

DRAFT: DUMBARTON BRIDGE TECHNICAL REPORT

Prepared by the Dumbarton Bridge Technical Group

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## I. INTRODUCTION, BACKGROUND, AND SUMMARY

In February 1980, representatives of various agencies concerned with the Dumbarton Bridge met to discuss potential connection alternatives. The purpose of the meeting was two-fold:

- 1) to provide information for each community to explore the impacts of alternatives on itself and other neighborhood communities, and
- 2) to provide an opportunity for communities to jointly discuss alternatives that can be beneficial to the entire Mid-Peninsula region.

At the meeting, the Dumbarton Bridge Technical Group was formed. The Technical Group was given the charge to assemble technical data on an array of potential connection alternatives.

From February to April, 1980, the Technical Group met four times and involved numerous hours of individual work, and discussion between individuals.

The findings of the Technical Group are presented in this report.

### Connection Alternatives

- Seven basic alternatives, with some modifications, were explored:
  - 1. Approved Connections
  - 2. Relocated Industrial Park (in EPA)
  - 3. Depressed University Avenue (in EPA)
  - 4a. Southern Connection, South of Oregon Expressway (in PA)
  - 4b. Southern Connection, Laura Lane (in PA)
  - 4c. Southern Connection, San Francisquito Creek (in EPA)
  - 4d. Southern Connection, Geng Road (in PA)
  - 5. Pulgas Avenue Connection (in EPA)
  - 6. Transit Lane (on Bridge)
  - 7. No University Avenue Connection (in EPA)
- In addition, the traffic effects of two combinations of alternatives considered:
  - 4a + 7 Southern Connection, South of Oregon Expressway Plus No University Avenue Connection
  - 4d + 7 Southern Connection, Geng Road Plus No University Avenue Connection

## Summary of Findings

- The Approved Connections will significantly aggravate the traffic situations on Willow Road east of Hamilton Avenue (in MP) and University Avenue east of Highway 101. In general, the existing adverse traffic conditions on other roads will either experience moderate changes or remain unchanged.

Along University Avenue east of Highway 101, noise will significantly worsen. The amount of disruption will significantly increase.

The potential for commercial development in East Palo Alto will be significantly improved.

- A Relocated Industrial Park will have the same effects on traffic situations as the Approved Connections. There will be significant adverse changes on Willow Road east of Hamilton Avenue and University Avenue east of Highway 101.

The noise situation on University Avenue east of Highway 101 will significantly worsen. There will be significant displacement in in the East Bayshore Frontage Road area of East Palo Alto, and a significant increase in disruption in that area and along University Avenue east of Highway 101.

The potential for commercial development in East Palo Alto will be significantly improved.

- A Depressed University Avenue will have the same effects on traffic situations as the Approved Connections and the Relocated Industrial Park with significant adverse changes on Willow Road and University Avenue.

Along University Avenue east of Highway 101, there will be a significant increase in disruption and a moderate improvement in noise. The potential for commercial development in East Palo Alto will improve significantly.

- A Southern Connection, South of Oregon Expressway will have positive effects on Willow Road east of Hamilton and east of Highway 101. All other traffic changes are similar to the Approved Connections, including the same significant negative change on University Avenue east of Highway 101.

Along University Avenue east of Highway 101, the noise and disruption will be significantly aggravated. There will be significant displacement along Embarcadero Road, east of Highway 101.

The potential for both commercial and industrial development in East Palo Alto will be significantly improved.

- A Southern Connection, Laura Lane will significantly aggravate the traffic situation on Embarcadero Road east of Highway 101. On the other roads, it will generally have the same effects on traffic conditions as the Approved Connections.

The noise affects along University Avenue will be the same as the Approved Connections. There will be significant aggravation of the noise condition. There will be some displacement in the Laura Lane area.

The potential for industrial development in East Palo Alto will be improved.

- A Southern Connection, San Francisquito Creek will have the same effects on traffic situations as the Southern Connection, Laura Lane.

The traffic situation on Embarcadero Road east of Highway 101 will have a significant adverse change. All other roads will generally have the same traffic condition effects as the Approved Connections.

Similar to the Southern Connection, Laura Lane, there will be significant aggravation of the noise condition along University Avenue. Displacement along Daphne Way in East Palo Alto will be significant. The potential for industrial development in East Palo Alto will be improved.

- Similar to the Southern Connection, Laura Lane and San Francisquito Creek, Southern Connection, Geng Road, will significantly aggravate the traffic situation on Embarcadero Road east of Highway 101. It will have moderate positive effects on Willow Road, east of Hamilton Avenue and east of Highway 101, and on University Avenue east of Highway 101.

There will be some improvement in air quality along Willow Road and some reduction in disruption along University Avenue.

In East Palo Alto, the potential for commercial development will be reduced and the potential for industrial development will be increased.

- A Pulgas Avenue Connection, similar to the Southern Connection, Laura Lane, San Francisquito Creek, and Geng Road, will significantly aggravate the traffic situation on Embarcadero Road, east of Highway 101. Similar to the Approved Connections there will be significant aggravation of traffic situations on Willow Road and University Avenue.

Along University Avenue, there will be a significant increase in noise and in the amount of disruption. The potential for commercial development in East Palo Alto will be significantly improved.

- A Transit Lane will have the same effects on traffic situations as the Approved Connections. There will be significant adverse changes on Willow Road east of Hamilton and University Avenue east of Highway 101.

The transit lane with High Occupancy Vehicles will, by itself, make a negligible difference in traffic conditions. To have some effect, the transit lane with HOV's would need to induce doubling up of occupants to reduce traffic. Other pressures, such as high gasoline prices, limited gasoline supplies, bridge tolls, traffic congestion on the bridge, and energy conservation efforts, may provide incentives for this alternative. Such pressures themselves may reduce traffic.

The noise situation and the disruption along University Avenue will be significantly aggravated. The potential for commercial development in East Palo Alto will be improved.

- No University Avenue Connection will significantly aggravate the traffic situation on Willow Road east of Highway 101. It will further degrade the traffic situation on Willow Road east of Hamilton Avenue. It will significantly improve the traffic situation on University Avenue east of Highway 101.

The noise situation on Willow Road will be significantly aggravated, while the noise situation on University Avenue will be significantly improved. The disruption along University Avenue will also be significantly reduced.

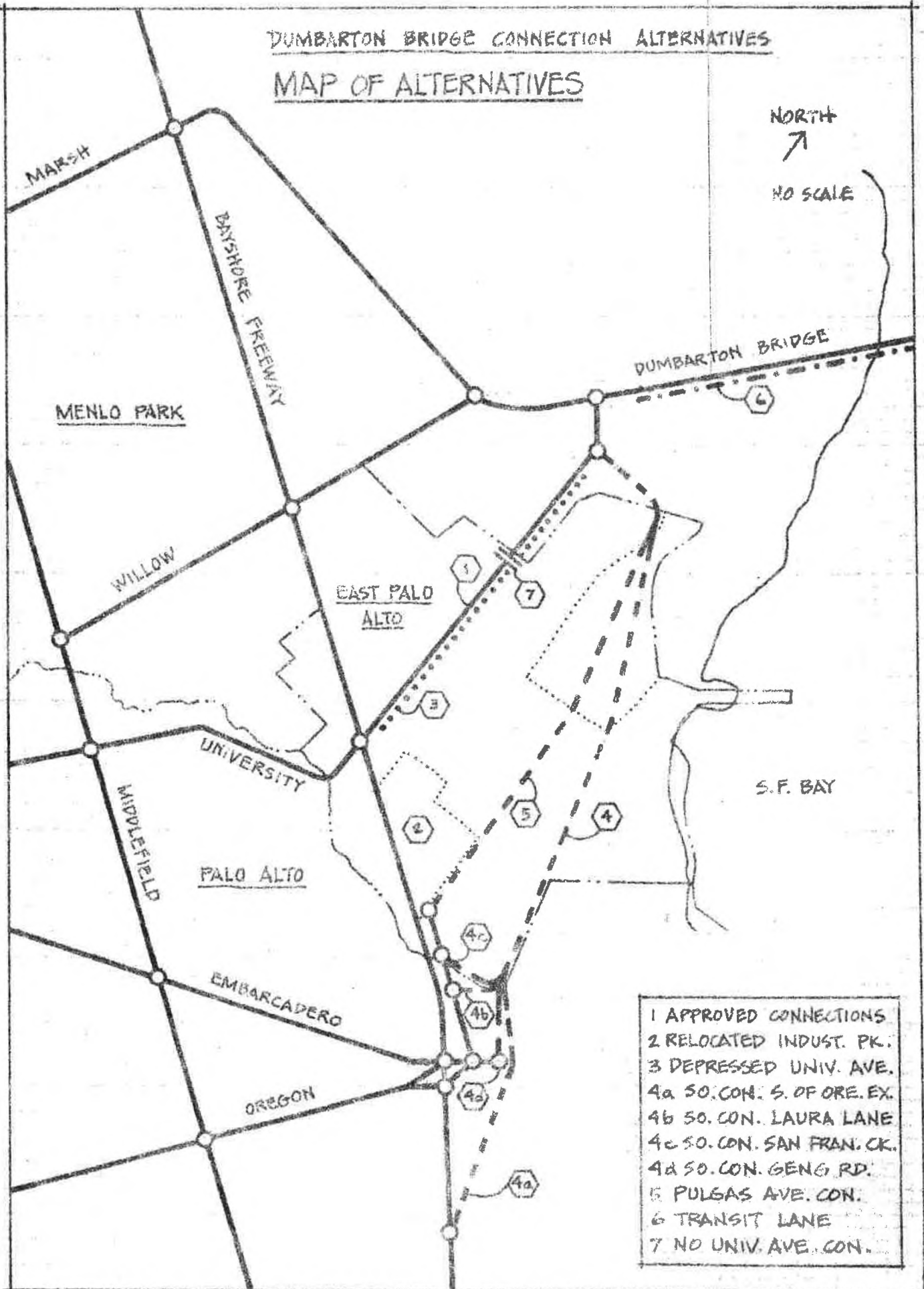
There will be some improvement in air quality along University Avenue, and some reduction in plant and animal qualities along Willow Road. Potential for commercial and industrial development in East Palo Alto will be reduced.

- A Southern Connection, South of Oregon Expressway Plus No University Avenue Connection will significantly improve the traffic situation on University Avenue east of Highway 101. It will have the same effects on other roads as the Approved Connection, with a significant adverse change on Willow Road east of Hamilton Avenue.
- A Southern Connection, Geng Road Plus No University Connection will significantly aggravate the traffic situation on Embarcadero Road east of Highway 101. It will significantly improve the traffic situation on University Avenue east of Highway 101. It will moderately improve the traffic situations on Willow Road east of Hamilton Avenue and east of Highway 101.

DUMBARTON BRIDGE CONNECTION ALTERNATIVES  
MAP OF ALTERNATIVES

NORTH  
 ↑

NO SCALE



- |    |                         |
|----|-------------------------|
| 1  | APPROVED CONNECTIONS    |
| 2  | RELOCATED INDUST. PK.   |
| 3  | DEPRESSED UNIV. AVE.    |
| 4a | SO. CON. S. OF ORE. EX. |
| 4b | SO. CON. LAURA LANE     |
| 4c | SO. CON. SAN FRAN. CK.  |
| 4d | SO. CON. GENG. RD.      |
| 5  | PULGAS AVE. CON.        |
| 6  | TRANSIT LANE            |
| 7  | NO UNIV. AVE. CON.      |

