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**transportation
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contingency
planning:
local experiences**



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TRANSPORTATION ENERGY CONTINGENCY PLANNING:
LOCAL EXPERIENCES

June 1979

Compiled By

OFFICE OF THE SECRETARY
FEDERAL HIGHWAY ADMINISTRATION
URBAN MASS TRANSPORTATION ADMINISTRATION

From Materials Developed By

MEMPHIS AREA TRANSIT AUTHORITY
METROPOLITAN TRANSIT COMMISSION, MINNEAPOLIS-ST. PAUL
METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS
MUNICIPALITY OF METROPOLITAN SEATTLE
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

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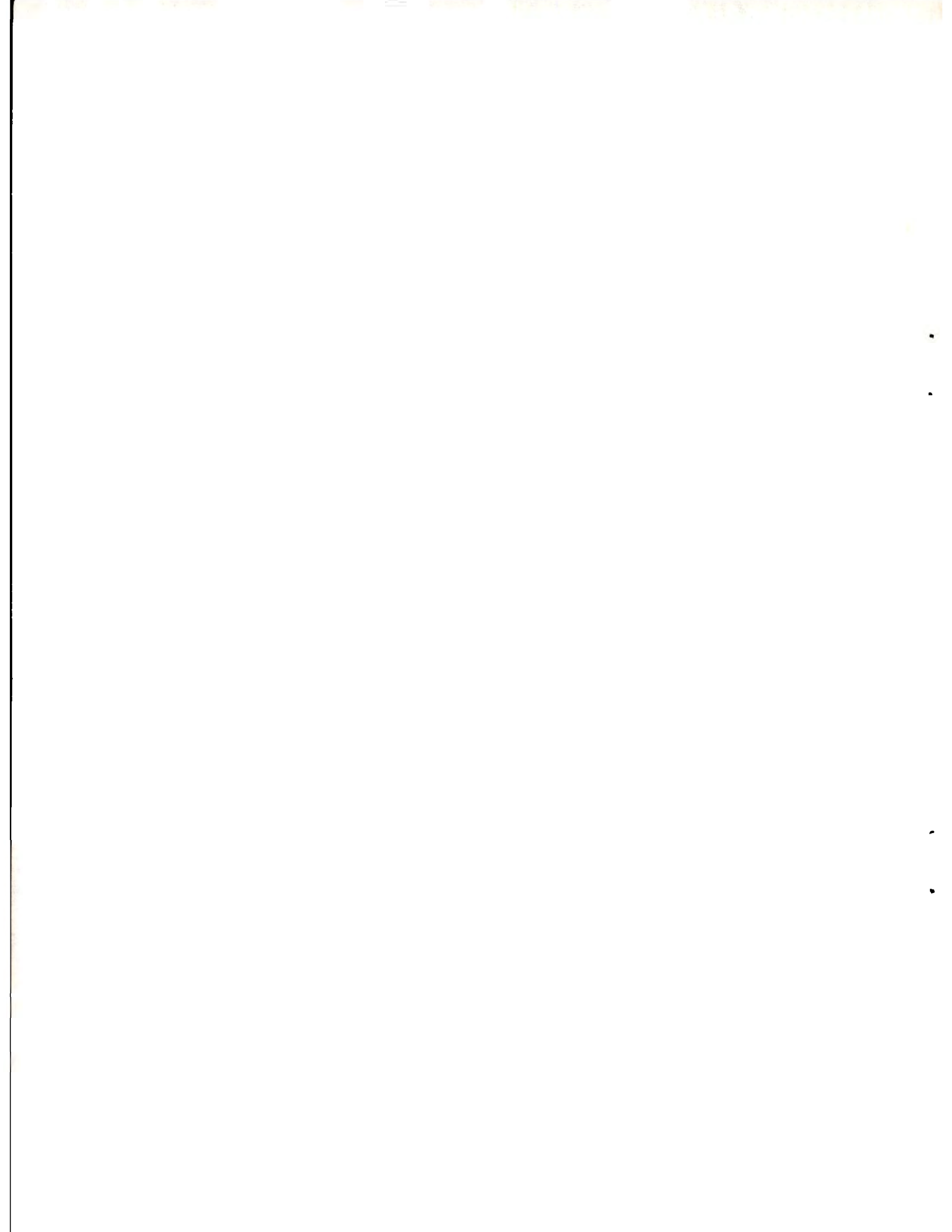
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INTRODUCTION

Despite the call for increased conservation of petroleum after the 1973-74 Arab oil embargo, the United States has become increasingly dependent on foreign sources of petroleum, and at this time imports exceed domestic production. Reliance on this "thin line of oil tankers," as President Carter phrased it in his April 5, 1979 energy speech, greatly increases the chances of serious internal disruptions due to the unstable nature of the world political climate.

The primary disruption is likely to be in the area of transportation, as evidenced during the Arab embargo and by the early impacts of the more recent Iranian oil production slow-down. Many metropolitan areas and transit properties have recognized the need and responded to the situation with the development of contingency plans which set out a course of action to provide for the basic transportation needs of people during periods of fuel scarcities.

The majority of plans developed thus far have been initiated by transit properties, and generally deal with two major themes: how to move more people on transit in response to the expected increase in demands; and, what to do if the transit property itself is unable to obtain its total fuel requirements. Several plans have taken an areawide view of the total transportation needs, recognizing that even very dramatic increases in transit ridership will only serve a relatively small number of daily trips

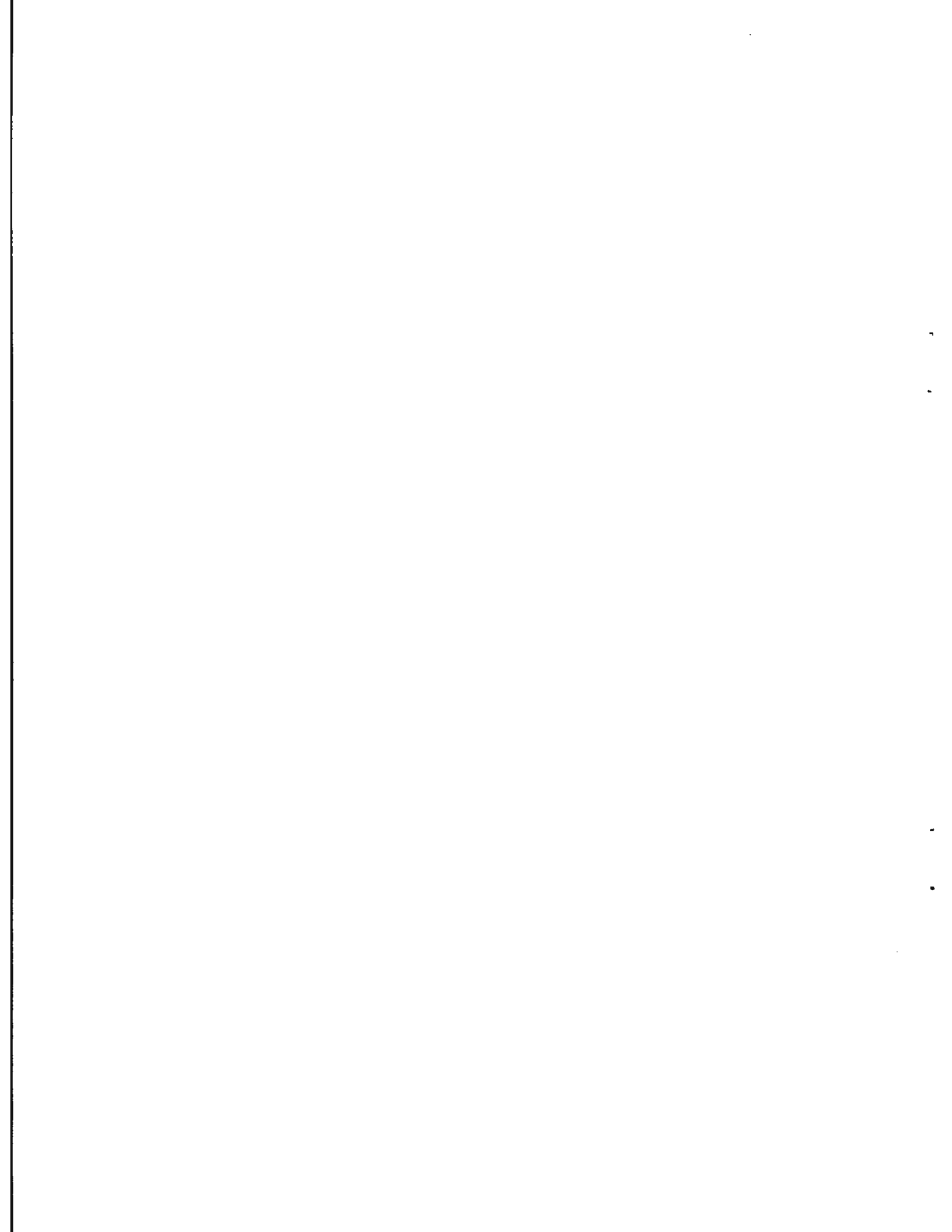
(especially peak-period trips, when many transit systems currently are at or near capacity). Coordination on a regional basis among local officials, major employers, retail business, labor organizations, and transit providers in the development of an overall contingency program is an important aspect of successful plan development. The Metropolitan Planning Organizations (MPO's) in each urbanized area are logical agencies to conduct and coordinate the effort.

The chapters of this report consist of directly-reproduced sections of several recently produced plans, and are presented in topical order similar to that of the actual plans. Some of these sections refer to other parts of the original full plan which have not been included, but the context and intent should be clear. There are other areas which have undertaken contingency planning, but time and space do not permit inclusion of all current examples. The examples shown represent many of the points which should be considered by metropolitan areas and transit properties in their own development of contingency plans.

Many of the reports begin with a synopsis of the energy situation, concentrating on the impacts of the 1973-74 embargo. This material has not been included but each MPO and/or transit property should, in the development of their own plan, closely analyze the reaction to that situation in their particular area. This information would then serve as an indication of expected effects during future shortages.

An attempt has been made to provide a balance between areawide plans and transit property plans. It should be stressed, however,

that each is necessary to an effective, coordinated program of action. For the success of ridesharing and typical transit related actions such as increased service of various types, it is frequently necessary that actions such as flexible work hours and expanded fringe parking also be instituted.



CONTENT OF SAMPLE PLANS

The following chart summarizes key issues involved in contingency planning and the manner in which several areas have addressed these issues. The extent and detail to which any specific agency conducts contingency planning and programming will depend on local circumstances such as local priorities, size, density, current level of transit use, employment locations, etc. However, this chart provides a good display of the scope of the plans which have already been produced and as such can serve as a guide to other areas interested in preparing their own plan.

KEY ISSUE	CONTINGENCY PLAN REVIEWED			
	North Central Texas Council of Governments Dallas/Ft. Worth, TX	Southern California Rapid Transit District Los Angeles, CA	Municipality of Metropolitan Seattle Seattle, WA	Metropolitan Transit Commission Minneapolis/St. Paul, MN
Maximum Utilization of Existing Transit Capacity - fill vacant seats, run longer peaks	Capacities available on some lines in Dallas (Avg. 10% un- filled seats), Ft. Worth (15%) Reduce service standards - standees tolerated	Increase of 10% on main routes, 75% on policy headway routes could lead to 35% increase in patronage.	About 4000 additional riders (5%) could be accommodated	Adjust schedules, add turnbacks
Flexitime, Variable Hours, Four Day Work Week	Flexible hours adds 10% to ridership in Dallas, 15% in Ft. Worth and should be encouraged.	Four-day work week would be ineffective in reducing travel; staggered and Flexible hours recommended.	Flexitime recommended, major employers identified, 3100 riders possible (5%).	Variable Hours recommended; generally including flexitime, staggered hours, 4-day week.
Expand Transit Fleet . stockpile old buses: where to store, how to return to service . use school, church buses: regulatory restrictions, vehicles . use charter buses for subscription, reg. route, non- work trips	Dallas needs 40 buses to handle over 30% increase in ridership, Ft. Worth needs none to handle 40%. Stockpiling <u>not recommended.</u> ----- 1500 church-owned buses, 1000 school buses; Texas law forbids school bus use; study further. ----- Obtain buses from SURTRAN (Airport access operator), reduce transit operator chartering-out	Recommended stockpile of 375 buses in sound mechanical condition; as new vehicles obtained, locate additional <u>storage facilities.</u> ----- 5400 school buses in region, but not recommended ----- Contract for additional off-peak service in over- capacity areas during severe shortage	Possibility of retaining replaced buses to be explored ----- 818 school buses available, but insurance and school schedules are problems. Study further. ----- Availability of rental vehicles held unlikely	Maintain 100 bus standby fleet (10%) ----- In serious shortage, could use school buses for feeder ----- Not considered
Add Additional Service - on new routes, shorter headways, double heading	Exploration of use of school buses, altering State law in suburban areas. Recommends law change.	300 buses stockpiled used to reduce peak hour headways on existing route-adds 5% to ridership. Severe crisis- operate peak hour level all day	Run any additional vehicles (school buses, stockpiled, added fleet) on existing routes	Adjust schedules, possible turnbacks, double heading, reduce deadheading, (layover at downtown, linking of trips)

KEY ISSUE	CONTINGENCY PLAN REVIEWED	
	Metropolitan Washington Council of Governments Washington, D.C.	Memphis Area Transit Authority Memphis, TN
Maximum Utilization of Existing Transit Capacity - fill vacant seats, run longer peaks	Significant increases in peak period core-destined trips made by transit would overload the transit system, especially during the peak hour.	Current operation at 80% of capacity during one hour peak.
Flexitime, Variable Hours, Four Day Work Week	Variable hours recommended with the Federal Government taking the lead. Staggering work hours is the only short-term way to increase Metrorail capacity.	Variable hours recommended, although effect would be less significant than other measures; major employers and present work shifts identified.
Expand Transit Fleet 7 .stockpile old buses: where to store, how to return to service .use school, church buses; regulatory restriction, vehicles .use charter buses for subscription, reg. route, non-work trips	Delay retirement of 178 old buses, rehabilitation of 30 out-of-service buses, expansion of a storage facility, no disposal of aged buses without authorization. ----- Coordinate school hours to possibly make school buses available ----- Not considered	Current level (300 buses) can adequately service Memphis system during peak hour in crisis, allowing a 5% spare ratio ----- School buses could be used for service, but would receive low priority even in a severe shortage ----- Contract with public/private carriers to provide feeder service to main lines
Add Additional Service - on new routes, shorter headways, double heading	Use old buses and lower spare ratio to increase service during peak periods along present routes (financial and time start-up considerations prevent initiation of new service). Begin Sunday Metrorail service.	Monitor ridership to determine schedule adjustment, use double-heading, develop additional park and ride, additional reverse commuter routes

KEY ISSUE	CONTINGENCY PLAN REVIEWED			
	North Central Texas Council of Governments Dallas/Ft. Worth, TX	Southern California Rapid Transit District Los Angeles, CA	Municipality of Metropolitan Seattle Seattle, WA	Metropolitan Transit Commission Minneapolis, St. Paul, MN
Provide Additional Personnel - drivers, maintenance - training - 13(c), contracts	Not explicitly considered	Need 7% (300) more drivers. Training needed. In severe crisis need 37% (1600) more. Need 6 months to train.	Not explicitly considered	Plans for driver, maintenance personnel training to be developed. 8 weeks to train driver.
Provide for Additional Maintenance - altered maintenance schedules - handling breakdowns - personnel needs	Altering maintenance schedule could add 10% (Dallas), 20% (Ft. Worth) to capacity - recommended	Maintenance provided by overtime, may need new personnel (about 20%), 50% in severe crisis	10% more buses possible by adding 10-15 (10%) more mechanics and using swing shift or jobbing out maintenance	Standby fleet needs garaging in emergency (cold weather)
∞ Role of Transit for Non-Work Trips - off peak service for shop, social-rec. trips - tourism trips	Not explicitly considered	Assumes some non-work trips would be foregone, but proposes addition of off-peak service	Not explicitly considered	Reduce certain shoppers service
Subscription Service (Buspools) - role of operator; trade-off of new service vs. more runs to old routes	Plan implies focus on serving existing routes by operator, leaves subscription services to private sector	Not considered	Potential for service to Duwamish Valley (Boeing) if vehicles are available	Expand "Total Commuter Service" with buspools if vehicles available
Storage of Fuel - standby sources - backup for allocation - borrow/lend to others	Increase storage capacity of Dallas Transit to 30 days. Maintain CITRAN capacity at 30 days	Expand capacity at all garages to 10 days supply; only one has this capacity now.	Not considered	Not considered

KEY ISSUE

CONTINGENCY PLAN REVIEWED

Metropolitan Washington Council of Government
Washington, D.C.

Memphis Area Transit Authority
Memphis, TN

Provide Additional Personnel
- drivers, maintenance
- training
- 13(c), contracts

Recruitment and training of new personnel could take up to 3 months; up to 313 operators and 99 maintenance personnel needed

Minimum of 6 weeks necessary to train new drivers.

Provide for Additional Maintenance
- altered maintenance schedules
- handling of breakdowns
- personnel needs

Most buses to be retained in service require rehabilitation, a storage facility is under expansion.

Expand to two full shifts, would require more personnel; increase preventative maintenance.

6 Role of Transit for Non-Work Trips - off peak service for shop, social-rec. trips
- tourism trips

Begin Sunday Metrorail Service.

Improve midday service, reverse commuting routes could promote transit use for suburban shopping; lower off-peak fares.

Subscription Service (Buspools)
- role of operator; trade-off of new service vs. more runs to old routes

Not considered

Subscription and charter buses suggested, low spare ratio (5%) could hinder the use of Memphis transit buses.

Storage of Fuel
- standby sources
- backup for allocation
- borrow/lend to others

Capacity for storage to be doubled; an additional fuel distribution truck is on order.

Tennessee Energy Authority assures public transportation agencies a minimum of 100% of previous year's allocation, plus has procedures for additional allocations.

KEY ISSUE

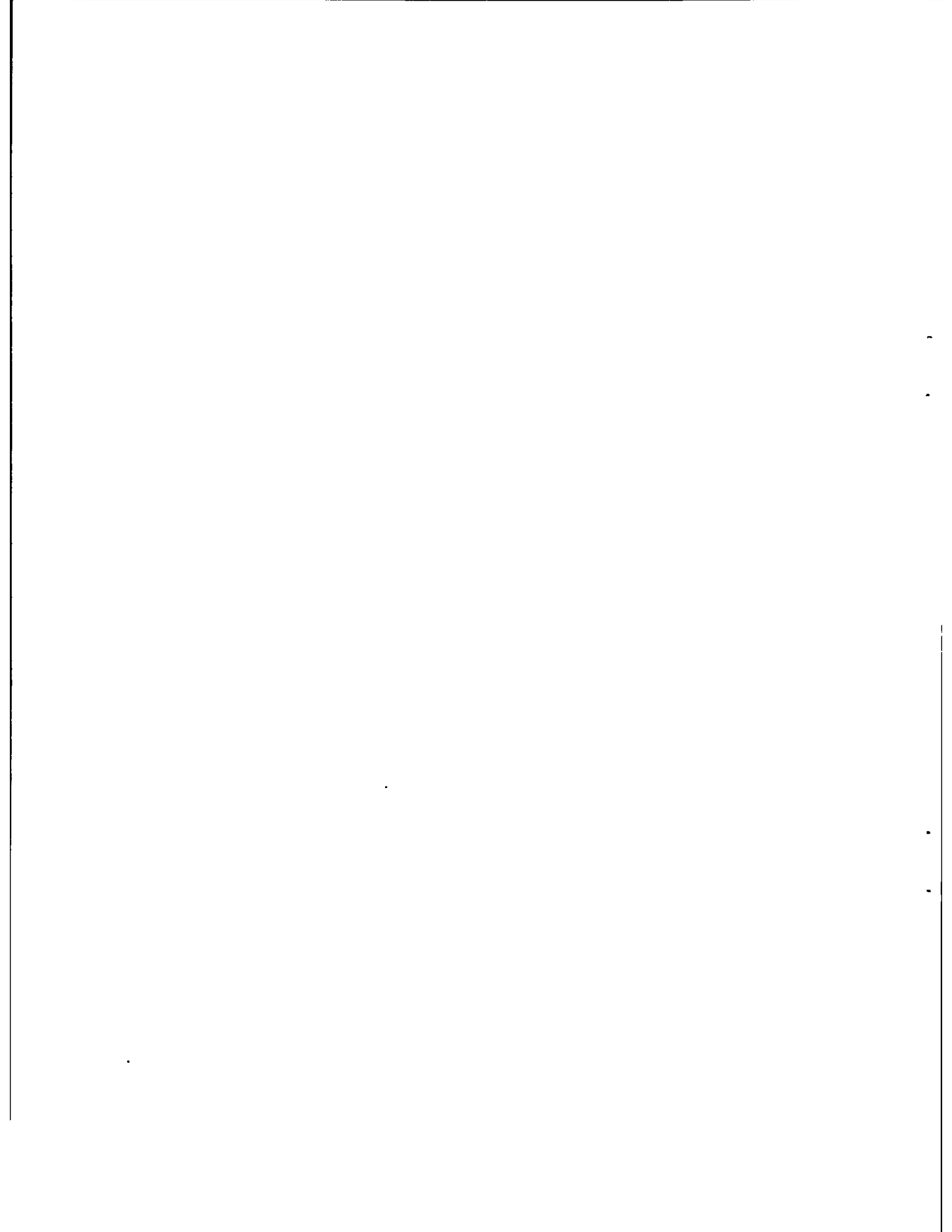
CONTINGENCY PLAN REVIEWED

	North Central Texas Council of Governments Dallas/Ft. Worth, TX	Southern California Rapid Transit District Los Angeles, CA	Municipality of Metropolitan Seattle Seattle, WA	Metropolitan Transit Commission Minneapolis/St. Paul, MN
Getting Transit Personnel to Work - carpool, vanpool - special operator-provided service	Not considered	Organize carpools, may need to have operator use its gas to help with carpools.	Not considered	Not considered
Funding Increased Service - cost of changes - fare change (raise) - revenue, fund sources	Peak period surcharge (to spread load rather than for revenue) considered.	No fare change, assumes revenue could fund part of increased cost, no other sources. Work with State and Federal governments to provide a fair share of transit funds.	Filling empty seats gains \$1.0 m/yr. Obtaining additional buses cost \$300K. Running additional service costs \$1.6 m, gains \$400K. Subscription service costs \$2.1 m., gains \$525K. Peak hour surcharge possible, other sources not considered.	Peak period surcharge; cost for strategies totals to \$2.4 m/yr. for 10% gas shortage, \$3.0 m for 20%, \$7.2 m for severe (30%). General revenue source not identified.
Information/Monitoring/Interagency Coordination - ensuring cooperation - understanding situation - transit route, service information - pooling information	Designate local energy coordinator at local governments. Draft contingency agreements. Ensure inter-governmental dialogue.	Establish 24-hour transit information service, work with CALTRANS to develop regionwide transit plans.	Monitor situation by route/review counts. Develop/implement general public information program. Possible additional personnel in information service.	Establish energy emergency information centers for consumer information. Monitor route ridership. Expanded marketing.
Meet Transit Fuel Short fall by Reducing Service - off peak, nights weekends, - eliminate routes - longer headways - skip stop, express service - reduce deadheading	If fuel supply for transit is curtailed, alternatives considered include: eliminate night service, eliminate weekend service, eliminate midday service, increase headways (10-20%), reduce bus stops (20-50%), express service, decrease deadheading by providing storage for 237 buses in downtown Dallas, 45 downtown Ft. Worth.	Cut back service, develop pricing options	- Alter routes (shuttle to routes for transfers). Eliminate midday expresses, extend headways, eliminate routes, provide peak hour only service on routes (7%) - Reduce midday, evening service to zero; Sunday, Saturday service (33% reduction) - Run trolley-bus service only (100%).	Supply shortage not addressed but actions recommended to save fuel include: increased turnback operations, reduced deadheading, skip stops, reduced shopper service.

KEY ISSUE	CONTINGENCY PLAN REVIEWED	
	Metropolitan Washington Council of Governments Washington, D.C.	Memphis Area Transit Authority Memphis, TN
Getting Transit Personnel to Work - carpool, vanpool - special operator-provided service	Not considered	Not considered
Funding Increased Service - cost of changes - fare change (raise) (reduce) - revenue, fund sources	Initial expense of bus rehabilitation and personnel training is \$2.9 million ;which would not be offset by revenue. Operating subsidy increase due to fleet expansion for 1980 FY in \$5.3 million.	A differential rate structure (peak vs. non-peak) is considered (to increase non-peak period usage rather than for revenue).
Information/Monitoring/Interagency Coordination - ensuring cooperation - understanding situation - transit route, service information - pooling information	Encourage use of commuter rail and private buses, establish information services for transit operations, ride-sharing, transportation options, and gasoline availability; coordinate with existing agency programs; monitor revenue and ridership.	Define key departments in the Authority and their roles during a crisis, establish emergency transportation information centers, monitor route ridership, expand marketing.
Meet Transit Fuel Short fall by Reducing Service - off peak, nights, weekends, - eliminate routes - longer headways - skip stop, express service - reduce deadheading	Work with officials to assure adequate allocations, utilize state reserves, evaluate conversion to Diesel #2 fuel, initiate energy conservation measures for Metrobus, Metro-rail, and associated buildings.	State energy policy assures little or no shortfall, fuel can be conserved by increasing turnback routes and commuting routes, reduced dead-heading, skip stops, preferential treatment, using shared ride taxi for night service.

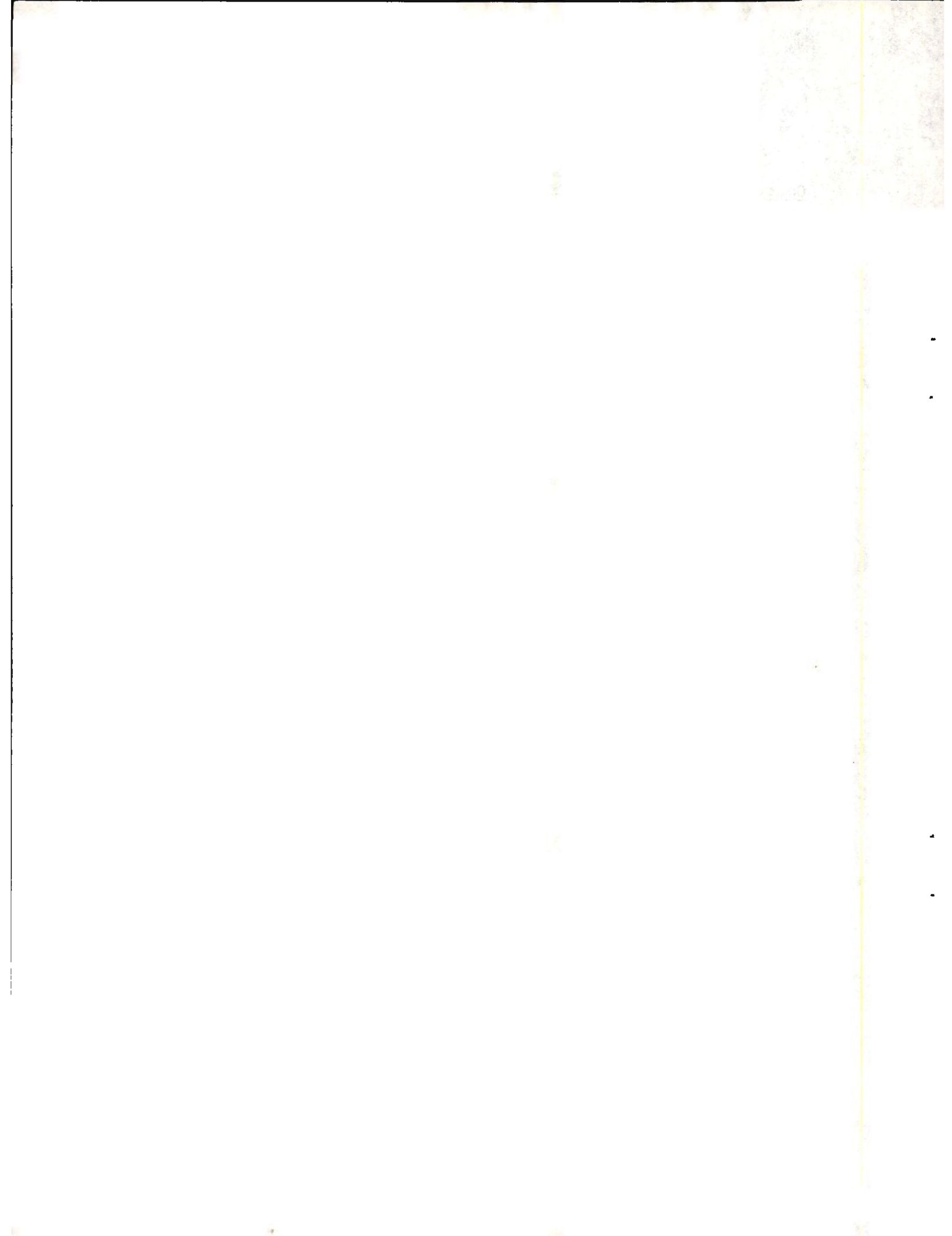
KEY ISSUE	CONTINGENCY PLAN REVIEWED			
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Ridesharing - buspool - vanpool - carpool - expanded matching - employer-based actions	Maintain existing matching programs	Maintain present program, arrange for more Commuter-Computer capacity to handle emergency ride matching; dial-a-ride not recommended as an energy saver.	Maintain existing "Commuter Pool" Program (City). Buspools possible if vehicles can be made available.	Expand "Total Commuter Service" by operator.
Park-and-Ride - temporary gravel lots - shopping center	Detailed plan for region to be developed as recommended	Park and Ride stations along freeways, especially in Long Beach and Orange County; greatly increase Park and Ride bus service	Not considered	Use of shopping center, churches, public facilities.
12 HOV Lanes - carpools, bus lanes - signalization, ramps - use of existing HOV - new lanes - restudy rejected lanes	Potential bus lanes on 37 miles of freeway, 44 miles of arterial in Dallas, 35 miles Freeway, 15 miles arterial Ft. Worth Possible priority ramps; future development recommended	Long term programs include ramp metering and exclusive HOV lanes on Freeways.	Not considered	Unspecified potential bus lanes in downtowns and outlying freeways and arterials.
Other TSM Actions - signal retiming - parking management	Considered in proposal for HOV prioritization	General TSM program reiterated	Not considered	Institute skip stop operation. Use of St. Paul emergency vehicle priority-system by buses. Preferential parking for HOV's.
Use of Taxicabs - route taxi - taxipool - feed fixed route transit	Options considered include route taxi. Further study recommended.	Route taxis could absorb some extra demand, could serve park and ride lots to take overflows.	Taxipools possible, but existing regulations now forbid out-of-area pickups. Study of possibilities recommended.	Use of Taxicabs for shared ride feeder service. Use taxis for shared ride night-time service.

KEY ISSUE	CONTINGENCY PLAN REVIEWED	
	Metropolitan Washington Council of Governments Washington, D.C.	Memphis Area Transit Authority Memphis, TN
Ridesharing - buspool - vanpool - carpool - expanded matching - employer-based actions	Maintain and coordinate with with present ridesharing staging areas, give preference to HOV's at fringe parking lots (include Metrorail lots)	Maintain present carpooling incentives; establish a carpooling and ridesharing program; use shared-ride vehicles for feeder and night service
Park-and-Ride - temporary gravel lots - shopping center	Expand present park-and-ride lots; use present shopping center lots.	Additional use of churches, shopping centers, schools, and other public facilities.
HOV Lanes - carpools, bus lanes - signalization, ramps - use of existing HOV - new lanes - restudy rejected lanes	Bus lanes, especially near Metrorail stations.	Additional priority measures are under study.
Other TSM Actions - signal retiming - parking management	Discontinue parking subsidies for government employees.	Signal retiming and preemption under study; preferential parking for HOV's.
Use of Taxicabs - route taxi - taxipool - feed fixed route transit	Not considered	Shared-ride taxis suggested for night service and as feeder service to main lines.



SELECTED PORTIONS OF CONTINGENCY PLANS

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I. SUMMARIES - SEATTLE AND LOS ANGELES

Following are summary sections drawn from An Energy Crisis Contingency Plan for Metro Transit (Draft, November, 1975) prepared by the Municipality of Metropolitan Seattle and the Energy Shortage Contingency Plan for the Southern California Rapid Transit District (March, 1979). The two summaries represent overviews of each of the full plans, and bring together lists of needed actions to prepare for potential energy shortages.

Summaries such as these can help insure that top management and decision-makers obtain a clear and concise view of the situation. Identification of required actions, implementation priorities, coordination requirements, and specific agency responsibilities are important products of contingency planning which should be reflected in day-to-day work plans and set up by the responsible agencies.

An Energy Crisis Contingency Plan
for Metro Transit

SUMMARY

NEED

This 66-page draft report has been prepared in response to a Metro Council request to detail how Metro transit could best respond to a fuel shortage similar to that of 1974. This report presents a proposed program outlining how the Metro transit system can better respond to a short-range energy shortage. The long-term impacts are not assessed here; however, an UMTA Coordinated Support Program grant application has been prepared and submitted for funding a special study to develop a long-range transportation efficiency/conservation plan.

CAN ANOTHER
CRISIS BE
EXPECTED?

Forecasting energy available, even for the short term, is not easy. And, of course, there are predictions galore, most sketching a future with some shortages, and all subject to many factors. However, here is one forecast for the near future:

- o A new Arab oil embargo is not expected within the next year.
- o Major interruption of Canadian oil and natural gas supplies are not expected, though higher costs are.
- o Metro will have no major difficulty in getting fuel to maintain or increase the current level of service.
- o Fuel costs will be higher.
- o The general public will offset higher fuel costs with more efficient cars, reduced trips, carpools--and transit.

This particular forecast suggests the need to plan for long-term (over five to ten years) impact expected from pricing controls, plus the gradual slowdown of imported oil and natural gas. However, if the above forecast does not hold

and there is another oil embargo, an appropriate course should be available to offset that contingency.

PROBLEM
SUMMARY

Under 1974 pre-crisis conditions, the Metro transit system normally carried about 125,000 trips every day--about 4% of the total weekday King County travel. During the 1974 crisis, patrons increased to almost 140,000 riders a day, or 5% of all the trips in the County.

Only people living on or near Metro service corridors and destined for areas somewhere along the way can be expected to regard the present system as a reasonable alternative mode of travel. This trip market is estimated at about 500,000 to 600,000 person-trips each weekday--20% of the total 3 million trips in King County. If there is another energy crisis, there will be a county-wide impact.

If a contingency plan for transit is to respond to the effects of county-wide energy shortages, it must: 1) enable existing transit to handle more riders as a greater portion of the 500,000 to 600,000 potential trips begin the shift from auto to bus; 2) assist at least some of the 2.5 million trips per day not directly served by transit--a larger market and a harder problem; 3) provide an alternate plan for action if fuel allocations are not enough for all the buses.

