construction or the proposed Phase 1 improvements.

Mainline

Eastbound on I-10 approaching the I-10/I-17 Interchange, a two-lane transfer ramp to the C-D road is developed in advance of the exit to I-17 north, reducing the mainline to three lanes. The three approaching lanes on I-17 split, with two lanes accessing the C-D road and two lanes joining the mainline to form a five-lane section. The single lane entrance ramp from 24th Street merges with the mainline and the five eastbound lanes continue across the Salt River (It should be noted that six lanes have been constructed in each direction across the Salt River and that this alternative will either incorporate the sixth lane into the C-D road or require a retrofit of the bridge deck). Underneath the University Drive structure a two-lane transfer ramp to the C-D road is developed. The two-lane exit reduces the mainline cross section to four lanes. The four lanes continue eastward to 48th Street where another two-lane transfer ramp is developed. The transfer ramp is used by traffic exiting to Baseline Road and a portion of the I-10 traffic destined for the Superstition Freeway. The mainline widens back to four lanes with the addition of the two-lane ramp from the Hohokam Freeway. At the Superstition Freeway the four lanes split, with two lanes exiting to the Superstition

Freeway and three lanes continuing eastward. The mainline widens to four lanes with the merging of the two-lane ramp from the Superstition Freeway and then to five lanes with the addition of the single lane entrance ramp from Baseline Road.

Westbound on I-10, approaching the Baseline Road Interchange, a five-lane cross section has been developed. The single lane exit to Baseline Road is followed by a two-lane exit to the Superstition Freeway, which in turn is followed by a two-lane exit to the C-D road. The successive two-lane exits provide access to the Superstition Freeway, Broadway Road, 40th Street, and University Drive. This reduces the mainline to three lanes as it passes under the eastbound connection to the Superstition Freeway. The cross section widens back to four lanes with the merge of the two-lane ramp connection from the Superstition Freeway. At the Hohokam Freeway Interchange, the two-lane exit to the northbound Hohokam Freeway is followed by a two-lane entrance from the C-D road. The four lanes then continue uninterrupted to University Drive where a two-lane transfer ramp from the C-D road adds a fifth lane (the previous comment regarding 12 lanes across the Salt River also applies here). After a single lane exit to 24th Street, the five lanes split, with two lanes accessing I-17 and four lanes continuing westward.

The mainline weave between the Superstition Freeway and the Hohokam Expressway disrupts the traffic flow and reduces the level of service to "E" in this critical section. The four basic lanes of the core roadway are not compatible with the proposed Phase 1 plans. The width of the core roadway is one lane less and in some locations two lanes less than the width to be constructed in the Phase 1 improvement plans. There are two potential operational problems with the locations of the transfer ramps. First, drivers approaching on westbound I-10, whose destinations are University Drive, must exit at the transfer ramp under the Superstition interchange and then travel the entire length of the C-D road. This also requires that the two exits at this location be signed for five destinations, one more than the recommended four. Second, eastbound drivers, whose destinations are Baseline Road, must exit in advance of the exit to the Superstition Freeway.

C-D Roads

The three-lane eastbound C-D road begins with the merging of the two-lane connection from I-10 and the two-lane connection from I-17. The two-lane I-17 connection carries not only the local (interchanging) traffic but also the I-17 to Superstition Freeway traffic. The C-D road passes to the outside of the half diamond ramp at 24th Street before crossing the Salt River. Under University Drive, the C-D road widens to four lanes with the merging of the two-lane transfer ramp. The single lane exit and entrance ramps at University Drive diverge and merge on the right. The cross section narrows to three lanes with the two-lane exit to 40th Street. The double entrance design and the addition of the auxiliary lane with the loop ramp from 40th Street reduces the weaving conflicts between the entering traffic at 40th Street and the existing traffic to the Hohokam Freeway. After the single lane exit to the northbound Hohokam Freeway, the C-D road narrows to three lanes with the two-lane exit to Broadway Road. The cross section widens back to four lanes with the merging of the two-lane transfer ramp from the mainline.

The entrance ramps from eastbound and westbound Broadway Road merge on the right. Approaching the Superstition Freeway, the four lanes split with two lanes exiting on the right to the Superstition Freeway and three lanes continuing towards Baseline Road. The single lane connection from westbound Superstition Freeway merges on the right. The C-D road then splits with two lanes exiting to Baseline Road and two lanes merging with mainline I-10.

The two-lane exit to the Superstition Freeway begins the westbound C-D road. After the merge of the Baseline Road entrance ramp, a single lane exit to the Superstition Freeway diverts on the right. The C-D road widens to three lanes with the merge of the two-lane transfer ramp and then to four lanes with the merge of the two-lane ramp from the Superstition Freeway. The single exit to Broadway Road is followed on the left by a two-lane exit to the mainline, which reduces the C-D road cross section to three lanes. The eastbound and westbound Broadway Road entrance ramps merge together before joining the C-D road as an auxiliary lane. The Hohokam Freeway ramp then merges on the right. The C-D road cross-section reduces to three lanes with the two-lane exit to 40th Street

and then widens back to four lanes with the addition of the 40th Street loop ramp. The southbound 40th Street entrance ramp merges on the right. Underneath the University Drive structure the C-D road cross section narrows to three lanes with the exit ramp on the right at University Drive. The three lanes of the C-D road cross the Salt River then split, with two lanes accessing I-17 and two lanes accessing I-10.