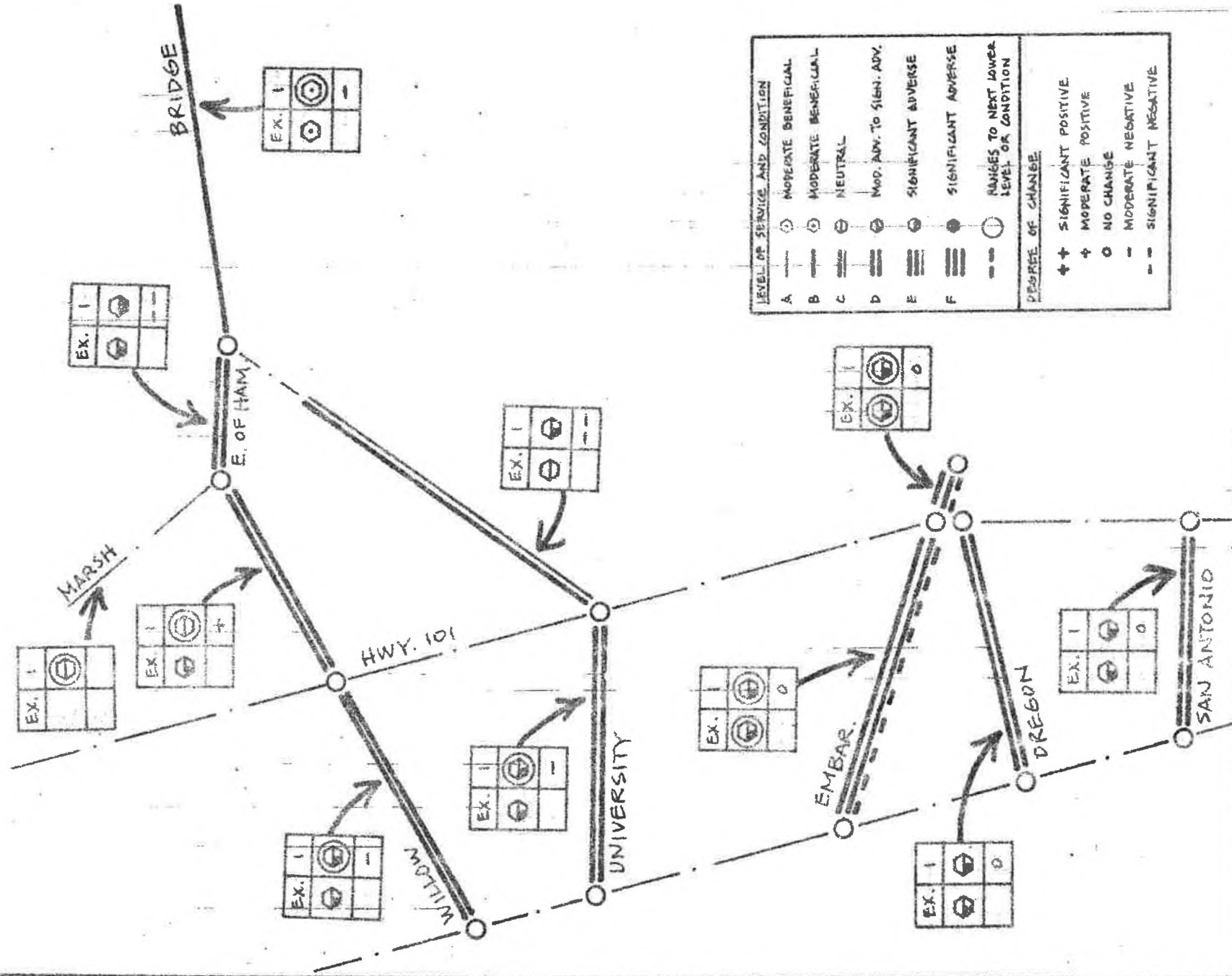


# DUMBARTON BRIDGE CONNECTION ALTERNATIVES

TRAFFIC MAP 1  
EXISTING VS. APPROVED CON.

NORTH  
7  
NO SCALE

ALTERNATIVE	CONDITION	CHANGE



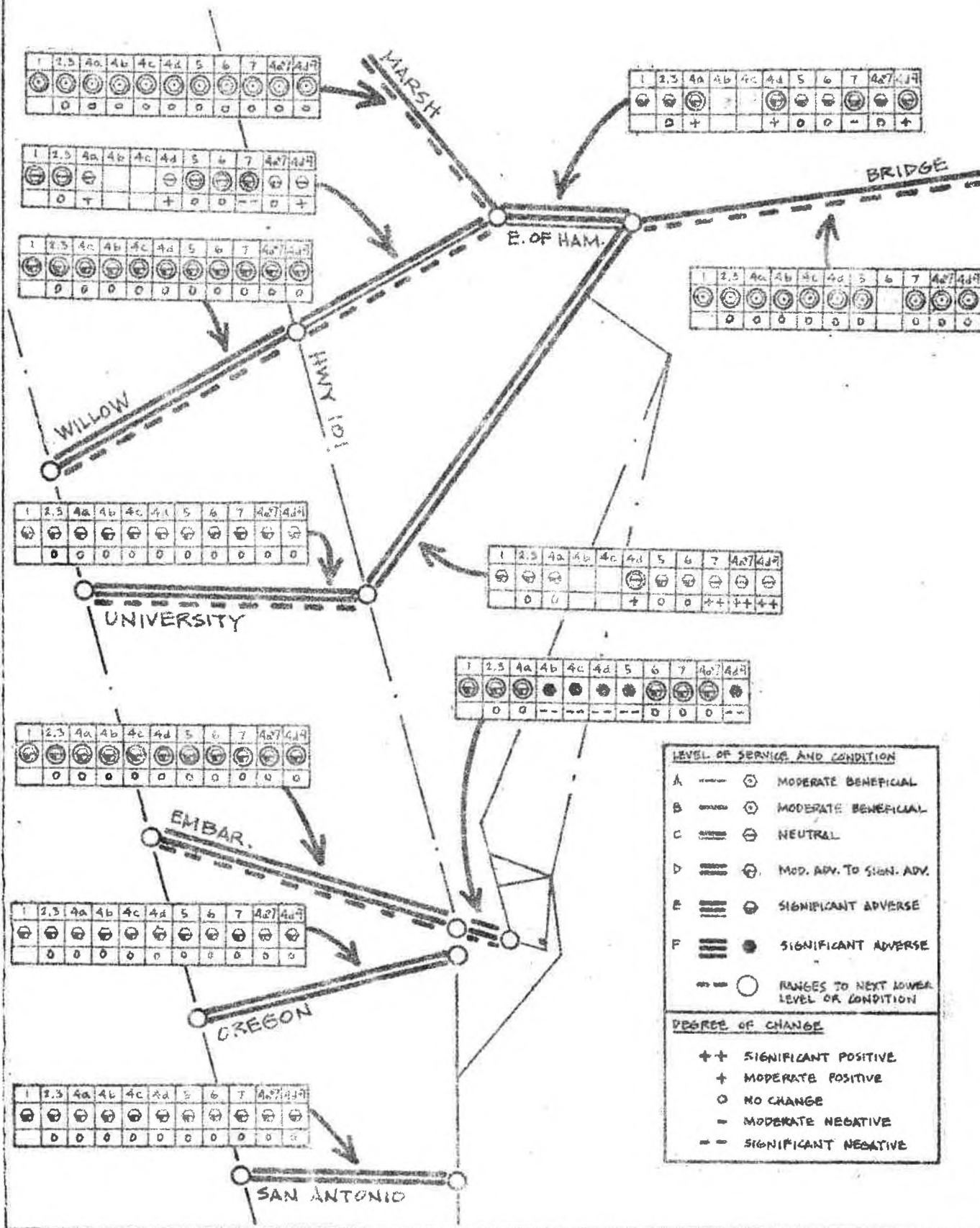
LEVEL OF SERVICE AND CONDITION	DEGREE OF CHANGE
A	⊕ ⊕ MODERATE BENEFICIAL
B	⊕ ⊕ MODERATE BENEFICIAL
C	⊕ ⊕ NEUTRAL
D	⊕ ⊕ MOD. ADV. TO SIGN. ADV.
E	⊕ ⊕ SIGNIFICANT ADVERSE
F	⊕ ⊕ SIGNIFICANT ADVERSE
	⊖ ⊖ CHANGES TO NEXT LOWER LEVEL OR CONDITION
DEGREE OF CHANGE	
⊕ ⊕	SIGNIFICANT POSITIVE
⊕	MODERATE POSITIVE
⊕	NO CHANGE
⊖	MODERATE NEGATIVE
⊖ ⊖	SIGNIFICANT NEGATIVE

# DUMBARTON BRIDGE CONNECTION ALTERNATIVES

ALTERNATIVE
CONDITION
CHANGE

## TRAFFIC MAP 2 APPROVED CON. VS. ALTERNATIVES

NORTH  
↑  
NO SCALE



CONDITION

MATRIX 1 : ENVIRONMENTAL CONDITIONS

- SIGN. BENEFICIAL
- ◐ MOD. BENE.
- ⊖ NEUTRAL
- ⊕ MOD. ADVERSE
- SIGN. ADV.
- RANGES TO NX. LOWER COND.
- Ⓢ SAME AS ALT. 1

EXISTING	1 APPROVED CONNECTIONS	2 RELOCATED INDUSTRIAL PARK	3 DEPRESSED UNIVERSITY PARK	4a SOUTHERN CON. UNIVERSITY AV.	4b SOUTHERN CON. S. OF OREGON EX.	4c SOUTHERN CON. LAURA LANE	4d SOUTHERN CON. SAN FRANCISCO BLVD	5 SOUTHERN CON. GENG RD.	6 FULGAS AV. CONNECTION	7 TRANSIT LANE	7 NO UNIVERSITY AV. CONNECTION
----------	------------------------	-----------------------------	-----------------------------	---------------------------------	-----------------------------------	-----------------------------	-------------------------------------	--------------------------	-------------------------	----------------	--------------------------------

A. TRAFFIC	( SEE TRAFFIC MAPS )											
B. NOISE												
1. WILLOW RD.	●	●	○	Ⓢ	○	○	○	⊕	○	○	●	
2. UNIVERSITY	⊖	●	○	⊕	○	○	○	⊕	○	○	⊖	
C. AIR QUALITY												
1. WILLOW RD.	⊕	⊖	○	○	○	○	○	⊕	○	○	○	
2. UNIVERSITY	○	⊖	○	○	○	○	○	⊕	○	○	○	
D. PLANTS/ANIMALS												
1. WILLOW RD.	⊕	⊕	○	○	○	○	○	○	○	○	⊖	
E. WATER QUALITY												
1. WILLOW RD.	⊕	⊖	○	○	○	○	○	○	○	○	⊖	
F. DISPLACEMENT												
1. WILLOW RD.		●	○	○	○	○	○	○	○	○	○	
2. EMBARCADERO					⊕							
3. LAURA LANE						⊕						
4. E. BAYSHORE FR. RD. AREA			●									
E. DAPHNE WAY							●					
G. DISRUPTION												
1. WILLOW RD.	●	⊕	○	○	○	○	○	○	○	○	●	
2. UNIVERSITY												
- E. OF 101	⊕	●	○	○	○	○	○	⊕	○	○	⊕	
- W. OF 101	●	●	○	○	○	○	○	○	○	○	○	
3. EMBARCADERO	●	●	○	○	○	○	○	○	○	○	○	
4. OREGON EXP.	●	●	○	○	○	○	○	○	○	○	○	
5. SAN ANTONIO	●	●	○	○	○	○	○	○	○	○	○	
EX.	1	2	3	4a	4b	4c	4d	5	6	7		



# MATRIX 2 : DEGREE OF CHANGE

## CHANGE

- + SIGN. POSITIVE
- + MOD. POS.
- o NO CHANGE
- MOD. NEGATIVE
- SIGN. NEG.
- / RANGE
- ND NOT DETERMINED

	1 APPROVED CONNECTIONS	2 RELOCATED INDUSTRIAL PARK	3 DEPRESSED UNIVERSITY AV.	4a S. OF SOUTHERN AV.	4b S. OF OREGON EX.	4c SOUTHERN CON. LAURA LANE	4d SAN FRANCISCO CA SOUTHERN CON.	5 SOUTHERN CON. GENG RD.	5 PULGAS AV. CONNECTION	6 TRANSIT LANE	7 NO UNIVERSITY AV. CONNECTION	4a+7	4d+7
<b>I. TRAFFIC</b>													
. BRIDGE	-	o	o	o	o	o	o	o	o	o	o	o	o
. MARSH CON.		o	o	o	o	o	o	o	o	o	o	o	o
. WILLOW RD.													
E. OF HAMILTON	--	o	o	+	ND	ND	+	o	o	-	o	+	+
E. OF 101	+	o	o	+	ND	ND	+	o	o	--	o	+	+
W. OF 101	-	o	o	o	ND	ND	o	o	o	o	o	o	o
. UNIVERSITY													
E. OF 101	--	o	o	o	ND	ND	+	o	o	++	++	++	++
W. OF 101	-	o	o	o	o	o	o	o	o	o	o	o	o
. EMBARCADERO													
E. OF 101	o	o	o	o	--	--	--	--	o	o	o	o	--
W. OF 101	o	o	o	o	o	o	o	o	o	o	o	o	o
. OREGON EXP.	o	o	o	o	o	o	o	o	o	o	o	o	o
. SAN ANTONIO	o	o	o	o	o	o	o	o	o	o	o	o	o
<b>II. NOISE</b>													
. WILLOW RD.	+/-	o	o	o	o	o	+/o	o	o	--			
. UNIVERSITY	--	o	+	o	o	o	+/o	o	o	++			
<b>III. AIR QUALITY</b>													
. WILLOW RD.	+/o	o	o	o	o	o	+/o	o	o	o			
. UNIVERSITY	+/-	o	o	o	o	o	+/o	o	o	+			
<b>IV. PLANTS/ANIMALS</b>													
. WILLOW RD.	+	o	o	o	o	o	o	o	o	o/-			
<b>V. WATER QUALITY</b>													
. WILLOW RD.	+	o	o	o	o	o	o	o	o	o/-			
	1	2	3	4a	4b	4c	4d	5	6	7			

