Induced Travel:
Definition, Forecasting Process, and A Case Study in the Metropolitan Washington Region

A Briefing Paper for the
National Capital Region Transportation Planning Board
Metropolitan Washington Council of Governments

September 19, 2001

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I. Induced Travel: What is It, and How is It Addressed in the COG/TPB Travel Forecasting Process?

National Capital Region Transportation Planning Board
Metropolitan Washington Council of Governments

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Overview

- What is generally considered to be induced travel?
- What is not generally considered to be induced travel?
- Why examine induced travel?
- How was induced travel examined?
- What types of transportation system improvements can result in induced travel?
- How does the COG/TPB travel forecasting process deal with induced travel?
- How does the COG/TPB travel forecasting process deal with other ("non-induced") changes in travel patterns?
- Conclusions

What is generally* considered to be Induced Travel?

- **Any increase in total daily travel over an entire transportation system that results from a change in transportation system capacity.**
  - Induced travel refers to entirely new travel—new or longer trips
  - Some induced travel may result from short-term responses to transportation system capacity changes
  - Other induced travel may result from longer-term location decisions by households, employers and other facilities
- *** Definitions in the literature vary: some focus just on highway travel and the highway system, for example, while others focus on particular corridors, geographic areas, or times of day, rather than daily travel on an entire transportation system**

What is not generally considered to be Induced Travel?

- **Changes in travel patterns that do not result in an increase in total daily travel over the entire transportation system:**
  - Diverted trips -- people using a new or improved facility in place of other routes
  - Mode shift -- people changing from one mode to another
  - Trip timing changes -- people shifting trips to different times of the day
- **Changes in travel patterns that are due to factors other than a change in transportation system capacity:**
  - Changes due to demographic factors – e.g. underlying population and employment growth over time
  - Changes due to underlying socio-economic factors – e.g. increases in workers per household, growth in organized sporting activities for young people

Why Examine Induced Travel?

- **Any transportation improvement potentially "induces" more travel which must be addressed in the MPO planning process**
- **Induced travel has become part of the public debate on transportation:**

  "Widened highways generate their own traffic. This phenomenon, called induced travel, raises urgent questions for the Washington region." (Widen the Roads, Drivers Will Come - MD's I-270 Offers a Lesson. Wash. Post, 1/4/99)

- **The TPB requested that staff examine the topic of induced travel and how it is addressed in the COG/TPB travel forecasting process**

How Was Induced Travel Examined?

- COG/TPB contracted with consultant to conduct an objective review of studies on the topic of "induced travel"
- Consultant report was presented to Travel Forecasting Subcommittee and TPB Technical Committee for review and comments
- At request of the TPB Technical Committee, a multi-jurisdictional working group was formed to review the consultant report and to assess the implications of the report for the COG/TPB travel forecasting process
- TPB staff attended national forums and Transportation Research Board sessions on the topic of induced travel

What Types of Transportation System Improvements Can Result in Induced Travel?

1. Major Highway Improvement: New lanes on a stretch of multi-lane access-controlled divided highway.

2. Incremental Arterial Improvement: Expanded capacity along an existing arterial that serves low-density residential areas - - added left turn lanes, real-time traffic signal synchronization, pull-out loading areas at bus stops.

3. Extended Metrorail line: New system-miles in a suburban corridor with congested conditions on parallel highway facilities.

4. Bike Path: New bike path linking activities in an urban mixed use corridor.

How does the COG/TPB Travel Forecasting Process Deal with Induced Travel?

- **Short-term responses to transportation system changes**
  - **New Trips –** Person trip rates used in travel forecasting models have not been found to change measurably as a result of changes in transportation system capacity
  - **Longer Trips –** Forecasting Process accounts for increases in transportation system capacity by sending some trips to more distant destinations or on longer (but faster) routes
- **Longer-term responses to transportation system changes**
  - **Trips associated with changes in development patterns –** COG/TPB's cooperative forecasting process addresses changes in development patterns predicted to occur as a result of major changes in transportation system capacity, and these updated development patterns are provided as inputs to the travel forecasting process

How does the COG/TPB Travel Forecasting Process Deal with Other ("Non-Induced") Changes in Travel Patterns?

- **Changes that Do Not Increase Total Daily Travel Over the Entire Transportation System**
  - **Diverted Trips --** Forecasting Process estimates the diversion of traffic from unimproved to improved facilities
  - **Mode Shifts –** Forecasting Process estimates shifts in person trips among transit, HOVs, and low-occupancy vehicles
  - **Trip Timing Changes --** New "version 2" COG/TPB travel forecasting process includes estimates of travel by time of day for both highway and transit
- **Changes Due to Factors Other than Transportation System Capacity**
  - **Demographic Factors --** COG/TPB's cooperative forecasting process provides the inputs for these factors in the travel forecasting process
  - **Socio-Economic Factors** – changes in workers per household and household travel characteristics are explicitly addressed in the COG/TPB travel forecasting process through periodic household surveys

Conclusions

- **Induced travel can result from any transportation system improvement --** highways, transit, bike/pedestrian facilities or others
- **Changes in travel patterns that do not increase travel over an entire transportation system, but are just shifts between routes, travel modes, and times of day, are not generally considered to be induced travel**
- **Travel growth is influenced by many factors other than changes in the transportation system --** Induced travel is only one component of overall increases in travel. Research has found that it is difficult to separate induced travel from other increases in travel, and results of research to date are of limited applicability to the Washington region
- **COG/TPB Travel Forecasting Process currently captures induced travel, but does not separate induced travel from other increases in travel**
- **COG/TPB Travel Forecasting Process is "State of the Practice"**

II. Induced Travel:
What Happened in the I-270 Corridor?

National Capital Region Transportation Planning Board
Metropolitan Washington Council of Governments

September 19, 2001

Overview

- Highway Widening and Traffic Growth in the I-270 Corridor: 1984-2000
- Comparisons of I-270 Study Forecasts With 2000 Conditions as Described in Most Recent Data
- What do Preliminary Findings Suggest?