As with the mainline, the level of service on the C-D road varies from "C" to "D-E". All of the transfer ramps are two lanes wide which allows greater operational flexibility than Alternative C-1. Eastbound entering traffic at University Drive must travel the entire length of the C-D road before joining the mainline, while westbound traffic entering at Baseline Road can join the mainline at Broadway Road. The separation of the routes and the signing of the I-17/Superstition traffic to the C-D road creates operational problems. There are several locations along both eastbound I-17 and westbound Superstition Freeway where the number of message units exceed the recommended guidelines.

Interchanges

The implementation of the C-D roads will not impact the operation of the I-10/I-17 Interchange. The required construction is similar to Alternative C-1, with the exception of the elimination of the half diamond ramps at Buckeye Road.

The half diamond ramps at 24th Street will continue to access the mainline and will not be impacted by the implementation of the C-D roads.

The construction sequence at University Drive is the same as Alternative C-1. In Phase 1, the half diamond interchange will be converted to a full diamond interchange. The interchange will have to be reconstructed when the C-D roads from University Drive to the Hohokam Freeway are implemented.

The reconstruction of the 40th Street Interchange is the same as Alternative C-1. The reconstruction of the 40th Street Interchange has been divided into two

phases. During Phase 1, the 40th Street structure across I-10 will be replaced and a loop in the southwest quadrant will be constructed. In Phase 3 the C-D roads will be added and the loop in the northeast quadrant will be built.

The reconstruction of the Hohokam Freeway Interchange is similar to Alternative C-1, with one major exception. The eastbound directional ramp to I-10 and the westbound directional ramp from I-10 merge and diverge from the mainline, creating weaving conflicts on mainline I-10 between the Superstition Freeway Interchange and the Hohokam Freeway Interchange. The directional ramp from the eastbound C-D road to the northbound Hohokam Freeway diverges on the right, creating additional weaving conflicts on the segment of the C-D road between the 40th Street Interchange and the Hohokam Freeway Interchange.

The Broadway Road Interchange has been reconstructed as a Parclo A Interchange, with entrance loops in the northwest and southeast quadrants. With the reconstruction of the interchange, all movements to and from the C-D roads are provided.

The Superstition Interchange has been reconstructed as a three level "T" interchange. This configuration is similar to Alternative C-1, with the exception of the two-lane connection to the mainline and the two-lane connection to the C-D roads. The two-lane connection from the eastbound C-D road to the Superstition Freeway exits on the right. It passes over the C-D road before joining the two-lane connector from the mainline to form the four lanes of the eastbound Superstition Freeway. The four westbound lanes of the Superstition Freeway split, with two lanes exiting to the westbound C-D road and three lanes accessing westbound I-10. Immediately after the diverge, the three-lane connector narrows to two lanes before actually merging with westbound I-10. As with Alternative C-1, the Superstition Freeway has been realigned to the south from east of Priest Drive to the I-10 Interchange to facilitate maintenance of traffic during the interchange reconstruction.

The proposed reconstruction of the Baseline Road Interchange is similar to Alternative C-1, with the exception of the eastbound exit to Baseline Road. The eastbound exit diverges from the C-D road instead of mainline I-10.

LEVEL OF SERVICE ANALYSIS

LEVEL OF SERVICE ANALYSIS

To analyze the operation of the two alternatives, the year 2005 design hour volumes were assigned to both. A level of service analysis was performed on all mainline and C-D road segments, weaving sections, and on the exit and entrance ramp terminals. The AM and PM design hour volumes and the results of the level of service analysis for Alternatives C-1 and C-3 are displayed in Figures 12 & 13 and 14 & 15, respectively. A brief discussion of the traffic assignments and level of service analysis follows.