ELEMENTS OF
THE PLAN

The first element of the plan involves an aggregate of strategies with a potential to increase the ability of the existing transit system to transport more riders during a crisis. These strategies include:

- o Monitoring crisis-related events.
- o Informing the public about what to expect and how to use the transit system.
- o Forcing unused transit seat capacity to fill.

- o Implementing a flexible hours program.
- o Adding more buses to heavily traveled routes. (Possible options include bus repair program, school buses, rentals from private carriers.)

The second element involves a group of strategies for dealing with those areas not served by today's transit system:

- o Monitor and identify demands in unserved areas.
- o Inform public of new services.
- o Market how existing system can be used as a multi-center through transfers.
- o Encourage the use of paratransit options ("Early Bird" employer service, carpools, taxipools, and jitney services).

This plan, if implemented, could accommodate anywhere from 15,000 to 50,000 more riders per day above today's system capacity. If a program can be worked out where school bus fleets are used, the system capacity could be greatly increased beyond these levels (exact increase not known at this time).

COST OF THE PLAN

It is unnecessary to implement the strategies of the plan concurrently. It could be decided to implement either one or a group of strategies. However, if all strategies were implemented at the same time and maintained and operated for one year, the cost (in 1976 \$) would be approximately (and very preliminarily) as follows:

Planning and Design Cost	\$ 420,000
"Crisis" M&O (in addition to "normal" M&O)	3,800,000
Increased Ridership Revenues (Crisis Related)	(1,900,000)
Net Cost	<u>\$2,320,000</u>

ACTIONS TO BE CONSIDERED

Upon reviewing short-term energy forecasts and evaluating the effectiveness of some of the strategies assessed in the draft report, actions for Metro to consider become evident:

- o Should Metro invest in planning and design costs when another crisis is not certain?
- o Under crisis conditions should Metro add a fare increase to offset added crisis related costs?
- o In what direction should Metro proceed with paratransit options?
- o Which strategies should Metro consider implementing now-- even without an energy crisis? (Some are good ideas under any condition.)

These highlight only some, but are enough to start discussion on what should be done next. Resolution of these questions can be a course of action.

ALTERNATE
PLAN

During the 1974 fuel shortage, the possibility existed that Metro would be allocated only 70% of the fuel needed for the bus fleet. The best strategy in this case would appear to be the incorporation of a transit priority in the allocation regulation, and also the following alternate plan:

- o How service could be trimmed if less than 100% of the needed fuel is allocated.
- o How service could be cut if all diesel fuel is temporarily interrupted (i.e., retain only the trolley service).

This alternate provides guidelines for the reduction of fuel consumption for four levels of cuts: 5%, 10%, 30%, and complete shutdown of diesel bus service.

ACTIONS TO BE
CONSIDERED

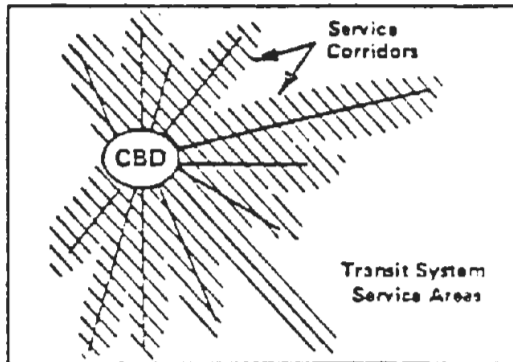
Development of the "Alternate Plan" is an example of being prepared for the worst. However, Metro should see to it that the "Alternate Plan" is not needed. Instead, as a course of action, Metro should press for Federal and State legislation to protect public transit systems from rising fuel costs and the possibility of insufficient fuel during energy shortage periods. The character of the legislative packages should:

- o Assure that Public Transit Operators receive top priority for procuring the fuel necessary to power the bus fleets to meet daily service requirements. Also any increases needed to respond to greater rider demands resulting from

SUMMARY OF THE PLAN

ELEMENT I

HOW TO GET THE EXISTING TRANSIT SYSTEM TO DO MORE

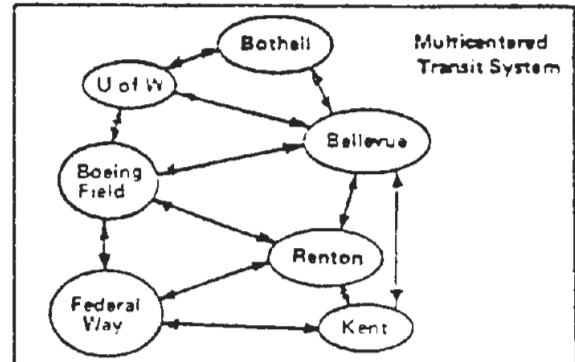


PROBLEM: The pre-crisis transit system carried 125,000 trips per day. When a crisis occurs this demand could increase to over 150,000+ trips per day.
 --What to do?

- Strategy 1—Monitor Demands & Report
- Strategy 2—Inform Public of Situation and What To Expect.
- Strategy 3—Let Reserve Transit Seating capacity fill up.
- Strategy 4—Implement flexible hours program.
- Strategy 5—Add more buses, if available.
- Strategy 6—Other Public Transportation options.

ELEMENT II

WHAT TO DO ABOUT AREAS NOT SERVED BY TRANSIT



PROBLEM: Over 2.5 million trips are made each day in areas not currently served directly by transit. Though not all of these 2.5 million trips can be expected to use transit, a good many would if it were available. What should be done for these people if another crisis occurred?

- Strategy 1—Monitor Demands & Report
- Strategy 2—Inform Public on What to Do.
- Strategy 3—Show how CBD Oriented Transit System can be used as a multi-center system through transfers.
- Strategy 4—Find more buses and assign them to unserved areas.
- Strategy 5—Paratransit Program.

ALTERNATE PLAN

WHAT TO DO IN THE EVENT METRO CAN'T GET ENOUGH FUEL



- Strategy 1—What service to cut back if Metro receives less than 100% of fuel needs.
- Strategy 2—What service to cut back if all diesel fuel is temporarily cut off.

energy crisis conditions. This pertains also to the electric trolley fleet in the event of shortages of electrical energy.

- o Fuel rebate or public transportation grant to offset fuel price hikes. In 1974 pre-crisis days Metro purchased gasoline at about 28¢ per gallon, and diesel fuel at 17¢ per gallon. If that cost had remained constant through 1974, Metro would have spent \$785,300 for fuel in 1974. At 1975 prices, gasoline costs 49¢/gallon and diesel fuel 30¢/gallon. The 4.3 million gallons for fuel purchased in 1974 would now cost \$1.4 million at 1974 prices. This added cost to Metro (75% increase in unit price cost) was not anticipated in Metro's operating budget projections. Continued increases in fuel expenses will further erode Metro's future operating budget, thus reducing the amount of funds available annually to increase transit service.

LONG
RANGE
PLAN

The Urban Mass Transportation Administration requires documentation of the methods by which local jurisdictions will increase regional travel efficiency and conserve energy. Such a documented plan is a condition for the receipt of capital and operating assistance under Section 5 of the UMTA Act. Under the Coordinated Support Program, Metro has funds to develop the required plan (\$72,000). To satisfy the UMTA requirements, the long-range plan should be much more comprehensive than the short-term Crisis Plan presented here, involving other governmental agencies and private groups, and incorporating a "total transportation" approach. With Federal Coordinated Support Program (CSP) funds, Metro will prepare the long-range plan, with the assistance of other agencies, beginning the first part of 1976. In the interim, this Crisis Contingency Plan for Metro Transit will be used to meet the intent of the UMTA requirements.

HINDSIGHT-- o National crude oil imports dropped to about 45% of normal, beginning in December of 1974.

THE IMPACT
OF THE 1974
ENERGY
CRISIS

- o Metro patronage during February through March, 1974, ranged from 130,000 to 140,000 per day, compared with 125,000 per day in the preceding months.
- o In January, transit carried about 22% of the daily trips in the transit service corridors. In February, 25% of all trips were made by transit; however, over 50,000 trips per day were not made because of lack of gasoline--People chose not to travel or combined trips into one.
- o Metro added 300 hours of new service with overtime repair crews during the crisis period.
- o The Customer Assistance Office logged more than 8000 calls on some days, overloading both operators and equipment.
- o Traffic volumes in the Metro transit service areas were down 10% to 15% during the fuel shortage.
- o AMTRAK patronage for the Seattle Terminal was up 41% during the first four months of 1974.
- o The January through June consumption of gasoline in Washington State during 1973 was 6% more than the 1972 rate. Consumption during the same period for 1974 dropped 1% below 1972 levels.

STAFF
RECOM-
MENDATIONS
FOR FURTHER
WORK

Many of the strategies discussed in this report need further research and assessment as to their applicability to Metro's specific situation. Almost all require funding for design, implementation, and operation. Others require Council guidance and some cannot be implemented without changes in legislation. The table that follows details actions that require pursuance by Metro Council and staff. Each strategy is being developed in an individual package for separate implementation.

It should be stressed that all the strategies should enter the design phase immediately. It is further stressed that some strategies should also be funded and implemented immediately. Even if a crisis were never to occur, they are strategies to optimize the existing transit system; however, it is essential that these strategies be in operation at the time any crisis appears imminent. These strategies are:

- o Early Detection System
- o Variable Work Hours
- o Monitoring Demand and Reporting System
- o Marketing Multi-Center Transit System

- o Paratransit Options
- o Guaranteed Fuel Supply
- o Reduced or Limited Fuel Cost Increases to Public Transit Agencies

**ENERGY CRISIS TRANSIT CONTINGENCY PLAN
ACTIONS TO BE INITIATED**

<i>Strategies</i>	<i>Provide Additional Research</i>	<i>Acquire Funding</i>	<i>Policy or Legislative Action Required</i>	<i>Proceed With Design Now</i>	<i>Implement Strategy As Soon As Possible</i>	<i>Implement Strategy Only During Crisis</i>
PRIMARY PLAN—ELEMENT I						
● Early Detection System		✓		✓	✓	
● Public Information		✓		✓		✓
● Fill Up Reserve Capacity		✓		✓		✓
● Variable Work Hours		✓	✓	✓	✓	
● Maintenance of Buses		✓	✓	✓		✓
● School Buses	✓	✓	✓	✓		✓
PRIMARY PLAN—ELEMENT II						
● Monitor Demands & Reporting System	✓	✓		✓	✓	
● Public Information	✓	✓		✓		✓
● Marketing Multicenter Transit System		✓		✓	✓	
● Paratransit	✓	✓	✓	✓	✓	✓
ALTERNATE PLAN						
● Methods For Cutting Back Service			✓	✓		✓
● Guarantee Fuel Supply			✓	✓	✓	
● Reduce or Limit Transit Fuel Costs			✓	✓	✓	

Energy Shortage Contingency Plan of the
Southern California Rapid Transit District

EXECUTIVE SUMMARY

Despite administrative attempts to control the level of oil imports and decrease the dependency on foreign oil, the United States continues to be heavily dependent on foreign petroleum. As the 1973-74 Arab oil embargo and the recent Iranian disruption demonstrated, slight shifts in international or even internal politics can have noticeable and often damaging effects on oil production and exports.

A 7% decrease in available oil will activate Federal allocation plans. A further decrease in petroleum supplies may eventually lead to more drastic measures, such as rationing. Either one of these actions will have an impact on gasoline available to consumers.

Cutbacks in fuel for private automobiles have traditionally led to large diversions of trips to multi-occupancy vehicles, most specifically mass transit. Since the Southern California Rapid Transit District currently provides over 90% of the public transit trips made in Los Angeles County, the District will be the first public transit resource turned to in a crisis. It is essential that the District be prepared with an approach that will help the agency and the public deal with a crisis.

The best preparation for an energy shortage is a timely, permanent expansion of the transit system on the scale of the complete Regional Transit Development Program (RTDP). In the absence of that expansion in time to meet a near-term emergency, the District has need for an energy shortage contingency plan that explores and makes recommendations on expansion measures that may be implemented in the short term.

A summary of the findings contained in the Energy Shortage Contingency Plan is presented below, along with a listing of recommended actions to be taken by the District and agencies outside of the District in preparation for a crisis.

CRISIS ASSUMPTIONS

The plan assumes that initially there will be a moderate crisis (similar to the one experienced in 1973-74). If an oil shortage continues, this moderate crisis will lead to a severe crisis situation similar to that experienced (for other reasons) during World War II.

The plan also assumes that, in concurrence with the President's Rationing Plan, there would be adequate fuel for public transportation during a crisis and that refineries would be able to gear up to increased diesel production relatively quickly.

One particularly significant finding while assumptions were being made was that demand/control measures such as the four-day week or carless Sundays would have little or no effect on fuel consumption or total travel in the Los Angeles area. Staggered work hours among employers in high-density areas would be the only demand/control measure likely to increase the District's ability to cope with crisis-level ridership.

IMPACTS ON DISTRICT OPERATIONS

Initial investigation of the District's system capacity revealed that 61 of the 203 District lines have little or no available capacity during peak hours.

Based on analysis of existing line ridership, we assumed that the existing service could carry 43% more passengers, with the following breakdowns:

- 10% more passengers could be carried on demand scheduled lines during the peak period (6 a.m. - 9 a.m. and 3 p.m. - 6 p.m.).
- 50% more passengers could be carried in the off-peak period on demand scheduled lines.
- 50% more passengers could be carried in the peak period on policy scheduled lines.
- 75% more passengers could be carried on policy scheduled lines during the off-peak period.

Two hundred eleven (211) extra buses were used in the 1973/74 crisis. We assumed that a minimum of 300 extra buses would be needed in a future moderate crisis. Assuming a 25% spare ratio, this would mean a total of 375 buses in storage. At 3.3 boardings per mile, these buses could accommodate 84,350 additional boardings per day (during a 6-hour AM and PM peak).

It was found that if the peak period were expanded for all buses (including the 300), each peak hour of operation added could bring in approximately 93,900 boardings. The following table presents a comparison between present mode split (at 1,100,000 RTD boardings/day) and maximum mode split (at 2,045,000 RTD boardings/day):

<u>Mode Split</u>	<u>All Trips</u>	<u>Work Trips</u>
Current	3.3%	5.6%
Maximum	6.2%	10.5%

DISTRICT RESOURCES: PRESENT AND POSSIBLE

The District plans to use a small extra land parcel adjacent to the East San Fernando Valley operating division for storage of buses for a crisis. When we looked into costs of assembly and storage of a reserve fleet, we found the following:

- Assuming a \$3,000 sale cost, the opportunity cost of storing buses (at 8%/year) would be \$240/year for each of 375 buses (\$90,000).
- In addition, the District would incur a \$350/bus one-time cost to store and start up the vehicles (\$175 to store and \$175 to start up) for a total of \$131,000.
- If the buses were put into service one year after storage, the total cost for storing the buses for a year and then putting them into service would be \$221,000.
- The District presently only has bus storage capacity at Divisions 15 and 18. This points to a need for additional storage in the central area.

Additional Bus Options

As a source for additional vehicles, the District looked into the use of school buses. While this is a possibility, the use of school buses also has some drawbacks:

- School transportation periods run into our peak operating hours. Thus, vehicles would not be available when most needed.
- School buses are not designed for adult rider comfort.
- The manual transmissions on school buses would require operator training.
- The vehicles lack fare collection devices.
- The single door would make it difficult to provide high-turnover local services with the vehicles.
- 58% of the publicly-owned school vehicles (1,350 buses) in Los Angeles County have seating for less than 16 passengers.

SCRTD may be able to tap into other existing large bus sources. There are over 150 large vehicles presently owned by commuter bus companies, and over 400 large vehicles owned by private tour and charter companies.

Fuel Storage

Although the plan assumes that adequate supplies of diesel will be available during a crisis, it is possible that the flow of fuel will be disrupted for several days at a time. When fuel storage facility improvements now in the design or construction phase are completed, the District will have an overall average storage capacity of 9.8 days fuel usage. Currently, only one operating Division has a 10-day fuel supply. Other options for storing additional fuel were explored, but were found to be infeasible. They included:

- Leasing a storage facility
- Purchasing a storage facility
- Purchasing a surplus tanker

In addition, the option of building a storage facility at the proposed Southwest Operating division is currently being studied for its feasibility.

Operator and Mechanic Availability

Operators

The District will need at least 340 additional operators for the 300 added peak buses. With a 3-hour expansion of the peak period, the District would need 450 additional operators. With a 16-hour peak expansion, the District would need 1,000 additional operators. The total additional drivers needed would equal 1,800. This would represent a 43% expansion of the pre-crisis operator force of 4,223. The inability to recruit trained personnel may cause an operator labor shortage. Even if enough operators can be recruited, training can only turn out 52 new drivers a week. This would mean that the District would only have 830 drivers after the sixth month of buildup at the present rate. It is clear from this analysis that operator training ability must be expanded.

Mechanics

With additional operation of all vehicles, the District will have more buses in for repair. The District currently has 742 mechanics, or one mechanic for each 445 daily bus miles. Since it takes two years to train and fully break in diesel mechanic and one year to full break in a bus diesel mechanic if the mechanic has diesel experience, build-up of mechanics will be extremely slow. This will be one of the District's most critical problems because of the age and condition of the current fleet. If bus repair capability cannot be expanded in a crisis, equipment will not be available. If buses are not available for operators to drive, expansion of operator training would be futile.

Regional Transit Development Program and Crisis Productivity

Given sufficient lead time, the most effective way to prepare for a crisis would be to pursue the four-part Regional Transit Development Program (RTDP).

The basic goal of this program is to provide a balanced transportation system for this region.

The four elements of this program are:

1. Transportation System Management

Basically consists of improving the existing bus system by adding additional buses, developing fringe parking lots and making the best use of existing facilities (such as preferential treatment on surface streets) so that the movement of people can be accomplished in the most expeditious manner. Overall actions encompass a wide range of activities requiring internal and external action.

2. Freeway Transit

The freeway transit element includes ramp metering to create free-flow conditions and construction of exclusive bus/carpool lanes on freeways. On-line stations with parking (where appropriate) will be constructed every 3 to 5 miles. Implementation of the freeway transit element would allow for high-speed connections throughout the region.

3. Downtown People Mover

The downtown people mover could decrease congestion downtown by allowing for a peripheral intercept during a crisis. This, in turn, would allow some buses to turn back, providing additional trips with the same amount of equipment.

4. Rapid Transit Starter Line

The rapid transit starter line would provide significantly increased capacity where it is most needed - along the Wilshire Corridor to downtown and North Hollywood. At the present time, it is operationally unfeasible to assign additional buses to the Wilshire Corridor. During a crisis it is projected that the passenger demand will increase most along this corridor. Without a rapid transit alternative to absorb this ridership, it is unlikely that transit will be able to absorb more than 15% of this demand.

Total implementation of this program will greatly enhance this region's ability to respond to a crisis. However, full implementation will take many years and will require additional sources of funding.

PROBABLE COSTS OF PREPARATION AND OPERATION OF THE SYSTEM IN A CRISIS

The plan investigates the different levels of operating costs that would be incurred during a crisis. In the moderate crisis situation, the yearly subsidy would increase by a total of approximately \$25,500,000.

To offset this increase, a peak-period surcharge was considered. A 50¢ one-way peak surcharge would do much to decrease the operations deficit during a crisis, and would tend to spread peak ridership. However, because of the negative impact on the public, it is unlikely that a surcharge would be pursued.

RECOMMENDATIONS FOR ACTION

Based on these findings, it is essential that the various departments within the District move immediately to undertake actions that will prepare the District for a crisis. Major recommendations made in the plan are as follows:

OPERATIONS

A. The District's Operations Department should:

1. Eventually store at least 300-500 buses in good condition with the fleet being continually upgraded as new buses arrive;
2. Investigate private firms that may have mechanics available for contract work during a crisis and prepare a report to the Board on number of hours potentially available and potential cost to the District during a crisis for various levels of contract work;
3. Develop a plan for use of extra supervisors or extra radio control to ensure through dispatching that "bunching" of buses does not occur along heavily-used lines during a crisis;
4. Develop plans for emergency expansion of the current staff of operators, mechanics, dispatchers and road supervisors including but not limited to identification of possible

flexible assignment of personnel, identification of emergency personnel sources external to the District, possible training of selected personnel for flexible assignments and pre-training of operators for crisis work.

5. Develop a plan for increased shortlining along highest-density route segments.
 6. If tests on automatic passenger counting equipment prove successful, accelerate installation of up to 1,000 additional units in order to facilitate passenger counting.
- B. The Operations and Purchasing Departments should set up formal emergency vehicle use agreements with vehicle sources (schools, charter services and private commuter services).

PERSONNEL

- A. The Personnel Department should:
1. Maintain a list of retired operators and mechanics for possible re-employment.
 2. Increase personnel recruitment and selection staff.
- B. The District's Manager of Employee Relations should discuss the following items in the upcoming union contract negotiations:
1. Employing part-time operators and clerical employees.
 2. Energy emergency clauses in union contract to allow contracting of maintenance overloads and emergency relief bus routes to outside public and private entities.

GOVERNMENT AFFAIRS

The District's Government Affairs Department should:

- A. Work with UMTA to facilitate existing equipment and facilities grants.
- B. Investigate and report on availability of Federal funds for development and testing of accelerated operator-mechanic training programs for use during a crisis;
- C. Investigate and report on availability of emergency

funds from UMTA for operation of crisis-level service at the \$25,500,000 level;

- D. Maintain liaison with all necessary agencies at the State and national level to ensure that the District has the highest priority for fuel allocation;
- E. Investigate accelerated programming of funding for fuel storage expansion at the operating divisions;
- F. Investigate the availability of funding for mileage-related spare parts inventory and storage, if it is found necessary;
- G. Contact CALTRANS and request them to set up contact with providers to ensure that adequate supplies of diesel are refined and available to transit during a crisis;
- H. Ask UMTA to grant immediate approval of all pending capital and operating grants which will enable the District to best respond to increased patronage in a crisis;
- I. Contact the Southern California Association of Governments and the Los Angeles County Transportation Commission and request them to establish a central carpool/buspool/vanpool information and referral system;
- J. Contact the County Transportation Commission to initiate work with other agencies and companies to develop emergency coordination networks to share supplies, vehicles, fuel and personnel;
- K. Direct the Bus Facilities Department to determine where bus storage capacity exists and where additional storage space is required;
- L. Direct the District's Manager of Real Estate of further investigate the lease of fuel storage facilities if it is found that a 10-day diesel supply is insufficient or if it is found that fuel storage expansion projects cannot be reprogrammed;
- M. Provide additional bus storage by accelerated programming of the new Central City Maintenance and Operating Facility.

CUSTOMER INFORMATION

The Manager of Customer Relations should:

- A. Hire and train additional telephone information operators for handling an increased number of calls on a 24-hour basis.

- B. Investigate and report on establishing an expanded Computerized Customer Information System systemwide.
- C. Investigate and report on inclusion of other ridesharing modes to the Computerized Customer Information System if that system proves successful.

SERVICE ANALYSIS AND SCHEDULING

- A. The Service Analysis and Scheduling Department should develop and implement check sampling program to allow more checks to be made in an emergency situation.
- B. Scheduling and Operations should investigate how operators are to get to work in case of severe gasoline shortages.

MARKETING

The Marketing Department should:

- A. At the first sign of a crisis, redirect marketing resources to passenger information and referral efforts in lieu of general service promotion and gear up to distribute literature to inform the public about transportation resources available.
- B. Establish 500 locations where present and potential SCRTD passengers may obtain information on the District's services. These locations would contain, at a minimum, display racks with timetables, sector maps, and general information brochures.
- C. Designate Marketing Department representative to contact medium and large employers in the regional core regarding the benefits to be derived through staggered work hours.

PLANNING

The Planning Department should:

- A. Determine where additional bus requirements will most likely occur during a crisis.
- B. Make the 1980 Sector Improvements to complete the county-wide grid.
- C. Identify additional lines that could use park/ride operations.
- D. Request LACTC, Los Angeles City, Los Angeles County, and CALTRANS to expedite the transit TSM improvements outlined in Appendix H.

- E. Continue to work cooperatively with CALTRANS in the development of park and pool lots in Pomona, Glendora and North Long Beach and encourage CALTRANS to develop additional park and pool facilities regionwide as feasible.

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

The District should send a formal request to the Los Angeles County Transportation Commission to:

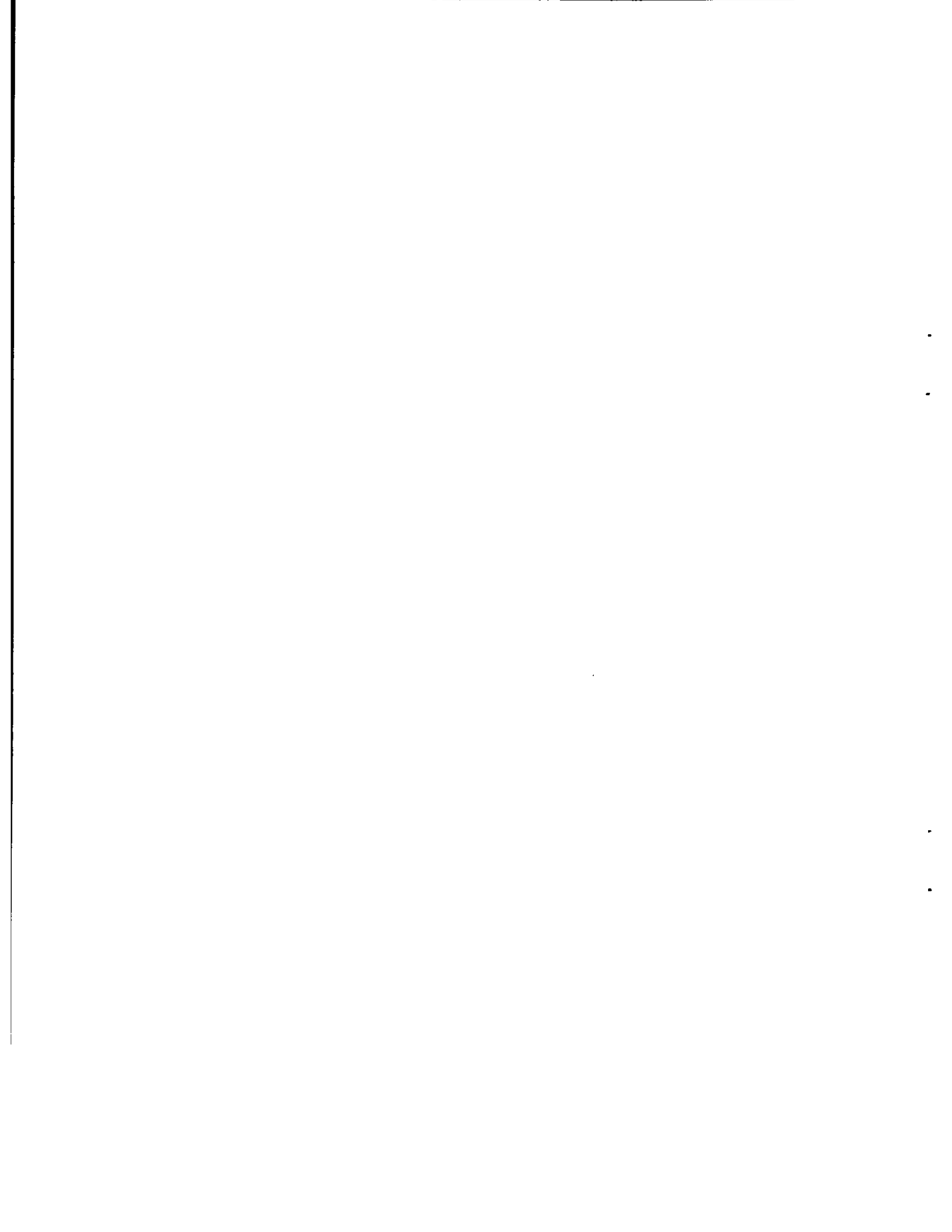
- A. Develop an overall emergency plan for crisis transportation in Los Angeles County, including a full exploration of alternative methods of transporting people during a crisis;
- B. Request the Los Angeles County Board of Supervisors to mandate staggered work hours for all Los Angeles County employees during a crisis;
- C. Request the Los Angeles City Council to mandate staggered work hours for all Los Angeles City employees during a crisis;
- D. Request all Downtown and Wilshire Corridor employers to assign staggered work hours to their employees during a crisis.

CALTRANS

The District should send a formal request to Caltrans to:

- A. Develop an emergency procedure to marshall all publicly-owned large transportation vehicles for bus transportation services during a crisis, including vehicles owned by municipal operators and school districts.
- B. Develop an emergency plan for use of vehicles owned by private transit providers (including charter and tour operators) for public transit during a crisis.

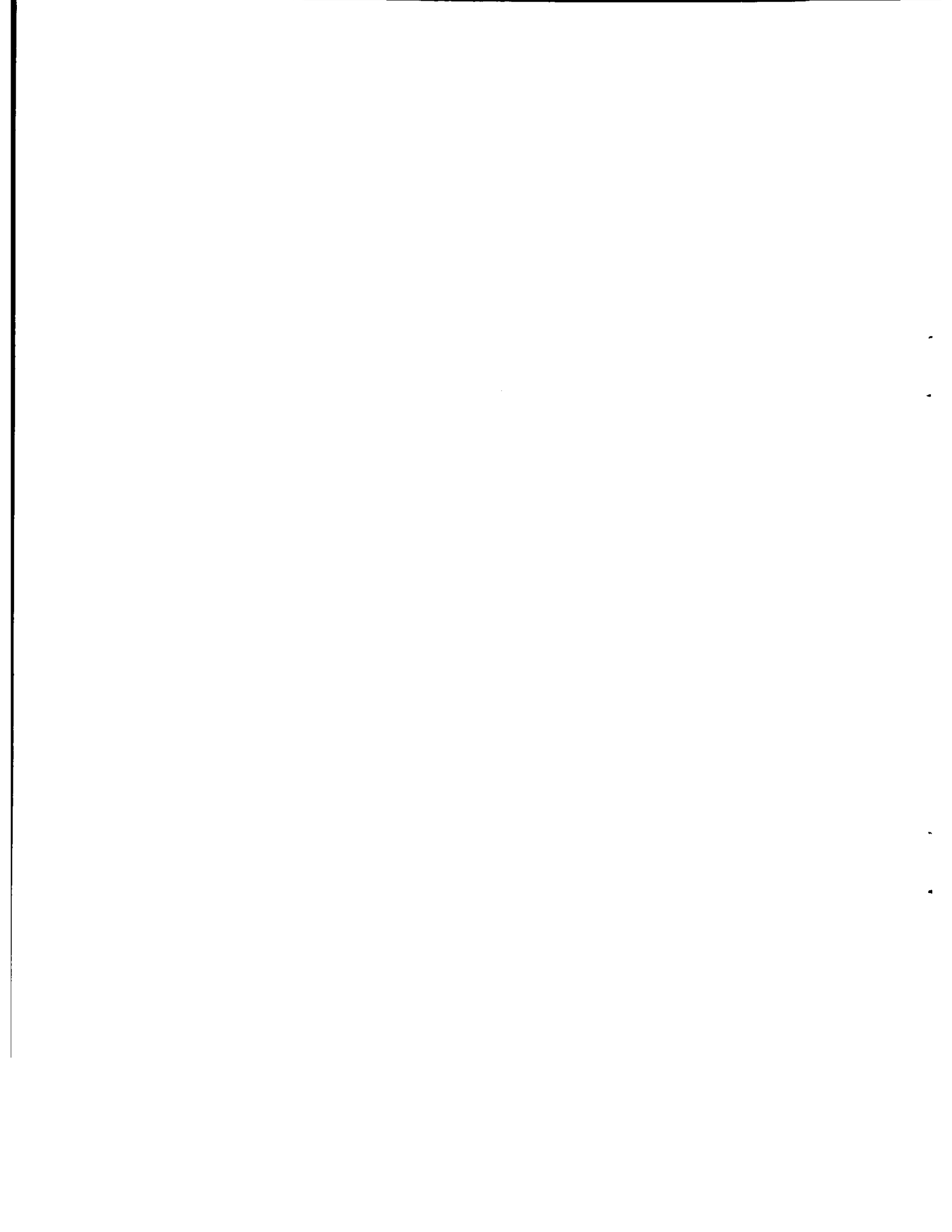
The immediate items represent actions the District and other agencies should take within the next few months to accommodate as much of the crisis ridership as possible with limited facilities, equipment and personnel.



II. PROBLEM ANALYSIS - DALLAS-FORT WORTH

The following section of this report is taken from A Metropolitan Transportation Plan for National Energy Contingencies (August, 1977), prepared by the North Central Texas Council of Governments (NCTCOG). This section serves to illustrate the content of a regional energy contingency plan involving several components.

The full NCTCOG report begins with an extensive analysis of the 1973-74 oil embargo, the effects of reduced allocations and rationing in the event of another energy crisis, and trends in national and local energy consumption. This section goes on to analyze several solutions that could be applied within the short-term, especially relating to the expected transit ridership increases and suburban transportation alternatives.