Highway Widening and Traffic Growth in the I-270 Corridor: 1984-2000

- MD SHA 1984 Study of the widening of I-270 from the I-270 Y-Split to MD Route 121, provided traffic forecasts for the year 2010
- Widening completed in 1991
- Year 2010 traffic forecasts were exceeded by the year 2000
- To what extent should this rapid growth be attributed to "induced travel"?
- We can address this question by examining the study forecasts and comparing them with year 2000 conditions as described in our most recent data

Comparison of I-270 Study Forecasts With 2000 Conditions as Described in Most Recent Data

- **Population and Employment**
  - Compare Current (Round 6.2) forecasts with the Round 2 forecasts for the year 2000 that were used in 1984 study
- **Transportation System**
  - Compare the improvements that were assumed in 1984 study with those that were actually constructed by the year 2000
    - Completion of Metrorail lines?
    - Inter County Connector?
    - Other Facilities?
- **Traffic Volumes**
  - Compare traffic forecasts in 1984 study with most recent (1999) observed traffic volumes

What do Preliminary Findings Suggest?

- **Population and Employment**
  - Round 6.2 regional population and household totals were somewhat lower and regional employment totals somewhat higher than the Round 2 forecast.
  - Population, household, and employment growth in the I-270 corridor was significantly higher than the Round 2 forecast while growth in several other areas was lower than the forecast
- **The Transportation System**
  - The transportation system improvements included in the 1984 study were based on the adopted regional transportation plan at that time, which included some facilities that have since been delayed or dropped from regional plans.
- **Travel Forecasts and Actual Volumes**
  - The higher observed traffic volumes relative to the 1984 forecast appear to be due in large part to shifts in population, employment, and travel to the I-270 corridor from other areas in the region, rather than to "entirely new travel"

III. Comparison of 1984 Study Forecasts with Most Recent Data: I-270 Corridor

National Capital Region Transportation Planning Board
Metropolitan Washington Council of Governments

September 19, 2001

Table 1
Comparison of Round 6.2 and Round 2 Cooperative Forecasts*
Year 2000: Population (In Thousands)

Jurisdiction	Round 6.2 Year 2000	Round 2 Year 2000	Difference Rnd 6.2-Rnd 2	Percent Difference
District of Columbia	518	733	-215	-29%
Arlington County	192	206	-14	-7%
City of Alexandria	127	138	-11	-8%
Montgomery County	848	790	58	7%
In I-270 Corridor	294	239	55	23%
Outside I-270 Corridor	554	551	3	1%
Prince George's County	791	871	-80	-9%
Fairfax County / Cities	999	986	13	1%
Loudoun County	172	160	12	8%
Prince William County / Cities	329	318	11	4%
Total	3977	4202	-225	-5%

* Round 6.2 Forecasts adopted in 2000 and Round 2 Forecasts adopted in 1979

Table 2
Comparison of Round 6.2 and Round 2 Cooperative Forecasts*
Year 2000: Households (In Thousands)

Jurisdiction	Round 6.2 Year 2000	Round 2 Year 2000	Difference Rnd 6.2-Rnd 2	Percent Difference
District of Columbia	222	299	-77	-26%
Arlington County	90	100	-10	-10%
City of Alexandria	62	65	-4	-5%
Montgomery County	315	289	26	9%
In I-270 Corridor	109	86	23	27%
Outside I-270 Corridor	206	203	3	1%
Prince George's County	293	311	-18	-6%
Fairfax County / Cities	366	345	21	6%
Loudoun County	61	53	8	14%
Prince William County / Cities	109	94	15	16%
Total	1517	1556	-39	-2%

* Round 6.2 Forecasts adopted in 2000 and Round 2 Forecasts adopted in 1979

Table 3

Comparison of Round 6.2 and Round 2 Cooperative Forecasts*

Year 2000: Employment (In Thousands)

Jurisdiction	Round 6.2 Year 2000	Round 2 Year 2000	Difference Rnd 6.2-Rnd 2	Percent Difference
District of Columbia	678	701	-23	-3%
Arlington County	201	198	3	2%
City of Alexandria	99	80	19	23%
Montgomery County	533	440	93	21%
In I-270 Corridor	282	194	88	45%
Outside I-270 Corridor	251	246	5	2%
Prince George's County	329	426	-97	-23%
Fairfax County / Cities	565	410	155	38%
Loudoun County	85	58	27	47%
Prince William County / Cities	114	84	30	36%
Total	2604	2397	207	9%

* Round 6.2 Forecasts adopted in 2000 and Round 2 Forecasts adopted in 1979

Table 4

Comparison of Round 6.2 Forecasts for 2000 with Extrapolated Round 2 Cooperative Forecasts for 2010*

(Region)

	Round 6.2 2000	Round 2 2010	Round 6.2 (2000) as a % of Round 2 (2010) Forecasts
Employment	2,604,000	2,796,000	93%
Households	1,517,000	1,781,000	85%
Population	3,977,000	4,721,000	84%

(Montgomery County)

	Round 6.2 2000	Round 2 2010	Round 6.2 (2000) as a % of Round 2 (2010) Forecasts
Employment	533,000	523,000	102%
Households	315,000	306,000	103%
Population	848,000	837,000	101%

* Round 6.2 Forecasts adopted in 2000 and Round 2 Forecasts adopted in 1979

Table 5
Comparison of Current with Previously Forecast*
Daily Traffic Volumes on I-270