Traffic Assignment

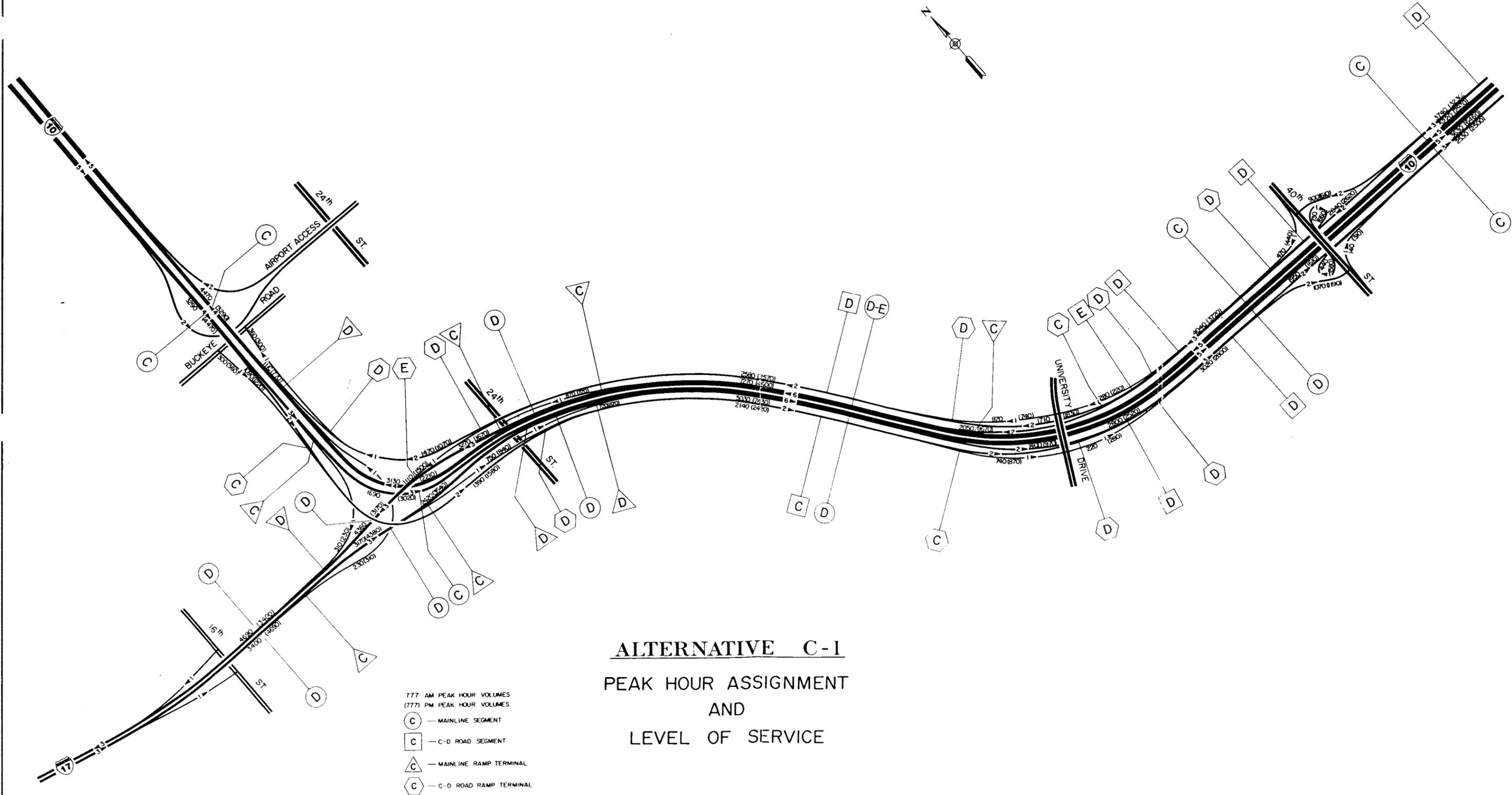
Traffic volumes for the year 2005 were developed from MAG 2005-34 transportation planning model. Current traffic counts were used to determine the peak hour volumes as a percentage of the daily volumes (K-Factor) and the peak hour directional distribution of traffic (D-Factor). The K & D Factors were applied to the 2005 ADT volumes from the planning model to determine the design year peak hour volumes.

The traffic assignments for the two alternatives differ simply due to the conceptual differences between them. A discussion of the differences between the traffic assignments for the two alternatives follows.

Alternative C-1

This alternative has been designed as a pure collector-distributor facility. With this design all of the through traffic is assigned to the mainline (core roadway) and only the local (interchanging) traffic is assigned to the C-D road. Approximately two thirds of the peak hour traffic has been assigned to the core road. The peak hour traffic assignment for Alternative C-1 is shown in Figures 12 & 13.

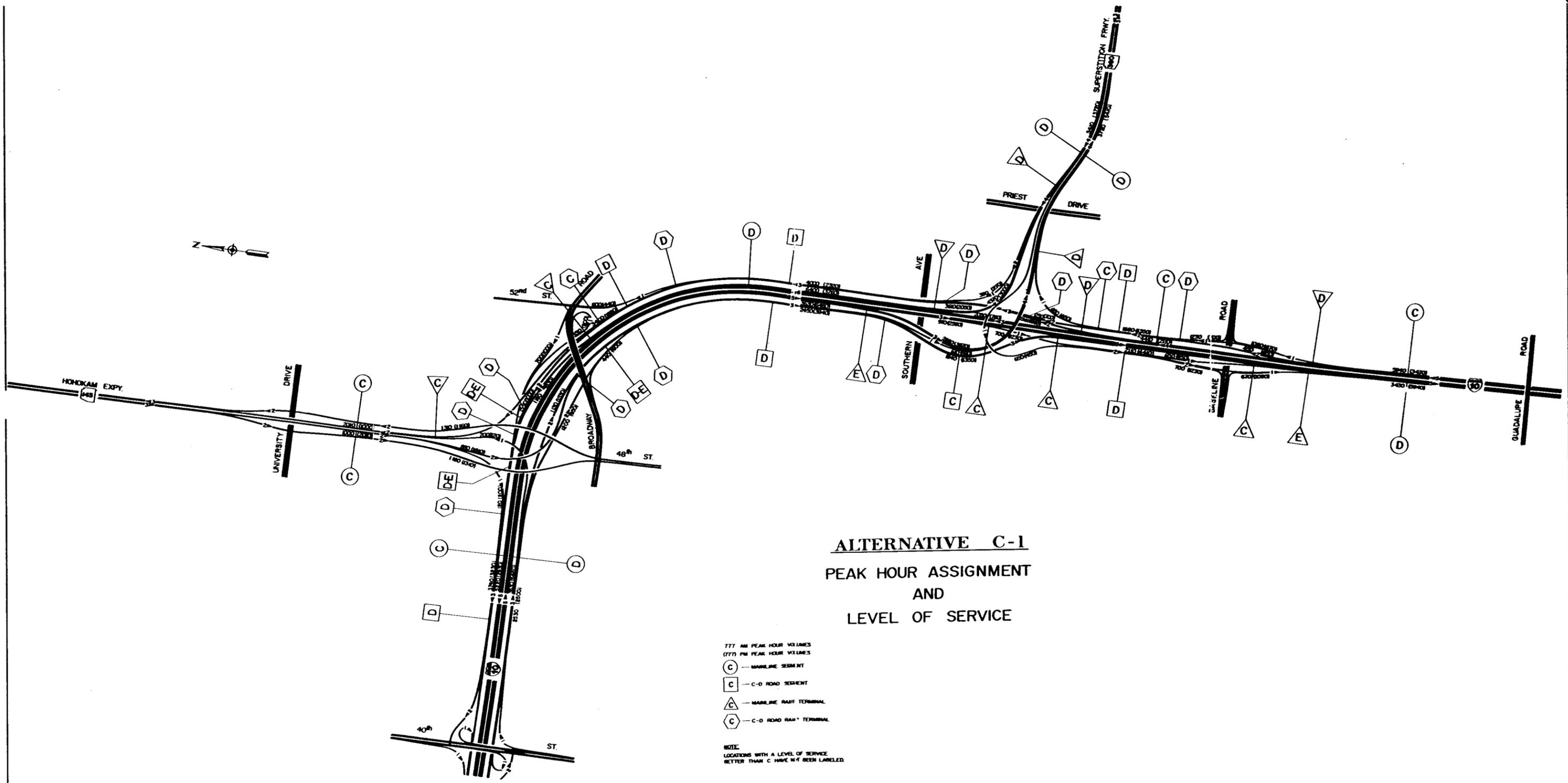
Traffic has been assigned to the transfer ramps for both alternatives based on a selected link analysis from the MAG planning model. The selected link