V. Problem Analysis

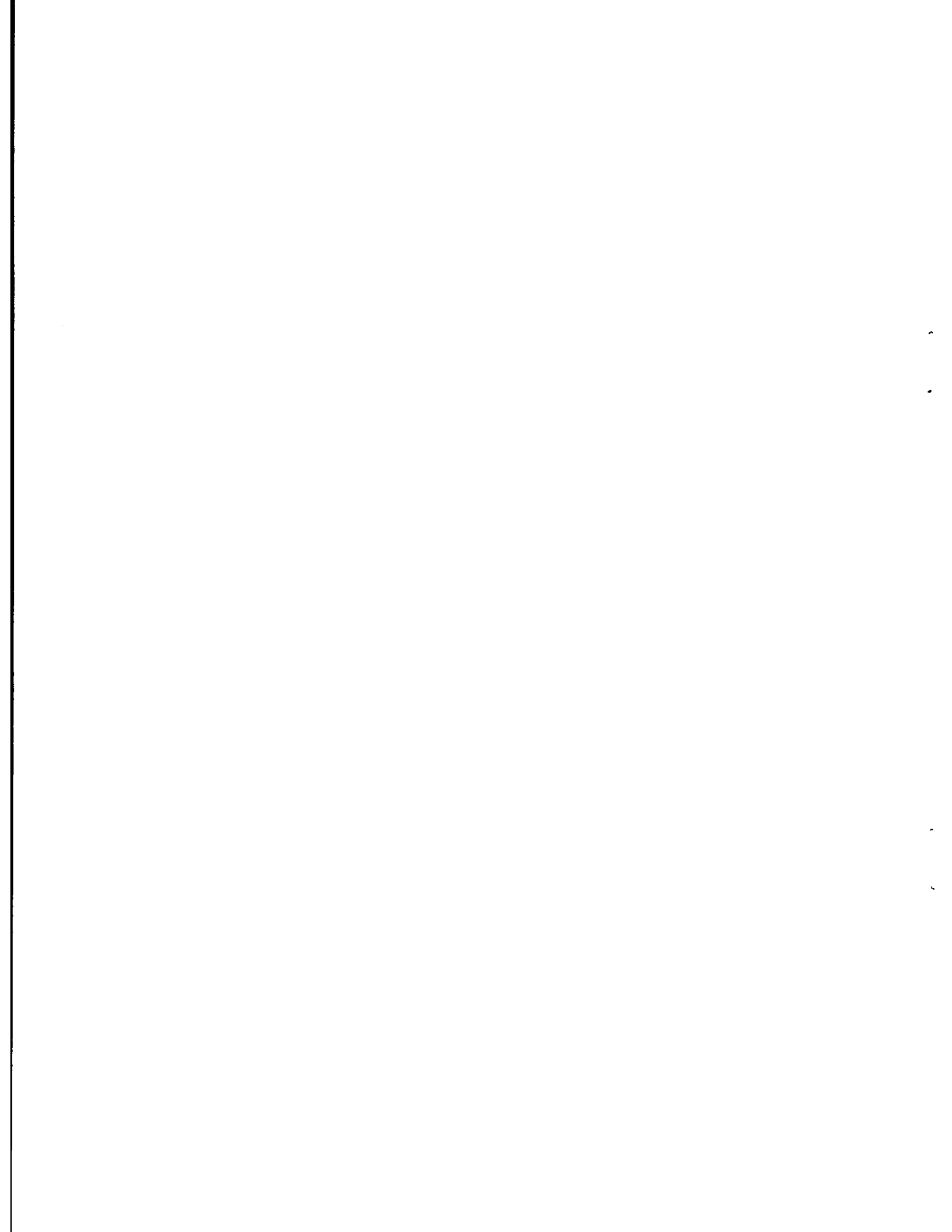
Under the basic assumptions that the impact of a sudden severe oil shortage in the near future will affect the nation in ways similar to that of the 1973-1974 oil embargo, that the shortages will be equally distributed throughout the United States, and that the federal government will implement a policy of fuel allocation and/or rationing, local transportation problems likely to develop during this scenario can be identified. These basic problems appear to be:

- Obtaining sufficient fuel supplies to operate public transportation
- Coping with mass transit ridership increases
- Providing transportation alternatives in suburban areas
- Reducing inequities and uncertainties associated with gasoline rationing and allocation

The following discussion analyzes these difficulties and suggests actions which, it is felt, will meet the major criteria of maintaining the work trip and maximizing the availability of public transportation under the anticipated conditions.

Insufficient Fuel Supplies for Public Transportation

A basic difficulty to be encountered during a period of fuel allocation or rationing would be one of obtaining sufficient gasoline or diesel fuel supplies to maintain normal public transportation services throughout the area. While most of the vital public transportation services (transit, school buses, emergency services), would be guaranteed 100 percent of their fuel needs under a rationing scenario (Table V-1), current State and federal regulations do not assure similar considerations under an allocation contingency. As can



also be seen in Table V-1, taxicabs and social service transportation services will receive only 90 percent of their base period use under the rationing program. In addition, it is conceivable that spot fuel shortages may develop locally. Therefore, the problem of securing adequate fuel supplies during a sudden oil shortage could produce severe hardships on the local transportation system if adequate measures are not taken to prepare for the situation. Possible short-term solutions to this problem would be to:

- Modify allocation regulations to assure priority treatment of transit and emergency transportation services
- Include taxicabs in preferential treatment under the rationing program
- Expand or establish in-house fuel supplies
- Reduce fuel consumption

TABLE V-1

GASOLINE/DIESEL FUEL ALLOTMENT CONTINGENCIES

USE	UNDER ALLOCATION	UNDER RATIONING
AUTO	NO LIMIT AT RETAIL	7.2-9.2 GALLONS/WK
TRANSIT	ALLOCATION RATIO (10-25% DEFICIT)	100% OF NEEDS
SCHOOL BUSES	ALLOCATION RATIO	100% OF NEEDS
TAXICABS	ALLOCATION RATIO - NO LIMIT AT RETAIL	90% OF BASE PERIOD
SOCIAL SERVICE	RATIO - NO LIMIT AT RETAIL	90% OF BASE PERIOD
SANITATION SERVICES	ALLOCATION RATIO	100% OF BASE PERIOD
EMERGENCY SERVICES (POLICE, MEDICAL, FIRE)	ALLOCATION RATIO	100% OF NEEDS

Source: Based on FEA information.

Modify Allocation/Rationing Regulations

Changes in the fuel allotment regulations at either the federal or state level to assure priority fuel supply considerations for transit and paratransit services would relieve much of the uncertainty currently associated with these regulations. As mentioned in Chapter IV, federal allocation regulations currently assure 100 percent of fuel requirements only to the Department of Defense and for agricultural food production. If, however, these federal allocation regulations were modified to assure transit and paratransit users with 100 percent of their fuel needs, much of the uncertainty of accommodating or expanding service demands could be avoided.

Modifications of fuel allocation regulations currently administered by the State could also result in more fuel reserves being made available for these users. Currently, the Federal Energy Administration requires that three percent of the gasoline/diesel fuel supply entering each state be set aside for distribution by the State Allocation Office. In Texas, this amounts to 16 to 18 million gallons of fuel per month.¹ The State office may allocate this fuel to anyone loosely defined as a "wholesale purchaser consumer" (such as a large business or trucking company) or an "end user" (farmers, transit operations). While transit systems and emergency services may be prime recipients of these allotments (during the 1973-1974 embargo, for example, the Houston Transit System received additional fuel in this manner), they are not assured special considerations over other applicants. If, however, a priority list which guaranteed transportation providers first priority for these supplies was established by the State, much of the uncertainty associated with this fuel source could be ended.

A change in the federal rationing regulations would also be desirable to assure supplies to paratransit users, especially for taxicab operations which would be given 90 percent

¹ Information obtained during a telephone conversation with Mr. Joseph Ventura, Texas State Allocation Office, Austin, November, 1976.

of other base period consumption. The FEA expects the 10 percent fuel supply reduction to be accommodated through taxi conservation measures such as "reduced cruising, increased use of taxi stands, and greater use of radio call equipment."² Since, however, these measures are currently being followed by most local taxicab companies, (Fort Worth, for example, has an ordinance against taxicab cruising), the rationing regulations would place an unfair burden on taxicab operations in the Dallas-Fort Worth Metropolitan area.

The solution to this problem would be to modify these federal rationing regulations to include paratransit users, or specifically taxicab operations, under the priority list of those receiving 100 percent of their fuel needs. It should also be noted that the federal rationing regulations are currently only proposed plans and are in a stage of restatement by the FEA. Thus, the opportunity exists for this position to be modified to include paratransit as a priority fuel user before the regulations are finalized.

Expand or Establish In-House Fuel Reserves

Another possible solution to a fuel shortfall would be to use stored in-house diesel/gasoline reserves. If a fuel user has established its own reserves of stored gasoline or diesel fuel prior to the shortage, it may be unnecessary to search for outside allotments during a time when normal supplies are reduced by federal actions or spot shortages. A similar policy on the national level is, in fact, in the process of being implemented by the federal government with regard to crude oil supplies. The Strategic Petroleum Reserve (SPR) program plans to eventually stockpile one billion barrels of crude petroleum. By 1980, 325 million barrels are to be stored throughout the nation (mostly in underground salt domes), a reserve sufficient to account for a 45 percent loss of imports for up to four months.³

² Federal Register, Vol. 42, No. 17, Wednesday, January 26, 1977, p. 4815.

³ Federal Energy Administration, "Strategic Petroleum Reserve Plan Goes to Congress," Energy Reporter, December, 1976/January, 1977, p. 3.

A similar strategy at the local level could likewise be an effective hedge against short-term fuel reductions, particularly since the federal reserves may encounter difficulties in implementation. While the desired size of the reserve supply could vary depending upon the duration and extent of the oil embargo, a one month's reserve (based on normal consumption) appears to be a worthy goal. By drawing from such a reserve to make up for fuel shortages, the user could maintain normal transportation operations of four to ten months depending on the severity of the shortage. This time period could be used to prepare additional contingency plans to cope with the shortfall once the reserves are depleted. On the other hand, if sufficient fuel is available to maintain normal operations, this reserve supply will allow for some expansion of service if desired.

Differences in fuel use and storage capacity between the Dallas Transit System and CITRAN (Table V-2), for example, may not make this alternative equally attractive to both bus systems. As can be seen in the table, CITRAN's current diesel fuel storage capacity is already near to a one month's supply while that for DTS is equivalent to less than a week's normal consumption. Therefore, the cost to develop a 30 day storage capacity in the case of CITRAN (an estimated \$10,000 - \$20,000) would require a much smaller investment than that for DTS, where approximately \$210,000 - \$300,000 would be needed.⁴

TABLE V-2
CURRENT FUEL CONSUMPTION AND STORAGE CAPACITY
DTS AND CITRAN

	<u>DTS</u>	<u>CITRAN</u>
Average Monthly Diesel Fuel Consumption	350-375,000 gallons	60-70,000 gallons
Current Diesel Fuel Reserves	60,000 gallons	50,760 gallons
Days Supply at Current Consumption	5 days	24 days

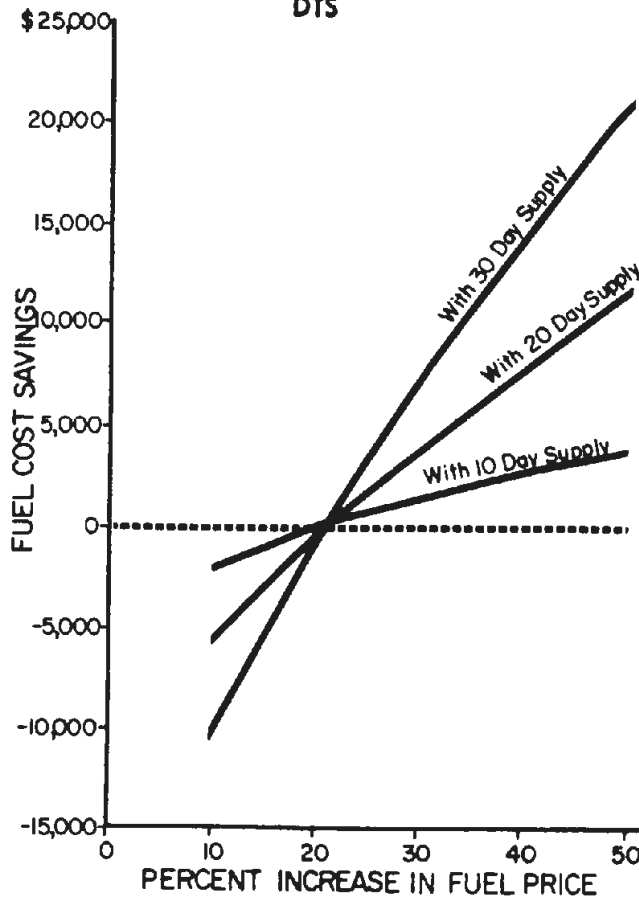
Source: Dallas Transit System and CITRAN, January 1977.

⁴The installed cost of a fully equipped 10,000 gallon storage tank ranges from \$7,000 to \$10,000 depending on the type of tank (steel, fiberglass). Source: Dallas Pump Service, 1977.

These investments in fuel reserves, however, could be financially profitable, especially if the price of fuel rises after the stocks had been established. Current FEA projections suggest that, if a rationing program were initiated in 1977, the cost of fuel would rise 21.33 percent.⁵ The local share by DTS and the City of Dallas, for example, to develop this capacity would amount to approximately \$20,000.⁶ If the price of fuel were to rise by 22 percent, however, the savings in fuel costs will offset the cost of the storage facility (Figure V-1). In addition, other financial savings of a large storage supply could be realized by decreasing truck deliveries and thus reducing the number of DTS man-hours involved in the administrative process as well as fuel transportation costs.

FIGURE V-1

**THE EFFECT OF FUEL PRICE INCREASES ON
STORED FUEL SUPPLY VALUE
DTS**



⁵ FEA, Economic Impact Analysis, p. 75.

⁶ Local cost would be seven percent of the total cost of the storage facility. This figure excludes the cost of the fuel itself.

The major disadvantages of this solution, however, are: 1) a large initial investment would be needed to purchase fuel to fill the tanks; 2) the large storage facility may be difficult to find; and 3) safety problems may arise from storing such a large quantity of fuel. It is also conceivable that this same strategy could be applied to expanding or establishing fuel storage facilities for other municipal operations and private transportation operations.

Reduce Fuel Consumption

The third alternative to coping with a fuel shortfall would be to reduce the amount of fuel consumed by 1) reducing or eliminating service and 2) operating the service more efficiently. If additional fuel supplies cannot be obtained, transit systems may find it necessary to reduce their service in order to save fuel. Such measures, besides inconveniencing patrons, could also mean eliminating or reducing the number of bus operation personnel, thus aggravating the local unemployment situation.

Through a detailed analysis of hourly bus line ridership, each transit system should be able to identify the lines and times for which service could be curtailed if fuel reductions make this necessary. Indeed, a readjustment of bus schedules may be necessary anyway to meet anticipated changes in rider demands. A contingency plan of this type has been developed by Seattle's Metro bus system based on an analysis of how the 1973-1974 oil embargo affected each line.⁷ This information was then used to develop three alternate levels of service reductions based on the severity of the fuel shortage. The first level reduced or eliminated service on certain lightly patronized routes and was designed to save about seven percent of the systems fuel supply. The second level reduced or eliminated service during non-peak (afternoon, late night, weekend) hours, and would save up to 33 percent

⁷The Municipality of Metropolitan Seattle, *An Energy Crisis Contingency Plan for Metro Transit* (Seattle, Washington: November, 1975).

of its fuel. The third level of service reduction would reduce or totally eliminate even peak hour bus service, however, the transit system's electric trolley would remain in service.⁸

The first level reduction would affect 29 routes and would be accomplished by service changes which would:

- Totally eliminate some routes
- Provide peak service only along certain routes
- Lengthen headways
- Eliminate weekend service
- Modify service to shuttle to other routes

Locally, DTS and CITRAN could choose actions similar to those proposed in Seattle for reducing fuel consumption. A system of priorities would have to be established by both systems to determine which types of cutbacks would occur, at what times, and on which lines. In addition, an examination of line changes during the past embargo (as discussed in Chapter III) will provide additional insight on what types of changes can be expected on the various lines.

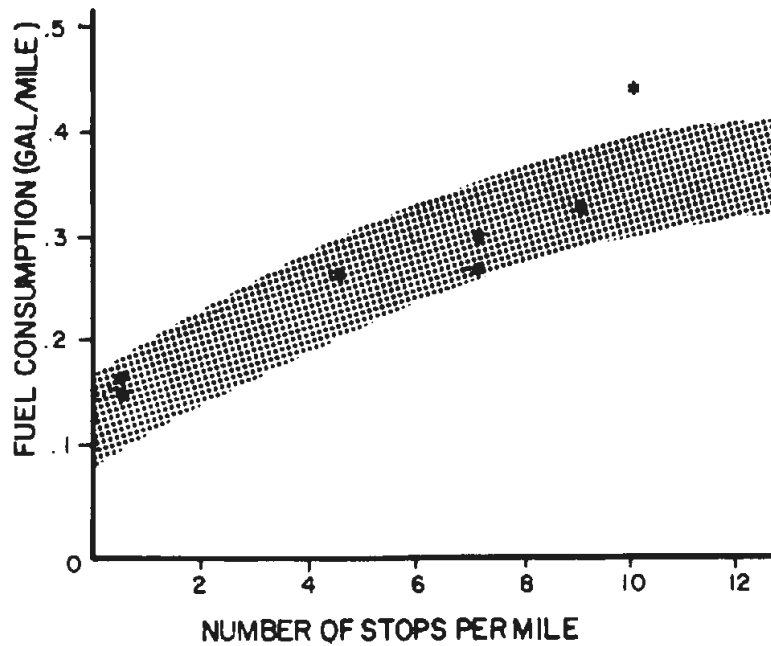
A number of strategies to increase the efficiency of current transit operations could also be utilized during a fuel shortage. These include actions which:

- Reduce the number of bus stops
- Change some local to express service
- Improve the flow of buses in traffic
- Decrease the number of "deadhead" bus miles

⁸ Ibid, pp. 60-63.

Figure V-2 shows that, as the number of bus stops increases, the fuel efficiency of a bus decreases. Therefore, if the number of stops is cut in half, say from four stops per mile (about average for local transit service) to two stops per mile, fuel consumption could be reduced by about 25 percent.

FIGURE V-2
BUS FUEL CONSUMPTION
AND BUS STOP FREQUENCY



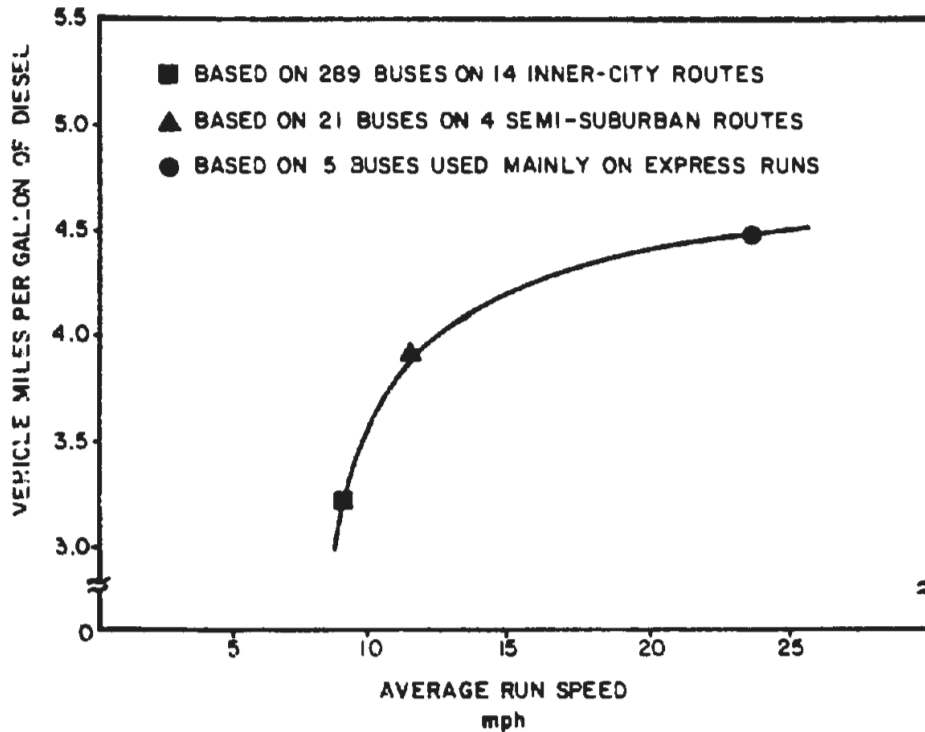
Source: DeLeuw, Cather, and Co., Case Studies of Transit Energy and Air Pollution Impacts, Prepared for the Environmental Protection Agency, June 1975.

Another possible way to save fuel would be to shift some existing service from local to express-type operations. This would have the effect of increasing the bus speed, and thus saving fuel. As can be seen by Figure V-3, bus fuel economy increases with speed. The average speed of local service DTS buses is currently 12-14 miles per hour and for CITRAN 11-13 miles per hour. Express bus service in these cities, however averages

over 20 miles per hour.⁹ Thus, each local bus that could raise its average speed to express levels could travel approximately 12 percent farther on the same amount of fuel.

FIGURE V-3

DIESEL BUS FUEL UTILIZATION VS. SPEED



Source: Martin J. Bernard III, and Sarah LaBelle, Energy Conservation in Urban Transit System, Presented at Energy Conservation: A National Forum, Ft. Lauderdale, Florida, December 1-3, 1975.

The major disadvantage of strategies such as those which reduce the number of bus stops or change local to express operations, is that the level of service to bus patrons is reduced below normal levels, thereby inconveniencing passengers and discouraging transit use. If, however, sufficient fuel supplies cannot be obtained, reductions in service may be unavoidable.

⁹ North Central Texas Council of Governments, Transit Development Program for the North Central Texas Region (Arlington, Texas: June, 1973), p. 39

The vehicle speed and hence fuel efficiency, could also be increased by implementing preferential bus treatment actions which would increase the bus flow through traffic. Such measures include:

- Bus activated signals
- Reserved bus lanes

The utilization of bus-activated signals would tend to speed the flow of buses through congested intersections. Such a system is currently being developed in Dallas which would provide bus signal preemption at 42 intersections.¹⁰ These measures, however, require considerable time and expense to develop and cannot be considered as short-term strategies unless they have been implemented prior to the energy shortage. Their effect on fuel reduction, however, could be considerable since time delays due to the traffic signals account for 10 to 20 percent of overall trip time.¹¹ A possible alternative to expensive signal equipment could be to manually direct traffic at major intersections to provide the priority movement of transit vehicles. Such traffic direction is currently used in downtown Dallas during peak hours.

Reserved bus lanes provide a greater potential as a short-term action to increase bus speed. Bus lanes in existence in other cities (e.g. Washington, D. C., Atlanta, Chicago, Toronto, London and Paris) have resulted in bus speed increases generally ranging from one to five percent.¹² Dallas and Fort Worth currently provide reserved bus lanes in downtown

¹⁰City of Dallas, Application for a Section 5 Capital Assistance Grant for a Bus Priority System, April, 1975, p. 70.

¹¹U. S. Department of Transportation, State-of-the-Art Bus and Carpool Priorities, Presented at the Workshop on Priority Techniques for High Occupancy Vehicles, Miami, April 29, 1975.

¹²Wilbur Smith and Associates, Inc., Bus Rapid Transit Options for Densely Developed Areas, Prepared for U. S. Department of Transportation, February, 1975, p. 104.

areas, and Dallas has established two experimental reserved lanes and arterial bus routes, one along Harry Hines Boulevard and another along Fort Worth Avenue.¹³ While most of these were relatively expensive long-range projects, it would be necessary to establish temporary lanes inexpensively on a short-term basis during an energy crisis. Reserved curb lanes along highways with three or more one-way lanes are prime targets for such a bus strategy. Bus lanes could be established in such areas relatively easily by placing traffic signs, painting lane stripes or using other traffic markers to indicate their exclusive use. Moreover, due to the anticipated decrease in traffic volume, the use of one lane for high-occupancy vehicles may not even increase traffic congestion on the other lanes. However, unless adequately supervised, legal enforcement of such exclusive lanes may become a problem.

A number of potential locations for short-term bus lanes in Dallas and Fort Worth have been identified.¹⁴ These are shown in Figures V-4 and V-5.

In addition to bus lanes, other preferential traffic actions, such as reserved bus ramps on freeways or reserved turning lanes could also expedite the flow of buses. The sum of these actions could be an effective means of increasing the bus flow thereby decreasing its fuel consumption.

¹³ City of Dallas, Department of Traffic Central, Report on Effect on Traffic Operations When Bus Lanes are Reserved on Major Thoroughfares, September, 1975.

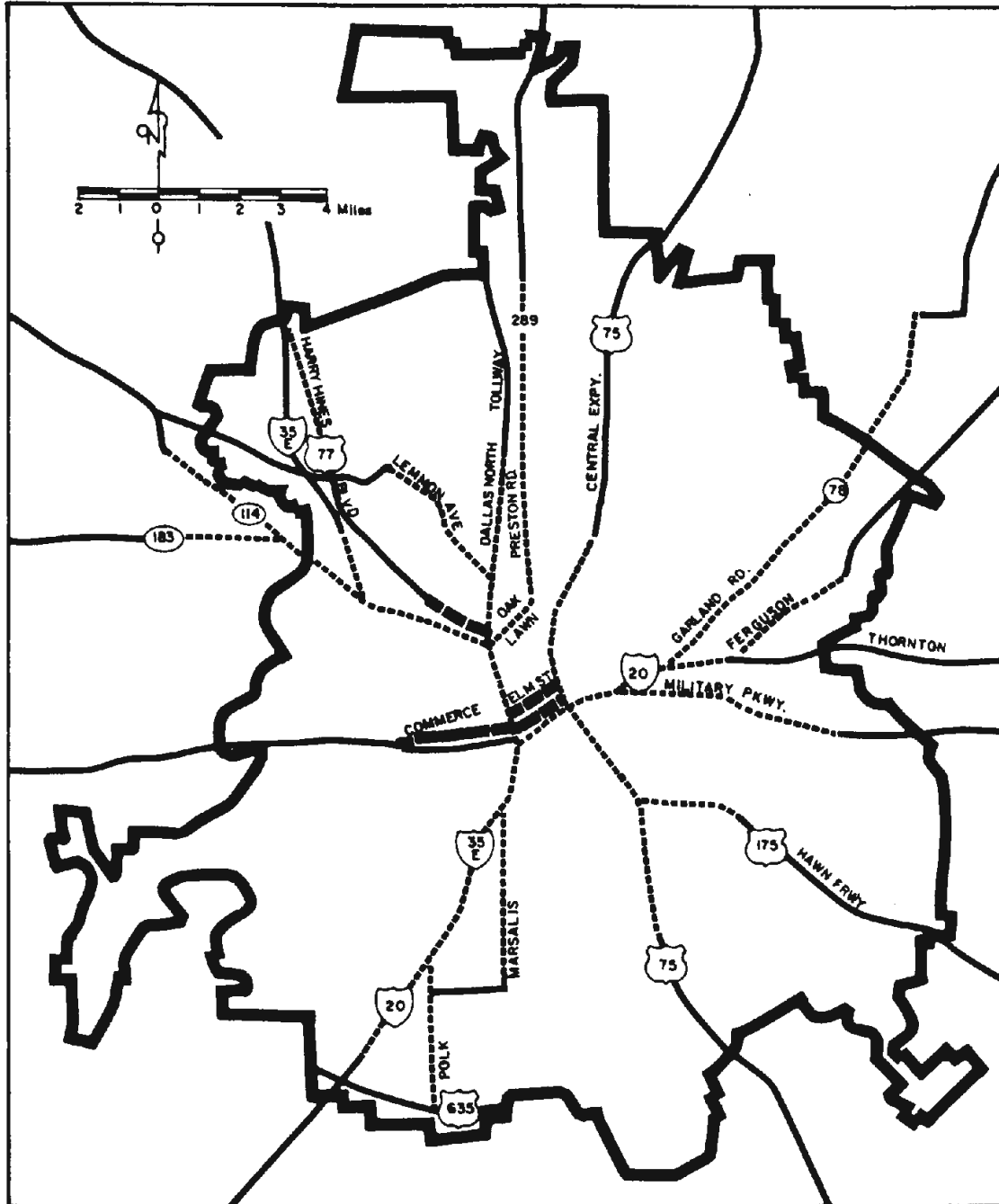
¹⁴ City of Fort Worth, Exclusive Bus/Carpool Lanes for the Fort Worth Metropolitan Area, February, 1974.

Barton-Aschman Associates, Inc., Dallas Urban Area Public Transportation Plan, Dallas Subregional Public Transportation Study, November, 1975.

Dallas Transit System.

FIGURE V-4

POTENTIAL BUS LANE LOCATIONS FOR EXISTING BUS ROUTES
DTS

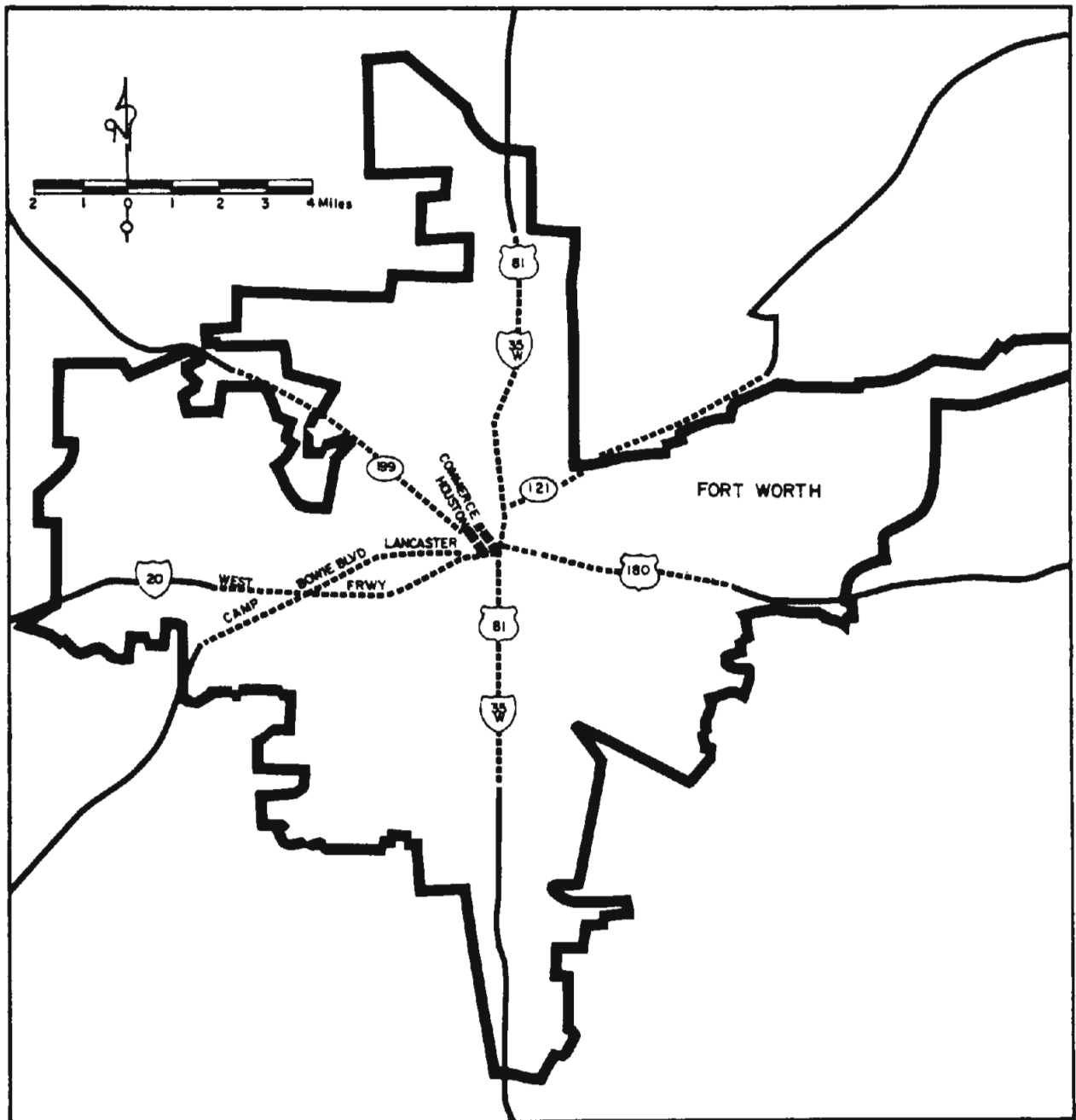


- Potential Bus Lane
- █ Existing Bus Lane

Source: Dallas Transit System, North Central Texas Council of Governments

FIGURE V-5

POTENTIAL BUS LANE LOCATIONS FOR EXISTING BUS ROUTES
CITRAN



..... Potential Bus Lane
———— Existing Bus Lane

Source: City of Fort Worth, Traffic Engineering Department,
Exclusive Bus/Carpool Lanes for the Fort Worth Metropolitan
Area, February, 1974.

Another possible method of decreasing bus fuel consumption would be to reduce the numbers of "deadhead" miles (i.e. miles to garages or other destinations when the bus is not in service). Unlike the automobile, not every bus vehicle mile produces passenger miles. This is due to unbalanced loading on different portions of some routes and the need to return vehicles to yards or garages between peak periods.

A strategy to reduce these "deadhead" bus miles could be to lease land for bus parking near or in the Central Business Districts. Here, buses which are used only during peak service could be parked during the midday rather than running them empty back to their respective garages. A single bus from each remote lot could be used to shuttle the drivers to and from the main bus garage. A study of the Chicago Transit Authority has estimated that approximately one percent of its fuel could be conserved by this strategy.¹⁵

Such a storage facility would need to accommodate 237 buses in Dallas and 45 in Fort Worth during the current off-peak hours¹⁶ and could result in an estimated one to four percent fuel savings. The major disadvantages, however, are the additional expenses of leasing the downtown lots and of providing security for the buses. Even so, the money saved by using less fuel could make up much of this added expense.

Table V-3 lists these strategies which would reduce fuel consumption by eliminating service and by increasing the system's fuel efficiency. The table also indicates the approximate fuel saving which could be realized by DTS and CITRAN through each action and the impact of each on ridership. The total savings from implementing all the actions listed would, of course be less than the sum of the percentages indicated.

¹⁵Martin J. Bernard III, and Sarah Labelle, "Energy Conservation in Urban Transit Systems," presented at Energy Conservation: A National Forum, Ft. Lauderdale, Florida, December 1-3, 1975, p. 5.

¹⁶Dallas Transit System and CITRAN, 1977.

TABLE V-3

TRANSIT STRATEGIES TO REDUCE FUEL CONSUMPTION

<u>Strategy</u>	<u>Percent Fuel Savings</u>		<u>Impact on Ridership</u>		<u>Impact on Annual Operating Costs</u>	
	<u>DTS</u>	<u>CITRAN</u>	<u>DTS</u>	<u>CITRAN</u>	<u>DTS</u>	<u>CITRAN</u>
Eliminate night service	8-12%	3- 6%	-12.5%	- 3.0%	\$1,640,000 Savings	\$149,000 Savings
Eliminate weekend service	16-20%	8-10%	-10.0%	- 9.0%	\$2,952,000 Savings	\$298,000 Savings
Eliminate midday service	20-25%	20-24%	-21.0%	-27.0%	\$3,690,000 Savings	\$729,000 Savings
Increase bus headways (by 10-25 percent)	10-25%	10-25%	- 5% to - 10%		\$2,670,000 Savings	\$580,000 Savings
Reduce number of bus stops (by 20-50 percent)	10-25%	10-25%	- 20% to - 40%		\$ 196,000 Savings	\$ 49,000 Savings
Modify local to express service (10 percent of local)	8-10%	8-10%	Uncertain		\$ 100,000 Savings	\$ 25,000 Savings
Increase bus flow by: 1) Bus lanes	1- 5%	1- 5%	+ 2.5%	+ 2.5%	\$ 28,000 Savings	\$ 8,400 Savings
2) Other preferential traffic treatment	1- 2%	2- 4%	+ 0.5%	+ 0.5%	\$ 17,000 Savings	\$ 8,400 Savings
Decrease "deadhead" bus miles	1- 2%	2- 4%	No effect		\$ 17,000* Savings	\$ 8,400* Savings

* does not include security costs

Source: Based on information provided by DTS and CITRAN.

UMTA, Guidelines to Reduce Energy Consumption Through Transportation Actions, May, 1974.