AS COMPARED TO APPROVED CONNECT. ↗

# MATRIX 2 : DEGREE OF CHANGE

## CHANGE

- ++ SIGN. POSITIVE
- + MOD. POS.
- 0 NO CHANGE
- MOD. NEGATIVE
- SIGN. NEG.
- / RANGE
- ND NOT DETERMINED

	1 APPROVED CONNECTIONS	2 RELOCATED INDUSTRIAL PARK	3 DEPRESSED UNIVERSITY PARK	4a SOUTHERN CON. AV. S. OF OREGON EX.	4b LAURA LANE	4c SOUTHERN CON. SAN FRANCISCO	4d SOUTHERN CON. GENG RD.	5 PULGAS AV. CONNECTION	6 TRANSIT LANE	7 NO UNIVERSITY AV. CONNECTION
<b>F. DISPLACEMENT</b>										
1. WILLOW RD.	-	0	0	0	0	0	0	0	0	0
2. EMBARCADERO	0	0	0	-/--	0	0	0	0	0	0
3. LAURA LANE	0	0	0	0	-	0	0	0	0	0
4. E. BAYSHORE FR. RD. AREA	0	--	0	0	0	0	0	0	0	0
5. DAPHNE WAY	0	0	0	0	0	--	0	0	0	0
<b>G. DISRUPTION</b>										
1. WILLOW RD.	+/-	0	0	0	0	0	0	0	0	--
2. UNIVERSITY										
- E. OF 101	--	0	0	0	0	0	+	0	0	++/+
- W. OF 101	-	0	0	0	0	0	0	0	0	0
3. EMBARCADERO	0	0	0	0	0	0	0	0	0	0
4. OREGON EXP.	0	0	0	0	0	0	0	0	0	0
5. SAN ANTONIO	0	0	0	0	0	0	0	0	0	0
6. E. BAYSHORE FR. RD. AREA	0	--	0	0	0	0	0	0	0	0
<b>H. COMMERCIAL DEVELOPMENT</b>										
1. E.P.A.	++	0	0	0	0	0	-	0	0	-
2. M.P.	+	0	0	0	0	0	0	0	0	0
<b>I. INDUSTRIAL DEVELOPMENT</b>										
1. E.P.A.	+	0	0	+	+	+	+	0	0	-
2. M.P.	+	0	0	0	0	0	0	0	0	0/-
<b>J. HOUSING DEVELOPMENT</b>										
1. E.P.A.	0	0	0	0	0	0	0	0	0	0
<b>K. AESTHETICS</b>										
1. WILLOW RD.	++	0	0	0	0	0	0	0	0	0
2. UNIVERSITY	0	0	0	0	0	0	0	0	0	0
	1	2	3	4a	4b	4c	4d	5	6	7

AS COMPARED TO APPROVED CONNECTIONS ↻

#### IV. DESCRIPTION OF ALTERNATIVES

Seven basic alternatives were considered:

1. Approved Connections: the West Approach, the Marsh Road Connection (or Northerly Connection), the Willow Road Connection, and the University Connection. The West Approach, Marsh Road Connection and Willow Road Connection were specifically defined by an agreement reached between CalTrans, Menlo Park, Atherton, and a citizens group. The West Approach will be four lanes from the bridge to the University Avenue Connection, and two lanes from the University Avenue Connection to the Willow Road Connection (i.e., two lanes on Willow Road east of Hamilton in Menlo Park). The Marsh Road Connection and University Avenue Connection will be four lanes from Highway 101 to the West Approach.

The existing conditions were evaluated to provide a basis for comparison with the Approved Connections alternative. The Approved Connections alternative is similar to the 'no project' alternative of an environmental impact report since the alternative has been approved and will be constructed if no additional action is taken.

2. Relocated Industrial Park: a relocated Ravenswood Industrial Park Site in East Palo Alto. The Industrial Park is presently located at the southern end of Bay Road. The site considered for a relocated Industrial Park was near the East Bayshore Frontage Road, north of Pulgas Avenue, in East Palo Alto.

3. Depressed University Avenue: a below grade University Avenue in East Palo Alto with at grade cross streets and limited at grade intersections.

4. Southern Connection: A two lane road that connects the University Avenue Connection in East Palo Alto on the north to Highway 101 in Palo Alto on the south. The road generally follows a shoreline dike in East Palo Alto.

Several modifications to the Southern Connection were considered:

4a. South of Oregon Expressway: a direct two lane connection to Highway 101 at the eastern end of Colorado Avenue in Palo Alto. The road would cross San Francisquito Creek near Daphne Way in East Palo Alto and the Baylands Athletic Center in Palo Alto. Following Geng Road, the connection would cross Embarcadero Road above grade and tie directly to Highway 101.

4b. Laura Lane: a two lane connection to Laura Lane in Palo Alto. The road would cross San Francisquito Creek near Daphne Way in East Palo Alto. Laura Lane intersects East Bayshore Frontage Road, which in turn intersects Embarcadero Road east of Highway 101.

4c. San Francisquito Creek: a two lane road that follows San Francisquito Creek and ties into East Bayshore Frontage Road in East Palo Alto. East Bayshore Frontage Road intersects with Embarcadero Road east of Highway 101 in Palo Alto.

4d. Geng Road: a two lane connection to Geng Road in Palo Alto. The road would cross San Francisquito Creek near Daphne Way in East Palo Alto and the Baylands Athletic Center in Palo Alto. Geng Road intersects with Embarcadero Road east of Highway 101.

5. Pulgas Avenue Connection: a two lane road that connects the University Avenue Connection on the north end to East Bayshore Frontage Road on the south. The road would go around the University Village area, through the Ravenswood Industrial Park area, and connect to Pulgas Avenue at Bay Road in East Palo Alto.

6. Transit Lane: An exclusive 'diamond' lane on the bridge restricted to high occupancy vehicles HOV's such as carpools, vanpools, minibuses, and full size buses.

7. No University Avenue Connection: closing University Avenue between Notre Dame Avenue and Kavanaugh Drive in East Palo Alto.

Various combinations of alternatives were not considered except for the traffic implications of Alternative 4a + 7 South of Oregon Expressway plus No University Connection and Alternative 4d + 7 Geng Road plus No University Connection.

Potential mitigation measures were not considered for significant adverse conditions or significant negative changes created by alternatives.



V. FINDINGS

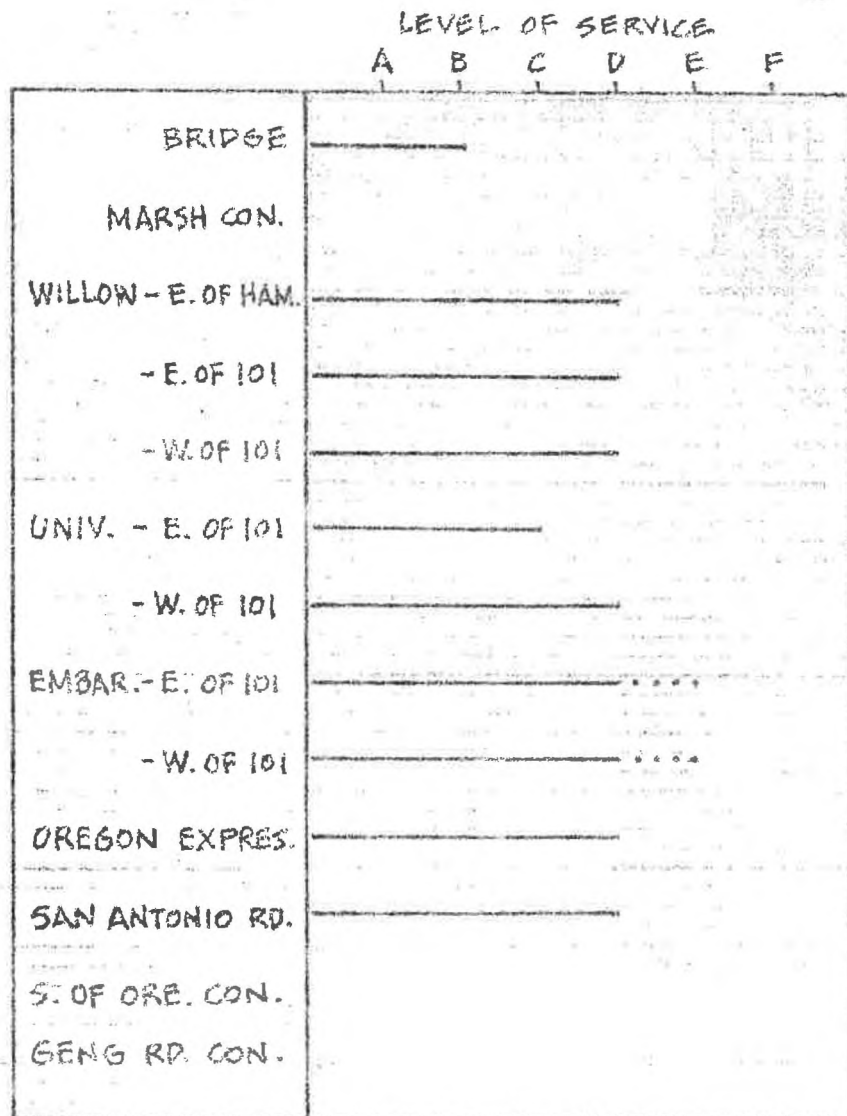
A. Existing Conditions:

The traffic conditions on nearly all the roads examined are currently adverse. Situations on Embarcadero Road, east and west of Highway 101, are particularly bad. The traffic on University Avenue east of Highway 101 is neutral, while traffic on the bridge itself is fairly good.

The noise situation on Willow Road is directly related to the traffic situation. The noise condition is currently adverse.

- TRAFFIC:

- EXISTING
- .... RANGE
- ▭ APPROVED CON.
- ▨ ALTERNATIVE
- ⋮ RANGE



- OTHER FINDINGS

- NOISE: Currently at 73 decibels along Willow Road east of Highway 101. This exceeds the Federal Highway Administration noise standard for residential land use. Along University Avenue in East Palo Alto, it ranges between 61 to 63 decibels.
- PLANTS AND ANIMALS: Affected by poor water quality.
- WATER QUALITY: Existing drainage system along Willow Road in Menlo Park is not adequate. This has a detrimental effect on water quality, plants and animals along Willow Road.
- DISRUPTION: Significant adverse conditions on Willow Road, University Avenue west of Highway 101, Embarcadero Road, Oregon Expressway, and San Antonio. There is some disruption on University Avenue east of Highway 101 and in the East Bayshore Frontage Road Area, East Palo Alto.
- COMMERCIAL DEVELOPMENT: Limited potential for commercial development in East Palo Alto. There is neutral to limited potential in Menlo Park.
- INDUSTRIAL DEVELOPMENT: Ravenswood Industrial Park is being developed at this time. Its condition is rated neutral. Industrial Development potential in Menlo Park range from neutral to limited.
- AESTHETICS: Poor along Willow Road and a portion of University Avenue east of Highway 101.

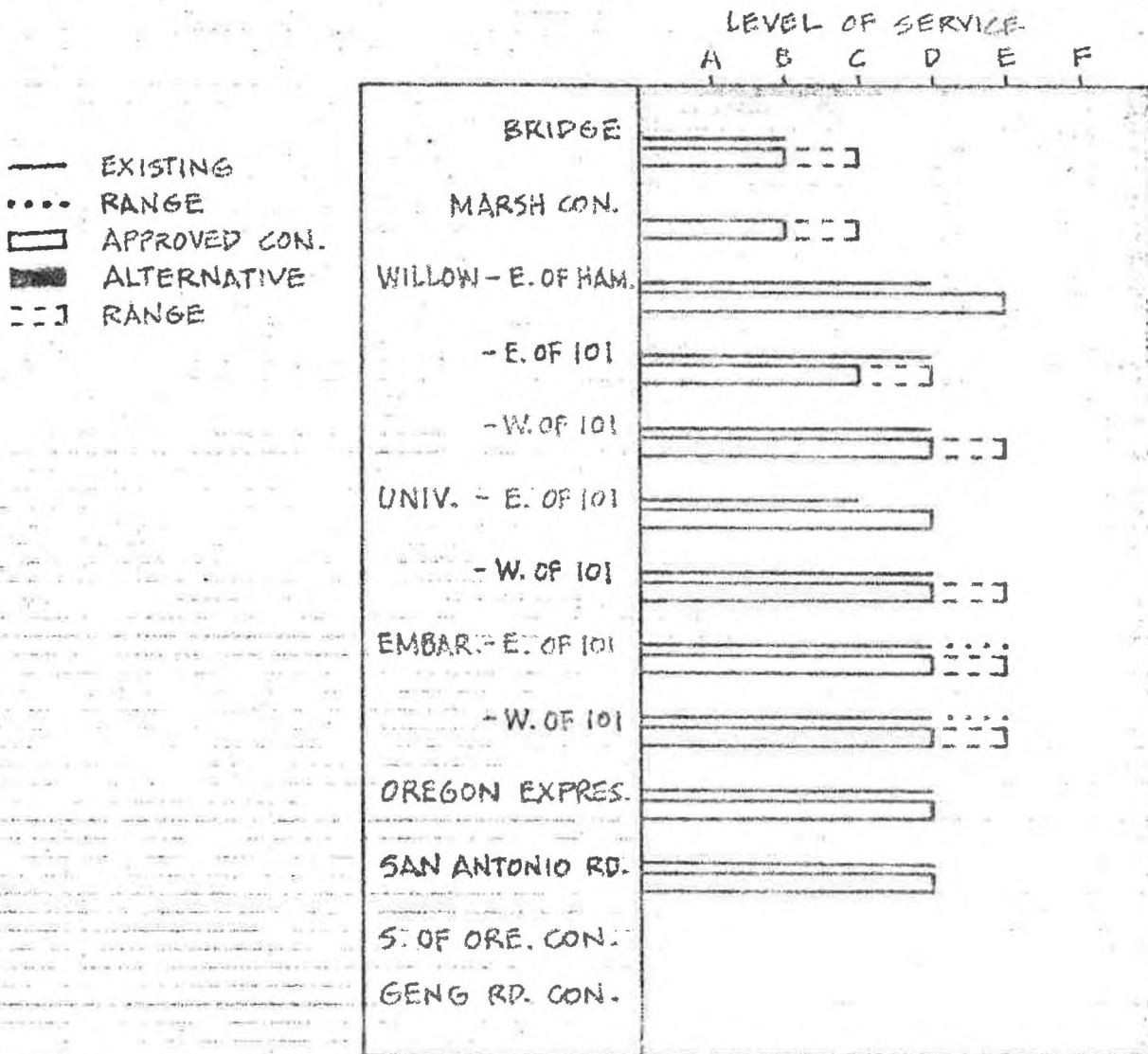
B. Alternatives:

1. Approved Connections:

- The Approved Connections will significantly aggravate the traffic situations on Willow Road east of Hamilton Avenue (in MP) and University Avenue east of Highway 101. In general, the existing adverse traffic conditions on other roads will either experience moderate changes or remain unchanged.