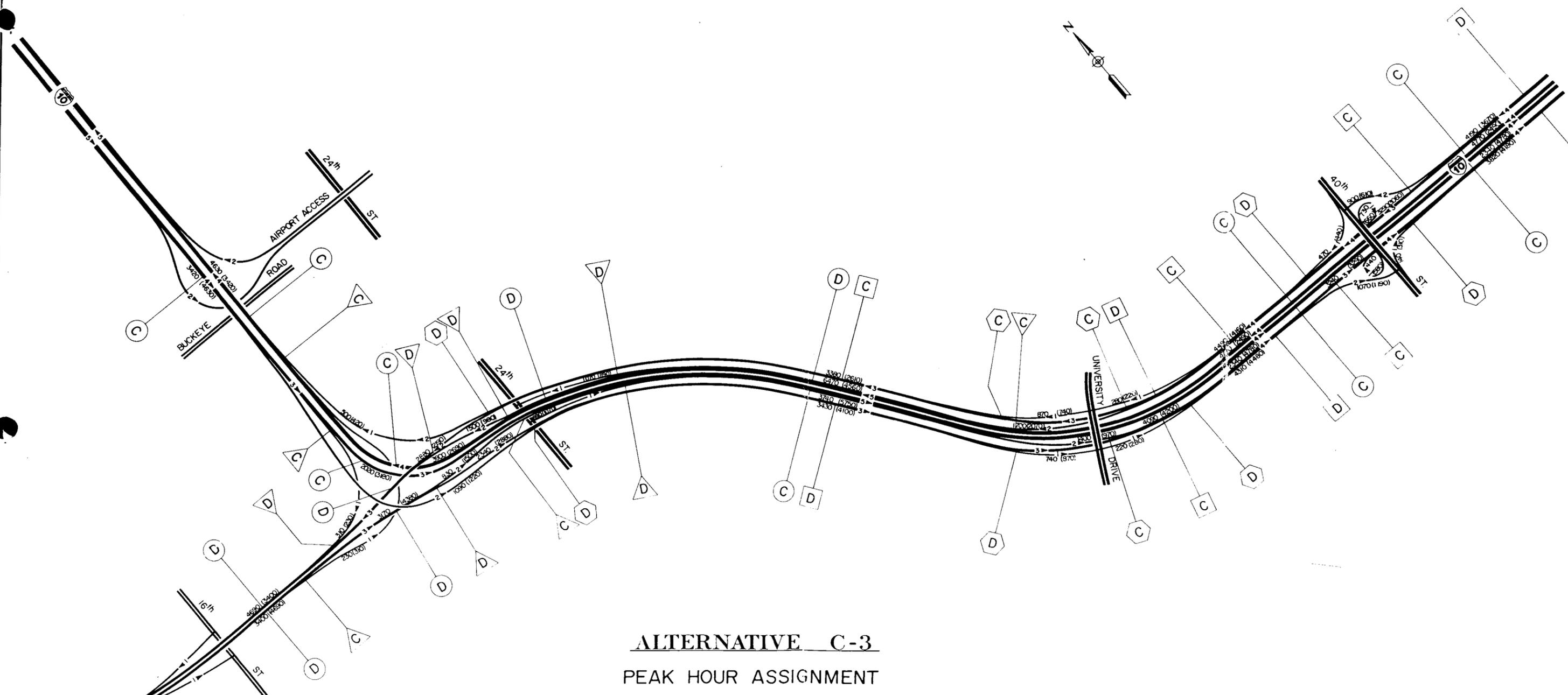
ALTERNATIVE C-1
 PEAK HOUR ASSIGNMENT
 AND
 LEVEL OF SERVICE

- 777 AM PEAK HOUR VOLUMES
 (777) PM PEAK HOUR VOLUMES
- (C) — MAINLINE SEGMENT
- [C] — C-D ROAD SEGMENT
- △ — MAINLINE RAMP TERMINAL
- ◊ — C-D ROAD RAMP TERMINAL