U. S. Department of Transportation, Priority Techniques for High Occupancy Vehicles, November, 1975.

Alan M. Voorhees and Associates, Handbook for the Development of Transportation System Management Plans, work draft, prepared for the North Central Texas Council of Governments, March, 1977.

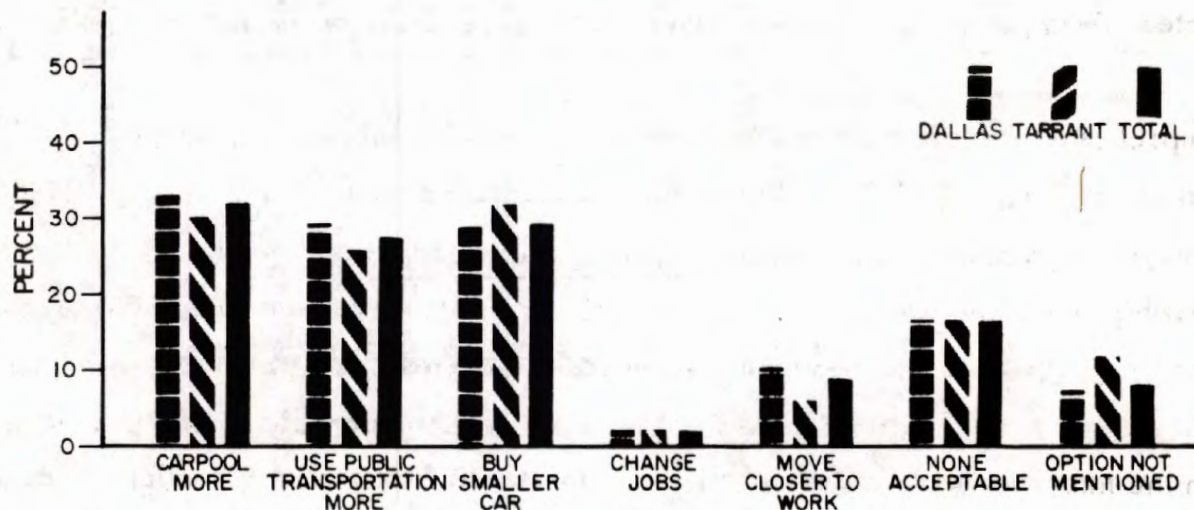
Paratransit services have limited opportunities to benefit from similar reductions. Local taxicabs could possibly attempt to save fuel by encouraging travel during off-peak hours rather than during congested peak hours or along congested routes. This could be done by adding a fare surcharge during peak travel periods. Taxis could also benefit from using bus lanes where they have been established. To save fuel, some transportation dependent municipal services could be curtailed, as during the last embargo period. While such municipal activities as street sweeping, solid waste disposal, police patrol, and inspections could be reduced, it would not be feasible to reduce emergency ambulance or fire fighting services. And finally, reductions in elderly and handicapped operations may be possible through better coordination of these services.

Coping With Mass Transit Ridership Increases

As mentioned in Chapter III, area mass transit systems experienced increases in ridership during the 1973-1974 oil embargo, and it is reasonable to assume that similar changes would occur during a future embargo. In addition, the Urban Panel Survey¹⁷ has explored likely local public reaction to higher gasoline prices by asking respondents how they would change their travel habits in the event of a large increase (to one dollar or more) in the price of gasoline. A common public response (28%) to this scenario was the greater use of public transportation (Figure V-6).¹⁸ The impact of potentially large increases in the

FIGURE V-6

PUBLIC REACTION TO SEVERE GASOLINE COST SCENARIO



Question: Suppose the price of gasoline were to move to one dollar or more. Which one or more of these options would be attractive to you?

Source: North Central Texas Council of Governments, Urban Panel Project, Macro-Level Data Analysis (Arlington, Texas: September, 1976).

¹⁷ Urban Panel Project, 1976, Macro-Level Data Analysis, p. VIII-8.

¹⁸ Care should be taken in assuming that people will do what they say they will do. Past experience has shown that forecasts based on this type of questioning are typically inflated by a factor of ten or more.

demand for public transportation will present a dilemma for transit operations: how can service be maintained or increased at a time when fuel supplies and rolling stock are limited? The following discussion will examine this impact on existing transit systems and the demand for transit and paratransit services in areas currently not served by mass transit.

Estimating Ridership Increases

Transit systems within the Intensive Study Area experienced significant increases in ridership during the energy shortage with the greatest monthly increases¹⁹ occurring in either March or April: Dallas Transit System increased a maximum of 20% (March, 1974), CITRAN 5% (April, 1974) and Texas Motor Coaches 26% (March, 1974). Since this occurred from public reaction to a relatively mild reduction in the area's fuel supply, a projected 10-25 percent shortfall by 1980 would likely produce an even greater demand.

The impact of a 10-25 percent shortage on transit ridership has been examined by the United States Congress, Office of Technology Assessment (OTA).²⁰ This study concludes that, depending upon the severity and extent of an oil shortage, near-term national transit ridership would increase by approximately 10 percent to 40 percent (from 1974 levels) (Figure V-7). Since the oil shortage is expected to be spread through the nation by the federal programs, these national ridership increases can be reasonably expected to occur within the Intensive Study Area.

The OTA study also cautions that the mild consumer reaction to the previous embargo appeared to be based on the judgement that it was only a temporary situation. Future travel modifications will likewise depend upon whether the shortage is perceived as a temporary or long-term phenomenon. In the latter case, the 40 percent increase in

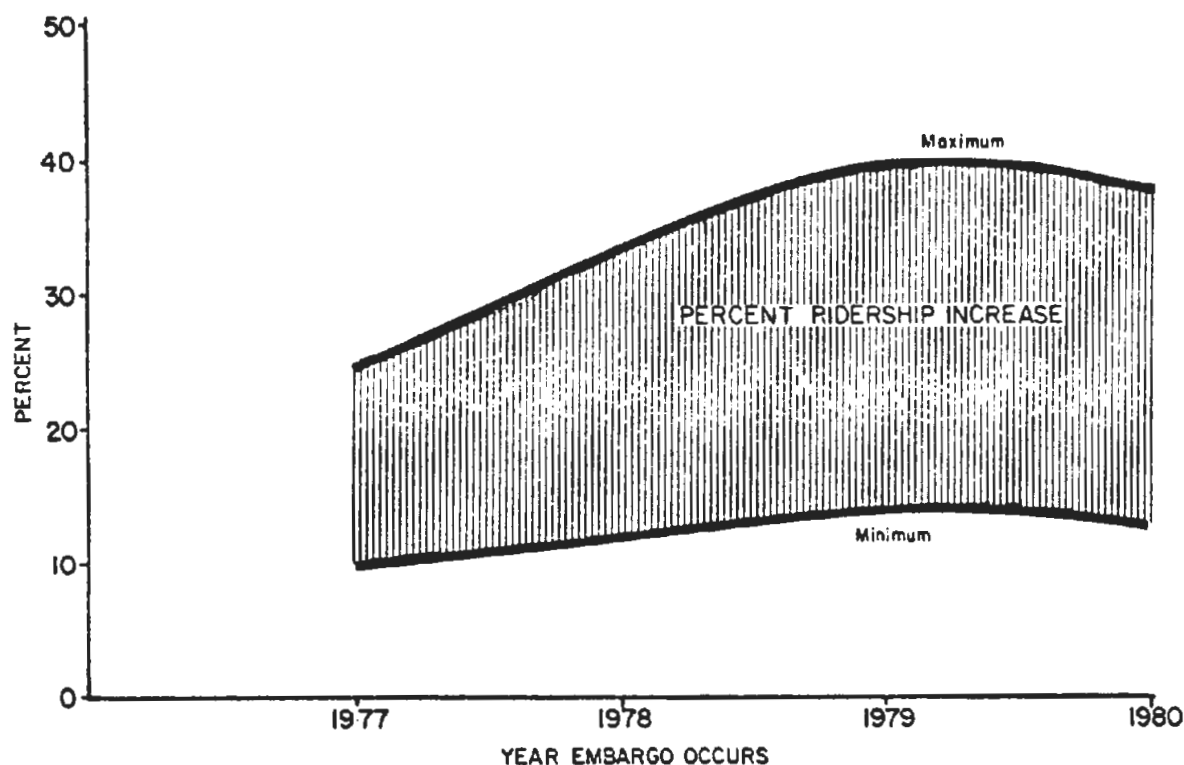
¹⁹Percent change from corresponding month of the previous year.

²⁰Energy, The Economy and Mass Transit, p. 70.

transit ridership may be conservative due to a greater effort on the part of the public to modify travel patterns.

FIGURE V-7

NATIONAL TRANSIT RIDERSHIP CHANGES DUE TO EMBARGO



Source: Adapted from Office of Technology Assessment, U. S. Congress, Energy, the Economy and Mass Transit (Washington, D. C.: December, 1975), p. 70.

By applying these estimates to local transit systems, as shown in Figure V-8, a 10 percent fuel deficit could mean an additional 65,000 weekly bus riders on DTS and about 10,000 on CITRAN. A 25 percent fuel shortfall could result in over 250,000 more weekly riders on DTS and over 35,000 on CITRAN. Assuming diesel fuel is available, strategies which could be implemented by the transit systems to cope with these anticipated ridership increases include:

- Filling unused capacity
- Spreading peak period ridership

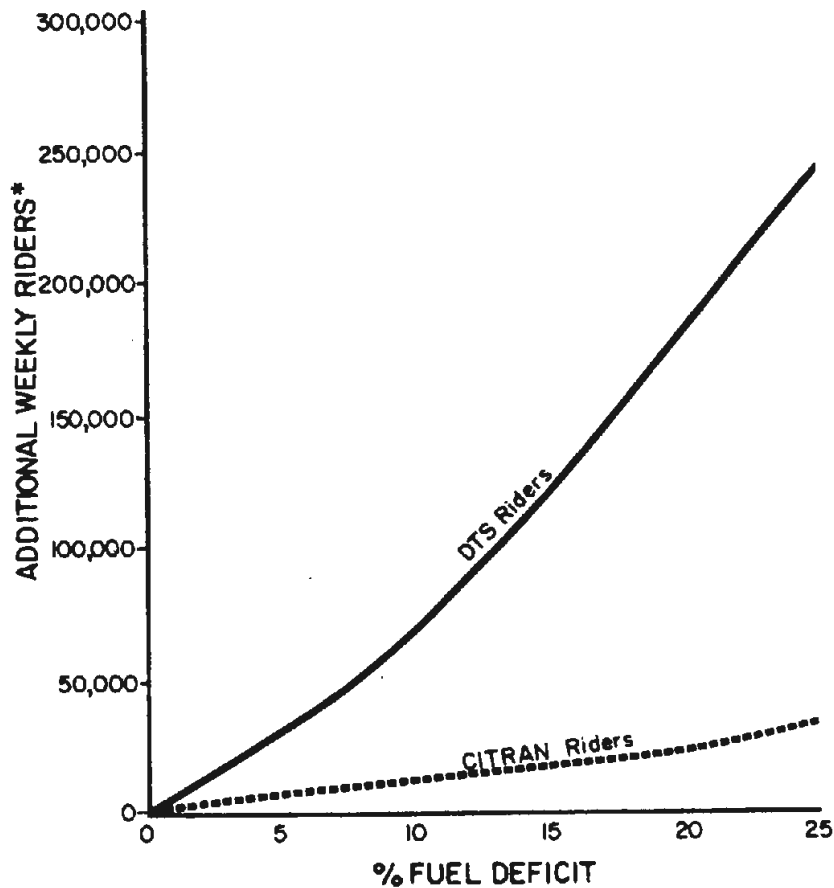
- Increasing the capacity of the existing bus fleet by:
 - 1) Increasing bus availability by modifying maintenance operations
 - 2) Decreasing headways by increasing bus speeds

- Temporarily increasing the bus fleet size by:
 - 1) Renting additional buses from other sources
 - 2) Utilizing public school buses

- Increasing the current bus fleet prior to contingency

FIGURE V-8

THE EFFECT OF FUEL SHORTAGE ON LOCAL TRANSIT RIDERSHIP



* Increase from 1974 average

Unused Seating Capacity

The initial response of the transit systems to a sudden passenger increase along established lines should be to allow the utilization of reserve transit seating capacity. During the height of the peak rush hour, approximately 10 percent of DTS seats are unused and an even larger percentage of CITRAN's are vacant.²¹ There are, however, buses on certain lines in both Dallas and Fort Worth which are currently operating at or above seated capacity. On these lines, it may be necessary to increase service on short notice at the onset of the shortage. Methods of achieving this will be discussed below.

Spread Peak Period Ridership

As discussed in Chapter III, ridership during the peak hours appears to experience the largest increases during a period of energy constraints. Yet, since the maximum utilization of transit vehicles occurs during these times, transit systems have the least potential additional capacity to absorb ridership increases during these times. If a sudden ridership increase were to occur, transit services during these peak times would be overtaxed while earlier or later peak period service would probably remain underutilized. One solution to this problem would be to spread this peak ridership uniformly over the entire period so that no additional buses or drivers would be needed to accommodate ridership increases. This could be accomplished by varying the work hours of transit riders so that they may travel at earlier or later times to avoid the overcrowded buses. In addition, a peak period fare surcharge could be added to discourage commuters from riding during the most congested times.

²¹ Estimates provided by DTS and CITRAN. It should be noted that, as a practical matter, it is impossible to achieve 100% capacity without leaving potential riders at bus stops, unable to get on the buses due to crowding.

A number of different variable work hour systems have been identified.²² These include:

- Staggered Hours - the starting and quitting times are fixed but vary among employees or businesses. (e.g., some employees work from 7:00 a.m. to 3:00 p.m. while others work from 7:30 a.m. to 3:30 p.m.).
- Shorter Work Week - the number of hours worked are concentrated into a shorter work week with the off day varying among employees or businesses.
- Flexible Work Hours - the employer determines a range of starting and quitting times and a core time during which all employees must work. For example, employees may start between 7:00 - 9:00 a.m. and leave between 3:00 - 5:30 p.m. as long as the total required hours are met.

The flexible work hour plan appears to be the most popular variable work hour option²³ and is perhaps the most likely to alleviate the peak period transit problems. Flexible work times have been introduced in several U. S., Canadian, and European cities and have reportedly reduced absences, raised employee morale and increased employee productivity.²⁴

Most importantly, however, flexible work hours would allow considerable individual modifications in travel times. With flexible hours, the transit systems could advise riders which buses on specific routes have seating and which are operating at capacity. Transit patrons could choose to ride at earlier or later than usual times to avoid crowds and still arrive at work at a time acceptable to the employer. Thus while the other variable work hour options would potentially help to distribute transit loads more broadly,

²²The Municipality of Metropolitan Seattle, p. 34.

²³A survey of federal employees conducted by the Region 10 Federal Energy Administration in 1974 indicated that 70 percent of those responding preferred the flexible working hour concept. The Municipality of Metropolitan Seattle, p. 33.

²⁴The Municipality of Metropolitan Seattle, p. 33.

flexible time appears to be the most effective because it would allow the employee to adjust to the transit service in his or her area.

The idea of variable work hours to distribute transit loads more evenly has been used in other cities with mixed results. On April 1, 1970, about 50,000 employees from some 50 public and private organizations in lower Manhattan, New York City, voluntarily staggered their work hours in a program to determine whether such changes would help relieve peak hour transportation congestion.²⁵ A close analysis of this experimental project has shown that the work hour changes did have a significant effect in reducing peak hour congestion of transportation facilities. Transit passenger trips through the Hudson Terminal, for example, declined by 16 percent during the 5:00 - 5:15 p.m. period and increased by 30 percent between 4:30 - 4:45 p.m., a time during which transit had previously been underutilized.²⁶

The impact of varied work hours on bus ridership has been examined during a variable work project in Ottawa, Canada.²⁷ On March 4, 1973, due to a serious overtaking of the bus system, federal agencies implemented a varied work hour plan for approximately 50 percent of the city's 70,000 CBD workers. The program consisted of a combination of staggered work hour options. As a result of the program, the study concluded that bus ridership was significantly improved and the peak period was dispersed. Figure V-9 shows a before and after comparison of bus ridership along one checkpoint. During the maximum peak 15 minute period, for instance, inbound demand was reduced by 21 percent.

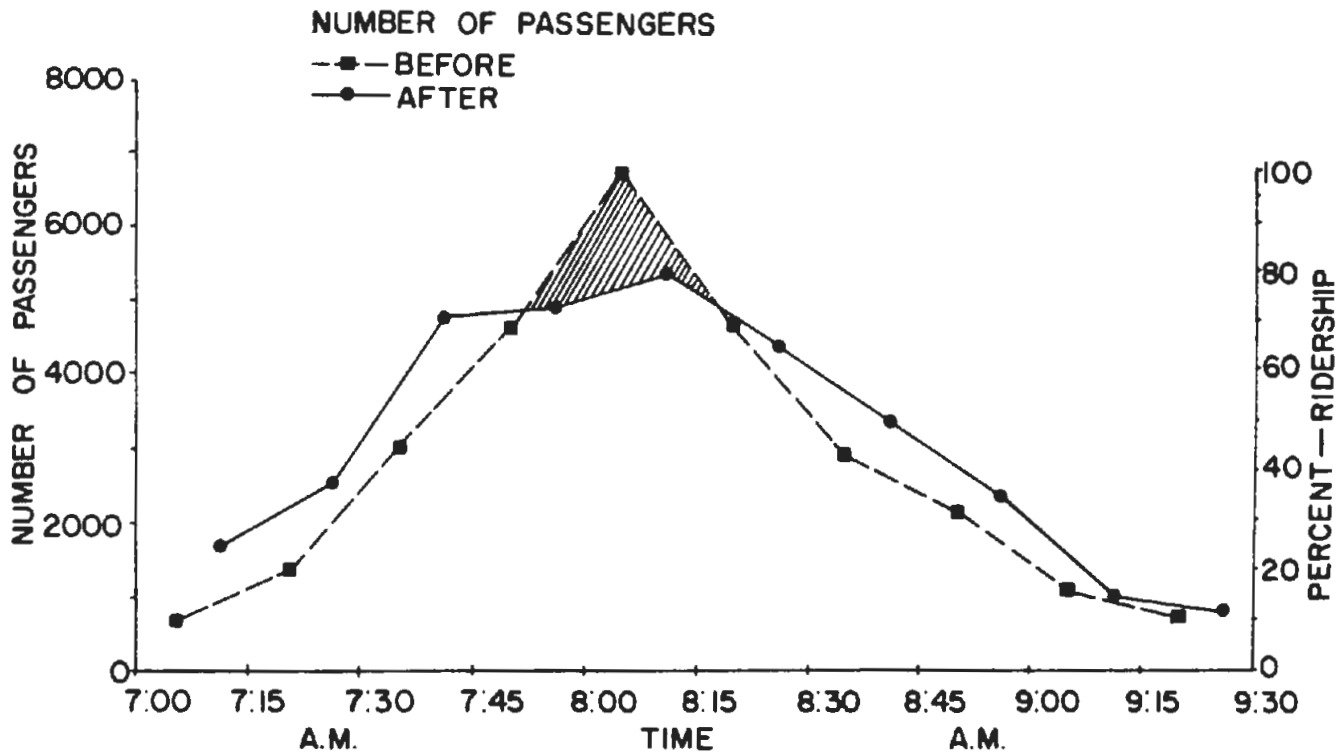
²⁵ Brendon O'Malley, Staggered Work Hours Project in Lower Manhattan (New York City, N. Y.: The Port of New York Authority, 1970), p. 1.

²⁶ *Ibid.*, p. 25.

²⁷ Reza Safavian, and Keith G. McLean, "Variable Work Hours: Who Benefits?", Traffic Engineering, Volume 45, No. 3, March, 1975, p. 17.

FIGURE V-9

BEFORE AND AFTER COMPARISON OF BUS RIDERSHIP,
OTTAWA VARIABLE WORK HOURS EXPERIMENT



Source: Rezo Safavian, and Keith G. McLean, "Variable Work Hours: Who Benefits?", *Traffic Engineering*, Volume 45, No. 3, March, 1975, p. 17.

A less successful staggered work hours project has been introduced in Atlanta.²⁸

Although the idea was backed by the Chamber of Commerce and funding for the project was obtained, employee opposition to the plan resulted. Reasons given for this were:

- There would be difficulty in adjusting present carpooling arrangements since many people rode with others who were not asked to stagger their hours.
- Bus scheduling problems can arise if certain large employers simply shift their work hours. This can move the peak on particular bus lines without reducing the peak load.

²⁸ R. H. Pratt Associates, Inc., Results of a Survey and Analysis of Twenty-One Low Cost Techniques, Volume 1 (Kensington, Maryland: Prepared for U. S. Department of Transportation, January, 1973), p. 42.

In addition, Atlanta has few really large firms to which these work changes would be most applicable. Other reasons given for the opposition include the interference with goods delivery schedules, existence of restrictive national labor contracts and the problems of operating with national headquarters.²⁹ Thus, the success of a staggered work strategy appears to be highly dependent on employer and employee acceptance of the plan.

A flexible work hour plan could also be applicable locally. The problem of an unbalanced distribution of commuters during peak period times also exists locally. In Dallas, for example, a recent DTS passenger count indicated that during the height of the morning peak period (7:30 - 8:00) at least 13 bus lines experienced capacity or standing-room only crowds.³⁰ However, during the half hour time periods before and after this time, an excess of seating capacity exists on these lines (Figure V-10). During a gasoline shortage, these problems would be further complicated by sudden ridership increases on most lines, especially during peak periods.

The applicability of a varied work plan is determined to a great extent by the size and type of economic activity groups in the target area. Small employers, for example, may find it difficult to vary their work hours since insufficient manpower would be available to cover for those not at work. In addition, some types of business, especially large government, service, and manufacturing organizations can alter work hours more easily than others such as education, transportation, or utility activities (Table V-4).³¹

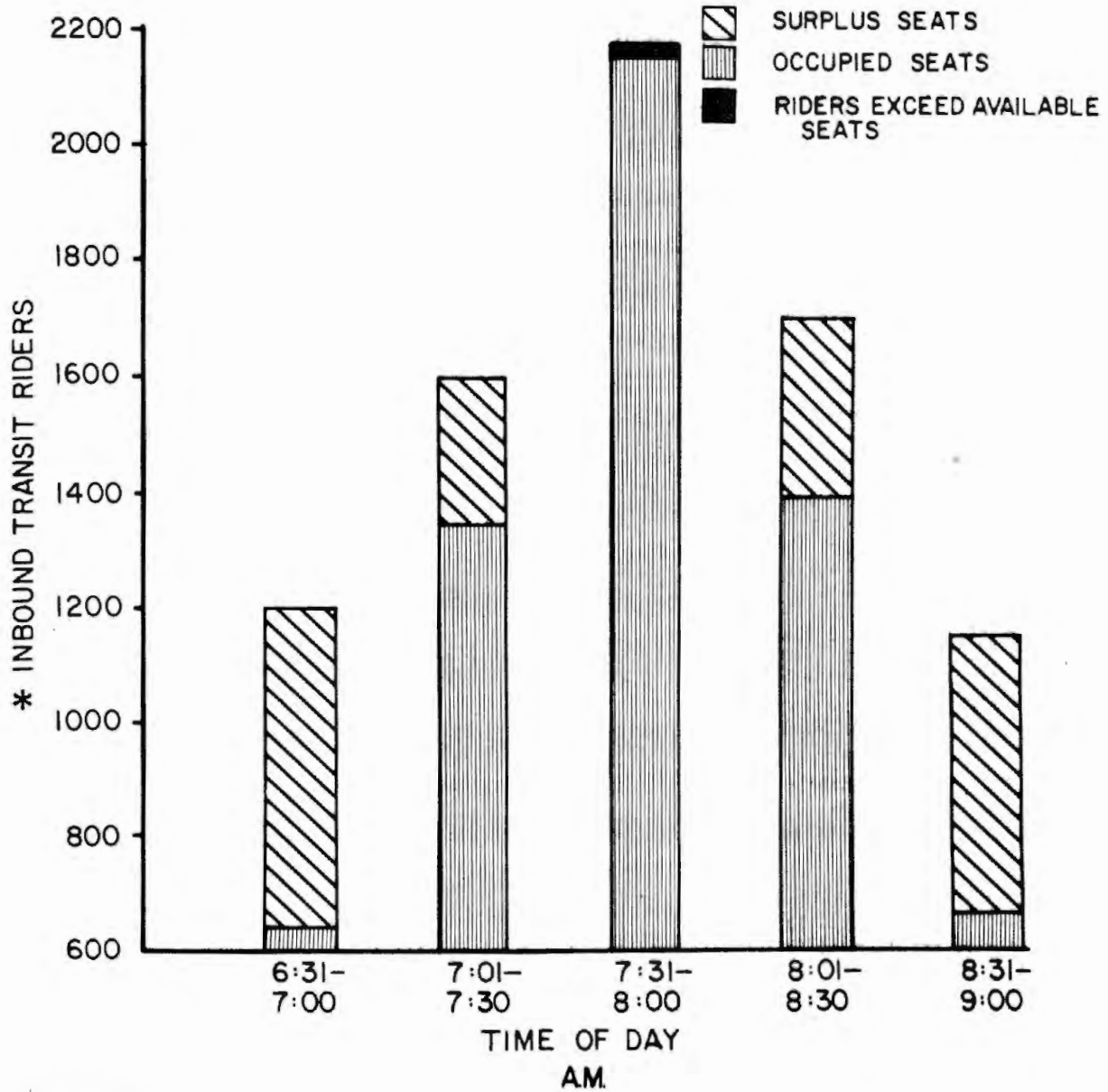
²⁹R. H. Pratt Associates, Inc., Results of a Survey and Analysis of Twenty-One Low Cost Techniques, Volume 1 (Kensington, Maryland: Prepared for U. S. Department of Transportation, January, 1973), p. 42.

³⁰Dallas Transit System, "Passenger Count," June-July, 1976.

³¹Joint Strategies, p. 2-92.

FIGURE V-10

TRANSIT RIDERS VS. AVAILABLE SEATS
D T S



* for 13 selected DTS lines

Source: Dallas Transit System, "Passenger Count," June-July 1976.

TABLE V-4

Applicability of staggered work hours to basic economic activity groups.

Employment Classification	Schedule Freedom	Staggered Hours Potential
Federal Government	Free ¹	Good; many small agencies
State Government	Free	Good
Local Government	Free	Good
Trans-Comm-Util.	Fixed ²	Poor; transportation (trade oriented)
Education	Fixed	Poor
Service	Free	Good; banks (trade oriented)
Retail	Flexible ³	Fair; large firms only
Manufacturing	Free	Fair +
Wholesale	Flexible	Poor

Source: Adapted from Wilbur Smith and Associates, "Staggered Hours Plan, Atlanta Metropolitan Area," 1970, p. 31

1. "Free" indicates organizations with considerable latitude to set work hour schedules. In theory, schedules could encompass any period in the day if it were not for employee preferences. Shifts of at least one to two hours appear possible.

2. "Fixed" indicates organizations with no flexibility to change work patterns to any schedule other than existing ones.

3. "Flexible" indicates organizations which could potentially alter work hour schedules, but only if related firms (i.e., firms in the industry, customers, suppliers, and so forth) do the same. Since such shifts from established economic relationships usually involve a great number of firms and business practices, the extent of schedule change acceptable to such organizations is probably one hour or less.

The Dallas-Fort Worth area has a diversity of employment activities. Activities in the downtown areas where the shifting of work times is most critical are, however, largely of the government and service type, making them prime targets for varied work hours. Table V-5 lists the number of large service and government employers in the Dallas and Fort Worth CBD's.

TABLE V-5
LARGE CBD EMPLOYMENT CENTERS
DALLAS AND FORT WORTH
1970

Number of Employees	Dallas CBD		Fort Worth CBD	
	Number of Centers	Approximate Number of Employees	Number of Centers	Approximate Number of Employees
100-250	47	7,000	19	3,300
250-500	33	11,000	7	2,600
500-1000	29	17,000	6	4,500
Over 1000	19	30,000	2	4,000
TOTAL	128	65,000	34	14,400

Source: North Central Texas Council of Governments.

An estimated 20 percent of these employees in downtown Dallas and 10 percent in downtown Fort Worth utilize transit service.³² Additionally, workers for these largest employers constitute about 50 percent of the peak hour transit riders in Dallas and 40 percent

³² Alan M. Voorhees & Associates, Inc., Travel Model Calibration, Regional Public Transportation Study, Technical Report No. 7 (McLean, Virginia: Alan M. Voorhees & Associates, Inc., March, 1975). Prepared for the Cities of Dallas and Fort Worth and the North Central Texas Council of Governments, Table II.

of peak hour riders in Fort Worth.³³ Therefore, if a program of varied work hours was implemented by each of these employers, approximately half of all peak period transit riders could conceivably modify their travel times.

The success of a varied work program in Dallas or Fort Worth will depend to a large extent on employer and employee cooperation. The emergency conditions which would exist during these "crisis" scenarios would probably encourage a greater public feeling of cooperation which may make this program easier to implement. The support of the local chamber of commerce, city governments, and transportation providers is essential.

The administration and implementation of a local staggered work hour plan could be handled by the city carpool program offices in conjunction with the Chambers of Commerce. These offices already have contacts with local employers and could therefore facilitate the rapid implementation of the program. The costs could be minimal. Most costs are one-time charges for organizational changes. The Downtown-Lower Manhattan Association spent \$50,000 to implement the Manhattan project, including surveys, information programs, and before-and-after data collection.³⁴ Since however, this local program would be a short-term action with voluntary employer support, certain of these expenses would not be necessary.

Increase the Bus Availability and Fleet Size

The ability of the transit systems to accommodate the ridership increases will depend to a large extent on the size of the bus fleet at the time of the emergency. Due to fluctuations in the characteristics of transit demand, and the size of the fleet, the historical number of passengers per bus has varied greatly (Figure V-11). As this figure shows, the existing

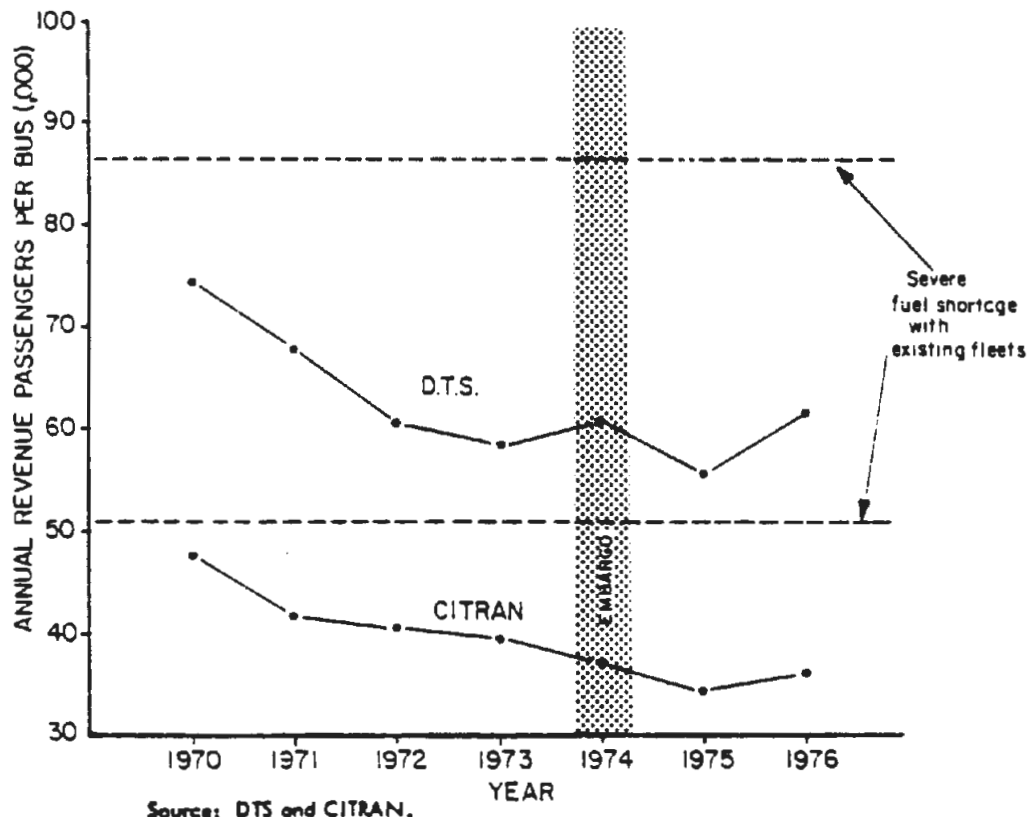
³³North Central Texas Council of Governments estimates.

³⁴Joint Strategies, p. 2-107.

bus fleets would have to accommodate ridership volumes greater than those ever experienced in recent years.

FIGURE V-11

REVENUE PASSENGERS PER BUS



Would additional buses be needed by local transit systems? Figures V-12 and V-13 show the effect of ridership increases on the current bus fleets of DTS and CITRAN based on national estimates developed by the U. S. Office of Technology Assessment. By using alternate strategies, such as allowing the seating capacity to full up and staggering work hours, ridership increases under the 10 percent gasoline shortfall could be accommodated. Once, however, it appears that existing bus service cannot accommodate ridership demands and that more buses would be needed, the bus systems could increase their bus availability by placing more of their current fleet into service or by running more trips with operating vehicles. CITRAN would apparently not have to increase its bus availability until approximately a 20-22 percent gasoline shortfall was experienced, and, if measures are taken

which would increase the efficiency of the existing fleet, no new buses would apparently be needed, even during a 25 percent shortage. DTS, by contrast would experience difficulty accommodating ridership demand when the gasoline shortfall reaches approximately 17 percent. If a 20-25 percent deficit is realized, the bus system would possibly have to obtain up to about 40 additional buses to accommodate a ridership increase of 30 to 40 percent. It should also be remembered that, since ridership increases will vary by line and time of day, it is conceivable that specific lines may require additional service even if the strategies of allowing the capacity to fill or spreading the peak hour ridership are implemented. The close monitoring of ridership changes along each line could identify these special problem cases and service modifications could be made accordingly. Recording fare buses, such as those now used by CITRAN, could be useful in providing this information.