Along University Avenue east of Highway 101, noise will significantly worsen and the amount of disruption will significantly increase. The potential for commercial development in East Palo Alto will be significantly improved.

- TRAFFIC:



## OTHER FINDINGS

- NOISE: Will increase between 10 and 16 decibels along University Avenue east of Highway 101. Along Willow Road, there will be a 3 decibel increase.
- AIR QUALITY: Will initially decline, then improve along University Avenue in East Palo Alto. Along Willow Road, it will improve. Sensitive receptors along University Avenue include children at Costano School, elderly at Runnymede Gardens and patients at Drew Medical/Dental Center. The school and the Medical/Dental Offices are located along University Avenue. The elderly housing project is two blocks away from University Avenue.
- PLANTS AND ANIMALS: Will be improved.
- WATER QUALITY: Will be improved when adequate drainage system becomes operable.
- DISPLACEMENT: Five commercial uses from the East Palo Alto portion of Willow Road will be displaced.
- DISRUPTION: Along University Avenue, east of Highway 101 will further fragment the community, create a physical and psychological barrier, and change the nature of University Avenue from a local to sub-regional arterial west of Highway 101, the residential nature of University Avenue will be further disrupted. The disruption along Willow Road east of Highway 101 will be somewhat reduced.
- COMMERCIAL DEVELOPMENT: Will have significantly improved potential in East Palo Alto. A modest-sized neighborhood supermarket will have an excellent opportunity. Up to 100 retail jobs and \$10,000 to \$15,000 in annual property taxes may be created. Commercial development potential in Menlo Park will be improved by better opportunity to locate in the area.
- INDUSTRIAL DEVELOPMENT: Will have improved potential in East Palo Alto and Menlo Park from greater access to the East Bay. A total of between 1255 and 2200 jobs can result industrial development in East Palo Alto. Annual property taxes of \$550,000 can be generated from light manufacturing use, with slightly more if warehousing is predominately developed.
- LAND AND CONSTRUCTION COSTS: Approximately \$180 million.

- AESTHETICS: Will be greatly improved with the fully landscaped Willow Road east of Highway 101.
- JURISDICTION: Menlo Park, Atherton, and a citizens group have a written agreement with CalTrans regarding the West Approach, Marsh Road Connection, and Willow Road Connection.
- LEGISLATION: Adopted.
- ENVIRONMENTAL DOCUMENTS: Approved.

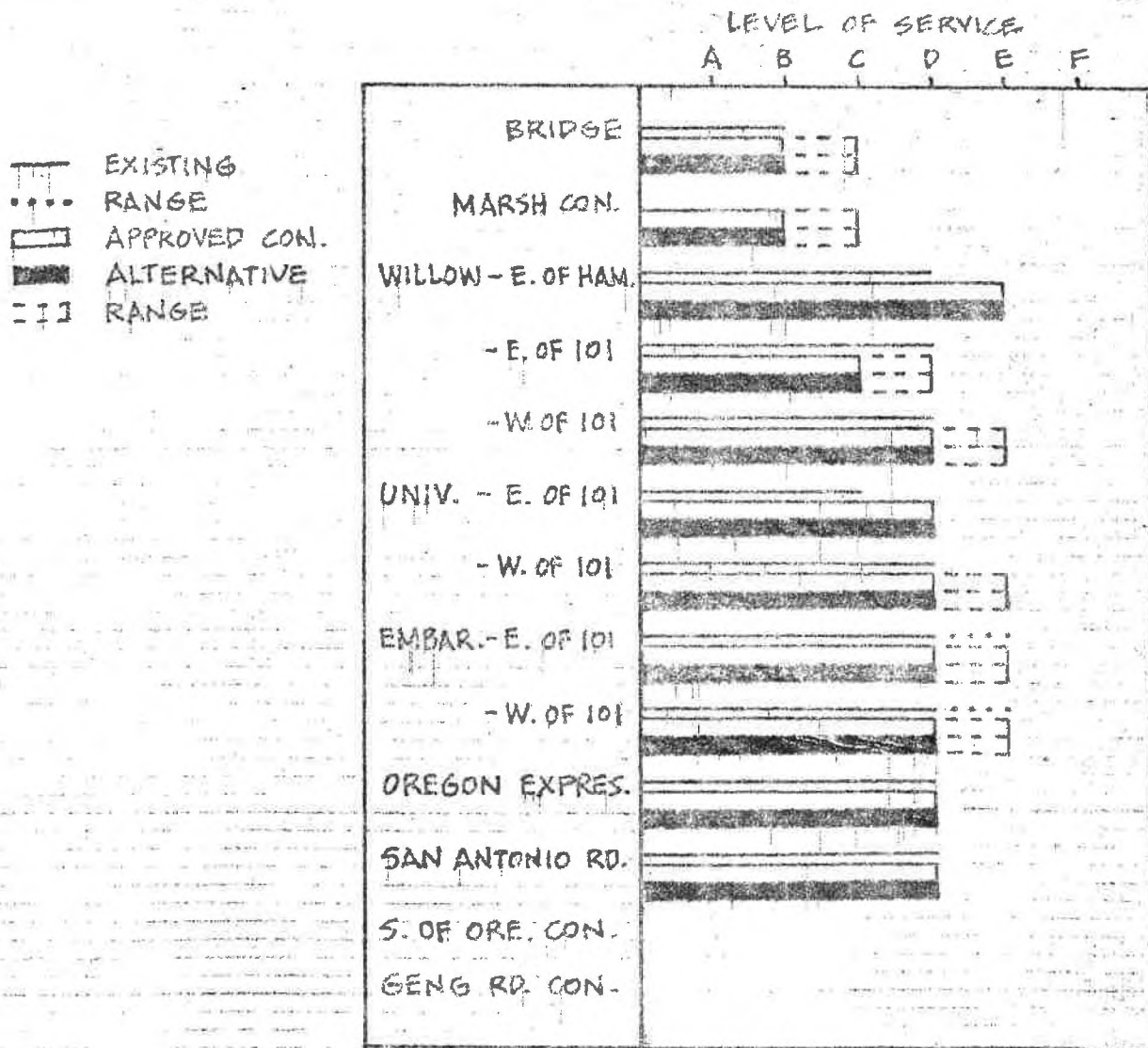
2. Relocated Industrial Park:

→ A Relocated Industrial Park will have the same effects on traffic situations as the Approved Connections. There will be significant adverse changes on Willow Road east of Hamilton Avenue and University Avenue east of Highway 101.

The noise situation on University Avenue east of Highway 101 will significantly worsen. There will be significant displacement in the East Bayshore Frontage Road area of East Palo Alto, and a significant increase in disruption in that area and along University Avenue east of Highway 101.

The potential for commercial development in East Palo Alto will be significantly improved.

→ TRAFFIC:



- OTHER FINDINGS

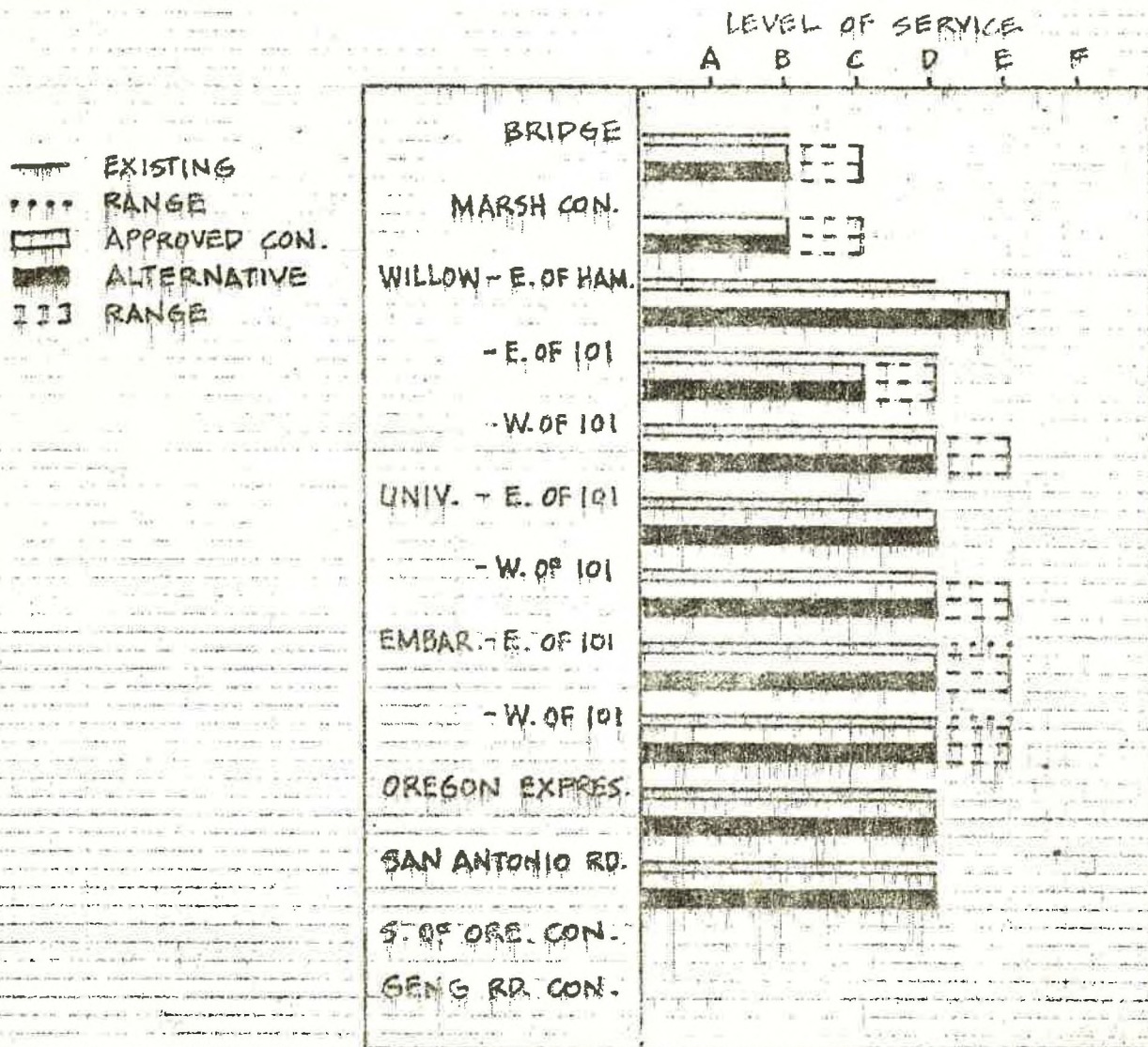
- **DISPLACEMENT:** 40-50 single family dwelling units, 80-100 mobile homes, one occupied apartment complex, and one apartment complex under rehabilitation will be displaced. Approximately 300-400 people will be dislocated.
- **DISRUPTION:** Will occur in the East Bayshore Frontage Road area of East Palo Alto.
- **JURISDICTION:** East Palo Alto
- **LEGISLATION:** May be required for funding.
- **ENVIRONMENTAL DOCUMENTS:** Not determined.
- **OTHER CONDITIONS:** Generally the same as Alternative 1, the Approved Connections.