NOTE:
 LOCATIONS WITH A LEVEL OF SERVICE
 BETTER THAN C HAVE NOT BEEN LABELED



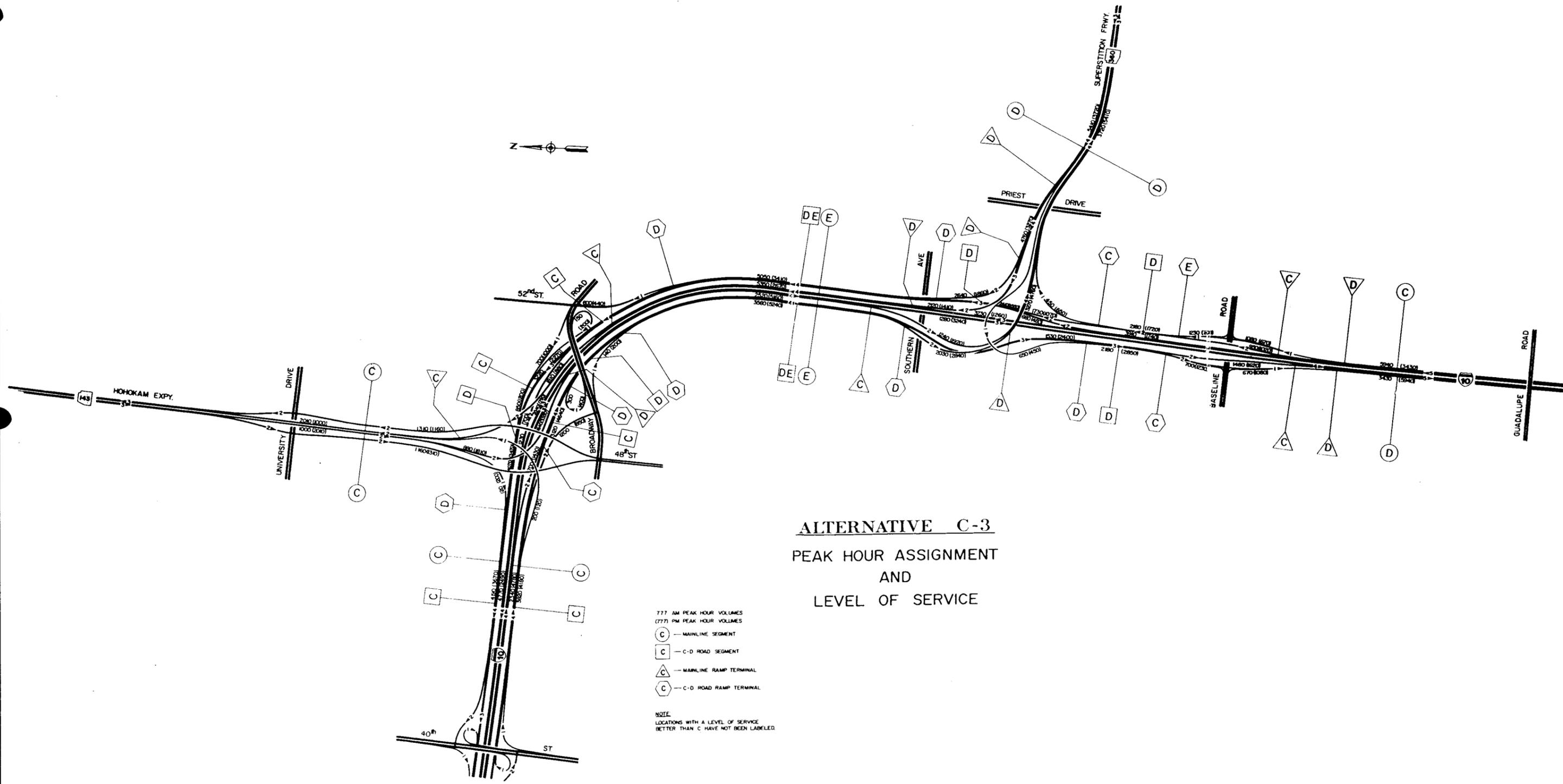
ALTERNATIVE C-1
 PEAK HOUR ASSIGNMENT
 AND
 LEVEL OF SERVICE



ALTERNATIVE C-3
 PEAK HOUR ASSIGNMENT
 AND
 LEVEL OF SERVICE

- 777 AM PEAK HOUR VOLUMES
 (777) PM PEAK HOUR VOLUMES
- (C) — MAINLINE SEGMENT
 - [C] — C-D ROAD SEGMENT
 - △ — MAINLINE RAMP TERMINAL
 - ⬡ — C-D ROAD RAMP TERMINAL

NOTE:
 LOCATIONS WITH A LEVEL OF SERVICE
 BETTER THAN C HAVE NOT BEEN LABELED



ALTERNATIVE C-3
 PEAK HOUR ASSIGNMENT
 AND
 LEVEL OF SERVICE

analysis is shown graphically in Figure 16. The upper drawing shows AM westbound design hour traffic entering the project area either on I-10 or the Superstition Freeway (SR 360) and their desired destinations. The lower figure shows PM eastbound design hour traffic entering the project area either on I-10 or I-17 and their desired destinations. The traffic assigned to the transfer ramps has been tabulated and is shown in Table 3 for the eastbound transfer ramps and Table 4 for the westbound transfer ramps.