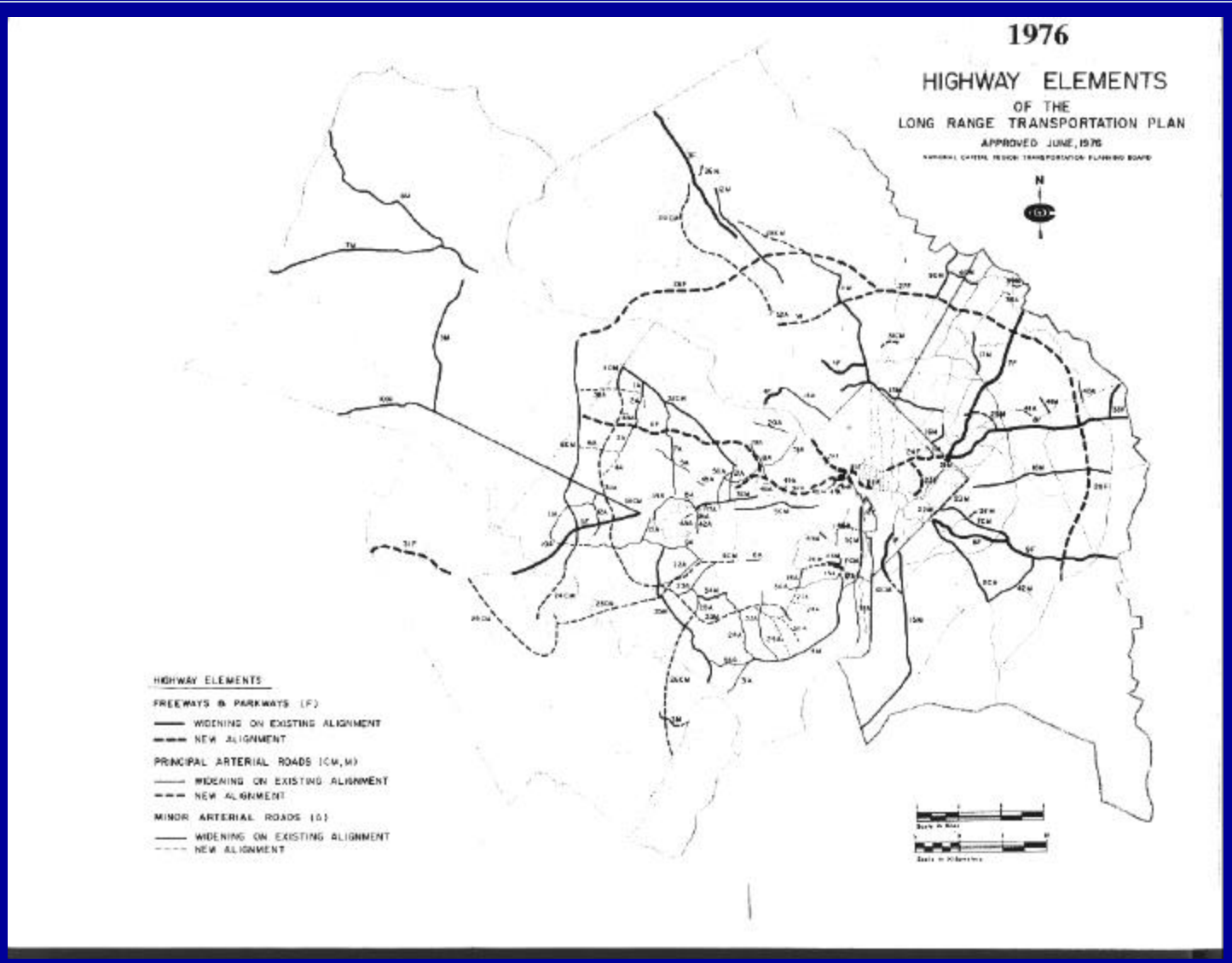
I-270 Segment	Current 1999	Forecast 2000*	Current as a % Forecast 2000	Forecast 2010*	Current as a % Forecast 2010
I-270 Y-Split to Montrose Rd	232,300	166,200	140%	187,900	124%
Montrose Rd to MD 189	196,700	154,500	127%	182,200	108%
MD 189 to MD 28	216,700	143,400	151%	165,500	131%
MD 28 to Shady Grove Rd	217,200	145,100	150%	170,100	128%
Shady Grove Road to I-370	165,200	128,100	129%	153,800	107%
I-370 to MD 124	151,200	121,800	124%	144,300	105%
MD 124 to Middlebrook Rd	136,900	91,500	150%	113,700	120%
Middlebrook Rd to MD 118	94,400	72,400	130%	85,100	111%
MD 118 to MD 121	65,900	69,900	94%	87,400	75%
MD 121 to Frederick County Line	63,900	63,700	100%	78,700	81%

* In 1984 the Maryland State Highway Administration prepared 2010 traffic projections for I-270 using traffic forecasts developed by the MetropolitanWashington Council of Governments reflecting Round 2 of the Cooperative Forecasts for the Year 2000. Daily traffic volume forecasts for 2000 in this table were estimated by interpolating between the 1980 base year Average Daily Traffic (ADT) volumes and the 2010 design year projections.