FIGURE V-12

**EFFECT OF RIDERSHIP INCREASES ON BUS USE
DTS**

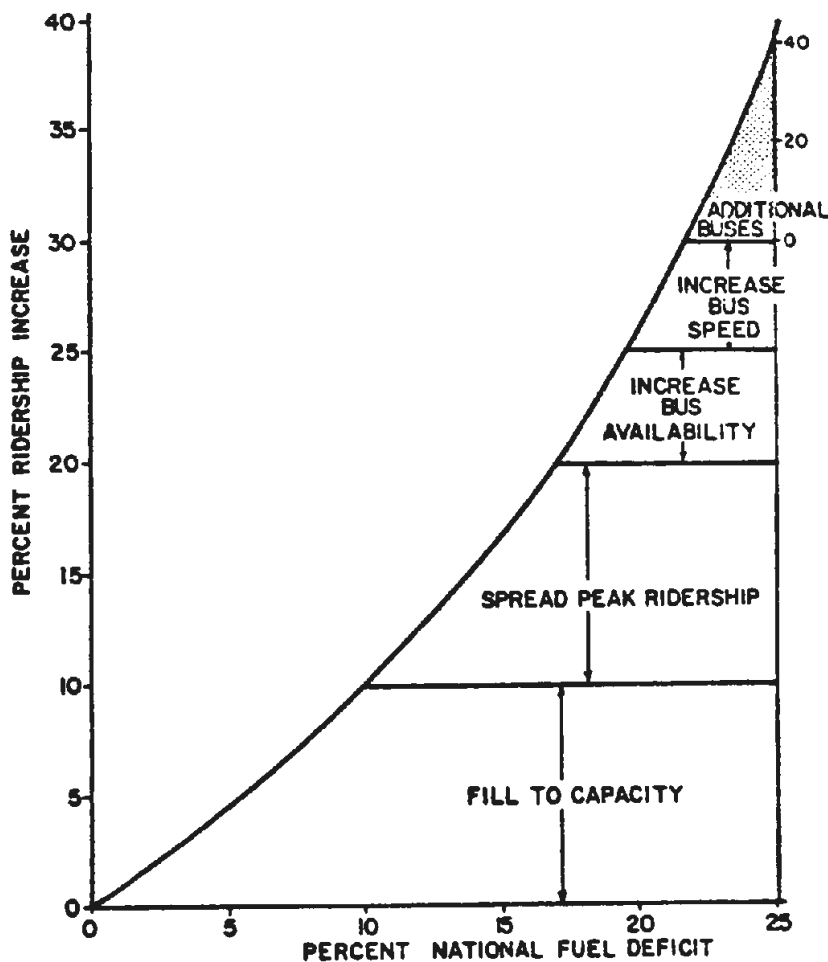
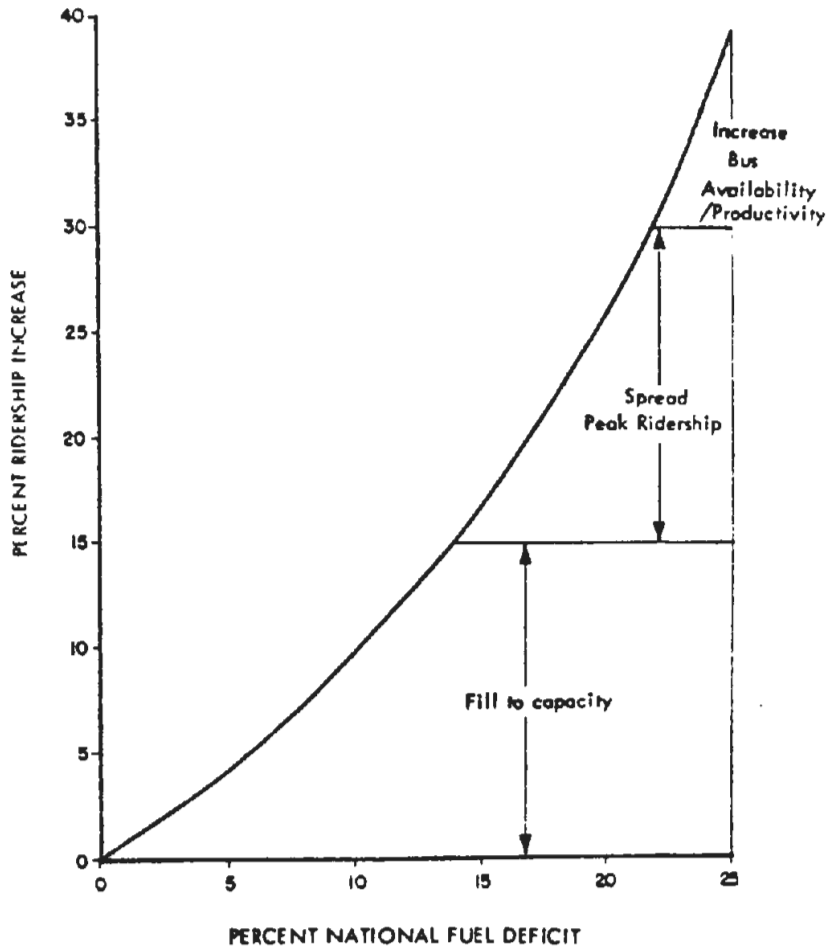


FIGURE V-13

EFFECT OF RIDERSHIP INCREASES ON BUS USE
CITRAN



Bus availability can be enhanced by increasing the utilization of the existing fleet. DTS currently operates approximately 80 percent of its total fleet during peak hours and CITRAN uses about 70 percent. If the number of out-of-service buses (those being repaired or maintained) were to be reduced, it would be possible to increase the number of operable buses available to the system. Also, the number of buses which are chartered out would have to be reduced or eliminated. An estimated 90 percent of a fleet may be operable under such conditions. Therefore, as a contingency strategy, transit operations could increase their shop work to reduce the number of buses waiting for repair. By increasing the number of available DTS buses from 80 percent or 90 percent, an estimated 17 extra buses could be placed in service.

The Seattle Metro Study estimated that by employing 10 percent more mechanics and using swing and graveyard shifts to repair buses, or by jobbing out maintenance, the number of downed buses could be greatly reduced. The initial labor and materials cost, however, would be high, an estimated \$5,000 per extra vehicle.³⁵

Another method of increasing bus service with the existing fleet would be to increase the speed of the buses to the extent that more trips could be made within a given time period. If, for example, the average daily bus speed for the system were increased by five percent, it would be possible to increase the service by five percent, i.e., run five percent more bus trips. The priority signalization and bus lane strategies mentioned previously could be helpful in increasing service as well as reducing fuel consumption. If bus lanes were established on these identified routes in Dallas, and were utilized by the existing bus routes, a four to five percent increase in speed during the peak period would result. This would be equivalent to placing an additional 15 buses into service during this time.

If the available bus fleet is still insufficient to accommodate ridership demands, extra buses may have to be obtained. Since it would not be possible to order and receive additional new buses within a short-term basis (the normal process takes from one to two years) other avenues of procurement must be considered. An alternative would be to lease some of the area's buses which are not owned by the city transit systems. As can be seen in Table V-6, this non-city transit fleet is nearly six times the size of the city transit fleet. Obtaining the use of the buses, however, presents significant legal and administrative problems.

³⁵The Municipality of Metropolitan Seattle, p. 46.

TABLE V-6

INTENSIVE STUDY AREA BUS FLEET INVENTORY

Public Intra-City Transit	Fleet Size (year of estimate)
Dallas Transit System	407 (1976)
<u>CITRAN</u>	<u>121</u> (1976)
Subtotal	528
Other Buses	
Texas Motor Coaches	32 (1976)
Surtran	45 (1976)
Continental Trailways (local and regional)	300 (est. 1975)
Church Owned	1,567 (1975)
School	1,023 (1975)
<u>Other</u>	<u>70</u> (est.)
Subtotal	<u>3,037</u>
Total Intensive Study Area	3,565

For example, the use of school buses for public transportation is now prohibited by Article 16.55 of the State Education Code which states:

School buses shall be operated to and from school upon approved school bus routes and no variations shall be made therefrom. The penalty for varying from authorized routes and for unauthorized use of buses shall be withholding of transportation funds from the offending county or school district. In the event the violation is committed by a district which receives no Foundation School Program Funds, the penalty provisions of Section 4.00 of this code shall be applied.

Furthermore, school bus funds and/or misrepresentation of local board use of them is a misdemeanor considered to be a felony which may be punishable by a one to five year prison term.³⁶

³⁶ Robert Means, et al., Legal Obstacles to the Use of Texas School Buses for Public Transportation (Austin, Texas: University of Texas at Austin, Council for Advanced Transportation Studies, January, 1975), p. 20.

A proposed change to this regulation which was introduced to the State of Texas legislature during the 1977 session would have amended the Texas Education Code to allow nonschool organizations to use school buses. The bill, however was not passed.

The churches of the Intensive Study Area operate a combined bus fleet which is the largest in the region. However, many of the individual church organizations may be reluctant to rent their vehicles for outside concerns since they are extensively used for church purposes.³⁷ In addition, other bus fleets (Texas Motor Coaches, Continental Trailways, Transportation Enterprises, etc.) will probably experience increased ridership demands and will thus have few, if any, extra buses to rent to others.

SURTRAN buses, however, which operate between the Dallas-Fort Worth Regional Airport and the major cities, could possibly make some of their vehicles available for other purposes. Since airport passenger traffic is expected to decline, as during the past embargo, a reduction in the demand for SURTRAN bus service may occur.³⁸ Since only about half of the fleet (about 25 of 45 vehicles) is currently utilized during any one time,³⁹ it appears that there are surplus buses which could be used by DTS and/or CITRAN in the event of a bus shortage. Allowing for bus maintenance and standby service, SURTRAN should be able to provide its present service with 30 buses. This would leave the remaining 15 vehicles available for outside use. In addition, since the current SURTRAN ridership demand in Arlington is low (Table V-7) it is possible for SURTRAN taxicab service to be substituted there. This would release another two vehicles and result in a total of about 17 surplus buses. If, however, ridership on SURTRAN increases, there may be few, if any extra buses available.

³⁷ This opinion was expressed by the majority of churches surveyed by the North Central Texas Council of Governments in July, 1976.

³⁸ SURTRAN bus service was initiated in January, 1977, so the changes in ridership due to the last embargo cannot be determined.

³⁹ Information supplied by Mr. Tom Killebrew, SURTRAN, March, 1977.

TABLE V-7

AVERAGE SURTRAN BUS PASSENGERS/WEEKDAY

Terminal	Number of Weekday Passengers (March, 1977)
Dallas CBD	1,000 - 1,500
North Central	600 - 900
Fort Worth CBD	400 - 600
Love Field	200 - 400
Arlington	40 - 80

Source: Data Supplied by SURTRAN.

Additional opportunities for DTS and CITRAN may exist to increase their fleet size by retaining replaced buses after future bus purchases have been made. Between 1977 and 1980, DTS and CITRAN plan to purchase 174 and 10 new buses respectively.⁴⁰ Fifty of these new DTS buses will be purchased during 1978. If these old buses can be maintained, placed in reserve and then replaced by subsequent purchases, probably no additional buses would be needed during a severe energy shortage. It is difficult to justify this standby capacity in practice, however, and the efficacy of this alternative is uncertain.

To summarize, numerous short-term opportunities exist to increase bus availability and to expand the local transit fleet size if it becomes necessary to cope with sudden bus ridership increases. Due to the inherent differences of both DTS and CITRAN, both should evaluate each strategy and determine its applicability to their individual situation. Table V-8 lists these mentioned strategies and the estimated impact of each service capability.

⁴⁰ 1977 Transportation Program for North Central Texas, p. VII-18. VII-29.

TABLE V-8

TRANSIT STRATEGIES TO INCREASE RIDERSHIP CAPACITY

Percent Capacity Increase

<u>Strategy</u>	<u>DTS</u>	<u>CITRAN</u>	<u>Remarks</u>
Allow capacity to fill	10 - 15	15 - 20	Some lines already at capacity
Spread peak period Ridership	5 - 10	10 - 15	Employer cooperation essential
Route private buses	Unknown	Unknown	Private owners may not have spare equipment
Use public school buses	Unknown	Unknown	Currently prohibited by State law. School hours would have to be rescheduled
Decrease out-of-service buses	10	20	High costs involved
Increase bus speed through bus lanes and priority signalization	1 - 5	1 - 5	Could be difficult to enforce
Retain replaced buses	10 - 15	2 - 5	Difficult to justify

Reducing Transit Ridership Through Paratransit Alternatives

While the existing transit services may be overloaded during a severe energy shortage, an opportunity may exist to enlist paratransit resources to alleviate these excessive bus demands. Two possible paratransit alternatives are considered here: route taxis and extensive carpooling.

A "route taxi" refers to the usage of taxicabs to transport passenger along fixed transit routes. Such service has been successful in European cities (Munich, West Berlin, Stuttgart) as a replacement for buses along routes with low ridership.⁴¹ A similar type of

⁴¹"Taxis Replace Buses at Night," Fort Worth Star Telegram, May 7, 1975.

service was attempted in Houston during a recent transit strike.⁴² While political and operational problems hindered the Houston program's success, a route taxi service would probably function better in an energy crisis situation than in a transit strike.⁴³

Data from the Dallas taxicab companies indicates that approximately 104 surplus taxicabs are available in the City.⁴⁴ Assuming that 90 percent of these could be put in route taxi service, it would be possible to provide service to many of the normal transit riders who

⁴² During this transit strike (from November 24, 1976, to January 17, 1977) fixed route, fixed scheduled taxicab service was attempted along four heavily traveled transit routes selected by the City. The routes were from 10 miles to 16 miles one way in length and extended from the CBD into the more affluent residential areas. The City provided placards for the cabs indicating the destination and taxicab supervisors attempted to start, or meter, the cabs so as to provide some kind of regularity to the service. The fare was one dollar. Although no figures are available, the patronage was very low.

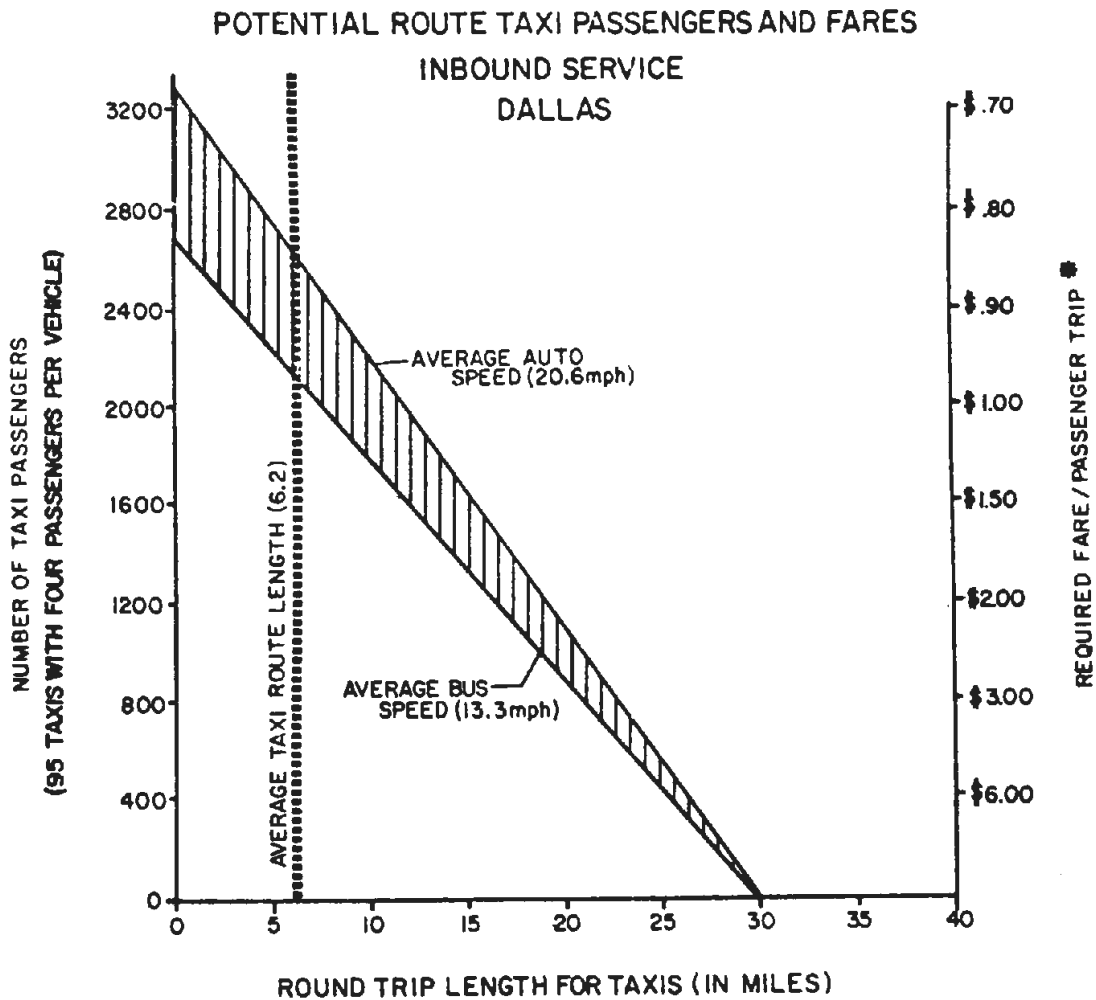
Information obtained during telephone conversation between Mr. William G. Barker, North Central Texas Council of Governments, and Mr. Jerry Wilson of Yellow Cab in Houston on March 17, 1977, and Ms. Linda Cherrington with the City of Houston Public Transportation Office on March 18, 1977.

⁴³ Reasons offered as causes for the failure of the program were: 1) The routes were extremely long, 2) Since Yellow Cab of Houston has independent owner drivers, there was no way to force the drivers into performing the service, and many often abandoned the route when either (a) they found a customer that wanted to go someplace else off the route or (b) they became discouraged because riders were not standing along the route waiting for service. Of course, the uncertainty of the service under these conditions was a major reason for a lack of response on the part of the public, and 3) Because the route served the more affluent areas, the former transit riders had many transportation options open to them, and the reliable dollar-a-ride route taxi was apparently not the best alternative. Mr. Wilson of Yellow Cab feels that the route taxi concept would have worked in lower income areas. Mr. Wilson feels that the route taxi idea would work much better in an energy crisis situation than in a transit strike situation. This is probably true since the cabs would be interspersed among the buses running the route. Also, people would be turning away from the automobile alternative rather than shifting toward it. The operational difficulties pointed out in the Houston experience are still a possibility, however, and company drivers would probably have to run the routes for the system to work.

⁴⁴ Data obtained from Yellow Cab of Dallas and Terminal Cab Company, March, 1977.

would be stranded at their bus stops due to filled buses. As Figure V-14 shows, the number of passengers this surplus taxi fleet can carry will depend on the length of the trip and the speed of the vehicles. Assuming that these taxis would be used only to transport riders between the bus overload points and the CBD, the average one way taxi trip in Dallas would be approximately 3.1 miles, or 6.2 miles round trip. Depending on the speed, the maximum route taxi capacity at this point would be 1800 to 2600 passengers (a 40 percent ridership increase will produce about 50,000 peak period riders in Dallas, or about 5,000 more than the system can carry). As the figure shows, a fare of approximately \$1.00 to \$1.25 per person would be needed to make the service economically feasible for the taxi-cab operators.

FIGURE V-14



* To earn \$8/hour; outbound passengers not considered

In sum, the route taxi idea may be able to accommodate a good portion of the unmet transit ridership demand. This will depend, however, on other factors such as where the extra capacity is needed and during what times the service is needed. It also appears that such a service would be most successful along short routes and through areas where a relatively high speed can be maintained.

Through the extensive use of carpools by commuters who reside and work in the cities of Dallas and Fort Worth, it may be possible to alleviate some of the possible transit ridership overload expected in these cities. Data from the current Dallas and Fort Worth carpool programs indicates that approximately 90 percent of the program participants living in Dallas and Fort Worth also work in these cities, and that the majority of these individuals work in the CBD's. In addition, data from the Fort Worth carpool program suggests that approximately 80 percent of Fort Worth's participants have been matched.⁴⁵

Although the number of carpools which might be formed through an extensive carpool program is not known nor is the impact that such carpools might have on transit ridership, a tentative forecast of carpooling to the Dallas CBD for example, suggests that an effective carpool program could substantially alleviate transit ridership overloads during an energy shortage (Table V-9). Analysis further indicates that, without carpool incentive, transit ridership would increase the expected 40 percent while, with an aggressive carpool program, this maximum increase may be kept at a more manageable 25 percent rise. The estimated 5,000 new Dallas carpools (with an average carpool size of 2.5 persons) thereby formed from would-be transit riders could eliminate the need for the previously mentioned additional 40 DTS CBD-bound buses required during a severe energy scenario.

⁴⁵Data based on the City of Dallas and City of Fort Worth Carpool Program information on current participants, May, 1977.

TABLE V-9

IMPACT OF A CARPOOL PROGRAM ON MODAL SPLIT
OF DALLAS WORKERS TO DALLAS CBD

Travel Mode	Percent Modal Split		
	Before Shortage	Severe Shortage With No Carpool Program	Severe Shortage With Carpool Program
Drive Alone	42%	31%	27%
Carpool	38%	41%	48%
Transit	20%	28%	25%

Source: Estimates based on methodology in: Cambridge Systematics, Inc., Guidelines for Travel Demand Analyses of Program Measures to Promote Carpools, Vanpools, and Public Transportation, prepared for Federal Energy Administration, (Cambridge, Massachusetts: Cambridge Systematics, Inc., November, 1976).

Attaining such carpool levels may, however, not be practically possible. Since typically only about 10 % of carpool program participants actually form carpools,⁴⁶ the current active participant data base for the Dallas program would have to be increased by three or four times its current size and additional employer incentive measures would be needed to even approach this extent of carpooling. However, it can be concluded that, if the existing carpool program is still in operation at the time of a future fuel shortage, the expected overburdening of the transit system would be at least slightly reduced and a substantial amount of fuel would be saved. The carpool option is, moreover, an alternative which the public fully expects to have available (see following discussion of para-transit) and thus should not be neglected.

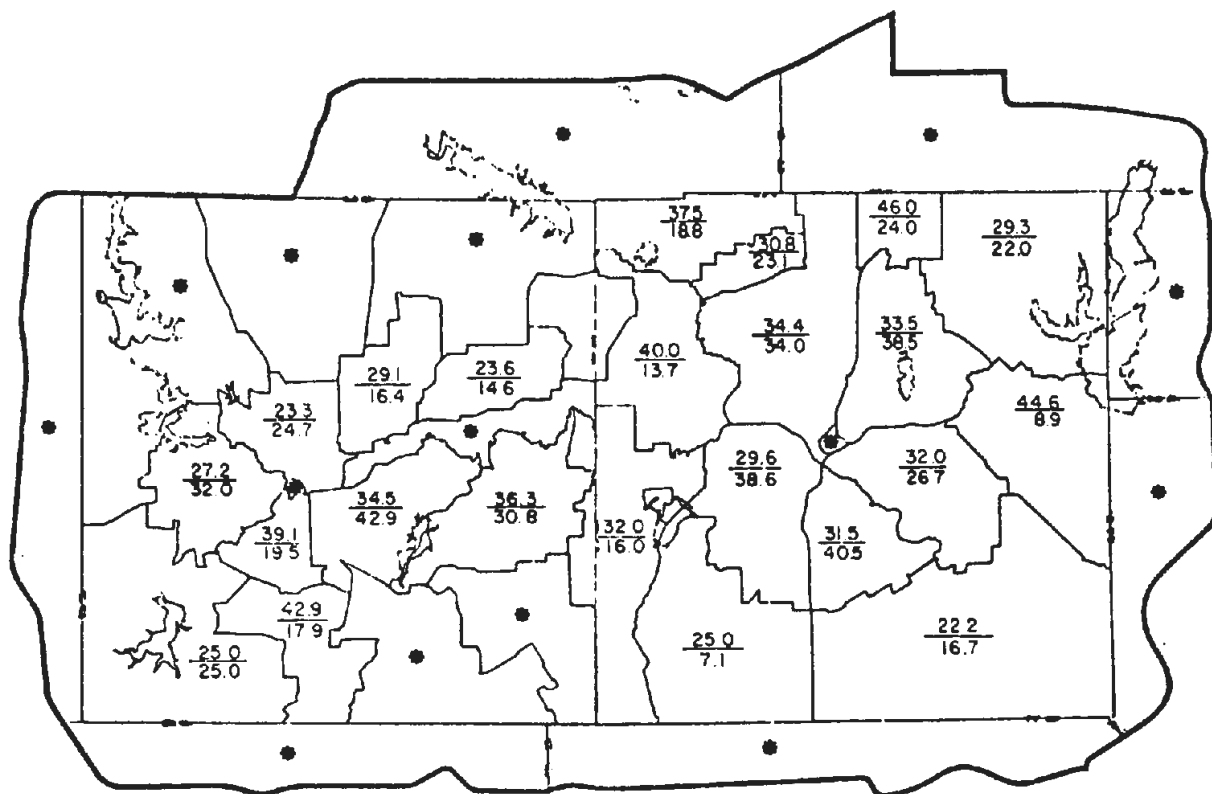
⁴⁶Richard H. Pratt, Neil J. Pedersen and Joseph J. Mather, Traveler Response to Transportation System Changes - A Handbook for Transportation Planners, prepared by R. H. Pratt Associates, Inc. for the U. S. Department of Transportation, February, 1977, pp. 84-86.

Transportation Alternatives in Suburban Areas

Meeting demands for public transportation in areas where such service is not currently provided could become a serious concern for communities. The Urban Panel survey indicates that the demand for travel alternatives to the individually driven auto, especially through modal shifts to carpooling and transit, is likely to be as great in the suburbs as in the major cities (Figure V-15). The following discussion examines the transportation problems likely to develop in suburban areas and suggests the applicability of transit and paratransit solutions to these problems.

FIGURE V-15

**PUBLIC RESPONSE TO FUTURE GASOLINE SHORTAGE*
INTENSIVE STUDY AREA**



CARPPOOL MORE \longrightarrow $\frac{32.2}{\text{total}}$ \longleftarrow PUBLIC TRANSPORTATION MORE
total 28.2

* INSUFFICIENT DATA

* RESULTING IN A GASOLINE PRICE INCREASE OF ONE DOLLAR OR MORE A GALLON. BASED ON PERCENT OF SURVEY RESPONDENTS (N = 2,000).

Source: North Central Texas Council of Governments, Urban Panel Project 1976.

Transit

Table V-10 estimates the potential number of transit riders who could use this service for work trips during a severe energy shortage if it were available in all areas of the Intensive Study Area by 1980. This indicates that a substantial demand for transit service would likely develop in the local suburban communities. Since, however, the anticipated fuel shortage may limit the extent of additional service the existing transit systems (DTS and CITRAN) will be able to provide, they cannot be depended on to extend new service into these suburban areas under the most severe energy shortages.⁴⁷ This depends on the extent of the fuel shortage and the success of the previously described actions to accommodate central city transit demand. Each community, therefore, must examine the possible alternate options for meeting this public demand for transit service. Possible solutions would be to:

- Utilize existing available transit equipment (if any) to the maximum extent
- Rent buses from the private sector
- Utilize public school buses

Some cities in the Intensive Study Area currently have preliminary programs aimed at developing a transit or paratransit capability within the near future. Arlington, Garland, Grand Prairie, Irving, Mesquite and Richardson may be in the position to operate their own transit or paratransit vehicles if such projects have been established. In addition, preliminary studies⁴⁸ on park-and-ride facilities for these communities have been undertaken and Garland currently provides park-and-ride service to downtown Dallas while

⁴⁷ It is anticipated that the general policy of the cities of Dallas and Fort Worth would be maintain existing service before any additional service would be considered.

⁴⁸ Pinnell-Anderson-Wilshire and Associates, Inc., Transit Operational Studies, Prepared for the Cities of Arlington, Grand Prairie, Irving, Garland, Mesquite, and Richardson (Dallas, Texas: 1975).

park-and-ride service from Irving is currently proposed. If such proposed services are in existence at the time of the gasoline shortage, they could likely meet much of the local demands for inter-city public transportation.

TABLE V-10

**ESTIMATES OF POTENTIAL DAILY TRANSIT RIDERSHIP
(WORK TRIPS ONLY)**

	Current Situation Workers Using Transit*	Severe Energy Shortage, 1980 Workers Using Transit**
DALLAS COUNTY	40,280	78,000
Dallas	38,000	53,200
Garland	500	5,700
Grand Prairie	210	2,000
Irving	110	4,900
Mesquite	150	4,300
Richardson	60	3,100
Remainder of County	1,250	4,800
TARRANT COUNTY	7,710	15,500
Arlington	460	4,900
Fort Worth	7,000	9,800
Remainder of County	250	800
Total Bi-county	47,990	93,500
Remainder of Intensive Study Area	150	5,000
TOTAL Intensive Study Area	48,140	98,500

* Estimates based on 1970 census data revised to reflect 1977 population and existing transit service.

** North Central Texas Council of Governments estimates assuming transit service is available in all areas.

The potential for renting buses from the private sector has been discussed previously. In smaller suburban communities, however, these may be more feasible alternatives than in Dallas or Fort Worth. Fewer buses would be needed and the spirit of community cooperation which would be likely to exist during this "crisis" period could help persuade the private sector to make their buses available for public use.

The Potential Use of School Buses

Although current State law prohibits the use of public school buses for general transportation purposes,⁴⁹ it is conceivable that an extreme emergency created by a fuel shortage could result in a temporary use of these vehicles. If so, how could school buses be used to provide or augment public transportation in a suburban community? A number of potential usage alternatives can be suggested. These include:

- Allowing school buses to serve the general public only during those hours in which they are not in school service
- Allowing the general public to board buses along normal, or slightly modified, school bus routes during school transporting times
- Using school buses as shuttles or a feeder service to fixed transit lines or park-and-ride lots (if in existence)
- Using some school buses to provide special trips, e.g., to transport workers to and from a major employment center
- Appropriating the school bus fleets for general public service during peak morning and afternoon travel periods.

The general public use of school buses during times which they are not in school service (primarily between 9:00 a.m. and 2:30 p.m., and after 4:30 p.m.) would probably be the alternative least disruptive to normal school operations. The obvious disadvantage of this option is that the buses would not be available during the general public's peak travel times. Although some of the afternoon commuters could be accommodated by school buses, no vehicles would be available during the morning peak hours.

By allowing the general public to board school buses along their normal (or slightly modified) routes at usual school times, there would be little disruption of normal operations. In many cities, school children ride public transit buses with the general public

⁴⁹House Bill 349 permitted the general use of these buses, but it was defeated in the 1977 Texas Legislature.

so this would not be an unusual situation. However, since the school buses operate during limited times and along routes which may not be major destination points for the general public, few would be able to take advantage of such a service. Also, buses which are at capacity with students would not be able to transport other passengers. If such a service were initiated in Arlington, as an example, nearly all residential areas would be served by a bus line, however, the major trip destinations such as the Great Southwest industrial district or the Abrams-Division Street commercial areas would be poorly served (Figure V-16).

School buses could also be used to shuttle passengers between residential areas and existing fixed route transit systems or park-and-ride facilities. Such an operation could be established by allowing the public to ride the school buses as they transport the students or by appropriating school buses to be used exclusively for this feeder service. It should be noted that a feeder system of this type is needed to make suburban park-and-ride operation bidirectional, i.e., to serve central city residents who work in the suburbs, some form of transportation is needed to get the worker from the suburban park-and-ride lot to his final destination.

Another alternate use of school buses could be to provide special trip service. Buses taken from school use, for example, might be used to pick-up and transport workers to a major employment center, such as the General Motors plant in Arlington. Trips for special groups, such as the elderly or handicapped could also be provided in this way.

Finally, the school bus fleet could be appropriated from school service and placed into general service throughout the community during the peak travel hours. While this would cause the most extreme disruption of normal school operations, the community would be able to meet a great part of its local transit demand with these fleets at their service.

If school buses are to be utilized in any way during peak travel periods, the school systems would have to adjust to accommodate these transportation changes. School class

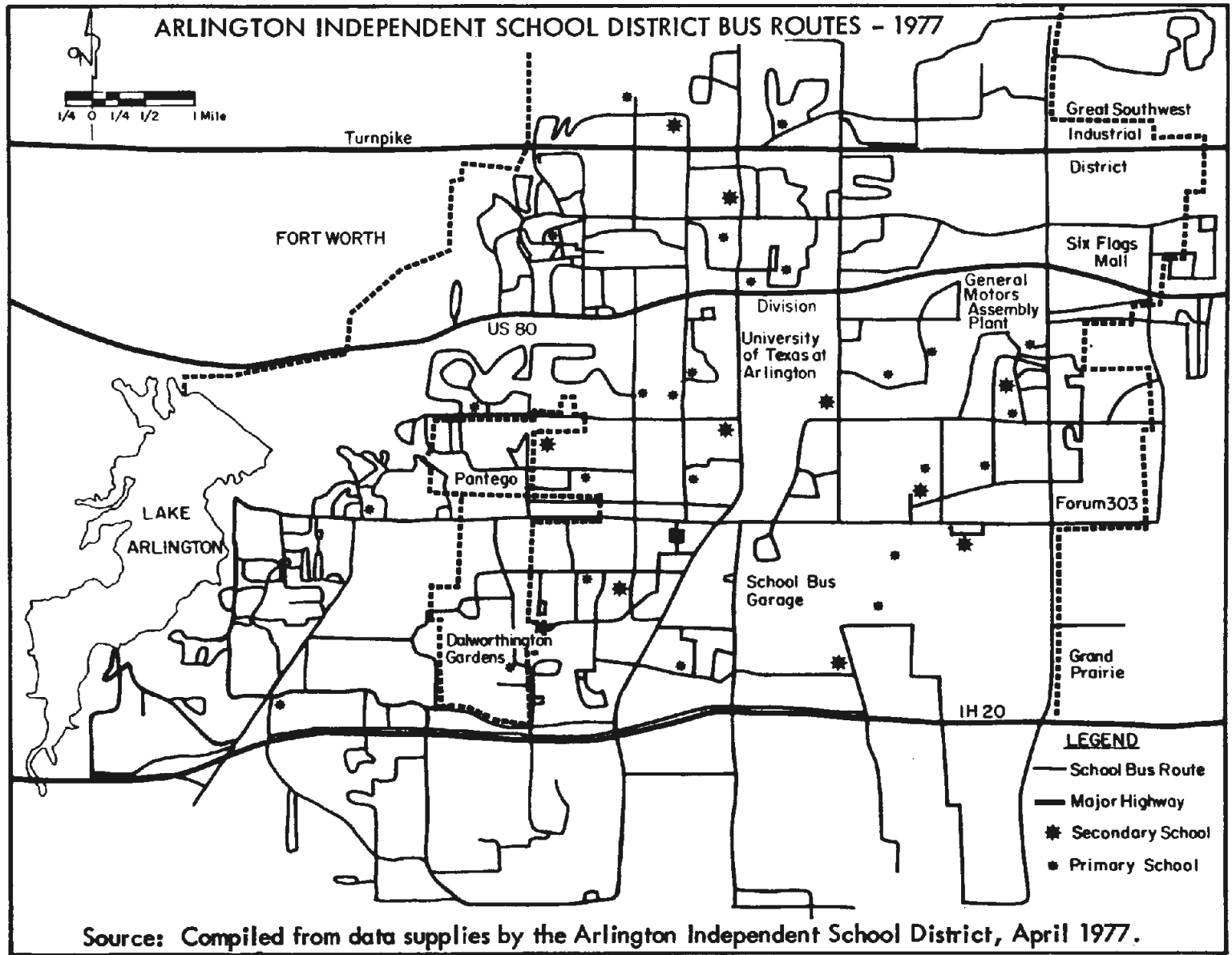


FIGURE V-16

hours could be affected. Allowing the general public to board school buses as they transport children along usual routes would probably result in longer travel times which could be accounted for by starting classes at a later time or beginning the bus service earlier.