As can be seen from the tabulation, drivers have the option of using two or more transfer ramps. The assigned volumes may differ from the actual volumes as repeat users (commuters) select the most efficient path to their destination. This selection process will maximize the efficiency of the facility and provide a more uniform level of service throughout the corridor.

Alternative C-3

The design of Alternative C-3 has been developed as the separation of overlapping routes. With this design, only I-10 traffic is assigned to the core roadway. The I-17/Superstition Freeway (SR 360) traffic is assigned to the C-D road. This concept balances the assignment with approximately 50 percent of the peak-hour trips assigned to the core roadway and 50 percent assigned to the C-D road. The peak hour assignment for Alternative C-3 is displayed in Figures 14 & 15.

The traffic assigned to the transfer ramps has been tabulated and is shown in Table 5 for the eastbound transfer ramps and Table 6 for the westbound transfer ramps.

As with Alternative C-1, drivers have the option of using two or more transfer ramps. Again, the commuter will select the most efficient route, maximizing the operation of the facility.

Level of Service

The 1985 Highway Capacity Manual procedures were used to perform the level of

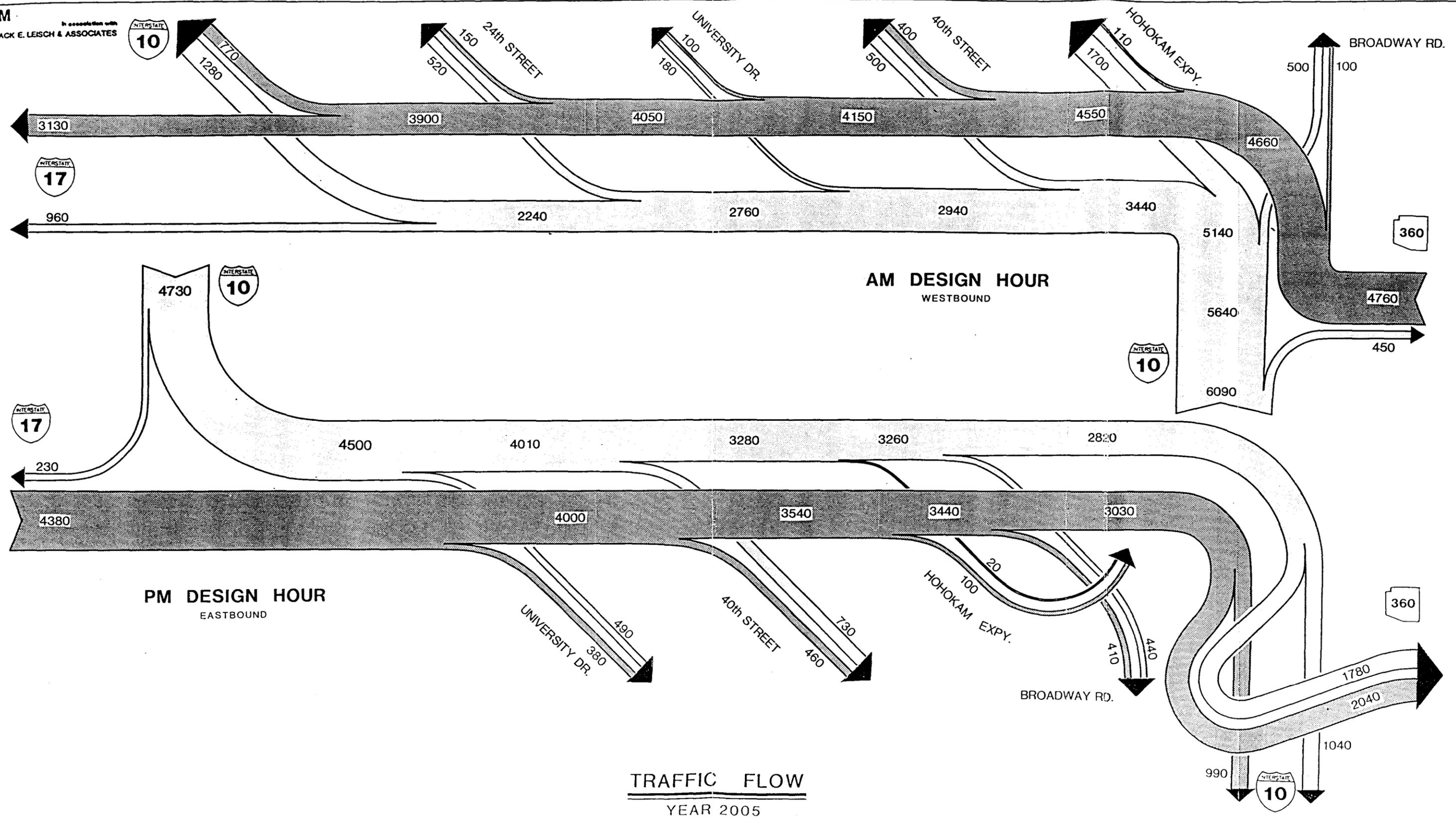


FIGURE 16

TABLE 3

TRANSFER RAMP TRAFFIC

ALTERNATIVE C-1 - EASTBOUND VOLUMES

	PEAK HOUR	
	<u>AM</u>	<u>PM</u>
EASTBOUND C-D ROAD INITIAL EXIT:		
Traffic Bound for University Drive	420	(490)
Traffic Bound for 40th Street	<u>670</u>	<u>(730)</u>
TOTAL TRAFFIC	1090	(1220)
TRANSFER RAMP EB T-1:		
Traffic Bound for University Drive	320	(380)
Traffic Bound for 40th Street	<u>430</u>	<u>(460)</u>
TOTAL TRAFFIC	750	(840)
TRANSFER RAMP EB T-2:		
Traffic Bound for Hohokam Freeway	200	(120)
Traffic Bound for Broadway Road	<u>1200</u>	<u>(850)</u>
TOTAL TRAFFIC	1400	(970)
TRANSFER RAMP EB T-3:		
All Traffic Bound for Superstition Freeway From:		
University Drive	80	(100)
40th Street	260	(400)
Hohokam Freeway	50	(110)
Broadway Road	70	(100)
Buckeye Road	<u>150</u>	<u>(180)</u>
TOTAL TRAFFIC	610	(890)
TRANSFER RAMP EB T-4:		
All traffic bound for Baseline Road:		
TOTAL TRAFFIC	700	(1230)

TABLE 4