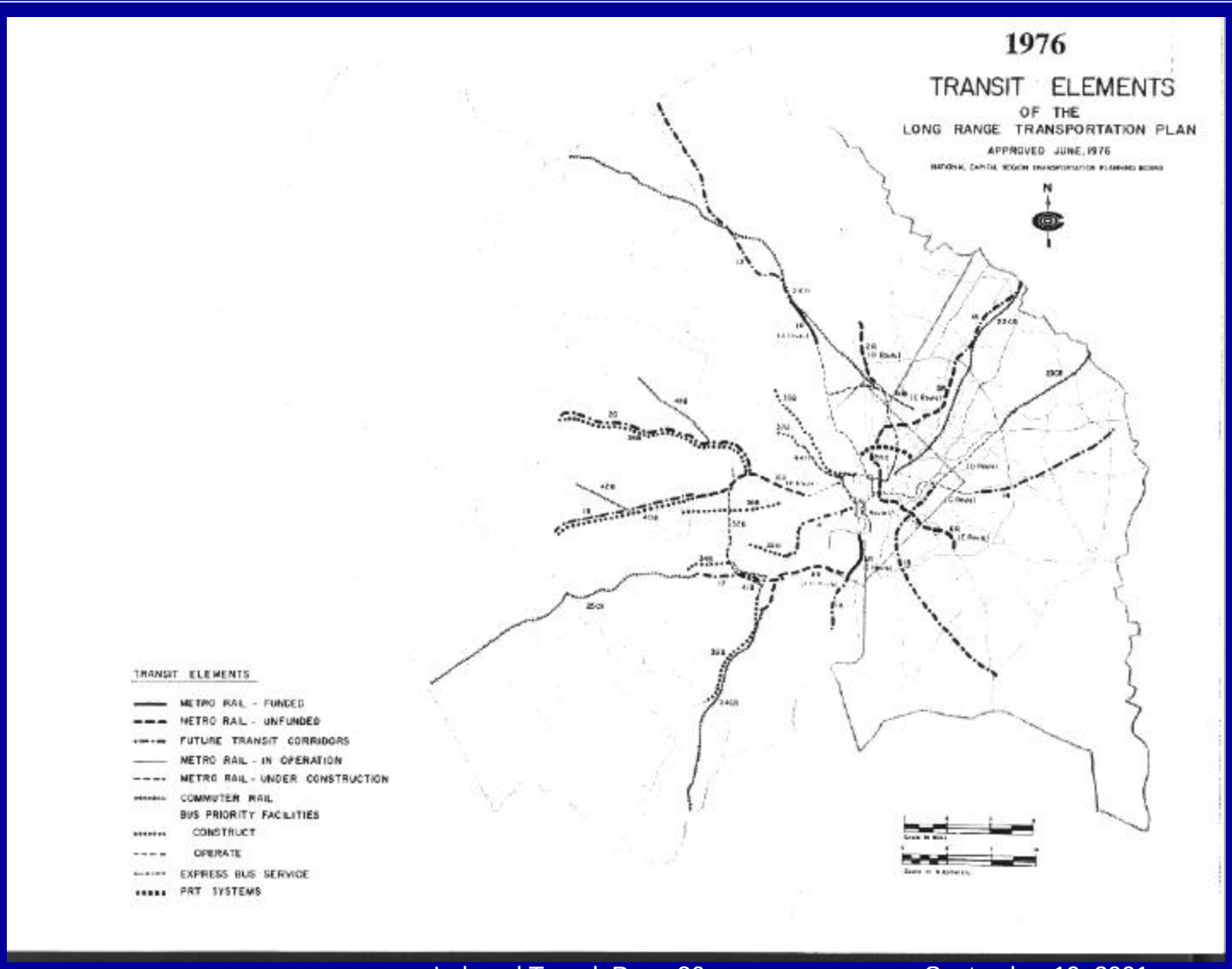
Table 6
Change in Daily Traffic Volumes on Parallel I-270 and MD 355 Highway Segments

I-270 Segment	I-270 Segment 1992	I-270 Segment 1999	I-270 Segment Change	Parallel MD 355 Segment (Rockville Pike) 1992	Parallel MD 355 Segment (Rockville Pike) 1999	Parallel MD 355 Segment (Rockville Pike) Change
I-270 Y-Split to Montrose Rd	175,900	232,300	56,400	55,700	63,700	8,000
MD 189 to MD 28	145,700	216,700	71,000	76,400	59,800	-16,600
MD 28 to Shady Grove Rd	111,600	217,200	105,600	46,900	45,200	-1,700
I-370 to MD 124	92,400	151,200	58,800	35,200	35,600	400
MD 124 to Middlebrook Rd	71,700	136,900	65,200	34,700	24,200	-10,500
Middlebrook Rd to MD 118	72,300	94,400	22,100	21,200	23,000	1,800
MD 118 to MD 121	64,300	65,900	1,600	28,100	19,700	-8,400
MD 121 to Frederick County	67,800	63,900	-3,900	8,600	8,700	100

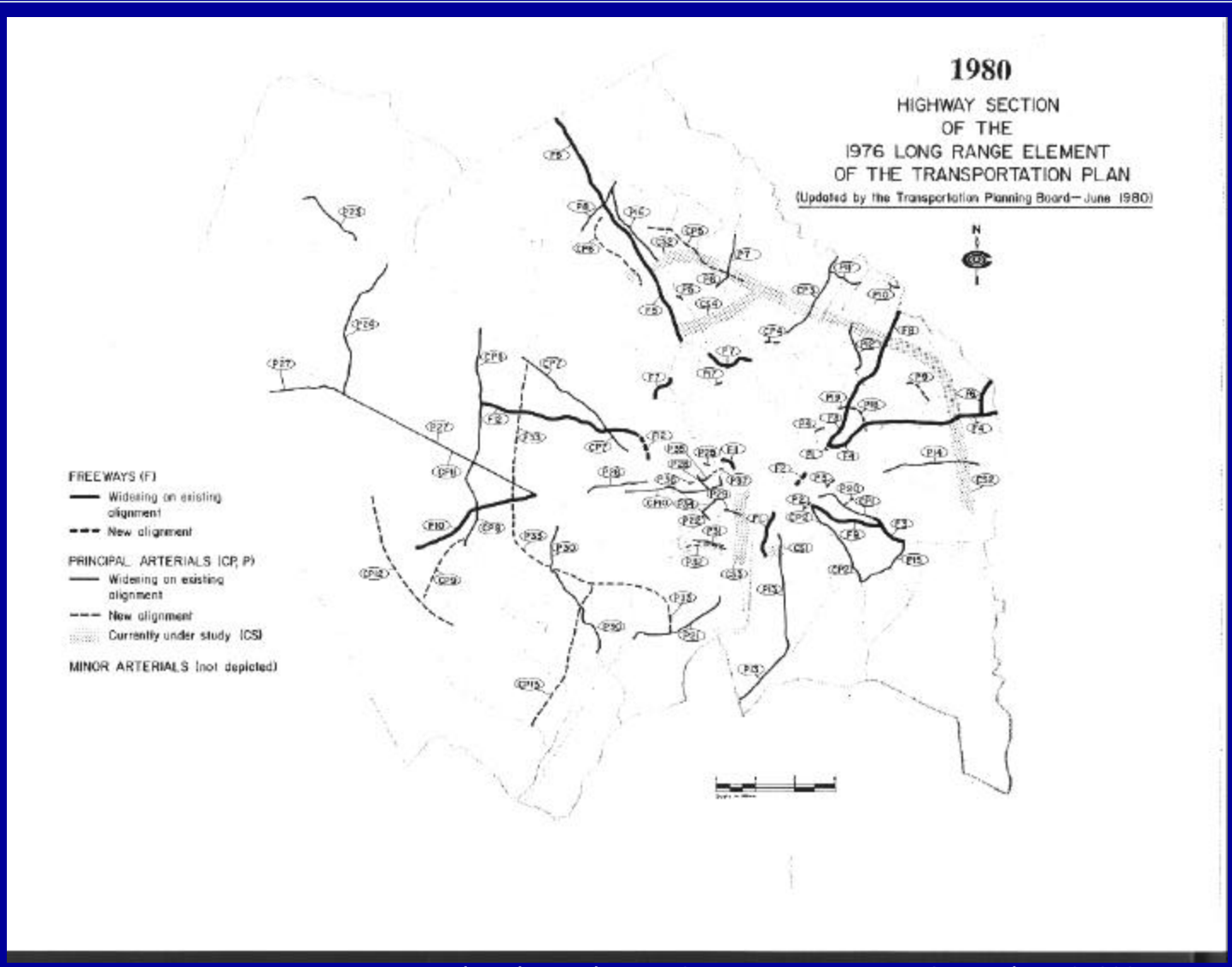
1976 Highway Elements of the Long Range Transportation Plan