If some school buses are appropriated for exclusive public transportation service, the school system would have to consolidate existing school routes to account for the reduction in their vehicle fleet. Such accommodation could be in the form of the remaining buses making more and longer trips along established school bus routes or possibly establishing neighborhood school transportation centers at selected existing schools or at new centrally located bus stops.

Under the neighborhood school transportation center concept, each pupil would live within two miles of his or her school or a school bus stop. While Texas law currently provides financial assistance for school bus transportation for students further than two miles from their school, no restrictions are placed on the distance from the residence to the bus stop, and bus riding school children generally walk less than those children within two miles from the school. The neighborhood center would tend to equalize the extent of walking by all pupils by requiring bus-riding children to walk to a neighborhood center for bus service.

In the Arlington case study, depending on the maximum walk distance, the neighborhood center approach would make available from 8 to 18 vehicles for general transportation purposes (Table V-11) or for increased service along the modified routes. It should also be noted that a plan for a local bus system which is being developed by the City of Arlington proposes to use only 12 transit vehicles.⁵⁰

⁵⁰ Pinnell-Anderson-Wilshire and Associates, Inc. and Simpson & Curtin, Transit Implementation Program, (draft), prepared for the City of Arlington, June, 1977, p. 31.

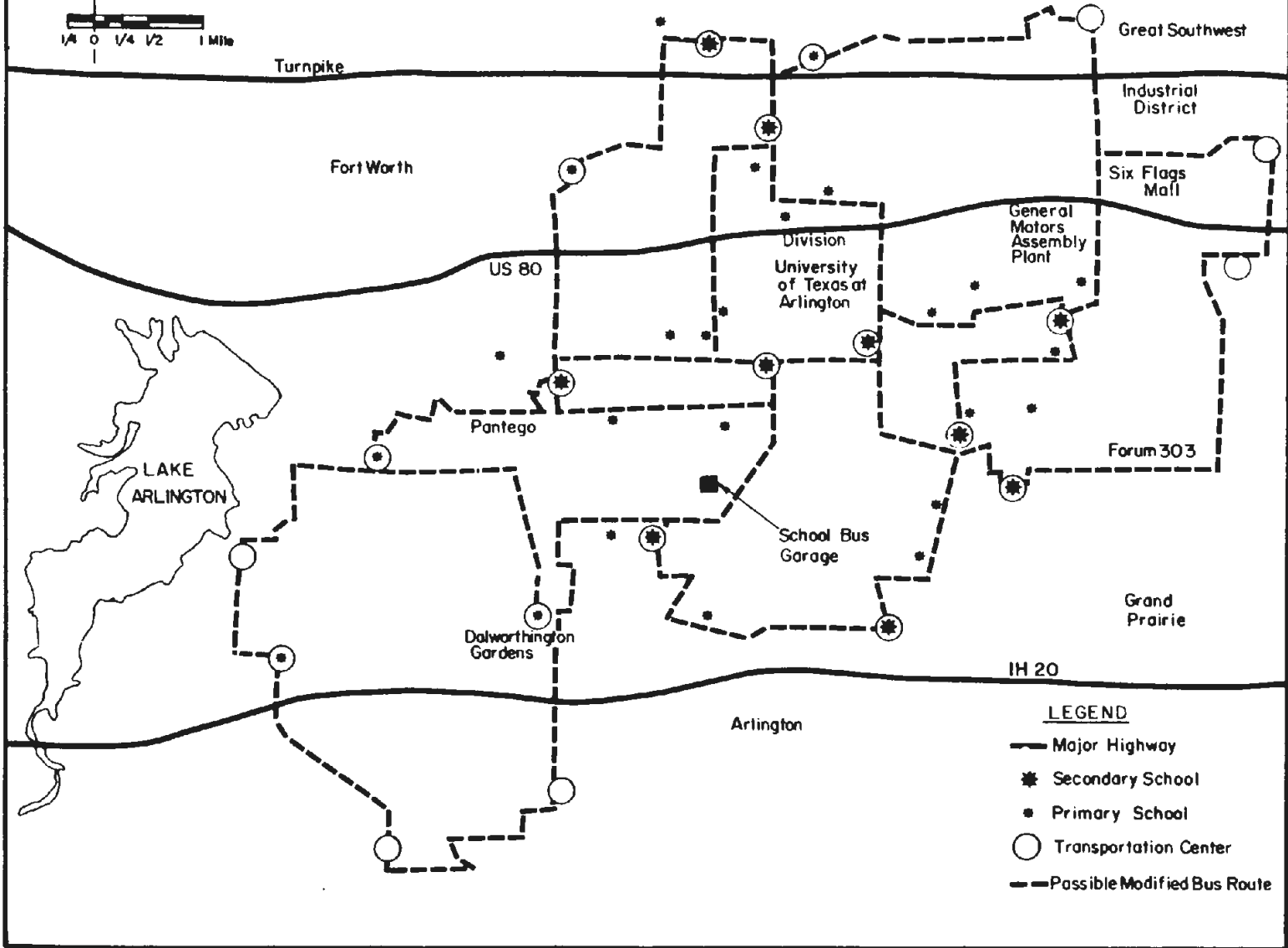
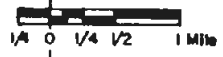
TABLE V-11

**IMPACT OF NEIGHBORHOOD SCHOOL TRANSPORTATION CENTER CONCEPT
ARLINGTON CASE STUDY**

	Current System	Cases Examined		
	1/8 Mile	1 Mile	1-1/2 Miles	2 Miles
Maximum Walk Distance	1/8 Mile	1 Mile	1-1/2 Miles	2 Miles
Number of Bus Routes	50	6	5	4
Number of Transportation Centers	none	21	13	5
Number of Buses Used	50	42	40	32
Number of School Buses Available for General Use	0	8	10	18
Trips Per Route Per Peak Period	2	14	16	16
Total Route Miles	594	74	60	58
Total VMT per Day	1848.6	2072	1920	1856
Seat Trip Capacity Per Peak Period	7160	6100	6000	4800
Passengers Served	Students Only (4,700)	Students, General Public	Students, General Public	Students, General Public
Public Ridership Allowable Per Peak Period	none	1,400 Passengers	1,300 Passengers	100 Passengers

The buses made available through this approach could be used to run additional routes or to provide higher frequency service on a modified route structure designed to service both public school children and the general public. Figure V-17 is an example of how a modified school bus route system which incorporates the neighborhood transportation center concept could appear in the Arlington case study. One system would consist of six bus routes which connect 21 transportation centers with a maximum student walk distance of one mile. If seven school buses were placed in service along each route during peak travel periods, approximately 1,400 city commuters could be accommodated as well as the usual number (approximately 4,700) of school children. In addition, a high level of service (bus headways as short as nine minutes) could be provided.

MODIFIED SCHOOL BUS ROUTE SYSTEM WITH THE NEIGHBORHOOD TRANSPORTATION CENTER ARLINGTON CASE STUDY



- LEGEND**
- Major Highway
 - ★ Secondary School
 - Primary School
 - Transportation Center
 - - - Possible Modified Bus Route

FIGURE V-17

In the most extreme case, where most of the school fleet would be appropriated, it might be necessary to totally restructure school hours or possibly cancel classes totally on a temporary basis. While this may seem to be a drastic step, it should be noted that numerous schools, in Texas and elsewhere, were closed during the natural gas shortage of the winter of 1976-1977. If, however, the fuel shortage were to occur during the summer holiday months, most of these problems would be obviated.

It appears that none of the preceding alternatives will be easy to accomplish. The problems of obtaining drivers, vehicle maintenance and fuel supply⁵¹ will be major obstacles, not to mention the institutional difficulties involved with alterations to the structure and purpose of the public school transportation system. If, however, the demand for public transportation is great enough, the use of school buses provides an alternative which should not be dismissed.

Paratransit

If transit service cannot be provided, the demand for transportation alternatives in suburban areas may be met through existing or new paratransit services. Paratransit alternatives include carpools, taxicabs and elderly and handicapped services.

Auto occupancy and public survey indicators have identified carpooling as one of the major responses to the previous energy shortage. Given the energy restraints of both the allocation and rationing scenarios, it can be expected that this option will become especially attractive to local commuters during this time. Also, an overwhelming 90 percent of local residents surveyed by the Urban Panel Project expect their communities to encourage carpool operations in the event of another energy crisis.⁵²

⁵¹ It should be noted that most school buses use gasoline and, a shortage of gasoline supplies is expected to be more severe than that for diesel fuel which most transit buses use.

⁵² Urban Panel Project 1976, p. VIII-13.

The major problem in the formation of carpools during an energy shortage period would probably not be the lack of demand, since most commuters would be searching for ways to save gasoline to avoid service station lines or to conserve ration coupons. Instead, the lack of information on carpool matching programs could possibly inhibit carpool formation and utilization. Most importantly, since the development of a local carpool program at the onset of another embargo would take too long to be effective as a short term solution (The Dallas and Fort Worth Carpool program took over a year from inception to initiation),⁵³ carpool programs should be in operation prior to an energy shortage to be effective.

The ground work for a regional carpooling effort has already been accomplished by the Dallas Carpool Demonstration Program and the Metropolitan Fort Worth Carpool Demonstration Project, both initiated during the embargo period of 1974.⁵⁴ Assuming these programs are in operation during any near-term energy shortage, most requests for suburban carpool information could also be met in this manner. The initial cost of the Fort Worth program was \$80,000 for the first year, and the initial Dallas program costs were \$170,000 for the first two and one-half years of operation. Current maintenance of the programs is estimated at \$30,000 annually in Fort Worth and \$50,000 per year in Dallas.⁵⁵ Thus, by maintaining the programs, start up costs are avoided, and, more importantly, the annual regional cost savings by participating carpools in suburban as well as urban areas would more than offset the cost of the program.⁵⁶

⁵³City of Dallas, Traffic Control Department, "Dallas Carpool Demonstration Program," Project N.M.-9001-(10), Quarterly Report No. 1 (Dallas, Texas: June 1, 1974), pp. 1-3.

City of Fort Worth, Traffic Engineering Department, "Evaluation: Metropolitan Fort Worth Carpool Program Demonstration Project M-9009-(14)" (Fort Worth, Texas: January, 1976), p. 3.

⁵⁴Ibid.

⁵⁵City of Dallas, "Dallas Carpool Demonstration Program."
City of Fort Worth, "Metropolitan Fort Worth Carpool Program Demonstration Project."

⁵⁶Ibid.

The use of carpools in local suburban areas, however, has not been a particularly effective alternative to individual travel in the past due to the lack of public participation. It is anticipated, however that with the emergency conditions which may arise during a severe fuel shortage, suburban commuters may turn to forming carpools in greater numbers. Indeed, approximately one-quarter of all suburban Urban Panel commuters indicated that they would carpool more in the event of a gasoline price increase to one dollar or more.⁵⁷ This seems consistent with the preliminary estimate in Table V-12 which indicates that the impact of a severe energy shortage (25 percent shortfall) on local suburban commuter patterns would be that up to one-third of all suburban commuters would carpool if an effective carpool program were in existence at the time.

TABLE V-12

THE MAXIMUM IMPACT OF A SEVERE ENERGY SHORTAGE ON
SUBURBAN CARPOOLING IN THE DALLAS-FORT WORTH AREA

Transportation Mode to Work	Percent Modal Split		
	Before Shortage	Severe Shortage With No Carpool Program (Upper Carpool Limit)	Severe Shortage With Carpool Program (Upper Carpool Limit)
Drive Alone	82%	74%	68%
Carpool	18%	26%	32%

Source: Estimates based on methodology in: Cambridge Systematics, Inc., Guidelines for Travel Demand Analyses of Program Measures to Promote Carpools, Vanpools, and Public Transportation, prepared for Federal Energy Administration (Cambridge, Massachusetts: Cambridge Systematics, Inc., November, 1976).

⁵⁷ North Central Texas Council of Governments, Urban Panel Project, Micro-Level Data, 1976, p. VIII-10.

Thus, while carpooling may not eliminate the need for the purchase of additional gasoline coupons in suburban areas, it is probably the cheapest and easiest conversation measure to implement. In order for carpool programs to be available at the onset of an emergency period, however, they should be in operation (though they may be relatively inactive) prior to the emergency. If the existing Dallas and Fort Worth carpool programs were not maintained, the time to develop and update the data base alone could take several months⁵⁸ and thus would reduce the effectiveness of this program as a short-term strategy.

The need to maintain a taxicab fleet, especially in suburban communities of the Intensive Study Area which have no other form of public transportation, is essential to the mobility of the region. Table V-13 lists the local cities with taxicab service.

TABLE V-13
INTENSIVE STUDY AREA TAXICAB STATISTICS

City	Number of Taxicab Companies	Number of Taxicabs
Arlington	1	10
Carrollton	1	2
Dallas	2	500
Eules	1	3
Farmers Branch	1	2
Fort Worth	2	200
Garland	•	•
Grand Prairie	1	2
Irving	1	21
Mesquite	1	2
Plano	1	2
Richardson	1	3
TOTAL	14	784

* Served by Yellow Cab of Dallas

Source: Texas Municipal League, Taxicab Service in Texas Cities - 1975, June, 1975.

⁵⁸Opinion expressed by Mr. Jim Haven, Dallas Carpool Program, February, 1977.

Major taxicab operation difficulties would probably arise from the reduced availability of fuel and the expected fuel cost increases. The availability of fuel could be managed through individual company actions, such as by enhanced fuel storage capability as was suggested for local transit operation, or by local service station regulations which will be discussed later.

Fuel cost increases would likely result in fare increases and thereby, through the attendant loss in ridership, threaten the continued operation of the smaller taxicab companies in some suburban areas. In addition, large fare increases may put service out of the reach of groups such as the poor or elderly and handicapped who depend on it for a significant portion of their trips. While a detailed analysis of these problems are beyond the scope of this study, they should be considered in the continuing transportation planning of the area.

Specialized taxicab services were tried during the last embargo. One such scheme was attempted by Yellow Cab Company of Houston during the 1973-1974 embargo.⁵⁹ This experiment introduced a "taxicab pool" service, similar to transit park-and-ride, which picked up commuters at suburban shopping centers and transported them to downtown Houston. During the first week of operation a fleet of 50 cabs carried about 200 persons from 13 suburban shopping centers to three downtown locations. Commuters who wished to use the service phoned Yellow Cab for a reservation and a computer assigned them to one of the pickup points. With about five persons sharing the costs, round trip fares ran as low as two dollars. The service, however, was not used by sufficient numbers of commuters to be considered successful. This may reflect the difficulty in starting temporary public transportation services in suburban areas or the problems of any new service establishing public acceptance on a short-term basis. The success of such a program could also be highly dependent on public information concerning the program.

⁵⁹"Taxicab Pool Starts for Houston Riders," The Dallas Morning News, 13 December, 1973, p. 37 A.

The problem of increased costs on elderly and handicapped services may be alleviated through the coordination and consolidation of such services and resources. Recommendations to this effect have previously been outlined in Transportation Options for the Elderly and the Handicapped⁶⁰ and are very applicable to coping with the rising costs and fuel availability associated with an energy shortage.

To summarize, paratransit solutions to the demand for public transportation in suburban areas seem to be feasible alternatives. However, the higher fuel costs and the unreliability of obtaining sufficient fuel supplies (neither taxicabs nor other paratransit services seating 10 passengers or less would qualify for preferential fuel supplies under either scenario) may discourage the development of these services and may even lead to a cut in the existing paratransit services.

Inequities and Uncertainties of Rationing and Allocation

While perhaps the impact of a future fuel shortage which will affect the greatest number of people is the result of the governmental approach to the distribution of scarce automotive fuel, dealing with this problem area is particularly difficult for local governments. Some measures may have some effectiveness, however, and these are discussed below.

Allocation

The auto user is the primary federal fuel conservation target of both rationing and allocation plans. Under allocation, long lines and difficulty in obtaining gasoline will result in public uncertainty and confusion with regard to fuel purchases. This is because station operators, who can obtain only limited fuel supplies, are free to establish their individual policies of business hours and customer sales policies. Some station operators may decide to allow unlimited fuel sales, some may impose a monetary purchase limit,

⁶⁰North Central Texas Council of Governments, Transportation Options for the Elderly and the Handicapped (Arlington, Texas: September, 1976).

and some may sell only to regular established customers. The days and hours of business generally may vary at the discretion of the operator. Policies such as these will probably add to the confusion and uncertainty of the period.

One obvious solution would be to coordinate local gasoline station sales policies. During the past embargo, numerous efforts, mostly by other states, were made to coordinate gasoline sales policies by determining who may purchase fuel on which days through such criteria as license plate numbers or letters. New York State, for example, during the past embargo mandated an odd/even gasoline rationing system which required minimum purchases of one-half of a tankful.⁶¹ A system of gasoline station regulations with regard to customer sales, similar to these used by some states during the past embargo, could be implemented on a local city basis.⁶² Based on the license plate (possibly State inspection sticker) number distribution in the Intensive Study Area (Table V-14) a system could be developed whereby half of the automobiles will be eligible for gasoline purchases on alternating days, assuming that the State has not already taken this step.

In addition to the above action, it may also be helpful to coordinate retail gasoline sales times so that supplies are available when the demand is greatest and so that each area will be served by at least one station during all times. Another measure may be to place a limit on the amount of gasoline each station should sell per day, thus ensuring a constant fuel supply through each allocation period. The implementation of actions such as these should solicit the voluntary cooperation of service stations since any legislative actions may prove time-consuming and difficult to enforce. In addition, the intent is not to encumber local businesses with extensive ordinances.

⁶¹ Carol A. Keck, et al., p. 8.

⁶² Existing Texas law may not permit counties to establish such measures except on a voluntary basis.

TABLE V-14

**LICENSE PLATE DISTRIBUTIONS FOR INTENSIVE
STUDY AREA COUNTIES ***

County	License Distribution (1975) **
Collin	GQK 925 - GSH 399
Dallas	GSH 400 - JDU 899
Denton	JDU 900 - JFZ 424
Ellis	JFZ 425 - JHC 199
Johnson	CGE 150 - CHL 449
Kaufman	JHC 200 - JHV 174
Parker	CJC 825 - CJW 524
Rockwall	JJP 175 - JJW 449
Tarrant	CJY 350 - DDC 699

* Only Dallas and Tarrant Counties are totally within the Intensive Study Area.

** License plate numbers range from 10 to 999. The letters I and O are not used for legibility purposes, otherwise the lettering uses a sequential lettering and numerical system. For example, after GQK 999 comes GQL 10. Additional numbers have been added through 1976.

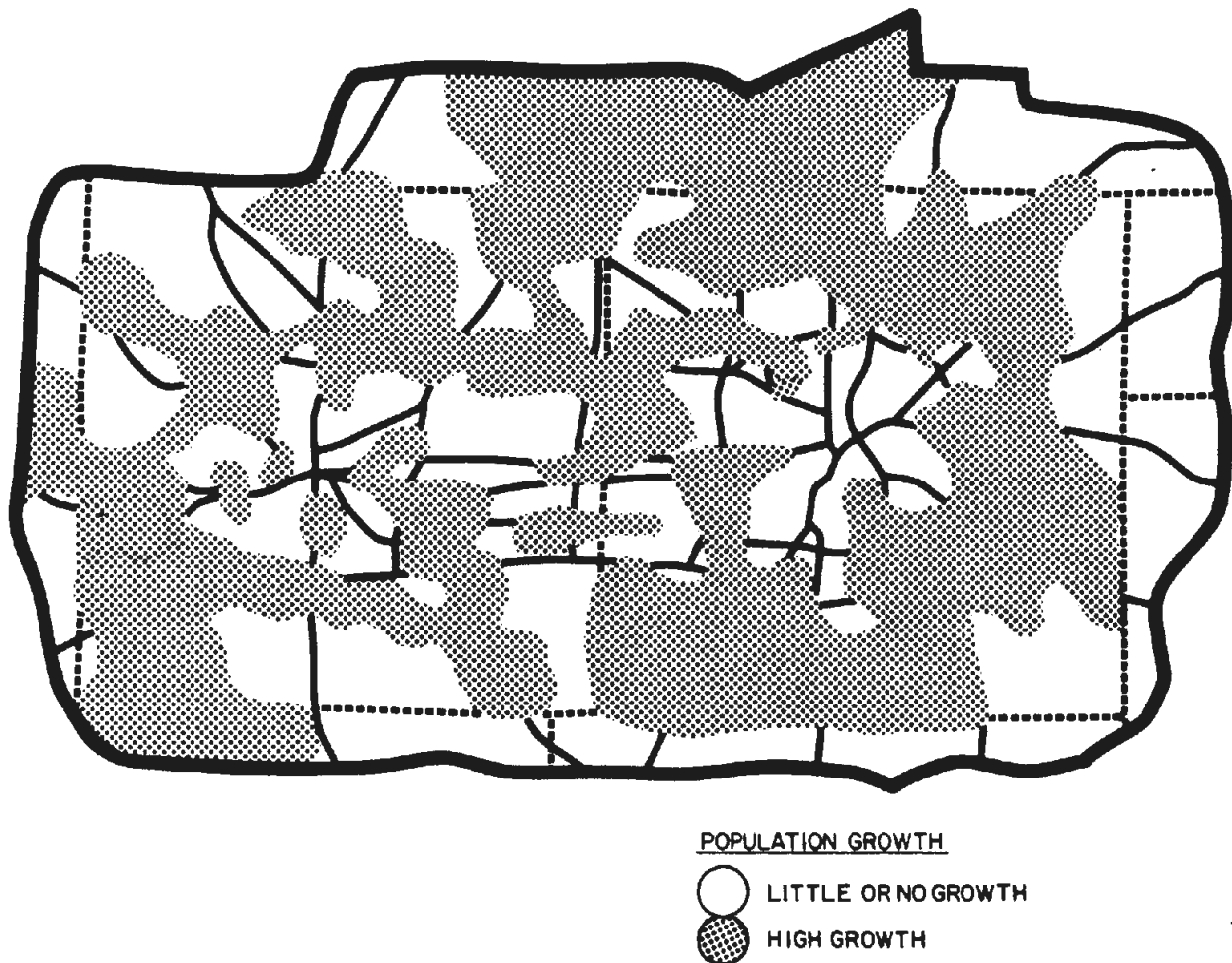
Source: Texas State Highway Department, 1975 License Plates Assigned to the County Tax Collectors (Austin, Texas, Motor Vehicle Division, 1975).

Another possible problem will involve the unequal regional allocation of gasoline supplies to local service stations. Since allocations are determined on a historical base year (currently 1972), it is likely that high-growth areas would not receive their fair share of fuel supplies. If adjustments are not quickly made by the individual station operators, suppliers, and the FEA, it is conceivable that all of the gasoline supplies in a community may be depleted well before the end of an allocation period.

As can be seen on Figure V-18, such high growth areas are mainly in the suburban areas of the Intensive Study Area surrounding the cities of Dallas and Fort Worth. To determine

under-supplied areas, however, gasoline allotments should be carefully reviewed throughout the area should an embargo or other shortage be imminent. While this is currently the responsibility of the individual station owner, local governments may want to offer assistance in this regard.

FIGURE V-18
EXPECTED POPULATION CHANGES
1970 to 1980

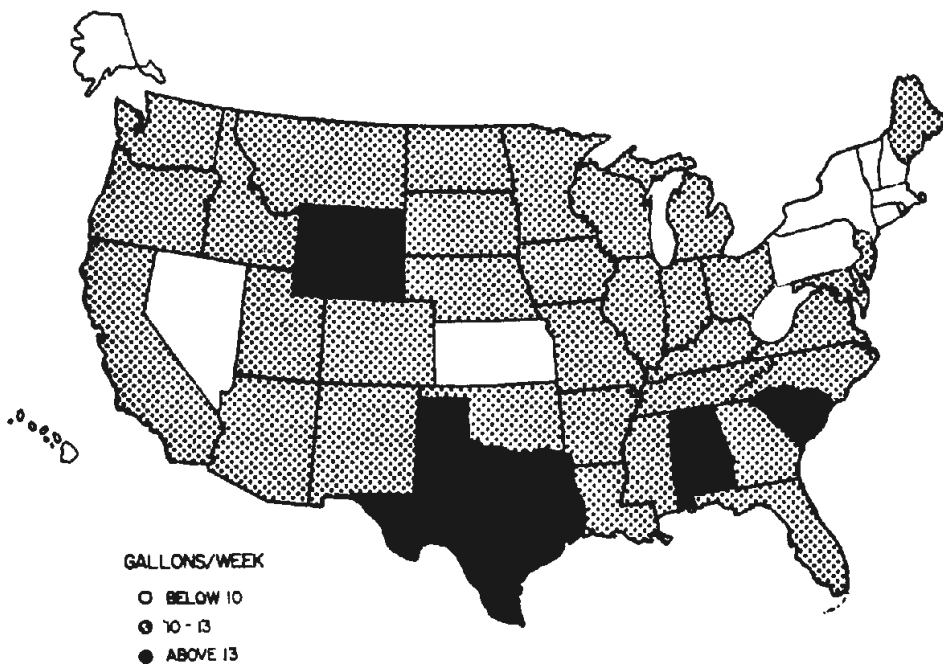


Rationing

As Figure V-19 shows, drivers in the State of Texas are among the largest gasoline consumers in the nation, using an average of over 13 gallons per capita per week. The impact of a rationing program which would limit individual gasoline allotments from seven to ten gallons could thus be considerable.

FIGURE V-19

GASOLINE CONSUMPTION PER LICENSED DRIVER BY STATE

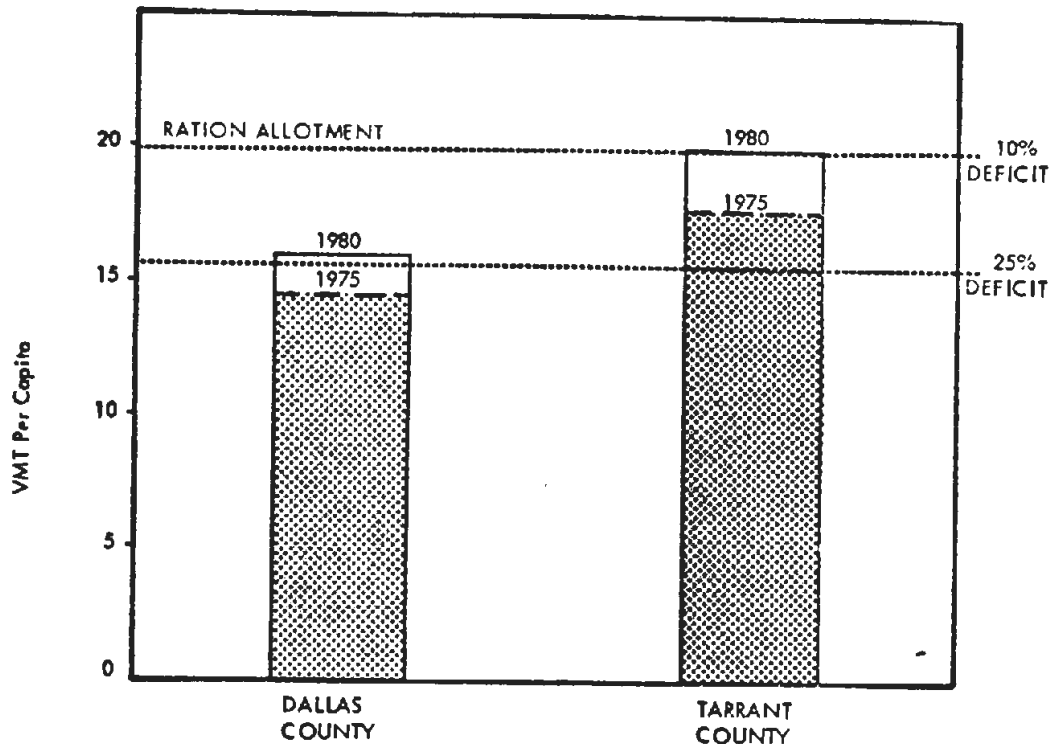


Source: Federal Energy Administration, Proposed Gasoline and Diesel Fuel Rationing Contingency Plan, Economic Impact Analysis (Washington, D. C.: September, 1976) p. 259.

Locally, because of differences in per capita gasoline consumption by county [as estimated by vehicle miles traveled (VMT)], gasoline rationing would probably affect Tarrant County more severely than Dallas County (Figure V-20). While it appears that neither county

would need to significantly reduce VMT under a 10 percent fuel shortfall (9.2 rationed gallons per week), both counties would need to reduce VMT under a 25 percent deficit (7.2 gallons per week) especially by the 1980 target year.

FIGURE V-20
PER CAPITA COUNTY VMT
1975-1980



Source: VMT estimates provided by the State Department of Highways and Public Transportation.

The imposition of fuel rationing will present a number of unique problems, especially those associated with the coupon mechanism. Since coupons will be distributed to licensed drivers equally, regardless of their needs,⁶³ it can be expected that some families will have insufficient coupons to maintain their necessary travel needs. This problem may be resolved by:

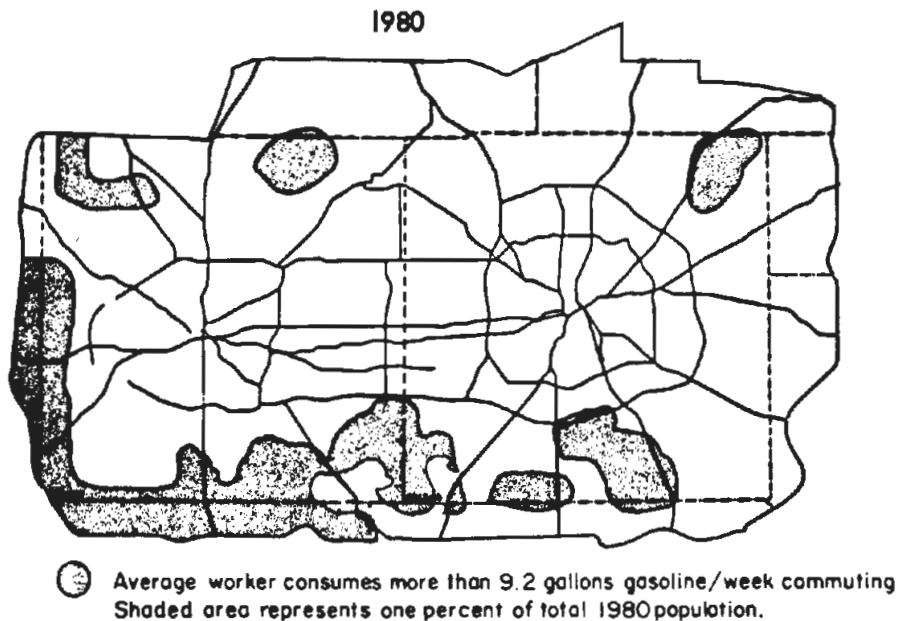
- Using alternate transport modes (transit, carpools)

⁶³ There are certain need exceptions as noted in Chapter IV.

- Purchasing additional coupons
- Increasing the number of licensed drivers per family
- Reducing personal travel

Figure V-21 shows the areas for which the anticipated coupon distribution (9.2 gal/week) would not be sufficient to satisfy the expected 1980 average weekly work trip. Most of these problem areas are located in the southern and western rural parts of the Intensive Study Area due to the high percentage of long distance commuters found here. These areas, however, include only about one percent of the total 1980 Intensive Study Area population. When the total home base travel is considered, however (Figure V-22), it can be seen that an average driver in nearly all areas would be unable to maintain normal travel behavior. These areas include approximately 70 percent of the total population. While much of this gasoline deficit could probably be resolved by eliminating unnecessary trips,⁶⁴ many drivers may choose one or a combination of the above alternatives rather than travel less.

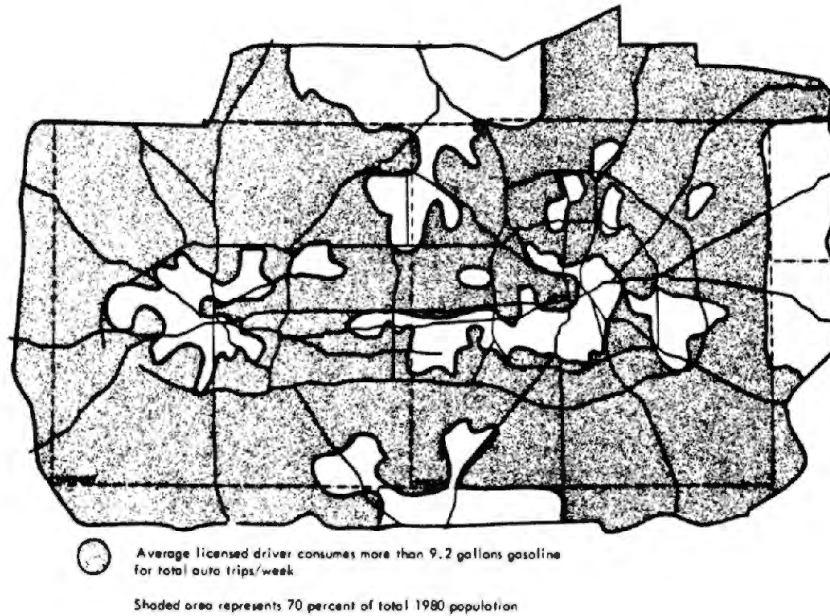
FIGURE V-21
AREAS IN WHICH AVERAGE WORK TRIPS USE MORE THAN 9.2 GALLONS/WEEK



⁶⁴The American Automobile Association has estimated that the average U. S. family could reduce its gasoline consumption by 25% and still maintain essential travel.