TRANSFER RAMP TRAFFIC

ALTERNATIVE C-1 - WESTBOUND VOLUMES

	PEAK HOUR	
	<u>AM</u>	<u>PM</u>
WESTBOUND C-D ROAD INITIAL EXIT:		
All traffic Bound for Superstition Freeway:		
TOTAL TRAFFIC	450	(650)
TRANSFER RAMP WB T-1:		
Traffic Bound for Broadway Road	500	(370)
Traffic Bound for Hohokam Freeway	1700	(830)
Traffic Bound for Buckeye Road	<u>180</u>	<u>(150)</u>
TOTAL TRAFFIC	2380	(1350)
TRANSFER RAMP WB T-2:		
Traffic Bound for Broadway Road	100	(70)
Traffic Bound for Hohokam Freeway	110	(50)
Traffic Bound for Buckeye Road	<u>180</u>	<u>(150)</u>
TOTAL TRAFFIC	390	(270)
TRANSFER RAMP WB T-3:		
Traffic Bound for 40th Street	900	(610)
Traffic Bound for University Drive	<u>280</u>	<u>(220)</u>
TOTAL TRAFFIC	1180	(830)
TRANSFER RAMP WB T-4:		
Traffic from Baseline Road Bound for I-17	610	(350)
Traffic from Broadway Road Bound for I-17	200	(---)
Traffic from Broadway Road Bound for I-10	440	(620)
Traffic from Hohokam Freeway Bound for I-17	50	(---)
Traffic from Hohokam Freeway Bound for I-10	20	(30)
Traffic from 40th Street Bound for I-10	<u>730</u>	<u>(670)</u>
TOTAL TRAFFIC	2050	(1670)
TRANSFER RAMP WB T-5:		
All traffic Bound for I-17 From:		
Broadway Road	210	(580)
40th Street	470	(430)
University Drive	380	(320)
Hohokam Freeway	<u>50</u>	<u>(170)</u>
TOTAL TRAFFIC	1110	(1500)

TABLE 5

TRANSFER RAMP TRAFFIC

ALTERNATIVE C-3 EASTBOUND VOLUMES

	PEAK HOUR	
	AM	PM
EASTBOUND C-D ROAD INITIAL EXIT:		
Traffic Bound for University Drive	420	(490)
Traffic Bound for 40th Street	<u>670</u>	<u>(730)</u>
TOTAL TRAFFIC	1090	(1220)
TRANSFER RAMP EB T-1:		
Traffic Bound for University Drive	320	(380)
Traffic Bound for 40th Street	400	(460)
Traffic Bound for Superstition Freeway	<u>1620</u>	<u>(2040)</u>
TOTAL TRAFFIC	2340	(2880)
TRANSFER RAMP EB T-2:		
Traffic Bound for Hohokam Freeway	200	(120)
Traffic Bound for Broadway Road	<u>1200</u>	<u>(850)</u>
TOTAL TRAFFIC	1400	(970)
TRANSFER RAMP EB T-3:		
Traffic Bound for Baseline Road	700	(1230)
Traffic Bound for Superstition Freeway	<u>0</u>	<u>(200)</u>
TOTAL TRAFFIC	700	(1430)
TRANSFER RAMP EB T-4:		
Traffic Bound for Superstition Freeway From:		
I-17	1620	(2040)
I-10	0	(200)
University Drive	80	(100)
40th Street	260	(400)
Broadway Road	<u>70</u>	<u>(100)</u>
TOTAL TRAFFIC	2050	(2840)