1976 Transit Elements of the Long Range Transportation Plan



1980 Highway Elements of the Long Range Transportation Plan



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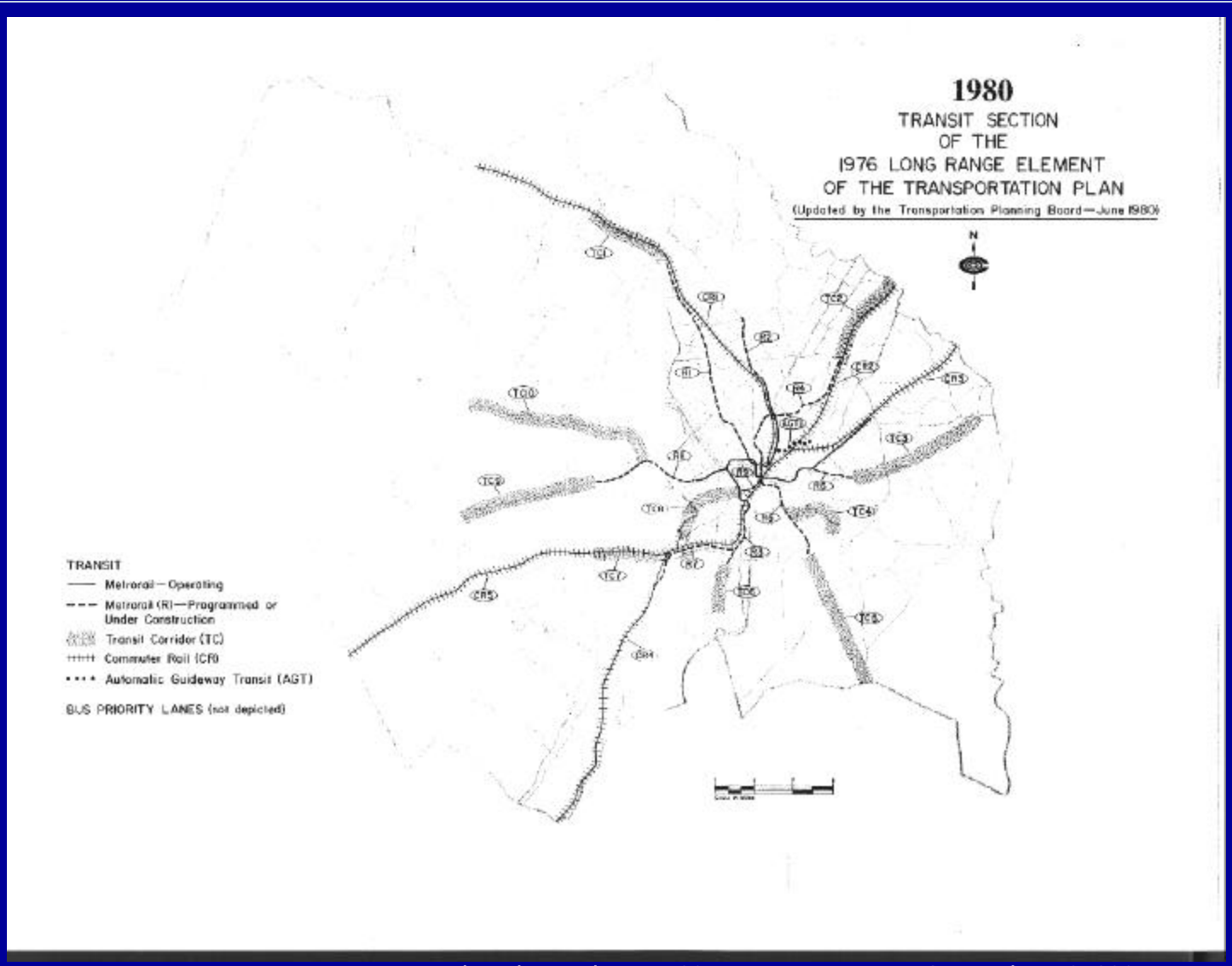