FIGURE V-22

AREAS IN WHICH AVERAGE TOTAL TRIPS USE MORE THAN 9.2 GALLONS/WEEK
1980

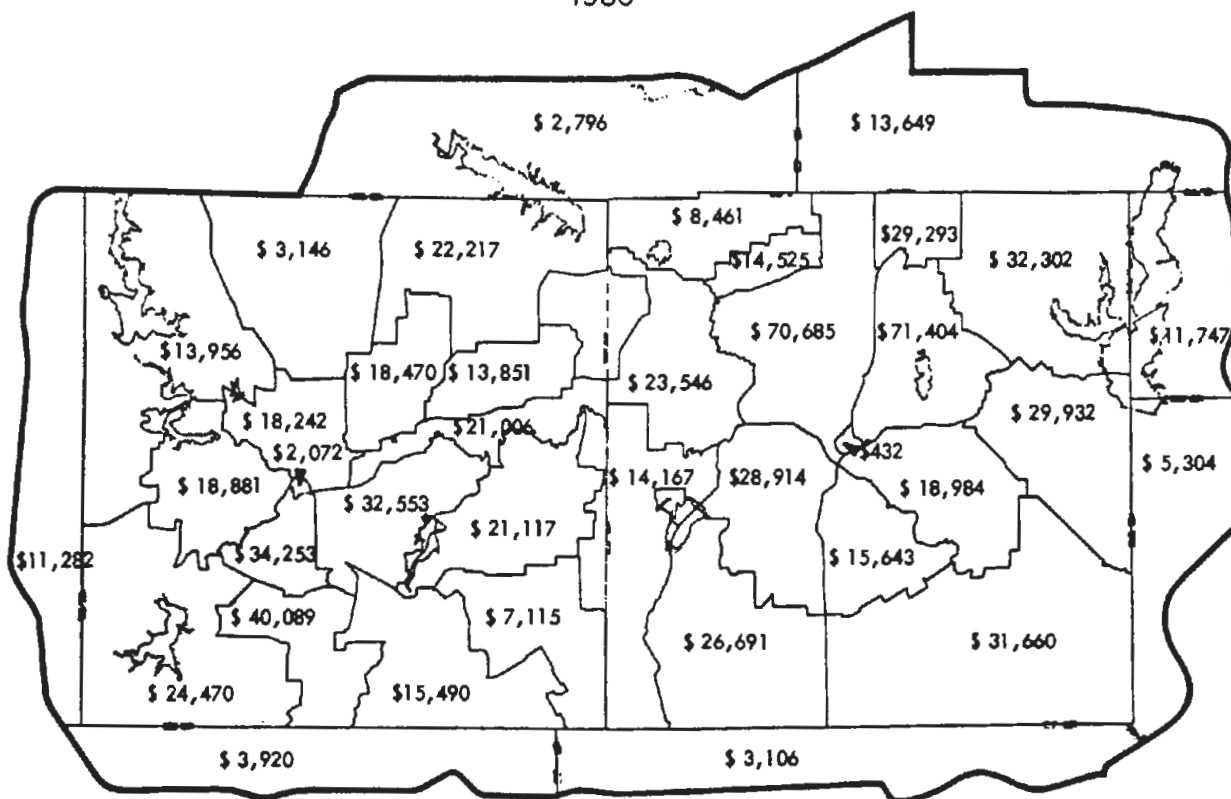


The idea of increasing the number of licensed drivers in each family whenever possible presents a possible solution to the coupon problem for some. By 1980, there will be an estimated 1,900,000 licensed drivers in the Intensive Study Area and approximately 570,000 eligible, but unlicensed persons. If just half of these eligible persons could be licensed, but restrained from driving, this would represent an additional 11,400,000 gallons of gasoline for this area during each ration period. It is questionable, however, as to whether governmental agencies should encourage this "solution" to the problem.

While another possible solution to an individual family's coupon shortage would be to purchase additional coupons on the white market, this may lead to a substantial financial drain on certain communities. Figures V-23 and V-24 show the estimated additional monthly costs which would be incurred by all licensed drivers and the cost per licensed driver by area if additional coupons are bought to maintain normal trip patterns. The total cost of these coupons in the Intensive Study Area would be over \$700,000 each month although the average cost per individual worker will be relatively small. Low income, long distance commuters, due to the coupon hardship reserve, may receive additional coupons at no extra expense. (These are not included in these estimates).

FIGURE V-23

ESTIMATED TOTAL COUPON COST PER MONTH FOR ALL LICENSED DRIVERS*
1980



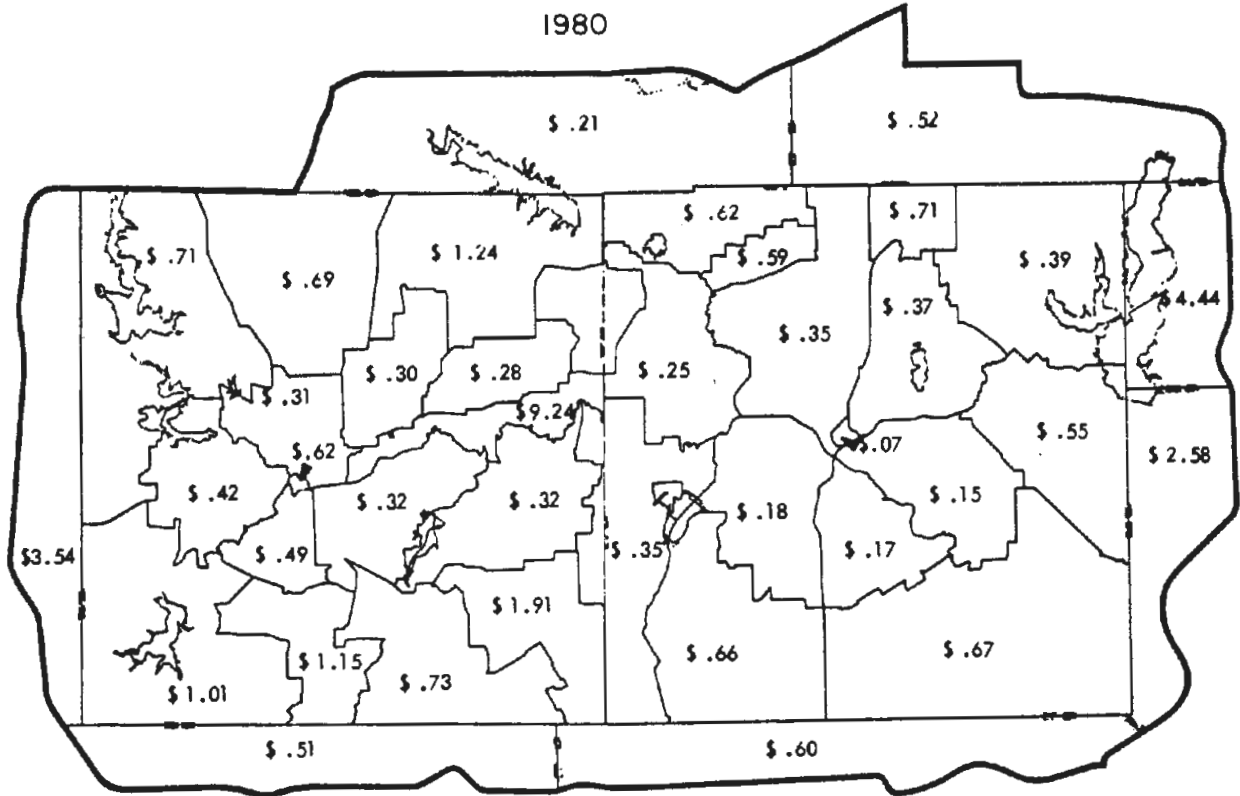
Total Intensive Study Area Cost = \$754,365

Coupon Price = \$1.20 per gallon

*Based on 28.8 gallon ration per month, 1980

FIGURE V-24

ESTIMATED MONTHLY COUPON COSTS PER LICENSED DRIVER*



Average Intensive Study Area Cost Per Licensed Driver = \$.39

Coupon Price = \$1.20 per gallon

* Based on 28.8 gallon ration per month, 1980

While the development of the "white market" for coupon distribution is anticipated by the FEA as being an effective means to redistribute coupons to better correspond to demand, it is possible that, locally, areas will exist in which coupon redistribution centers have not been established. This will lead to inconveniences for those who must drive additional mileage to obtain extra coupons. It would thus be desirable for local communities to monitor the location of coupon redistribution centers and attempt to encourage such centers where needed.

The FEA anticipates that significant coupon cost differences may develop around the nation. To contend with this problem they propose to publish national coupon prices periodically to aid in the equalization of price through an open market. Locally, significant disparities in coupon prices may also develop especially between city and suburban areas. It may therefore be helpful to publish prices from selected locations in local newspapers. This would help to establish a more-or-less uniform local price and provide the public with the information necessary to purchase fuel supplies at the least expense or to sell extra coupons at a maximum profit.

Institutional Arrangements

Since the preceding problems associated with gasoline allocations to service stations and the rationing coupon distribution and redistribution processes will vary within each community, it would not be practical to suggest a regional solution to these problems. It would be appropriate, however, for local governments to appoint a Local Energy Coordinator (LEC) to oversee these specific public energy concerns within each city and/or county. This LEC could be appointed from an existing position on the county, or possibly city level. The LEC's major functions could be to:

- Respond to public inquires regarding local problems of fuel allocation and coupon distribution or redistribution
- Collect and publish local coupon prices
- Coordinate information and policies with other LEC's
- Identify local problems, report these to the respective governing bodies and suggest local solutions to these problems
- Coordinate a local public information program

Most importantly, the LEC would fill the information gap between the public, the media, and local governing bodies. If, for example, numerous public complaints are received

with regard to gasoline outlet sales policies, the LEC may choose to recommend to the County Commissioners or City Council that a program of gasoline sales based upon license plate numbers be instituted or whatever course of action he or she may feel is appropriate.

Conclusions

The preceding problem analysis has identified the local transportation problems which are expected to develop as a result of federally imposed fuel allocation and/or rationing programs. In addition, possible solutions for each of these problems were discussed. The following chapter considers the solutions most applicable to the Dallas-Fort Worth Metropolitan area and outlines specific implementation steps and considerations.

III. PETROLEUM CONTINGENCY PLAN OPTIONS - MINNEAPOLIS-ST. PAUL

This section is made up of the main body of the Contingency Plan for Transit and Paratransit Expansion During Petroleum Emergencies (February, 1978), prepared by the Metropolitan Transit Commission for the Twin Cities Area. The section details the implementation of components of the contingency plan for three stages of energy shortfall.

Options under the Twin Cities plan are grouped according to general transportation, regular route transit, and paratransit. Each option is described in terms of actions associated with it, its benefits, and the preparations for implementation at each energy crisis stage. In reviewing the options in this section, one must remember that this plan assumes that the transit system will receive all the fuel necessary for regular expanded operations.

Contingency Plan for Transit and Paratransit
Expansion During Petroleum Emergencies

CHAPTER II - PETROLEUM CONTINGENCY PLAN OPTIONS

Specific actions that might be undertaken during a petroleum shortage to accommodate increased demand for public transportation services are described in this chapter. Among the kinds of options that could be implemented are actions that maximize the use of existing equipment as well as actions that would supplement regular transit service with paratransit and school bus services. Additionally, measures will be taken to inform the community of these special transportation opportunities and to encourage metropolitan residents to alter their trip-making patterns. Table II-1 shows the transportation options developed in this plan.

The application of these emergency transportation options will depend on the severity and length of the petroleum shortfall as well as the availability of equipment and the willingness of the community to participate. It may also be advisable to use various combinations of options for different parts of the region.

Each of the options listed is specified separately. First, there is a description of the option. Second, there is discussion of the petroleum savings. In some instances, they are site-specific and cannot at this time be quantified. Third, the tasks required to prepare each option for implementation are described.

The implementation of each option is subdivided into three stages:

STAGE I

Tasks MTC could integrate into the current workload. These tasks would be prioritized, based upon the importance of the option.

STAGE II

Tasks which would be initiated when petroleum supply conditions start to deteriorate.

STAGE III

Tasks which should be accomplished if it is readily apparent that some sort of national petroleum allocation or rationing is imminent.

Upon completion of Stage III tasks, the selected options of this Contingency Plan could proceed to full implementation.

A. GENERAL OPTIONS

Some methods of improving transportation petroleum consumption could provide features, such as park-ride facilities and variable working hours. These are applicable to both transit and paratransit services.

OPTION A-1. DEVELOP ADDITIONAL PARK-RIDE LOTS

Description: The potential for establishment of emergency park-ride lots would be primarily through joint use of existing parking lots at churches, shopping centers.

TABLE II-1 - Contingency Plan Options

	Time For Implementation	
	Less Than One Month	Over One Month
<u>GENERAL OPTIONS</u>		
A-1 Develop Additional Park-Ride Lots	Temporary Some	X Most
A-2 Encourage Employers to Establish Variable Working Hours		
A-3 Establish Emergency Transportation Information Centers	X	
<u>REGULAR ROUTE TRANSIT OPTIONS</u>		
B-1 Prepare Standby Bus Fleet for Service (Less than 40 buses) (Over 40 buses)	X	X
B-2 Monitor Ridership and Operations by Routes and then Determine Required Changes	X	
B-3 Increase Number of Turnback Operations	X	
B-4 Double Heading on Heavily Patronized Routes	X	
B-5 Reducing Deadhead Bus Mileage	X	
B-6 Promote Reverse Commute		X
B-7 Improve Transit Flow with Skip Stops	X	
B-8 Make Modifications in Shopping Services		X
B-9 Implement Differential Fare Structure (Peak vs. Off-Peak)	X	
B-10 Expanded Marketing Communications Program	X	
B-11 Improve Flow by Providing Preferential Treatment for Buses		X
<u>PARATRANSIT OPTIONS</u>		
C-1 Expand Total Commuter Service Program	X	
C-2 Provide Feeder Service Using School Buses, Shared-Ride Taxi		X
C-3 Modify and/or Supplement Night Service with Shared-Ride Taxi		X
C-4 Provide Preferential Parking for Shared-Ride Vehicles	X	

schools, and public facilities. Temporary park-ride lots would be established throughout the metropolitan area. These lots would enable individuals who have little or no bus service in their neighborhoods to drive or carpool to a park-ride facility where they could then transfer to express and local buses, carpools, or vanpools.

This program would also represent an acceleration of the MTC's present program for joint-use park-ride lots and extension of its park-ride lot development program to include temporary facilities.

Benefits: This would provide increased accessibility to public transportation and an opportunity to reduce transportation costs and save up to 200 gallons of gasoline per park-ride patron per year.

Preparations for Implementation:

STAGE 1

- a. Identify sites that could also be used for park-ride lots.
- b. Identify potential search areas for the development of new exclusive park-ride lots.
- c. Identify type of service (such as local, express buses, van pooling, or car pooling) for each proposed lot.
- d. Estimate and prioritize the most viable candidate sites.

STAGE 2

- a. Contact owners or managers of the candidate sites to discuss possible usage and terms.
- b. Select the most promising sites.
- c. Evaluate present bus schedules to see if adequate bus service is provided or how much revision might be necessary.
- d. Estimate cost of implementation.
- e. Prepare preliminary consumer information plans.
- f. Identify needs for and availability of special traffic expediting provisions, such as temporary traffic signals or signs, trail blazing information signs or highway patrol escort of buses through highly congested area.
- g. Seek Commission approval.

STAGE 3

- a. Negotiate standby contracts for use of sites with appropriate parties.
- b. Arrange for special traffic expediting provisions with the appropriate authorities.
- c. Prepare detailed consumer information program to the copy-layout stages (less schedule detail).
- d. Detail the requirements for materials and services procurement, i.e., signs, schedule holders, construction, etc.

OPTION A-2. ENCOURAGE EMPLOYERS TO ESTABLISH VARIABLE WORKING HOURS

Description: Types of "variable working schedules" include staggered work hours, flexible

work hours, a four-day week, whichever appears to be most effective. These programs, as petroleum emergency options, could reduce the differential between peak and off-peak bus loadings. More passengers could be accommodated without increasing the number of buses.

The implementation of a staggered work hour program large enough to achieve this reduction in peak loadings would require significant cooperation from Twin Cities employers. A recent report (23) states:

"A voluntary variable work hours program in the Twin Cities Central Business Districts appears to be unfeasible under current conditions.

"To achieve beneficial results, both with respect to bus fleet utilization and vehicular traffic congestion in central business districts, a rigid staggered work hours program would be required. However, employers and employees under current conditions would not voluntarily accept major changes in work hours. Without full cooperation of all employers and employees currently starting and leaving work during peak times, a variable work hours program will not produce desired results.

"Selective, individual employer variable work hours programs to reduce local traffic congestion or to better schedule transit service appear to have a better chance for current implementation.

"Assuming governmental control over start/leave times, some savings in capital costs and petroleum utilization appears likely from the implementation of a variable work hours program.

"Because of the general lack of employer support for the area-wide variable work hours program under current conditions, it would be extremely difficult to implement such programs without substantial incentives.

"Under times of extreme national concern (such as a petroleum crisis), an area-wide variable work hours program would have a better chance of implementation."

It is, therefore, assumed that if any efforts were expended to establish a broad program of variable work hours, a strong public policy would be required.

Benefits:

- a. Reduced peak-period vehicle requirements.
- b. Increased opportunity for serving "revenue commuters" increasing bus service efficiency.

Preparations for Implementation:

STAGE 1

- a. Use existing data and work with business groups to prepare a variable working hours plan.
- b. Determine types of schedule changes needed.
- c. Consider legislative needs including incentive alternatives.
- d. Prepare preliminary consumer information plans, including cost of

implementation.

STAGE 2

- a. Seek Commission approval.
- b. Seek standby legislation for the appropriate local or regional government.

STAGE 3

- a. Prepare detailed consumer information program to copy-layout stage.
- b. Detail the requirements for materials procurement.

OPTION A-3. ESTABLISH EMERGENCY TRANSPORTATION INFORMATION CENTERS

Description: At the start of a petroleum emergency people would have an immediate need for information on the public transportation options available. Presently, there are county and municipal Directors of Emergency Services with offices in the communities they serve. It may also be desirable to provide emergency information services at major employment centers. In a severe emergency these offices could provide transportation information ranging from inquiries on express bus schedules to methods for forming car pools. Bus schedules, car pool application blanks, transit maps, van pool information, etc., would be handed out in person or mailed to people on request. Where necessary, these offices would include a trained MTC representative with system maps, schedules, and specific transit information.

Benefits: Consumer information available when needed most--at the outset of the emergency.

Preparations for Implementation: (This option will be implemented in coordination with Option B-10, Expanded Marketing Communications Program.)

STAGE 1

- a. Identify communities that are expected to be hit the hardest by a gasoline emergency.
- b. Select and prioritize locations of candidate public and private facilities for information centers.

STAGE 2

- a. Determine willingness of public agency or property owners or managers to enter into standby arrangements for use of their facilities.
- b. Prepare preliminary consumer information plans including cost of implementation.
- c. Establish plan and cost estimates.
- d. Seek Commission approval.
- e. Formulate conceptual training program.

STAGE 3

- a. Prepare detailed consumer information program to the copy-layout stage (less schedule detail).
- b. Negotiate standby agreements to use the selected facilities.
- c. Establish program to equip the facilities.

- d. Prepare consumer information program on the information centers.
- e. Detail training programs for employees.
- f. Detail the requirements for materials procurement.

B. REGULAR ROUTE TRANSIT OPTIONS

These options deal with techniques for making conventional transit bus service more attractive, more productive, more fuel efficient and provide more capacity. More attractive service includes frequent opportunities to use service and better trip times. Increasing the capacity and providing more productive operations is accomplished with larger capacity of bus fleet and increasing the amount of ridership per bus mile. Increasing the fuel efficiency (passenger miles per gallon of bus fuel) can be accomplished by increasing the passengers per bus and/or decreasing the bus mileage.

These options are discussed below:

OPTION B-1. PREPARE STANDBY BUS FLEET FOR SERVICE

Description: MTC presently has approximately 1,000 active and 100 standby buses in the standby fleet. During a petroleum emergency a number of standby buses are to be placed in service at least during peak periods in key corridors. To place these buses back into active service would require an estimated \$50,000 and ten weeks.

Benefits: For each 100 buses that could be placed into peak period service, it is estimated that up to 3,570,000 additional riders could be accommodated and 2.6 million gallons of gasoline could be saved annually. However, 320,000 additional gallons of diesel fuel would be consumed annually. These values are highly dependent upon the operating strategies selected.

Preparation for Implementation:

STAGE 1

- a. Establish rehabilitation plan for standby buses including requirements for funding, schedule, materials, personnel, and work space.
- b. Prepare preliminary driver and mechanic recruitment and training plans.
- c. Search for emergency garage space.*
- d. Prepare preliminary plans for increased maintenance needs.

STAGE 2

- a. Seek Commission approval.
- b. Prepare detail plans for driver and mechanic recruitment and training. (Note: minimum of 8 weeks required for training.)
- c. Initiate negotiations with Minnesota Energy Agency for allocation of the added fuel required.

STAGE 3

- a. Detail the requirements for materials procurement.

*Continuous idling of buses to prevent engine freeze up in storage areas and under winter conditions would not be acceptable in a petroleum emergency.

- b. Negotiate standby contracts for temporary garage facilities.
- c. Prepare detailed plan for expanded maintenance capacity.

OPTION B-2. MONITOR RIDERSHIP AND OPERATIONS BY ROUTES
AND THEN DETERMINE REQUIRED CHANGES

Description: MTC operations presently provide a level of service at or above a minimum standard of service for a pre-selected maximum level of subsidy. In event of a petroleum emergency, it will be necessary to adjust these criteria to maximize the productivity of petroleum consumed. Techniques to improve productivity are:

- a. Adding buses from the standby fleet to increase the over-all capacity (Option B-1).
- b. Adjusting schedules to increase the average passengers per bus.
- c. Adding turnbacks to minimize the bus miles traveled in marginally productive areas (See Option B-3).
- d. Doubleheading on heavily patronized schedules (See Option B-4).
- e. Reducing the deadhead bus mileage; i.e., non-revenue bus miles between the terminal of a run and the garage (See Option B-5).

MTC has ridership data for each bus route, both winter and summer. These data will be used to determine what runs should be operated at changed headways, what runs should be doubleheaded, and what runs should be turned back at an intermediate point. A significant effort to reduce deadhead mileage is the computerized RUN Cutting and Scheduling (RUCUS) program.

Benefits: In general, schedule changes would serve more riders, accommodate heavy peak demands, and reduce the operations that yield a lower productivity of the energy consumed. In estimating the energy productivity of the proposed changes, the added or reduced diesel fuel consumption to be effected by the proposed change would be weighed against the added or reduced gasoline consumption.

Preparations for Implementation: This could be a multilevel implementation: a) add buses from the storage fleet as described in Option B-1; b) readjust the present period layovers for buses used during the peak periods at the downtown end of the route in mild weather; and d) link special-purpose trips; i.e., charter and school service to terminals for peak period express service.

STAGE 1

- a. Identify candidate route and run changes.
- b. Prepare preliminary operations plan.
- c. Prepare preliminary consumer information plan, including cost of implementation.

STAGE 2

- a. Seek Commission approval.

STAGE 3

- a. Prepare to use standby bus fleet as discussed in Option B-1.
- b. Prepare detailed operations plan.

- c. Prepare detailed consumer information program to the copy-layout stage (less schedule detail).
- d. Detail the requirements for materials procurement.

OPTION B-3. INCREASE NUMBER OF TURNBACK OPERATIONS

Description: Some buses operate the full length of a route while others are scheduled to turn back at an intermediate point. Presently, MTC has hundreds of such turn back route runs. To increase the number of buses that turn back would reduce bus fuel consumption with a possible decrease in ridership in the outer areas because of reduced service.

Benefits: For each 1,000 bus miles that could be saved annually by increasing the number of turnbacks, bus fuel consumption could be reduced by an estimated 250 gallons. It would allow turned back buses to be used on more than one run and thereby substantially increase the bus productivity per gallon of fuel consumed.

Preparation for Implementation:

STAGE 1

- a. Identify candidate routes and locations for turnbacks.
- b. Prepare preliminary operations plan.
- c. Prepare consumer informations plan, including cost of implementation.

STAGE 2

- a. Seek Commission approval.

STAGE 3

- a. Prepare detailed operations plan.
- b. Prepare detailed consumer information program to the copy-layout stage (less schedule detail).
- c. Detail the requirements for materials procurement.

OPTION B-4. DOUBLE HEADING ON HEAVILY PATRONIZED ROUTES

Description: On each heavily patronized route, extra buses could be assigned to handle overflow loadings. The buses could travel together, occasionally one skipping a stop, to equalize their loading as is customarily done in double heading service. Extensive double heading would require reactivation of the standby bus fleet.

Benefits: Double heading could produce relief to overloaded schedules with a minimum of advance planning and schedule revisions.

Preparations for Implementation:

STAGES 1, 2, and 3

- a. Use existing MTC procedures and present bus fleet to provide double heading of selected runs.

OPTION B-5. REDUCE DEADHEAD BUS MILEAGE

Description: The locations of garages and bus routes require that buses travel a number of non-revenue miles between the garage and the start or finish of revenue service. MTC schedule planners are continuously seeking ways of reducing deadhead miles. A significant effort in this direction is the computerized RUn CUTting and Scheduling (RUCUS) program. Another significant effort is the garage expansion program. These are ongoing MTC efforts that will be emphasized always -- not merely in event of a petroleum emergency.

Benefits: For each decrease of 1,000 deadheading bus miles annually, MTC can save approximately 250 gallons of diesel fuel. Energy productivity and financial productivity would also be improved.

Preparation for Implementation: During a petroleum shortage, several steps can be considered depending on the severity of the shortage: a) layover of peak period buses at the downtown end of the route in mild weather, and b) more linking of special-purpose trips; i.e., charter and school service to terminals for peak period express service.

STAGE 1

- a. Continue the present RUCUS and garage selection programs.
- b. Identify opportunities for downtown layover .
- c. Identify opportunities for trip linkages.
- d. Prepare preliminary operations plan.
- e. Prepare preliminary consumer information plan, including cost of implementation.

STAGE 2

- a. Seek Commission approval.

STAGE 3

- a. Prepare detailed operations plan.
- b. Prepare detailed consumer information program to the copy-layout stage (less schedule detail).
- c. Detail the requirements for materials procurement.

OPTION B-6. DEVELOP REVERSE COMMUTE

Description: The general pattern of commuter travel is one direction during the AM peak period and the opposite direction during the PM peak period. There are, however, exceptions, called reverse commute, such as Route 35P. The morning round trip takes riders to the GSA building, the airport employment centers, and the employment centers near Control Data Corporation, then returns to downtown Minneapolis with riders from the Met Stadium park-ride site and the 60th and Portland neighborhood. This reverse commute pattern increases energy productivity significantly. Although MTC already has reverse commute service, there are a number of additional reverse commute opportunities that could be developed if employers were willing to adjust work hours (Option A-2).

Benefits: For each bus that can be used in reverse commute service, its energy and financial productivity can be significantly increased.

Preparations for Implementation: In cooperation with employers (Option A-2) at major employment centers, MTC would search for reverse commute trip patterns, determine if any opportunities exist, determine what, if any, changes of working hours would be needed, and develop incentives to bring about these changes.

STAGE 1

- a. Using the survey techniques developed in the Total Commuter Service Project, determine if work hours and trip patterns in other areas offer opportunities for reverse commute.
- b. Prepare preliminary consumer information plans, including cost of implementation.

STAGE 2

- a. Seek Commission approval.

STAGE 3

- a. Prepare detailed consumer information program to the copy-layout stage (less schedule detail).
- b. Detail the requirements for materials procurement.

OPTION B-7. IMPROVE TRANSIT FLOW WITH SKIP STOPS

Description: With few exceptions, MTC bus stops are located at all intersections along the routes. A skip stop policy would speed bus service with only a slight inconvenience to riders. These two factors would largely offset each other and would produce a reduction of diesel fuel consumption.

Benefits: Skip stops could save an estimated average of seven minutes for the average rider's trip and 300,000 gallons of diesel fuel per year.

Preparations for Implementation:

STAGE 1

- a. Identify candidate locations for skip stops.
- b. Prepare preliminary schedule revisions.
- c. Prepare preliminary consumer information program including cost of implementation.

STAGE 2

- a. Seek Commission approval.

STAGE 3

- a. Prepare detailed consumer information program to the copy-layout stage (less schedule detail).
- b. Detail the requirements for materials procurement.

OPTION B-8. MAKE MODIFICATIONS IN SHOPPING SERVICE

Description: Presently, MTC provides 89,600 bus miles per year for special evening shopper service, patronized by 65,900 riders per year. The business community has a number of available options that could enhance petroleum efficient transportation. Late shopping hours one or two evenings per week could be replaced by extensions of shopping periods during the week to allow downtown workers to shop before coming home.

Benefits: If Monday and Thursday evening shopper services were reduced, some diesel fuel could be saved. However, the major savings in fuel consumption would be derived from (1) auto trips eliminated, and (2) reductions in building heating and air conditioning.

Preparations for Implementation: If the petroleum emergency is severe enough to warrant, MTC with support from the Minnesota Energy Agency would work with downtown or major center businesses to establish changed shopping hours. The MTC would then change its evening service to adjust to these changes.

STAGE 3

- a. In cooperation with the MEA, convene meetings with the appropriate downtown or major center business organizations concerning shopping hours.
- b. Adjust schedules accordingly.

OPTION B-9. IMPLEMENT DIFFERENTIAL FARE STRUCTURE (PEAK VS. OFF-PEAK)

Description: A major problem to be encountered during a petroleum shortage is severe overcrowding in the peak period. A number of peak period riders may be able to travel in off-peak periods and could be induced to do so if fares during off-peak periods were lower than during peak periods. This would provide more space for persons who have no choice but to ride during peak periods, and who would be deterred from doing so if overcrowding occurred. This strategy would be even more effective if it could be combined with variable working hours, Option A-2.

Benefits:

- a. Better use of existing bus fleet.
- b. Better service to peak period riders.
- c. Increase off-peak bus occupancy.

Preparations for Implementation:

STAGE 1

- a. Review existing surveys of off-peak discount fares.
- b. Estimate the economics of installing alternative differentials between peak and off-peak riding.
- c. Seek Commission approval of a standby rate structure.

STAGE 2

- a. Prepare preliminary schedule revision.
- b. Prepare preliminary consumer information plans, including cost of implementation.
- c. Seek Commission approval of overall plan.

STAGE 3

- a. Prepare detailed consumer information program to the copy-layout stage (less schedule detail).
- b. Detail materials procurement program.

OPTION B-10. EXPANDED MARKETING COMMUNICATIONS PROGRAM

Description: A number of marketing communications techniques could be used to increase bus and paratransit usage during a petroleum emergency. Marketing could both persuade and inform, using store front information centers, direct mailing to a target audience, newspaper, radio, television advertising and disseminating paratransit information.

Benefits:

- a. Increased public awareness of options.
- b. Opportunities to use more energy-efficient transit.

Preparations for Implementation:

STAGE 1

- a. Prepare consumer information plans, including cost of implementation.

STAGE 2

- a. Seek Commission approval.

STAGE 3

- a. Prepare detailed consumer information program to the copy-layout stage.
- b. Detail materials procurement program.

OPTION B-11. IMPROVE FLOW BY PROVIDING PREFERENTIAL TREATMENT FOR BUSES

Description: Preferential treatment for buses generally consists of exclusive lanes or ramps and special signaling. Exclusive bus lanes are presently used only on Second and Marquette Avenues in Minneapolis but could be added on a temporary basis to other routes in the two downtowns, and certain outlying freeway and trunk highway routes. The City of St. Paul also has a traffic control system on certain streets that can be overridden by specially-equipped emergency vehicles. In a severe emergency, buses could be equipped to use the extended green period of these traffic signals, and additional traffic signals could be so equipped. Preferential treatment for platoons of buses from large park-ride lots (see Option A-1) using the service of the highway patrol through any remaining congested areas may also be practical.

Benefits:

- a. Reduced conflicts between buses and other traffic.
- b. Increased bus speed through congested areas.
- c. Increased attractiveness of the bus service provided.

Preparations for Implementation:

STAGE 1

- a. Identify candidate locations, special equipment needs and funding requirements for preferential treatment.
- b. Evaluate feasibility of the candidate locations and select the most feasible for further consideration.
- c. Prepare preliminary consumer information plans, including cost of implementation.

STAGE 2

- a. Seek Commission approval.

STAGE 3

- a. Determine willingness of the affected public agencies to participate.
- b. Make preliminary arrangements with the affected municipalities to purchase/provide the required special equipment and facilities.
- c. Make preliminary arrangements to identify the required highway patrol or local police services.
- d. Prepare preliminary schedule revisions.
- e. Prepare detailed consumer information program to the copy-layout stage (less schedule detail).
- f. Detail the requirements for materials procurement.

C. PARATRANSIT OPTIONS

Paratransit options deal with modes that differ from regular route bus service that can increase the number of passenger miles per gallon of fuel. This can be accomplished through ride pooling (Option C-1), feeder service (Option C-2), taxi service to replace bus service during low occupancy periods (Options C-2 and C-3), and parking incentives for multi-occupancy vehicles (Option C-4).

OPTION C-1. EXPAND TOTAL COMMUTER SERVICE PROGRAM

Description: MTC is presently involved in the Total Commuter Service Demonstration in the South Hennepin area in coordination with local employers, Public Service Options, Mn/DOT, and others. (24) This program assists private employers in establishing ride sharing such as carpools, vanpools, custom bus service, and preferential parking for car pools and van pools. (25) In the event of a petroleum emergency these efforts will be expanded to include other employers and other areas. Administrative tools, promotional materials, and organizational experience already exist; therefore, in event of a petroleum emergency, these efforts can receive substantially increased emphasis with a minimum of delay.

An offshoot of this program could be the opportunity to use pool vans for mid-day

service to individuals or groups with common transportation needs.

Benefits:

- a. 800-2,000 gallons of gasoline savings per year by a typical van pool.
- b. 370 gallons per year savings by typical carpool.
- c. Reduced operating costs for the participants.
- d. Reduced congestion in the employment areas served.

Preparations for Implementation:

STAGE 1

- a. Prepare plans to accelerate the expansion of Total Commuter Service.
- b. Identify large employment centers, such as Rosedale, Ridgedale and Maplewood that would be candidates for additional efforts.
- c. Prepare preliminary consumer information plans, including cost of implementation.

STAGE 2

- a. Seek Commission approval.

STAGE 3

- a. Prepare detailed consumer information program to the copy-layout stage.
- b. Prepare detailed materials procurement program.

OPTION C-2. PROVIDE FEEDER SERVICE USING SCHOOL BUSES OR SHARED-RIDE TAXI

Description: At certain periods of the day, school buses and the taxi companies have extra seating capacity. These might be used in combination with or supplementary to other transit service elements. The amount of service that could be provided is somewhat limited, however, because these vehicles are more readily available at certain off-peak periods. As stated in a recent report:(26) "Due to the different emphasis in terms of type of service provided, focus of that service, and special equipment needs, the potential for the integration of school bus fleets with MTC buses is not very great." It would require a rather serious petroleum emergency and adjustments to school and work schedule to make school buses feasible.

Methods for making use of school buses and shared-ride taxis for feeder service would largely be site-specific.

Benefits: Public transit service would be accessible to more persons.

Preparations for Implementation:

STAGE 1

- a. Identify candidate communities for shared-ride taxi or school bus feeder service.
- b. Contact candidate firms to determine interest in shared-ride feeder service contracts.

- c. Prepare preliminary consumer information plans including cost of implementation.
- d. Prepare preliminary project operating plan and cost estimate.

STAGE 2

- a. Seek Commission approval.
- b. Seek enabling legislation.

STAGE 3

- a. Prepare draft operating contracts.
- b. Prepare detailed consumer information program to the copy-layout stage (less schedule detail).
- c. Detail materials procurement program.