### 3. Depressed University Avenue

- A Depressed University Avenue will have the same effects on traffic situations as the Approved Connections and the Relocated Industrial Park with significant adverse changes on Willow Road and University Avenue.

Along University Avenue in disruption and a moderate improvement in noise. The potential for commercial development in East Palo Alto will improve significantly.

#### - TRAFFIC:





- OTHER FINDINGS

- NOISE: Will improve along University Avenue east of Highway 101.
- LAND AND CONSTRUCTION COSTS: Additional \$100+ million.
- JURISDICTION: East Palo Alto
- LEGISLATION: Required
- ENVIRONMENTAL DOCUMENTS: Not determined
- OTHER CONDITIONS: Generally the same as Alternative 1, the Approved Connections.

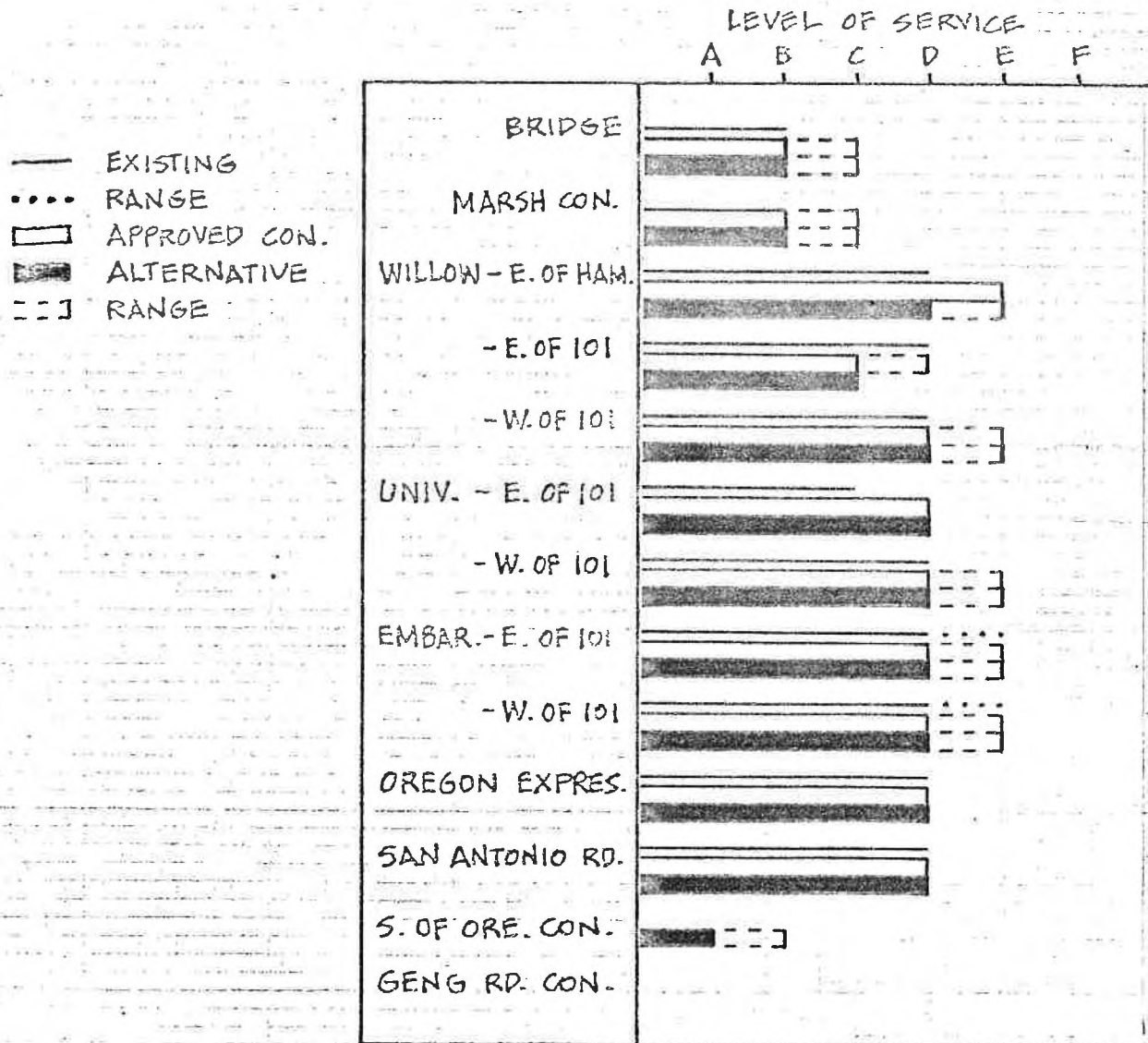
4a. Southern Connection, South of Oregon Expressway

- A Southern Connection, South of Oregon Expressway will have positive effects on Willow Road east of Hamilton and east of Highway 101. All other traffic changes are similar to the Approved Connections, including the same significant negative change on University Avenue east of highway 101.

Along University Avenue east of Highway 101, the noise and disruption will be significantly aggravated. There will be significant displacement along Embarcadero Road, east of Highway 101.

The potential for both commercial and industrial development in East Palo Alto will be significantly improved.

- TRAFFIC:



- OTHER FINDINGS

- PLANTS AND ANIMALS: Not determined. Further study needed.
- DISPLACEMENT: One or more commercial uses along Embarcadero Road will be displaced.
- INDUSTRIAL DEVELOPMENT: In East Palo Alto will have improved potential with any southern connection alternative. The Industrial Park Site will gain important visibility and easy access to the East Bay and Highway 101. The rate of development will be improved.
- LAND AND CONSTRUCTION COSTS: Approximately \$32 million, additional.
- JURISDICTION: Menlo Park, East Palo Alto, Palo Alto.
- LEGISLATION: Required
- ENVIRONMENTAL DOCUMENTS: Required
- OTHER CONDITIONS: Generally the same as the Approved Connections.

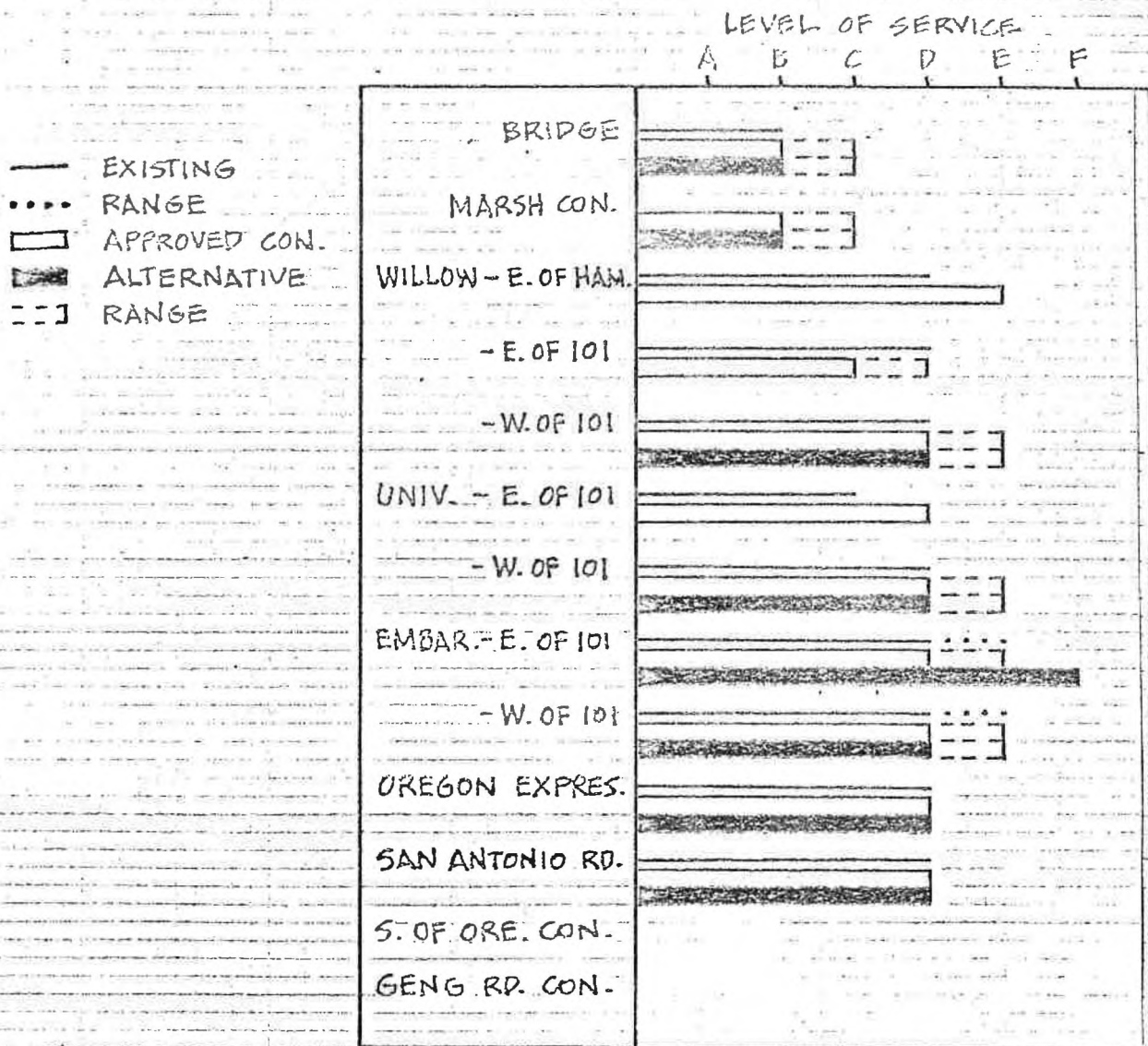
4b. Southern Connection, Laura Lane

- A Southern Connection, Laura Lane will significantly aggravate the traffic situation on Embarcadero Road east of Highway 101. On the other roads, it will generally have the same effects on traffic conditions as the Approved Connections.

The noise affects along University Avenue will be the same as under the Approved Connection. There will be significant aggravation of the noise condition. There will be some displacement in the Laura Lane area.

The potential for industrial development in East Palo Alto will be improved.

- TRAFFIC:



OTHER FINDINGS

- PLANTS AND ANIMALS: Not determined. Further study required.
- DISPLACEMENT: A portion of the U.S. Postal Service parking area on Laura Lane will be affected.
- INDUSTRIAL DEVELOPMENT: In East Palo Alto will have improved potential with this Southern Connection alternative. Visibility, access, and rate of development will improve.
- LAND AND CONSTRUCTION COSTS: Not determined. Further study needed.
- JURISDICTION: Menlo Park, East Palo Alto, Palo Alto
- ENVIRONMENTAL DOCUMENTS: Required
- OTHER CONDITIONS: Generally the same as the Approved Connections.

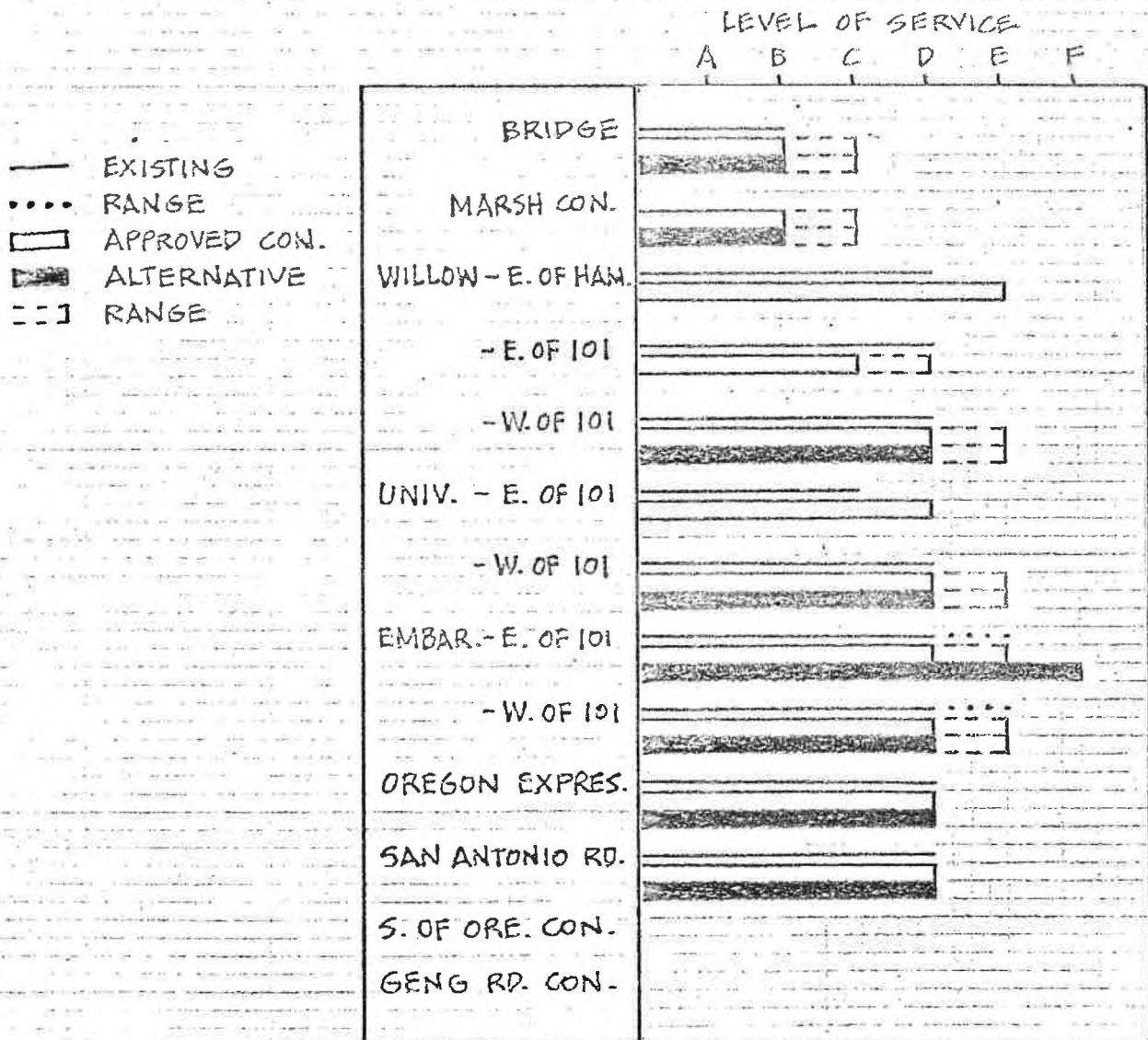
4c. Southern Connection, San Francisquito Creek

- A Southern Connection, San Francisquito Creek will have the same effects on traffic situations as the Southern Connection, Laura Lane.