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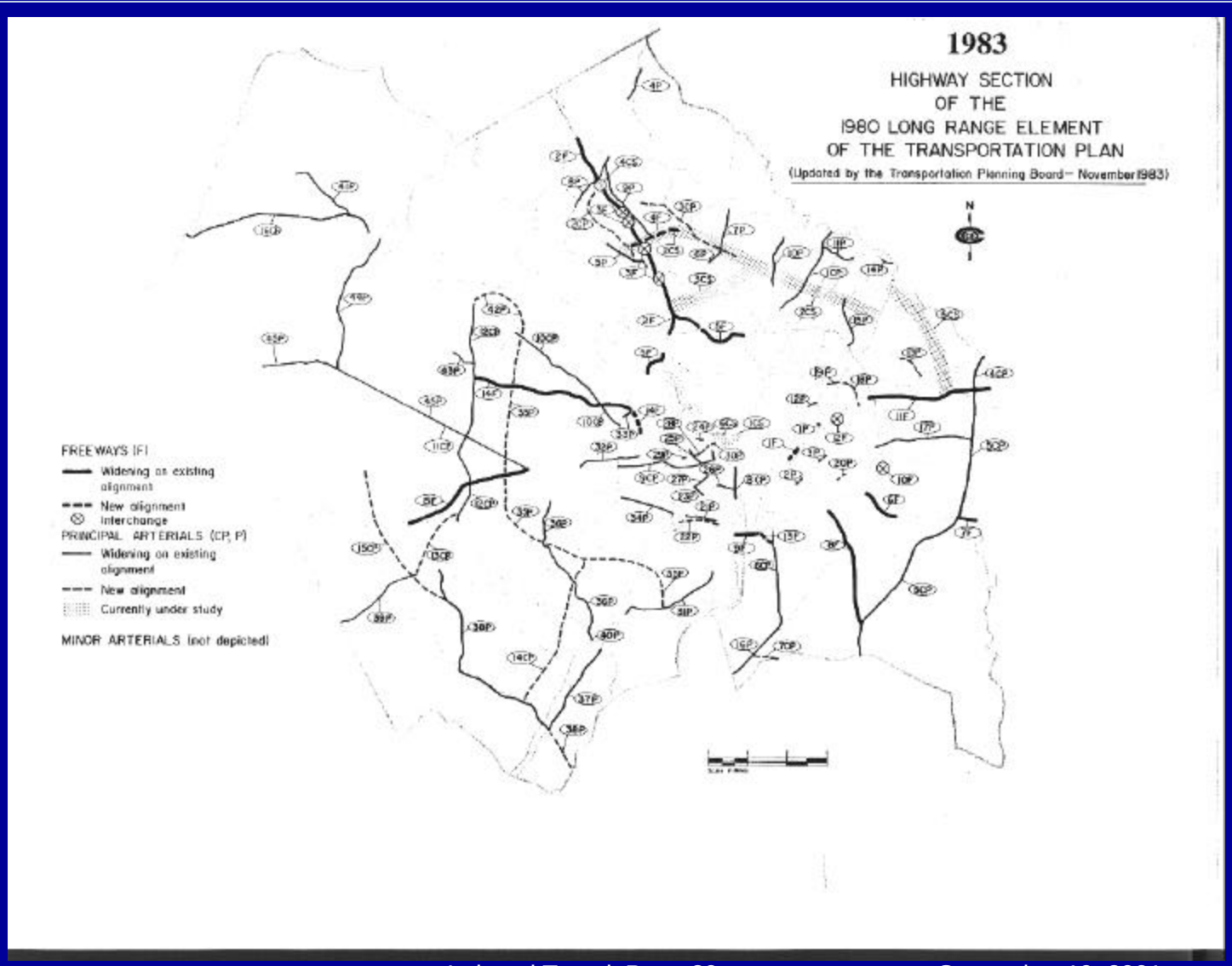

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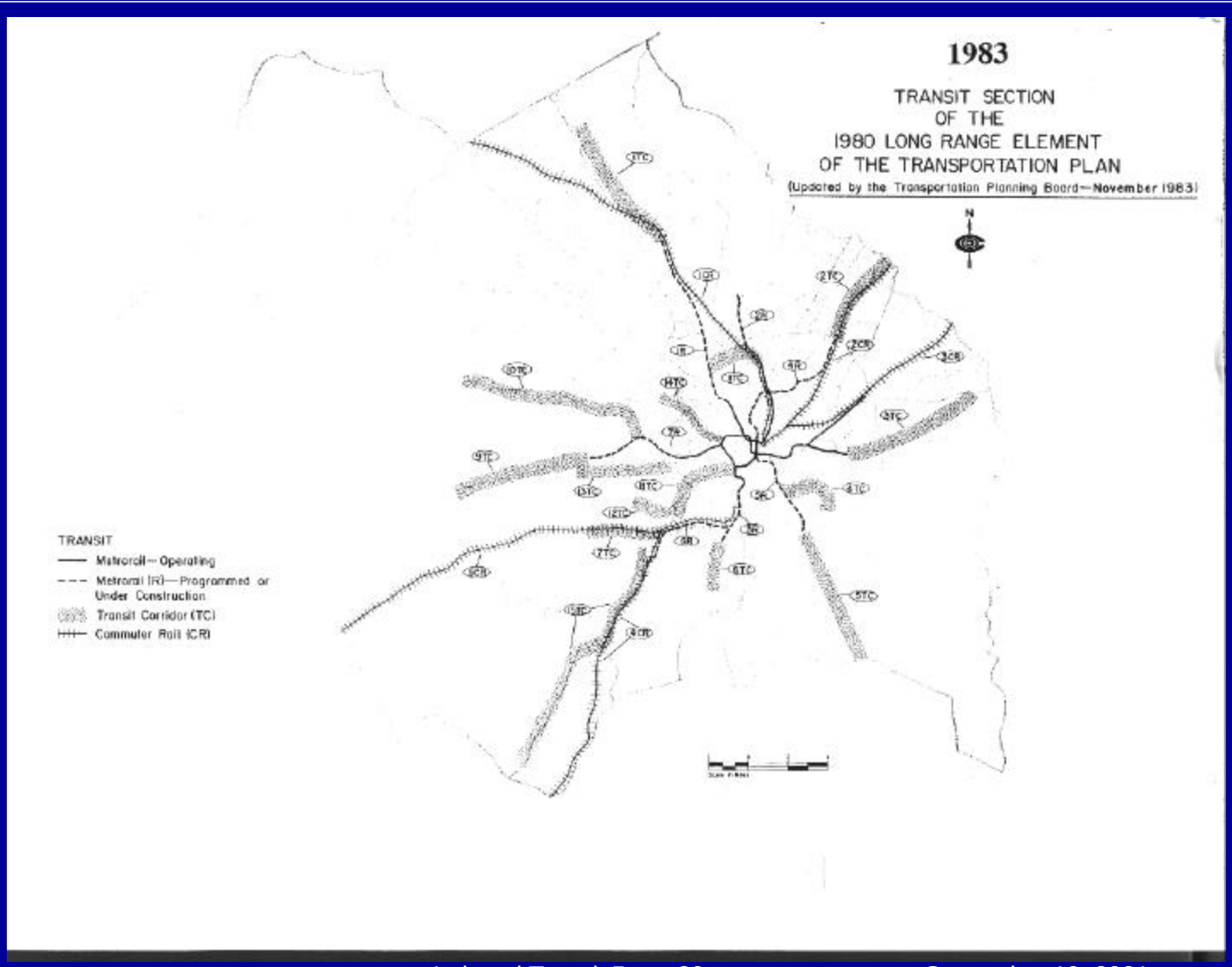