TABLE 6

TRANSFER RAMP TRAFFIC

ALTERNATIVE C-3 WESTBOUND VOLUMES

	PEAK HOUR	
	<u>AM</u>	<u>PM</u>
WESTBOUND C-D ROAD INITIAL EXIT:		
Traffic Bound for Superstition Freeway	450	(650)
Traffic Bound for Broadway Road	<u>500</u>	<u>(370)</u>
TOTAL TRAFFIC	950	(1020)
TRANSFER RAMP WB T-1:		
Traffic Bound for 40th Street	500	(340)
Traffic Bound for University Drive	<u>180</u>	<u>(140)</u>
TOTAL TRAFFIC	680	(480)
TRANSFER RAMP WB T-2:		
Traffic Bound for Broadway Road	100	(70)
Traffic Bound for 40th Street	400	(270)
Traffic Bound for University Drive	100	(80)
Traffic Bound for I-17	<u>2040</u>	<u>(1440)</u>
TOTAL TRAFFIC	2640	(1860)
TRANSFER RAMP WB T-3:		
All Traffic from Baseline Road		
TOTAL TRAFFIC	1230	(700)
TRANSFER RAMP WB T-4:		
Traffic from Broadway Road Bound for I-10	440	(620)
Traffic from Hohokam Freeway Bound for I-10	20	(30)
Traffic from 40th Street Bound for I-10	730	(670)
Traffic from Broadway Road Bound for I-17	410	(580)
Traffic from Hohokam Freeway Bound for I-17	<u>100</u>	<u>(170)</u>
TOTAL TRAFFIC	1700	(2070)
TRANSFER RAMP WB T-5:		
All traffic Bound for I-17 From:		
Superstition Freeway	2040	(1440)
University Drive	380	(320)
40th Street	<u>460</u>	<u>(430)</u>
TOTAL TRAFFIC	2880	(2190)

service analysis. Computer software programs and capacity monographs based on the 1985 Manual were employed in computing levels of service for exit and entrance ramp terminals, mainline segments, and weaving sections. The results of the analyses for Alternative C-1 & C-3 are displayed in Figures 12 & 13 and 14 & 15, respectively.

Alternative C-1

This alternative provides a fairly uniform level of service "D" on most of the mainline and C-D road segments. Due to heavy weaving volumes, there is one segment of the mainline and three short segments of the C-D road which operate at level of service "D-E". These are:

- Westbound mainline across the Salt River.
- Eastbound C-D road between the Hohokam Freeway entrance and the Broadway Road entrance.
- Westbound C-D road between the transfer ramp to I-10 and the Broadway Road entrance ramp.
- Westbound C-D road between the Broadway Road entrance ramp and the Hohokam entrance ramp.

One segment of the westbound C-D road between the exit to University Drive and the transfer ramp to westbound I-10 theoretically operates at level of service "E". This segment is part of a multiple, two-sided weave. Repeat users (commuters), knowing that weaving within this short segment is difficult, would begin their weaving maneuver earlier and the combined segments would operate at level of service "D" or "D-E".

There are several ramp terminals which operate at level of service "E". These are:

- Eastbound I-10 exit to the Superstition Freeway.
- Eastbound entrance from Baseline Road.
- Westbound transfer ramp to I-17.

The most critical of these is the eastbound exit from I-10 to the Superstition Freeway (SR 360). The operation of the exit ramp could be improved by developing an auxiliary lane a quarter of a mile in advance of the exit. The six-lane cross section would then split, with three lanes exiting to the Superstition Freeway and four lanes continuing eastward on I-10. The fourth lane would then be dropped with a two-lane exit to Baseline Road. The operation of this ramp could be re-evaluated before the C-D road is constructed and the design modified at that time.

The operation of the Baseline Road entrance ramp can be improved with the construction of an auxiliary (6th lane). The auxiliary lane would be tapered into the mainline in advance of the Guadalupe overpass. Since the lane would be added to the outside of the I-10 roadway, the decision to implement the auxiliary lane can be made at any time, with little impact on the operation of I-10.

Improvement of the operation of the transfer ramp to I-17 would be costly, requiring the widening of the I-17 structures over I-10 and 16th Street to four lanes. This is the last segment of C-D road to be constructed, with construction scheduled for the year 2005. At that time, it is recommended that the operation of the transfer ramp be re-evaluated. It is possible that the widening of the structures could be included with required deck maintenance (rehabilitation).

Alternative C-3

The configuration of this alternative does not provide a uniform level of service for either the mainline or the C-D road. The operation of the mainline varies between "C" and "E" level of service, while the operation of the C-D road varies between "C" and "D-E" level of service.

The weave eastbound on I-10 between the Hohokam and Superstition Freeways reduce the mainline level of service to "E" and the weave westbound on I-10 between the Superstition Freeway and Broadway Road reduce the level of service of the C-D road to "D-E". These are critical links within the corridor. The operation of the mainline could be improved by widening the I-10 roadway to five lanes. The five-lane section is more compatible with the first phase improvements.

The westbound Baseline entrance is the only ramp terminal which has been analyzed to operate at level of service "E". It is anticipated that the ramp will operate better than the analysis shows, as repeat users (commuters) can be expected to avoid the right lane of the two-lane C-D road. The Baseline Road entrance ramp would then operate as an exclusive entrance. This is also one of the cases where the theoretical assigned volumes may be more than the actual volumes. The I-10/Broadway Road traffic assigned to this ramp can also use the next transfer ramp. As the operation of the merge and weave begin to break down, drivers destined for Broadway Road will use the other ramp. The repeat user will use either ramp and a uniform level of service will be achieved.