The traffic situation on Embarcadero Road east of Highway 101 will have a significant adverse change. All other roads will generally have the same traffic condition effects as the Approved Connections.

Similar to the Southern Connection, Laura Lane, there will be significant aggravation of the noise condition along University Avenue. Displacement along Daphne Way will be significant. The potential for industrial development in East Palo Alto will be improved.

- TRAFFIC:



- OTHER FINDINGS

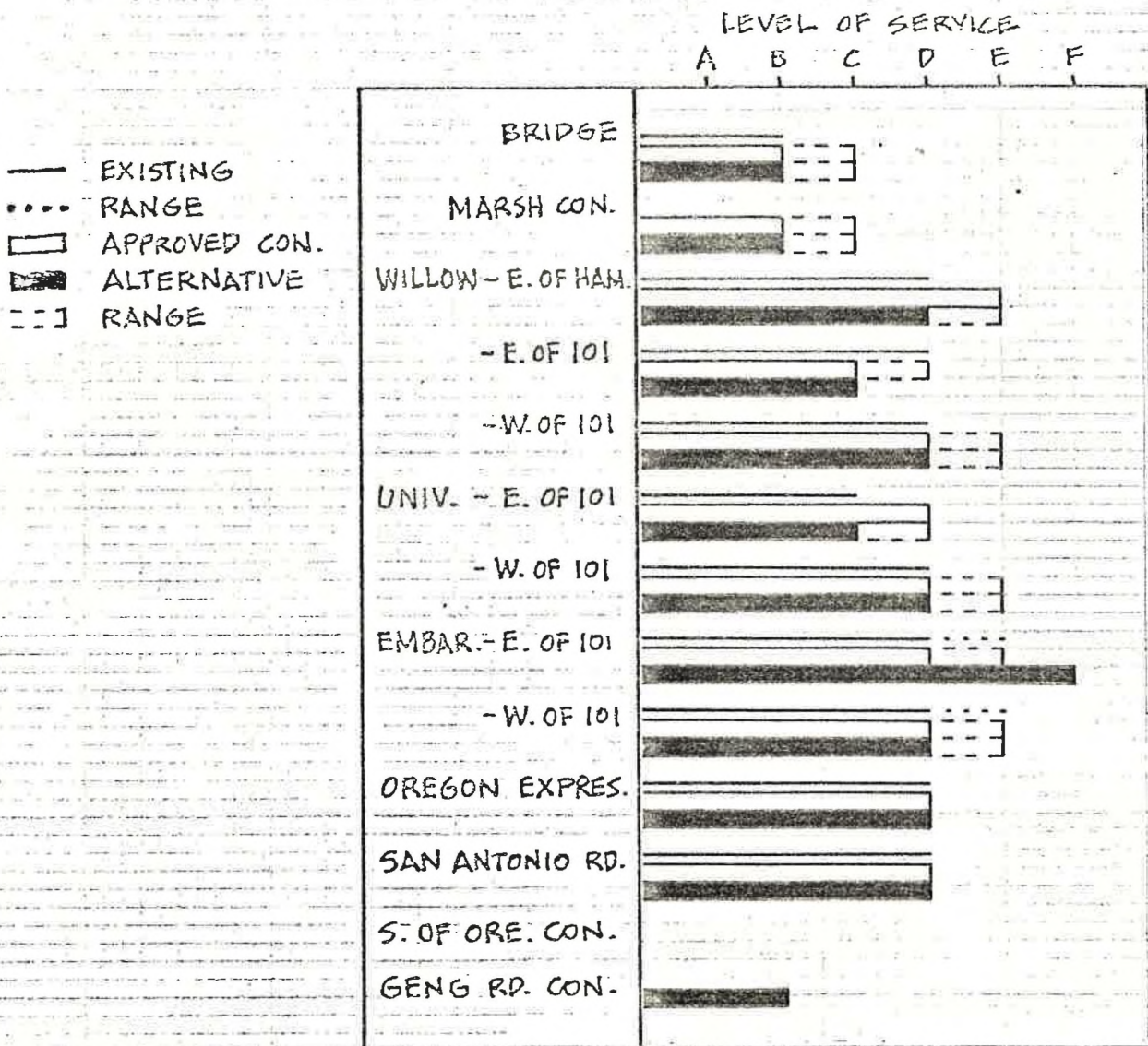
- PLANTS AND ANIMALS: Not determined. Further study needed.
- DISPLACEMENT: Approximately 17 single family dwelling units along Daphne Way in East Palo Alto will be displaced.
- INDUSTRIAL DEVELOPMENT: Similar to the other Southern Connection Alternatives. There will be improved potential for industrial development through improved visibility, access, and vote of development.
- LAND AND CONSTRUCTION COSTS: Not required
- JURISDICTION: Menlo Park, East Palo Alto
- LEGISLATION: Required
- ENVIRONMENTAL DOCUMENTS: Required
- OTHER CONDITIONS: Generally the same as the Approved Connections.

4d. Southern Connection, Geng Road

- Similar to the Southern Connection, Laura Lane and San Francisquito Creek, Southern Connection, Geng Road, will significantly aggravate the traffic situation on Embarcadero Road east of Highway 101. It will have moderate positive effects on Willow Road, east of Hamilton Avenue and east of Highway 101, and on University Avenue east of Highway 101.

There will be some improvement in air quality along Willow Road and some reduction in disruption along University Avenue. In East Palo Alto, potential for commercial development will be reduced and the potential for industrial development will be increased.

- TRAFFIC:





- OTHER FINDINGS

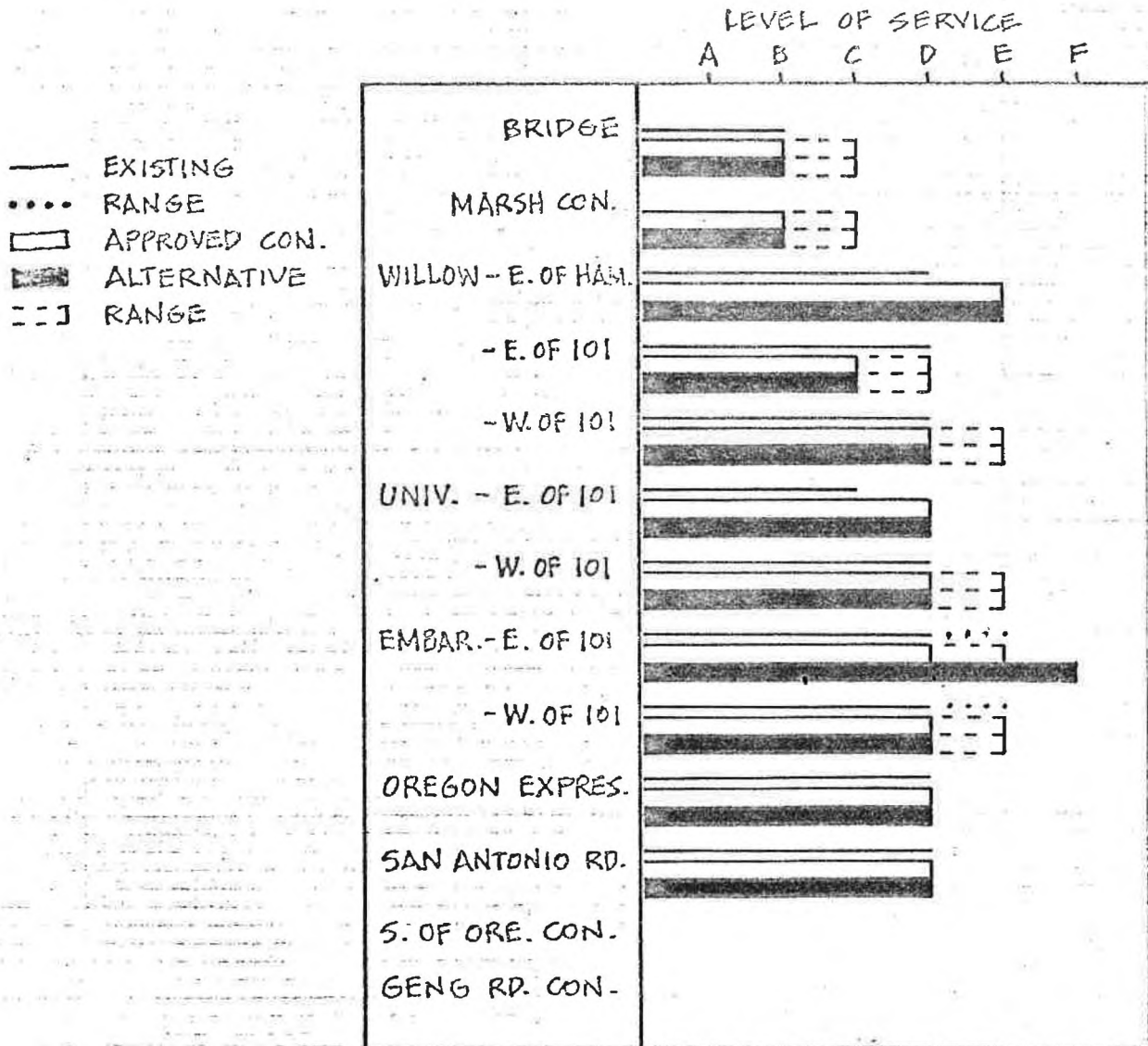
- NOISE: May improve slightly with the reduction of traffic volume on Willow Road and University Avenue east of Highway 101.
- AIR QUALITY: Will improve slightly on Willow Road and University Avenue east of Highway 101.
- DISRUPTION: Along University Avenue east of Highway 101 will be improved.
- COMMERCIAL DEVELOPMENT: Potential will be reduced in East Palo Alto.
- INDUSTRIAL DEVELOPMENT: Potential will be improved in East Palo Alto.
- LAND AND CONSTRUCTION COSTS: Approximately \$20 million additional
- JURISDICTION: Menlo Park, East Palo Alto, Palo Alto.
- LEGISLATION: Required
- ENVIRONMENTAL DOCUMENTS: Probably required.
- OTHER CONDITIONS: Generally the same as the Approved Connections.

5. Pulgas Avenue Connection

- A Pulgas Avenue Connection, similar to the Southern Connection, Laura Lane, San Francisquito Creek, and Geng Road will significantly aggravate the traffic situation on Embarcadero Road, east of Highway 101. Similar to the Approved Connections there will be significant aggravation of traffic situations on Willow Road and University Avenue.

Along University Avenue, there will be significant increase in noise and in the amount of disruption. The potential for commercial development in East Palo Alto will be significantly improved.

- TRAFFIC:



- OTHER FINDINGS

- LAND AND CONSTRUCTION COSTS: \$6.5 to \$7.5 million additional.
- JURISDICTION: Menlo Park, East Palo Alto.
- LEGISLATION: Required
- ENVIRONMENTAL DOCUMENT: Not determined.
- OTHER CONDITIONS: Generally the same as the Approved Connections.