Figure 1
Comparison of Round 6.2 and Round 2 Cooperative Forecasts*
Year 2000: Households

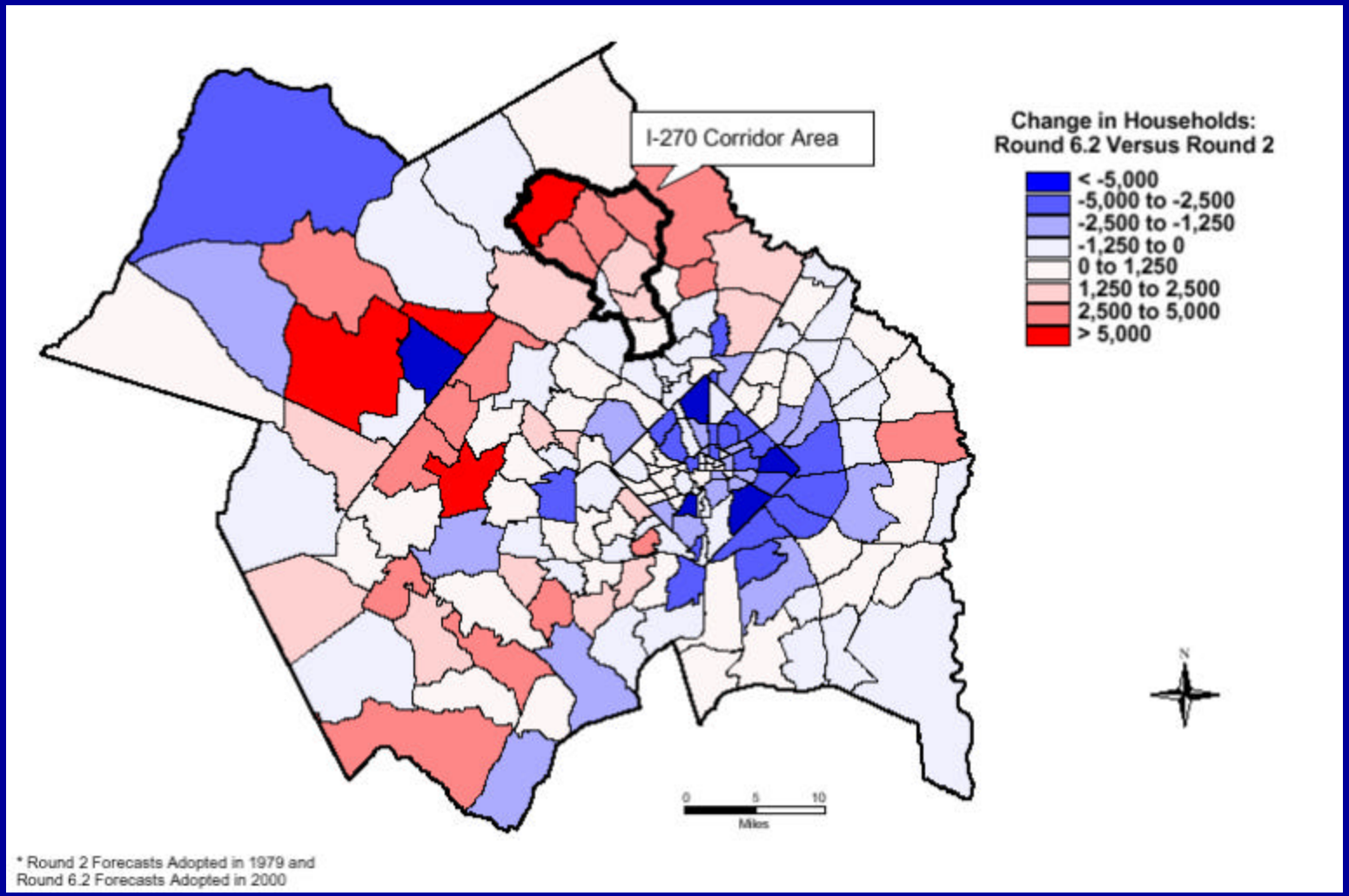
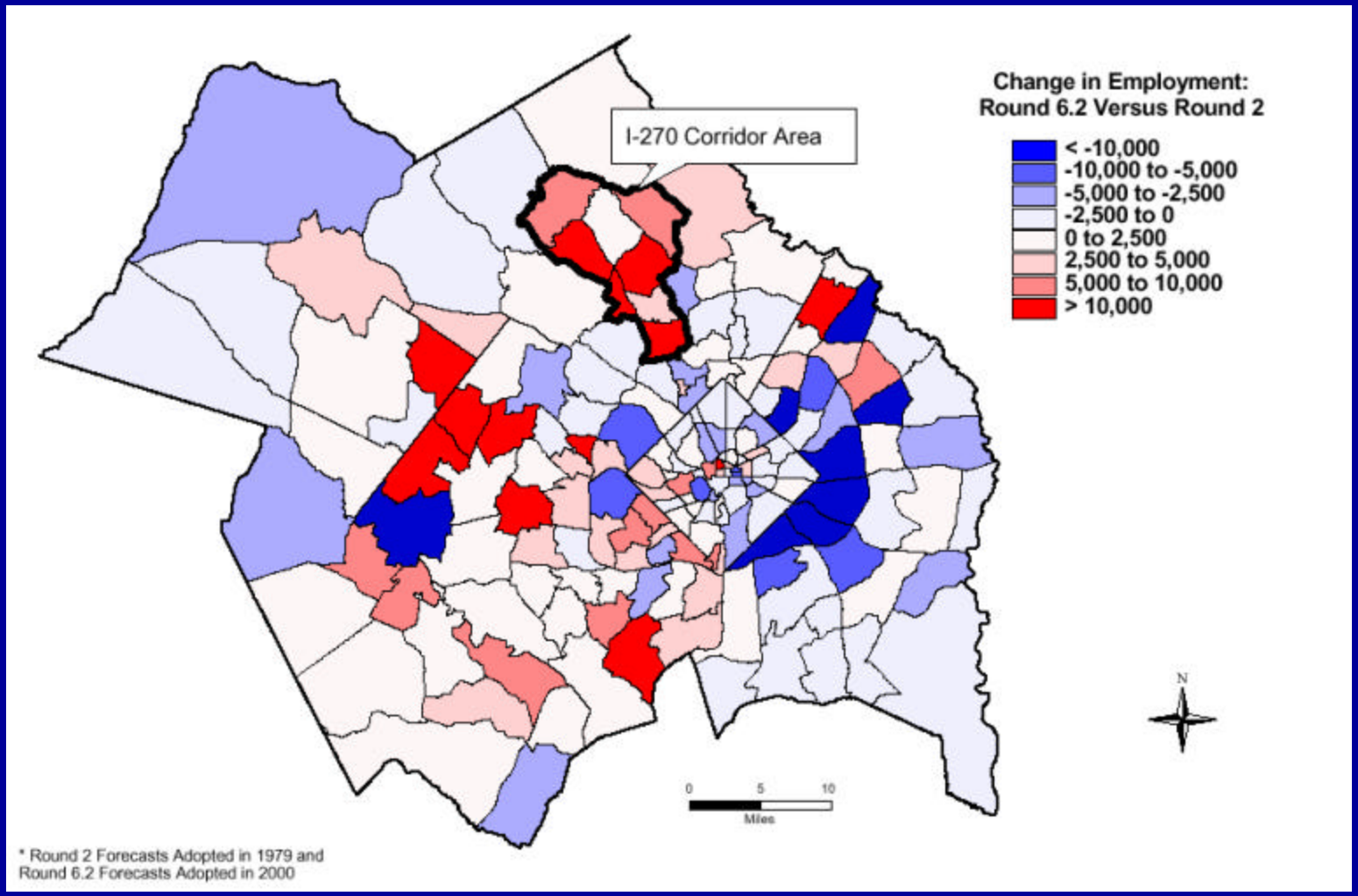


Figure 2
Comparison of Round 6.2 and Round 2 Cooperative Forecasts*
Year 2000: Employment



IV. Response to Comments Received on Induced Travel Briefing Paper

National Capital Region Transportation Planning Board
Metropolitan Washington Council of Governments

TPB Work Session
September 19, 2001

Response to Comments Received on Induced Travel Briefing Paper (1 of 3)

- Comment 1: The definition of induced travel used in the paper does not capture some of the important travel impacts of policy interest.
- Response 1: The definition used is the consensus definition from the professional literature, as recommended in a report by the TPB's consultant, Hagler Bailly. (Copies of the consultant report are available for those who are interested). It is true that some important travel impacts like diverted trips and mode shifts are not captured in this definition of induced travel, which refers only to new or longer trips.

Response to Comments Received on Induced Travel Briefing Paper (2 of 3)

- **Comment 2:** It is unclear how the TPB process captures changes in trip generation rates over time.
- **Response 2:** These changes are captured in periodic surveys of household travel behavior. Such surveys would capture over time the growth in "soccer moms" for example, along with other socio-economic factors such as the growth in labor force participation by women. While the level of mobility on the transportation system has not been found to be a significant variable in trip generation models, this factor is inherent in the travel survey information. In fact to the extent that the most recent survey (currently 1994) was taken when congestion was lower and mobility levels were higher, the trip generation models may actually overstate the number of trips currently being made.

Response to Comments Received on Induced Travel Briefing Paper (3 of 3)

- **Comment 3: The I-270 data suggest that transportation system changes can have significant impacts on the location of future households and employment. It is unclear to what extent these changes result in "induced travel".**
- **Response 3: If the land use changes result in a significant number of new or longer trips, as in the case, for example, of shifting development to more remote locations in the region, then an induced travel effect may very well occur. However, if the land use changes result in similar or reduced travel relative to the baseline, there may not be any induced travel effects. To the contrary, such land use changes may result in reduced travel relative to the baseline.**