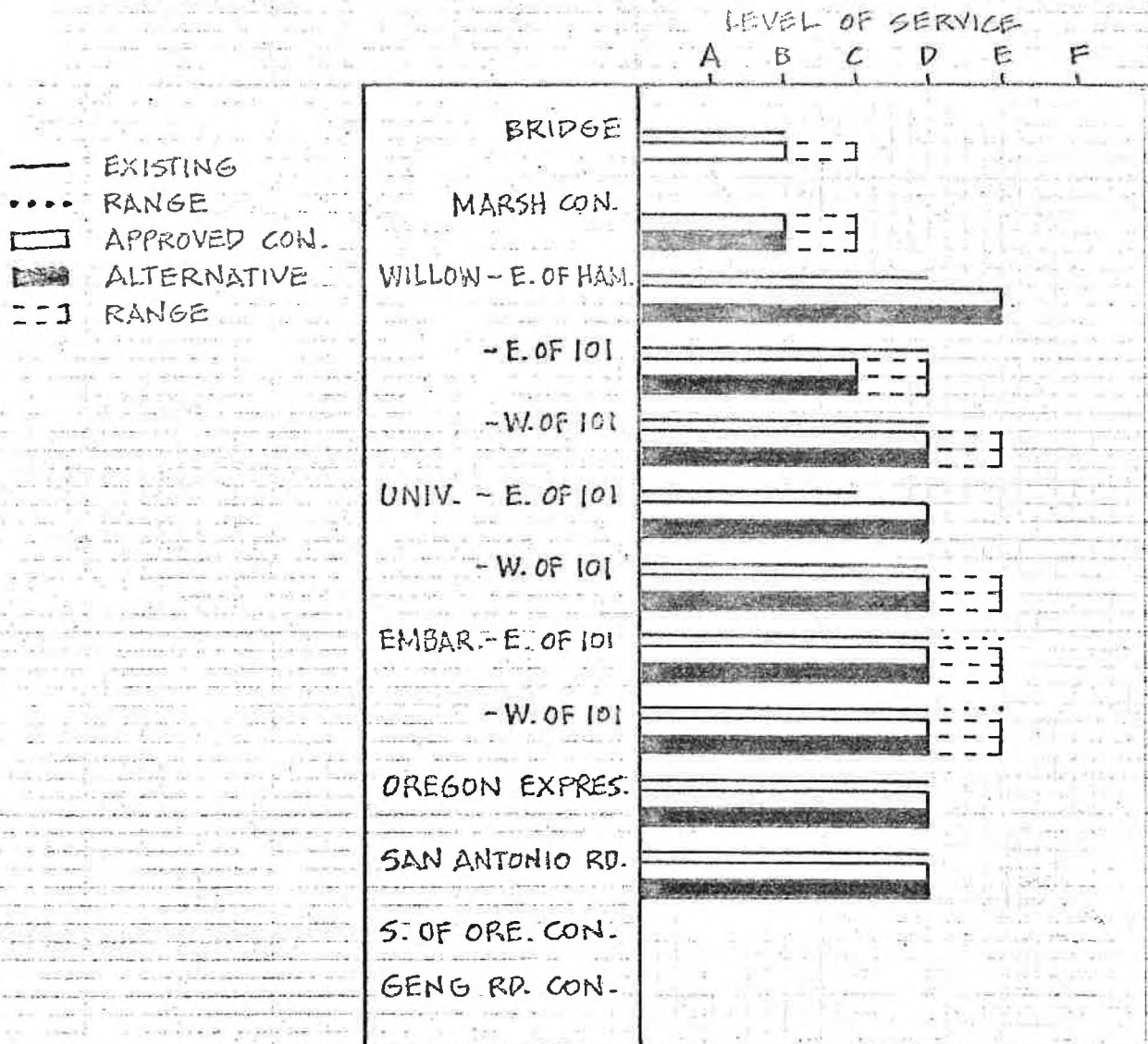
6. Transit Lane

- A Transit Lane will have the same effects on traffic situations as the Approved Connections. There will be significant adverse changes on Willow Road east of Hamilton and University Avenue east of Highway 101.

The transit lane with High Occupancy Vehicles will, by itself, make a negligible difference in traffic conditions. To have some effect, the transit lane with HOV's would need to induce doubling up of occupants to reduce traffic. Other pressures, such as high gasoline prices, limited gasoline supplies, bridge tolls, traffic congestion on the bridge, and energy conservation efforts, may provide incentives for this alternative. Such pressures themselves may reduce traffic.

The noise situation and the disruption along University Ave., will be significantly aggravated. The potential for commercial development in East Palo Alto will be improved.

- TRAFFIC:



- OTHER FINDINGS

- LAND AND CONSTRUCTION COSTS: Nominal. Equipment and operating costs not determined. Further study needed.
- LEGISLATION: Required
- ENVIRONMENTAL DOCUMENTS: Not determined.

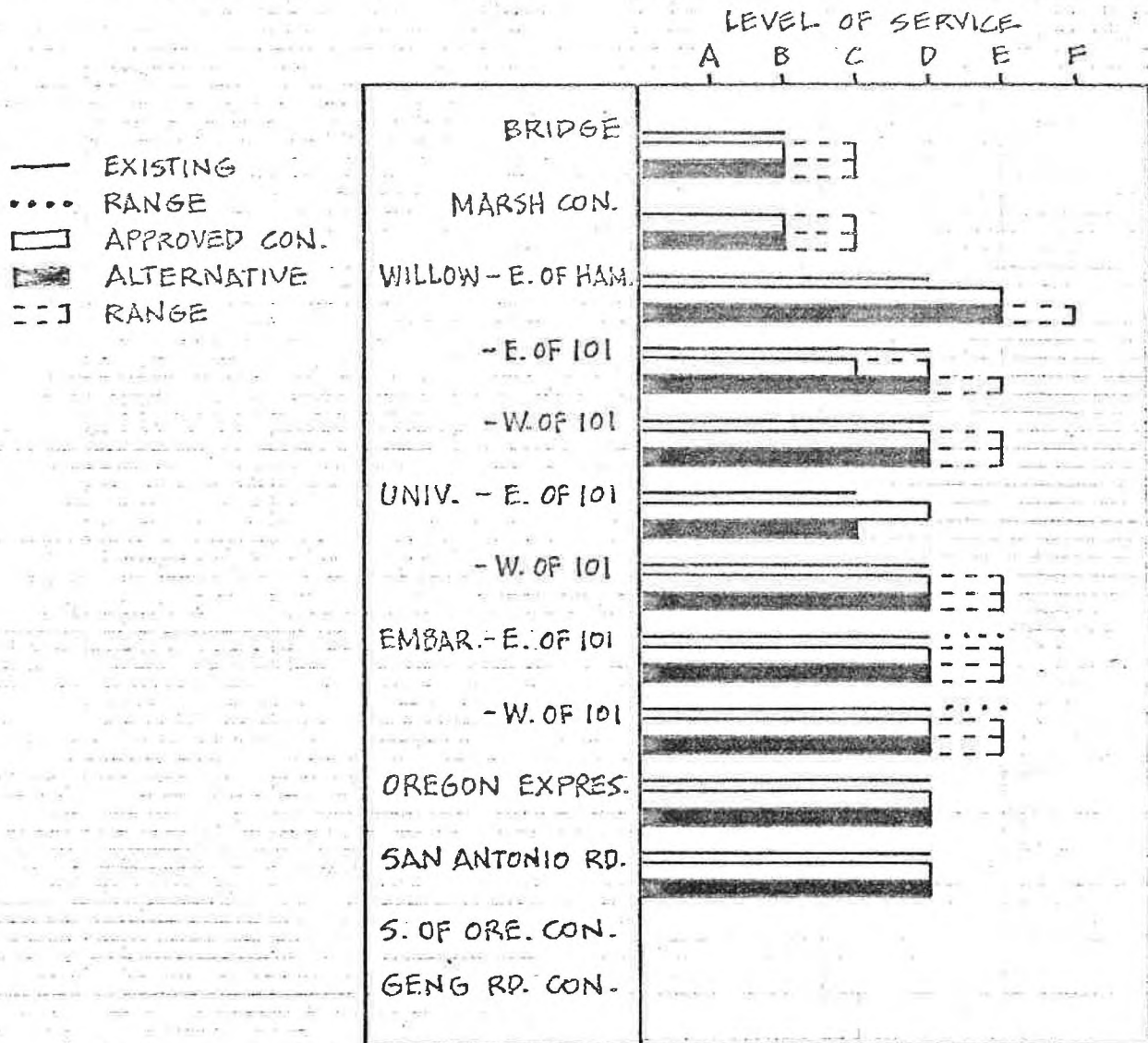
7. No University Avenue Connection

- No University Avenue Connection will significantly aggravate the traffic situation on Willow Road east of Highway 101. It will further degrade the traffic situation on Willow Road east of Hamilton Avenue. It will significantly improve the traffic situation on University Avenue east of Highway 101.

The noise situation on Willow Road will be significantly aggravated, while the noise situation on University Avenue will be significantly improved. The disruption along University Avenue will also be significantly reduced.

There will be some improvement of air quality along University Avenue, and some reduction in plant and animal quality along Willow Road. Potential for commercial and industrial development in East Palo Alto will be reduced.

- TRAFFIC:



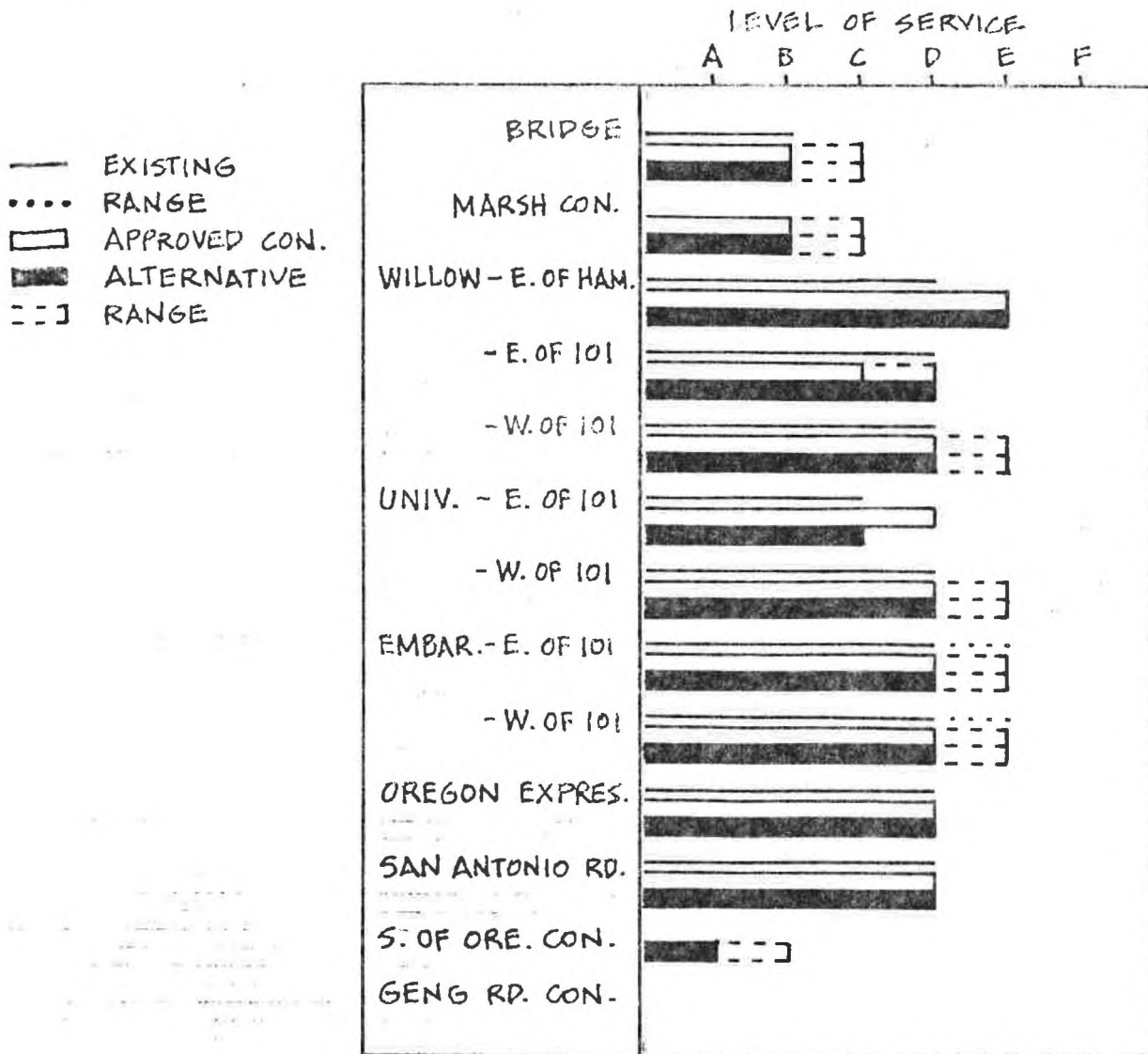
- OTHER FINDINGS

- NOISE: Will be greatly increased on Willow Road east of Highway 101 and greatly decreased on University Avenue east of Highway 101.
- AIR QUALITY: Will be improved on University Avenue.
- PLANTS AND ANIMAL: May have some decrease along Willow Road, east of Highway 101.
- WATER QUALITY: May have some decrease along Willow Road, east of Highway 101.
- DISRUPTION: Along Willow Road east of Highway 101 will be greatly increased. Along University Avenue east of Highway 101, the disruption will be greatly reduced.
- COMMERCIAL DEVELOPMENT: Potential in East Palo Alto will be decreased.
- INDUSTRIAL DEVELOPMENT: Potential in East Palo Alto will be decreased. In Menlo Park along University Avenue, industrial development will be reduced.
- LAND AND CONSTRUCTION COSTS: Approximately \$6 million reduction.
- JURISDICTION: East Palo Alto
- OTHER CONDITIONS: Generally the same as the Approved Connections.

4a + 7 Southern Connection, South of Oregon Expressway Plus No University Avenue Connection (Traffic Considerations Only)

- A Southern Connection, South of Oregon Expressway Plus No University Avenue Connection will significantly improve the traffic situation on University Avenue east of Highway 101. It will have the same effects on other roads as the Approved Connection, with a significant adverse change on Willow Road east of Hamilton Avenue.

- TRAFFIC:

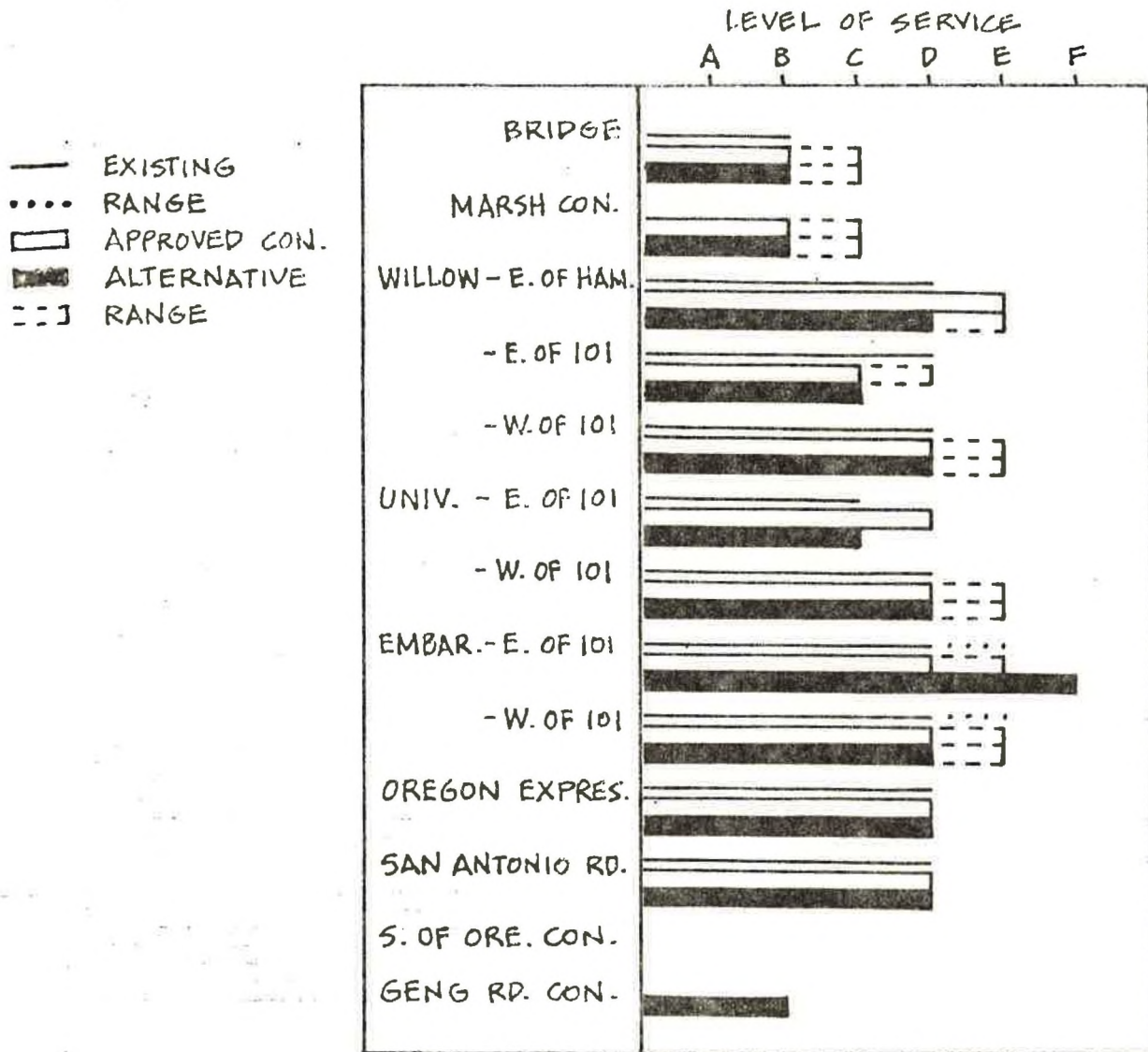




4d + 7 Southern Connection, Geng Road Plus No University Avenue Connection (Traffic Considerations Only)

- Southern Connection, Geng Road Plus No University Connection will significantly aggravate the traffic situation on Embarcadero Road east of Highway 101. It will significantly improve the traffic situation on University Avenue east of Highway 101. It will moderately improve the traffic situation on Willow Road east of Hamilton Avenue and east of Highway 101.

- TRAFFIC:



#### IV. METHODOLOGY AND SOURCES

##### A. Methods of Assessment:

The Technical Group used two methods of assessing the alternatives. First, the Technical Group assigned a rating or range of ratings to the Environmental conditions 1) that exist and 2) that will probably exist in connection with a specific alternative. Also, the Technical Group collected data on other local concerns.

Second, the Technical Group determined the degree of range of change that will probably occur in connection with a specific alternative. The conditions of the Approved Connections were compared to the existing condition and the changes were noted.

Similarly, each of the other alternatives was compared to the conditions of the Approved Connections and the changes noted accordingly.

The environmental conditions under the existing situation and under each alternative were rated as follows:

- Significant beneficial condition: a substantially healthful situation.
- ◉ Moderate beneficial condition: a fairly healthful situation.
- ⊖ Neutral condition: a situation which is neither detrimental nor healthful.
- ⊕ Moderate adverse condition: a mildly detrimental situation.
- Significant adverse conditions: a substantially detrimental situation or a substantial environmental problem; indicated on matrix.

The degrees of change were evaluated in terms of direction and magnitude:

- ++ Significant positive change: a substantial improvement from one condition to another.
- + Moderate positive change: a mild improvement from one condition to another.
- No change: a negligible difference from one condition to another.
- Moderate negative change: a mild deterioration from one condition to another.
- Significant negative change: a substantial deterioration from one condition to another.

B. Description of Concerns:

TRAFFIC - the movement of people and goods as measured by the existing volumes of vehicles, projected volumes, and levels of service. Traffic conditions were rated as follows:

Level of Service	Urban and Sub-Urban Arterials	CONDITION
A	Average over-all travel speed of 30 mph or more. Free flowing with volume/capacity ratio of 0.60. Load factor at intersections near the limit of the 0.0 range. Peak-hour factor at about 0.70.	MODERATE BENEFICIAL ⊕
B	Average over-all speeds drop due to intersection delay and inter-vehicular conflicts, but remain at 25 mph or above. Delay is not unreasonable. Volumes at 0.70 of capacity and peak-hour factor approximately 0.80. Load factor at intersections approx. 0.1.	MODERATE BENEFICIAL ⊕
C	Service volumes about 0.80 of capacity. Average over-all travel speeds of 20 mph. Operating conditions at most intersections approximate load factor of 0.3. Peak hour factor approximately 0.85. Traffic flow still stable with acceptable delays.	NEUTRAL ⊖
D	Beginning to tax capabilities of street section. Approaching unstable flow. Service volumes approach 0.90 of capacity. Average over-all speeds down to 15 mph. Delays at intersections may become extensive with some cars waiting two or more cycles. Peak hour factor approx. 0.90; load factor of 0.7.	RANGES FROM MODERATE ADVERSE TO SIGNIFICANT ADVERSE ⊖
E	Service volumes at capacity. Average over-all traffic variable, but in area of 15 mph. Unstable flow. Continuous back-up on approaches to intersections. Load factor at intersections in range between 0.7 and 1.0. Peak hour factor likely to be 0.95.	SIGNIFICANT ADVERSE ⊖
F	Forced flow. Average over-all traffic speed below 15 mph. All intersections handling traffic in excess of capacity with storage distributed throughout the section. Vehicular back-ups extend back from signalized intersections, through unsignalized intersections.	SIGNIFICANT ADVERSE ⊖

The degree of change in traffic conditions was indicated as follows:

- Significant negative change: a substantial deterioration from one level of service to a lower one; ( -- ).
- Moderate negative change: a range from one level of service to a lower one or no change; ( 0/- ).
- No change: a negligible change in level of service ( 0 ).
- Moderate positive change: a range from one level of service to a higher one or no change; ( +/0 ).
- Significant positive change: a substantial improvement from one level of service to a higher one; ( ++ ).

ENVIRONMENTAL:

NOISE - Unwanted traffic sound that may damage hearing, interfere with communication, interrupt sleep, cause stress, and impinge upon the quality of life.

AIR QUALITY - High air pollution levels may have adverse effects on human health, especially to sensitive receptors such as children in schools and on playgrounds, elderly persons and medical facilities.

PLANTS AND ANIMALS - The loss of important or unusual plant or animal populations, the reduction of biologically productive land, the modification of ecosystems or habitats, and the loss of wildlife through destruction of food and shelter sources.

WATER QUALITY - Surface water deterioration caused by contaminated stormwater runoff.

DISPLACEMENT - Direct relocation of individuals, homes, or businesses.

DISRUPTION - Fragmentation; change in community character and patterns, such as income, housing type, land values; creation of barriers.

COMMERCIAL DEVELOPMENT - Structure, jobs, and tax base related to retail, professional, and financial activities.

INDUSTRIAL DEVELOPMENT - Structures, jobs, and tax base related to production, assembling, and light manufacturing.

HOUSING DEVELOPMENT - Housing units, and tax base.

LAND AND CONSTRUCTION COSTS: 1980 dollars for acquisition and improvements.

AESTHETICS: Landscaping and view of or from project.

JURISDICTION: Agencies with approval authority.

LEGISLATION: State Legislative action.

ENVIRONMENTAL DOCUMENT: State and Federal environmental requirements.

C. Traffic Analysis

- Existing traffic counts taken from CalTrans, Menlo Park Palo Alto 1976-77 Traffic Flow Map, and San Mateo County Traffic Section.
- Projected percentage of bridge traffic on local roads initially determined from U.S. Coast Guard Final Environmental Impact Statement and State of California Final Environmental Impact Statement; generally verified by traffic counts taken at Willow Road/Highway 101 interchange and Santa Clara County Transit Transportation Survey; adjusted to be compatible with both Palo Alto Traffic Model and CalTrans Traffic Model.
- Total projected bridge traffic taken from Palo Alto Traffic Model and CalTrans Traffic Model.
- Following algorithm used on each road to isolate effects of bridge traffic from local traffic:

$$\begin{array}{rcccccc} & & \text{EXISTING} & & \text{PROJECTED} & & \\ & & \text{BRIDGE} & + & \text{BRIDGE} & = & \text{PROJECTED} \\ \text{EXISTING} & - & \text{TRAFFIC} & & \text{TRAFFIC} & & \text{TRAFFIC} \\ \text{TRAFFIC} & & \text{PERCENTAGE} & & \text{PERCENTAGE} & & \end{array}$$

This examines the projected bridge traffic plus the existing traffic. It does not account for growth in local traffic.

- Using projected Average Daily Traffic (ADT), roadway conditions, and planned improvements, determined the Level of Service as defined for Urban and Sub-Urban Arterials in A Policy on Design of Urban Highways and Arterial Streets - 1973 by American Association of State Highway and Transportation Officials.









D. Individuals who participated in the February, 1980 meeting where the Dumbarton Bridge Technical Group was initiated:

- |                      |                                     |
|----------------------|-------------------------------------|
| 1. Geoff Ball        | FORUM on Community & Environment    |
| 2. Don Bruzzone      | Stanford Urban Coalition Task Force |
| 3. William David     | " " " " "                           |
| 4. Hattie Harlow     | Stanford Urban Coalition            |
| 5. Alan Henderson    | Palo Alto                           |
| 6. Fred Jordan       | Stanford Urban Coalition            |
| 7. Bob Keller        | CalTrans                            |
| 8. Naphtali H. Knox  | Palo Alto                           |
| 9. Ted Noguchi       | Palo Alto                           |
| 10. Vernon Richby    | CalTrans                            |
| 11. Bradford Stamper | East Palo Alto                      |
| 12. Marge Sutton     | FORUM on Community & Environment    |
| 13. Larry Tong       | East Palo Alto                      |
| 14. Bill Zaner       | Palo Alto                           |