OPTION C-3. MODIFY AND/OR SUPPLEMENT NIGHT SERVICE WITH SHARED-RIDE TAXI

Description: During certain periods of light patronage, ridership might be adequately handled by shared-ride taxi service. This could range from collection and feeder service to actual line haul service on a number of MTC routes.

Benefits: For each thousand bus-miles per year of line haul service that could be replaced by a single shared-ride taxi, an equivalent of 125 to 150 gallons of gasoline could be saved annually. If two taxis are required, the savings would be only 65 to 85 gallons. More than two taxis could be counterproductive depending on ridership levels.

Preparations for Implementation: It would probably be necessary to develop special licensing provisions, labor agreements, and insurance arrangements. The changed services would be publicized and it may be that MTC would need to obtain funding to operate the additional service.

STAGE 1

- a. Identify routes that could be modified and/or supplemented by shared-ride taxi service.
- b. Identify legislative and labor issues that must be addressed.
- c. Establish a preliminary plan and costs for modified and/or supplementary service.
- d. Through labor negotiations, seek to establish an agreement that would enable the routes to be modified and/or supplemented by shared-ride taxis.
- e. Prepare preliminary consumer information plans including cost of implementation.

STAGE 2

- a. Seek Commission approval.

STAGE 3

- a. Prepare standby operating contracts.

- b. Prepare detailed consumer information program to the copy-layout stage (less schedule detail).
- c. Detail the requirements for materials procurement.

OPTION C-4. PROVIDE PREFERENTIAL PARKING FOR SHARED-RIDE VEHICLES

Description: To encourage ride sharing, multi-occupancy vehicles could be offered preferred parking treatment (26) (conveniently located parking spaces in parking facilities). This is directed at both commercial parking facilities and lots not covered in Option C-1.

Benefits: This could increase ride sharing, thereby reducing gasoline consumption.

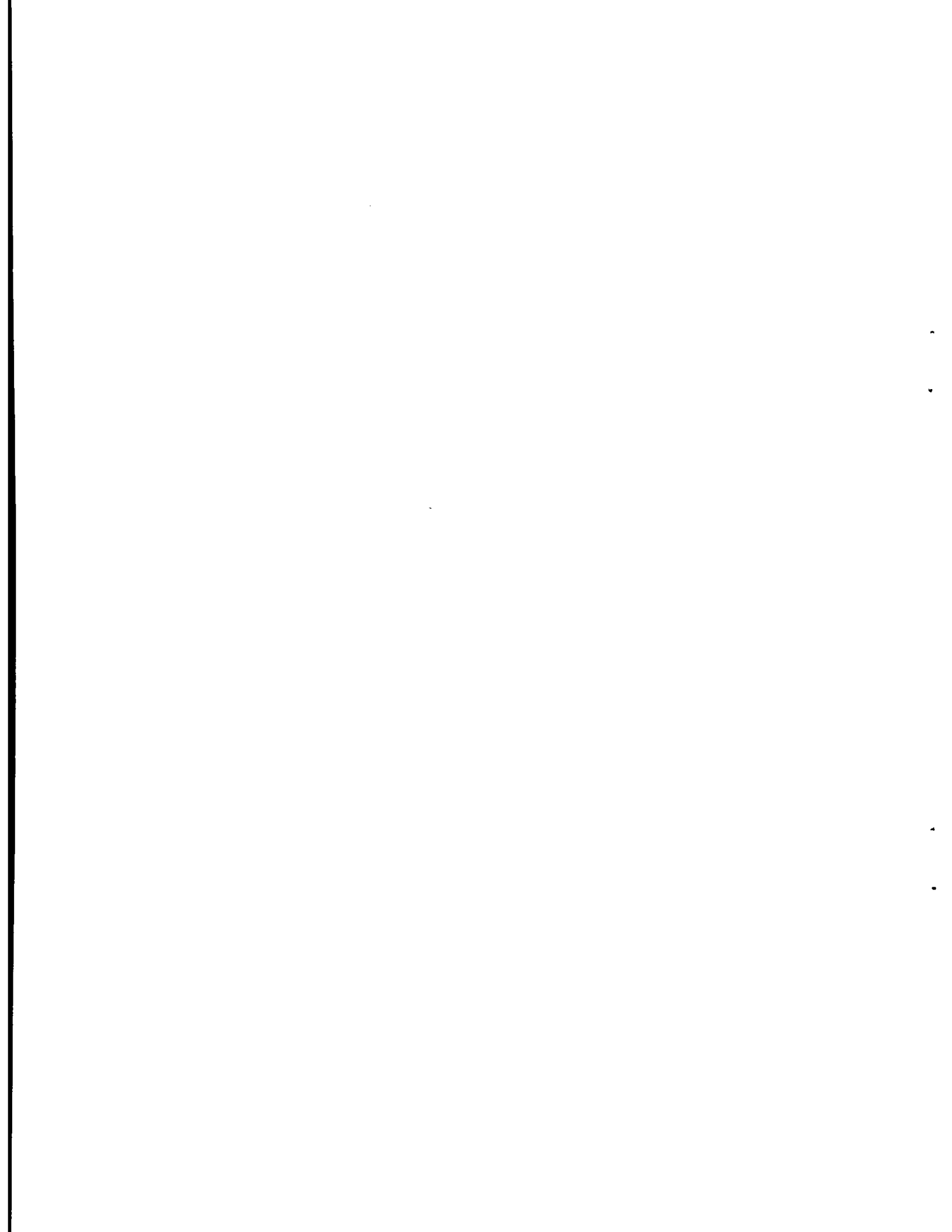
Preparations for Implementation:

STAGE 1

- a. Identify major parking facilities that can provide preferential parking and the problems that could be encountered.
- b. Prepare preliminary consumer information program including cost of implementation.

STAGE 2

- a. Place increased emphasis upon the total Commuter Service Program (Option C-1).
- b. Negotiate standby arrangements with other parking lot or ramp operators.
- c. Prepare detailed consumer information program to the copy-layout stage.
- d. Detail the requirements for materials procurement.



IV. IMPLEMENTATION - MEMPHIS

This section, taken from the Memphis Area Transit Authority's Petroleum Shortage Contingency Plan (March, 1979), details a specific implementation policy during a crisis period. The plan discusses Memphis' actions with respect to those of the U.S. and Tennessee. It then evaluates several proposals, including implementation strategies, for general transportation, transit, paratransit, and conservation options.

Memphis' implementation policy outlines the steps to be taken during fuel emergency, from the events leading to contingency actions to the actions themselves. The section describes the responsibility for action for several transit authority departments.

This delegation of responsibility increases the chances for making the plan work, and may be useful in preparing plans within localities. It should also be noted that the specific order of implementation of specific strategies will vary according to local priorities.

Petroleum Shortage Contingency Plan

IMPLEMENTATION OF MATA'S CONTINGENCY PLAN FOR A PETROLEUM SHORTAGE EMERGENCY

General Sequence of Events

Declaration of a petroleum emergency will, in all probability, come from the federal level. The stand-by Energy Conservation Contingency Plan, the Contingency Gasoline Rationing Plan (DOE, 1979), and other conservation measures would be put into effect by federal order, with the individual states assuming major responsibility for coordinating and implementing the regulations at the local level. The following sequence of events could be expected to take place during an emergency, leading to implementation of MATA's contingency plan:

- The President of the United States would declare a national emergency, outlining the nature and scope of the problem as well as the measures for dealing with it.
- The Governor of Tennessee would issue executive orders for implementation of state and federal contingency plans.
- The Tennessee Energy Authority would assume major responsibility for implementation of state and federal regulations relative to energy conservation measures and fuel allocation procedures.
- MATA would review its contingency plan.
- MATA would seek additional funding levels for immediate plan implementation from City Council and other potential sources (state and federal).

- MATA would coordinate its efforts with the Tennessee Energy Authority, City and County officials, and locally designated agencies that are charged with implementing the emergency measures.
- MATA would initiate the internal procedures necessary to implement the service changes and other actions outlined in this plan.

Responsibilities Within MATA

MATA responsibilities for the General Options would be assigned to the operating departments as shown in Table VIII. Each department should review the plan annually and, if appropriate, recommend changes so it can be kept up to date.

Contingency Plan Actions

Upon determination by the MATA Board and management, in coordination with the City of Memphis, that national and/or local conditions warrant implementation of this plan, the following actions will be undertaken immediately:

1. Reduce MATA's fleet spare ratio to 5% and prepare standby buses for expanded service;
2. Increase number of turnback operations to provide additional service;
3. Adjust maintenance schedule to accommodate increased service requirements and reduced spare ratio;
4. Direct an expanded marketing effort to park-ride and express service and emphasize transit for home-to-work and work-to-home trips;
5. Expand Information Center and Customer Service functions to handle new riders and new service;

MATA DEPARTMENTAL
RESPONSIBILITIES

OPTIONS

<u>GENERAL OPTIONS:</u>	<u>RESPONSIBLE DEPARTMENT *</u>		
A-1 Develop Additional Park-Ride	PE		
A-2 Encourage Employers to Establish Variable Working Schedules	PE, SC		
A-3 Establish Emergency Transportation Information Centers	CS		
 <u>TRANSIT OPTIONS:</u>			
B-1 Reduce Spare Ratio to 5%	MT, SC		
B-2 Monitor Ridership by Routes and Then Determine Which Routes Require Changes	SC		
B-3 Increase Number of Turnback Operation	SC		
B-4 Increase Doubleheading on Heavily Patronized Routes	SC		
B-5 Reduce Deadheading Bus Mileage	SC		
B-6 Promote Reverse Commute	MK		
B-7 Improve Transit Flow With Skip Stops	SC		
B-8 Implement Differential Fare Structure	FN, CS		
B-9 Expanded Marketing Communications Program	MK, CS		
B-10 Improve Flow by Providing Prefer- ential Treatment for Buses	PE		
 <u>PARATRANSIT OPTIONS:</u>			
C-1 Implement Ride Sharing Program	PE		
C-2 Provide Feeder Service Using School Buses or Shared-Ride Taxi	SC		
C-3 Modify and/or Supplement Night Service With Shared-Ride Taxi	SC		
C-4 Provide Preferential Parking for Shared Ride Vehicles	PE		
 NOTES:			
* MK	Marketing	SC	Scheduling
CS	Customer Service	FN	Finance
PE	Planning & Engineering		
MT	Maintenance		

6. Where possible, modify existing routes or add new routes to better serve major employment areas;
7. Improve mid-day service to handle increased ridership and provide better service to shopping areas;
8. Monitor ridership and operations by route and then determine if additional route and schedule changes are required;
9. Coordinate service improvements with public/private carriers providing feeder service to main line routes;
10. Reallocate service from marginally productive routes (under revised service standards) to those where capacity is being exceeded or where more people can be served.

Major responsibility for implementation of these actions will fall on top-level MATA management and several key operating departments. A brief description of the functional areas and their respective responsibilities under this contingency plan is provided below:

Management

The MATA management team will be responsible for overall direction and administration of MATA's Petroleum Shortage Contingency Plan. They will coordinate MATA's operation with other national, state, and local emergency plans during a fuel shortage, and will provide the necessary day-to-day direction for the operating divisions to accomplish the actions outlined above.

Maintenance

The Maintenance Department will prepare all available buses for service, with a 5% spare ratio being observed. Work shifts will be adjusted as necessary and additional personnel will be added to meet

the equipment requirements as well as insure that preventive maintenance inspections are conducted in a timely manner.

Telephone Information Center, Customer Service, and Marketing

MATA's Telephone Information Center will be expanded to provide new transit riders with a level of service comparable to that which is being currently provided. The number of telephone lines to center would be increased, the hours of operation expanded, and an appropriate increase in Information Center personnel would be provided. Additional customer service representatives would also be employed to handle passenger inquiries as well as to distribute information to the public concerning new or expanded service.

An expanded marketing program which makes use of television, radio, newspapers, and hand-distributed flyers will describe new service improvements that result from the implementation of the contingency plan. Park-ride lots and express service will be emphasized to suburban commuters, and shoppers will be urged to use mid-day service to malls and shopping centers.

Transportation

The Transportation Department will be responsible for implementation of the "on-street" service. They will determine the number of drivers needed on a day-to-day basis; get the equipment on the street in an efficient and timely manner to serve the increased demand; report ridership levels citywide, and ensure the optimization of equipment and personnel.

Scheduling, Driver Training and Safety

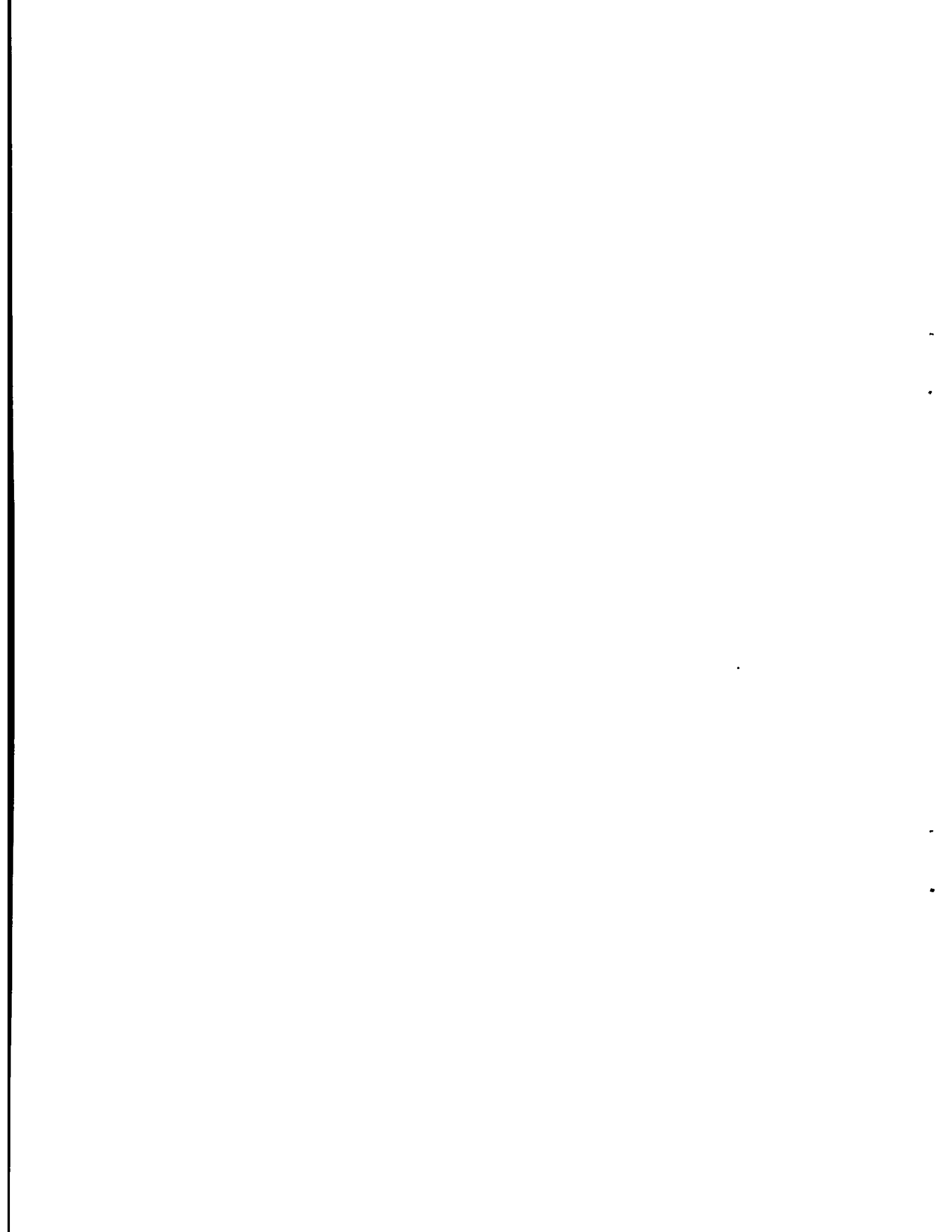
This department will be responsible for training additional drivers that are hired to provide the expanded service. Their other primary function will be to plan routes and schedule buses to serve increased demand. Where possible, existing routes will be modified and new routes will be added during the peak hours which will provide service to major employment areas. During the mid-day and off-peak hours new service will be aimed toward improving accessibility to shopping areas and medical services. After implementation of the contingency plan Scheduling will review on a continuing basis reports from the Transportation and Customer Service Departments concerning load problems, passenger inquiries, and requests for additional service. Service modifications will then be made on an "as needed" basis.

Finance

The Finance Department will be responsible for monitoring the daily statistical information generated by the system to determine increased costs and increased ridership resulting from implementation of the contingency plan. The department will forecast additional funding/budgetary requirements on a short-term basis (quarterly or semi-annually) during the extent of the fuel shortage.

Personnel

The Personnel Department will be responsible for recruiting, interviewing and hiring the additional personnel required to implement this contingency plan. The Personnel Director will work with major Memphis employers regarding coordination and implementation of staggered work hour schedules.



V. IMPLEMENTATION CONSIDERATIONS; RECOMMENDATIONS
AND CONCLUSIONS - DALLAS-FORT WORTH

This section, also taken from NCTCOG's publication A Metropolitan Transportation Plan for National Energy Contingencies (August, 1977), outlines regional considerations related to the implementation of an energy contingency plan. Using past experiences of transportation emergencies, the section suggests several implementation policies and outlines several areas in which special arrangements would be necessary prior to a crisis.

In addition, several transportation policies are recommended that are more long-range in nature. It would be difficult to totally implement any of these recommendations within the short time implied by an energy emergency. Rather, these recommendations are proposals for long-term action on the State and local levels to insure preparedness in the event of another energy shortage.

Implementation Considerations

This chapter discusses the issues and practicalities associated with the implementation of actions described in the previous chapter. In addition, the most promising measures are identified from those previously analyzed.

Past Experience

A review of previous energy and transportation-related emergencies in other areas provides valuable insight into the type of program implementation difficulties which may be experienced locally during a future severe energy shortage. An examination of the implementation of an emergency transit plan during a severe flood in Wilkes-Barre, Pennsylvania¹ and the governmental reaction to a utility power shortage in Los Angeles, California² during the 1973-1974 embargo are two such cases to be discussed here.

Wilkes-Barre

On June 23, 1972, Hurricane Agnes produced severe flooding in Wilkes-Barre which covered the CBD with up to nine feet of water. City evacuation efforts, directed by the Civil Defense, utilized Wilkes-Barre Transit and White Transit in order to reduce the auto traffic congestion which was occurring on the few remaining open roads. After the flood, the City sponsored free local bus service under contract with the Wilkes-Barre Transit

¹Simpson and Curtin, Manual of Transit Operations in Civil Emergencies, Prepared for Luzerne County (Pa.) Transportation Authority and the Urban Mass Transportation Administration (Philadelphia, Pennsylvania: Simpson and Curtin, April, 1974).

²U. S., Congress, Senate, Current Energy Shortages Oversight Series, Mayors' Panel-Urban Impact, Hearings before the Permanent Subcommittee on Investigation of the Committee on Government Operations, 93rd Congress, 2nd Session, March 6, 1974, pp. 702-706.

Company. Ridership during this time nearly doubled from normal usage (from 68,000 prior to the flood to 132,500 weekly passengers afterwards). This no fare service was later subsidized by the federal Office of Emergency Preparedness (O.E.P.) from July 10, 1972, until October 18, 1972.

The Wilkes-Barre emergency identified a number of difficulties regarding the local implementation of a transit disaster plan. These lessons suggest that:

- the ultimate responsibility for emergency planning, prevention, response, and relief resides within the local community itself;
- funding of initial transit emergency support should be arranged beforehand to insure an available delivery service;
- a public information plan is important;
- flexible federal support is needed;
- previous transit disaster planning could have identified problems experienced in the areas of:
 - labor
 - extra buses and support vehicles
 - fuel supplies
 - the lack of mutual-aid agreements
 - the lack of two-way radio communications;
- and, that a plan is needed for transition back to normal operations.

Los Angeles

The primary source of electrical power in Los Angeles during 1973 was residual oil of which 48 percent originated from Arab countries. The Arab oil embargo in the winter of 1973, however, resulted in a sudden shortfall in the amount of fuel available for electrical power. This reduction in fuel supply became so critical by December, 1973, that the Department of Water and Power (DWP) in Los Angeles declared an emergency and

notified the Los Angeles City Council of the situation. Mayor Bradley responded to the emergency by appointing an ad hoc committee on energy conservation composed of members from labor, industry and commerce. On December 21, 1973, a two phase emergency energy curtailment program was initiated which required a 10 percent electrical energy reduction by residential and industrial users and a 20 percent reduction by commercial consumers. In addition, DWP was allowed to purchase as much extra oil as it could obtain.

The emergency program was generally successful. While a 12 percent reduction in total electrical consumption was expected, an 18 percent curtailment was actually achieved.

The Los Angeles experience identified the following implementation considerations as being important to similar emergency strategies:

- Local governments often must assume leadership under adverse conditions.
- Emergency ordinances should remain as a standby mechanism for future emergencies.
- The public education and information program should be multi-lingual.
- The long-range plan for local growth patterns should be consistent with energy considerations.

With the Wilkes-Barre and Los Angeles lessons in mind, the following discussion examines the implementation of previously identified strategies in the Intensive Study Area.

Local Strategy Implementation

The actions discussed in Chapter V can be categorized according to their time frame of implementation. Since the exact date of a future emergency energy situation is not known, strategies which require a long lead or those which should be in effect at the onset of the emergency should be initiated as soon as possible. In the case of several

other actions which involve a short start-up time, these can be implemented at the beginning of the emergency or federal contingency. It should also be noted that the preparation for many of these short lead time strategies can be begun now since their present implementation would result in energy conservation.

Strategies for Current Implementation

In view of the long lead time needed and the importance of their existence at the onset of a future oil shortfall, it is recommended that the following measures be implemented as soon as possible:

- the increase or establishment of in-house fuel reserve supplies by large gasoline/diesel fuel users,
- the modification of federal allocation and rationing regulations to assure public transportation fuel supplies,
- the maintenance of local carpool programs, the expansion of their planning capacity, and the incorporation of a flexible work hour program,
- the securing of agreements between local communities and transportation providers as well as mutual aid agreements between cities,
- the appointment of Local Energy Coordinators (LEC's), and
- the modification of the Texas Education Code to permit the use of school buses for public transportation.

Strategies to be Implemented at the Emergency Onset

Due to shorter lead times (less than six months) and unnecessary prior existence, numerous other local strategies would not have to be implemented until emergency energy conditions occur or appear imminent, although planning of such measures at

this time would be desirable as a function of the LEC's. These strategies include:

- the pursuance of all transit and paratransit fuel conservation measures mentioned in this report (Table VI-1),
- the stepwise implementation of transit strategies designed to contend with large ridership increases (Figure VI-1), and
- the initiation and maintenance of a public information program concerning the existing contingency

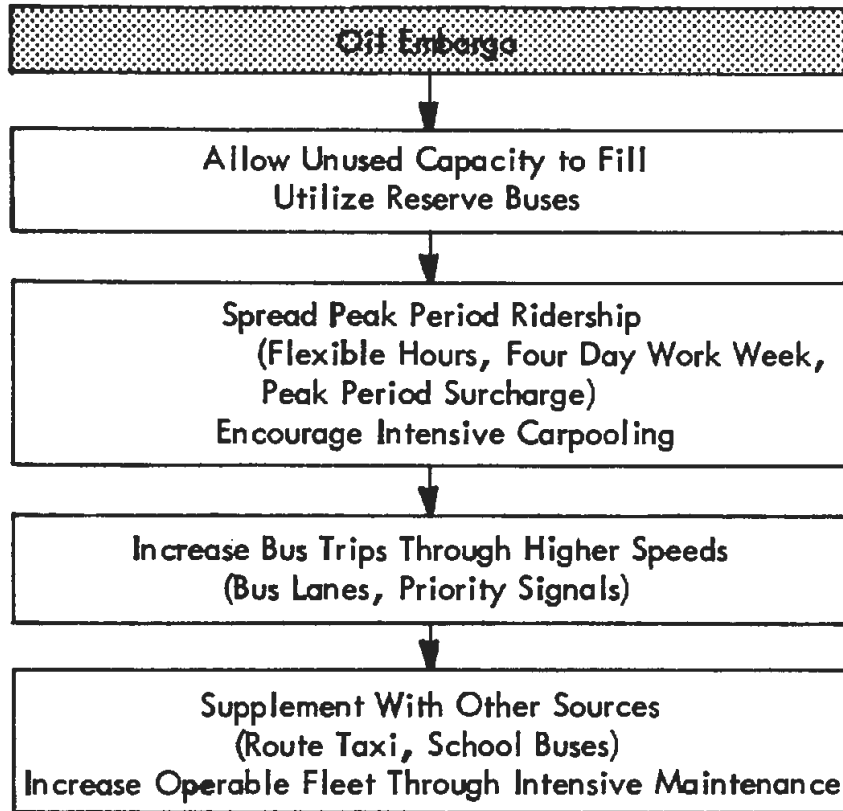
TABLE VI-1

TRANSIT AND PARATRANSIT FUEL CONSERVATION STRATEGIES
TO BE IMPLEMENTED AT EMERGENCY ONSET

	Strategies	Potential Fuel Savings Percent
<u>Transit</u>	Increase Efficiency:	
	Bus Lanes	1 - 5
	Priority signals	1 - 4
	Decrease "deadhead" miles	1 - 4
	Modify local to express service	8 - 10
	Decrease Service:	
	Eliminate/reduce night	3 - 12
	Eliminate/reduce weekend	8 - 20
	Eliminate/reduce midday	20 - 25
	Longer bus headways	10 - 25
Reduce number of stops	10 - 25	
<u>Paratransit</u>	Taxicab and carpool use of exclusive bus lanes	uncertain
	Consolidate school bus routes	uncertain
	Coordinate/consolidate elderly and handicapped transportation services	uncertain

FIGURE VI-1

IMPLEMENTATION OF SHORT-TERM TRANSIT STRATEGIES TO
CONTEND WITH RIDERSHIP INCREASES



As of this writing some of the previously defined strategies are already in various degrees of local implementation. The Dallas Transit System and CITRAN are both in the process of initiating action to expand their fuel storage facilities. Other measures have been included in the proposed 1978 Transportation Program for North Central Texas as part of the local transportation improvement program. These planned actions include:

- bus and carpool priority systems in Dallas and Fort Worth
- transit data collection programs in Dallas and Fort Worth which could be useful in the speedy monitoring of patronage trends during a crisis

- the proposal of new transit and paratransit service in Arlington, Garland, Grand Prairie, Irving, Mesquite and Richardson
- the continuation and expansion of the Dallas and Fort Worth carpool program

Special Problem Areas

Numerous obstacles to the speedy implementation of these and other suggested strategies remain, however, as the experiences in Wilkes-Barre and Los Angeles have indicated. The short-term establishment of transit or paratransit facilities in suburban areas where such a service is not already in existence could present some serious implementation problems. Intercity service, such as the proposed park-and-ride facilities from the suburban cities to Dallas and/or Fort Worth, would require the approval of the Texas Railroad Commission (RRC). Such an application process would include a public hearing and the chance for other passenger carriers in the area to contest the proposal.³ If the application is not contested and all necessary information is filed with the RRC by the applicant, service may be initiated within approximately one month of its approval. If the application is contested, a new hearing is scheduled and court proceedings may take six months or longer. In addition, all licensed carriers are required to equip and maintain all vehicles in use according to safety and performance specifications outlined by the RRC. Any of these regulations, however, may be waived or amended in the event of an "emergency" situation.⁴ For any intercity service in existence prior to an energy emergency, RRC regulations now require that any changes in routes, fares, or schedules must obtain approval by the Commission.

³ Information obtained from telephone conversation with Mr. Bill Phillips, attorney to the Texas Railroad Commission, Austin, October, 1975.

⁴ Ibid.

To avoid delay in the implementation of intercity public transportation service, it is desirable to secure such agreements prior to any emergency, particularly since a great number of applications may be submitted at the time of a fuel shortage. Agreements for emergency transportation services, which, as an example, could be in the form of the park-and-ride service now provided by the Dallas Transit System for the City of Garland (Appendix D), should be developed between suburban communities and local transportation (both private and public) providers. In addition, neighboring communities should develop mutual aid agreements, such as for fire, emergency medical or police protection, to share reduced service capabilities if sufficient fuel cannot be obtained to maintain these services.

Emergency agreements should be secured between the following parties:

- suburban communities and existing public or private transportation providers (DTS, CITRAN, SURTRAN, churches, Texas Motor Coaches, Transportation Enterprises, etc.)
- neighboring communities to share limited or curtailed municipal services
- transit systems and downtown parking lot owners or other appropriate land owners for emergency parking areas to decrease deadhead bus miles
- transit systems (especially DTS) and local taxicab companies to provide "route taxi" service
- cities and SURTRAN to transfer extra buses (if any) for city or suburban use; SURTRAN may also wish to review its agreement with SURTRAN taxi to replace some bus service with taxi service.

The use of school buses for public transportation presents some of the most difficult implementation problems. Since the legal use of school district-owned school buses for these purposes is prohibited by law (as described previously) and since another

attempt to amend this regulation through the State legislature must wait until the next legislative session of 1978-1979, an alternate method of obtaining these buses has been suggested. A report⁵ on the legal obstacles to the use of school buses for public transportation suggests that an

.... alternative is for the public transportation authority to own the school buses and to lease them on reasonable terms to the school district for use during the hours when they are required for the transportation of pupils. This second alternative probably is lawful under existing statutory provisions, but an Attorney General's opinion on its legality should be obtained before embarking on such an undertaking.⁶

This alternative is based on the existing Education Code which would allow school districts to contract with public transportation authorities for service if the cost of such service is less than the cost of maintaining a school bus transportation system. At present (1975), however, no Texas school district is under such a contract and the Texas Education Agency has neither established guidelines for review nor assigned to any official the responsibility for making it. The report on legal obstacles suggested that the condition of providing the school transportation service for less could be met through the following procedures:⁷

- organize and charter a Local Transit Authority under laws applicable to such entities
- sell the school buses and maintenance equipment and transfer all bus-related personnel to the Authority⁸
- negotiate a contract meeting the condition outlined in the Education Code for approval by the State Board

⁵Robert Means, et al., Legal Obstacles to the Use of Texas School Buses for Public Transportation, prepared for Council for Advanced Transportation Studies, The University of Texas at Austin (Austin, Texas: January, 1975), p. 1.

⁶Ibid, p. 1-2.

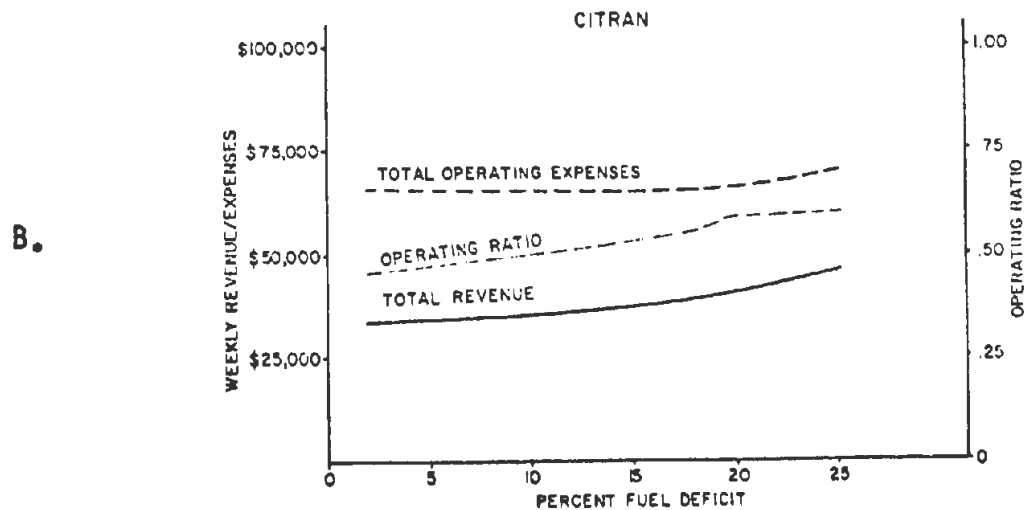
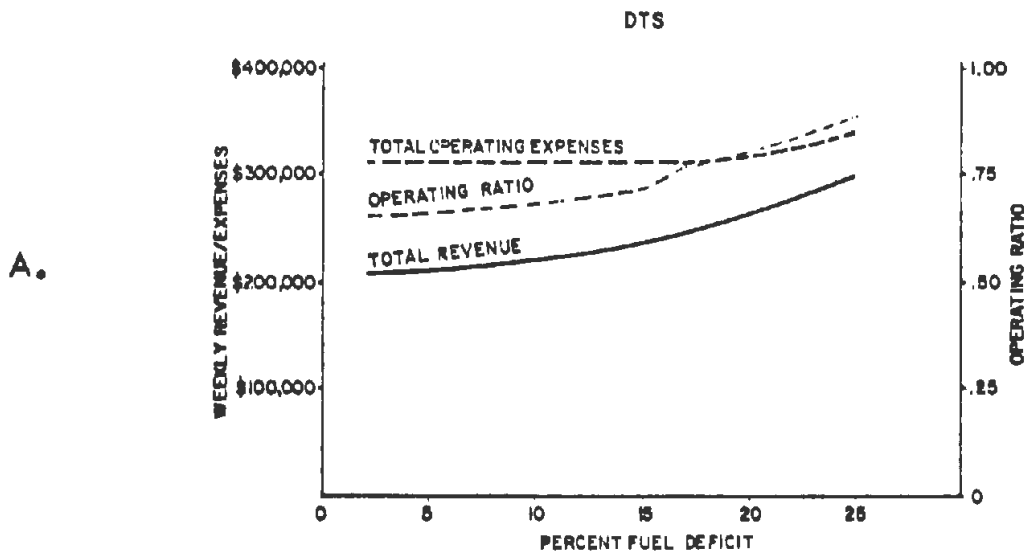
⁷Ibid., p. 22.

⁸The buses and equipment could be "sold" for a token amount, e.g., one dollar. The geographic scope of authority would be the same as the existing school district. The Board could be made up of schoolboard and city council members with a balance to assure adequate service for schools.

Financial considerations of the suggested strategies will be especially critical in suburban communities attempting to establish new public transportation services. The Cities of Dallas and Fort Worth, meanwhile, should expect increased revenues from the existing transit services to increase the operating ratio and exceed the cost of short-term emergency strategies (Figures VI-2A, VI-2B). Appendix E lists the proposed strategies and the estimated cost or savings which may be expected from each action for DTS and CITRAN.

FIGURE VI-2

IMPACT OF FUEL SHORTAGE ON TRANSIT REVENUE/COSTS



While most of these strategies and problems could be resolved by individual local governments, the role of a regional planning organization, such as the existing Steering Committee of the Regional Transportation Policy Advisory Committee, could be significant. Such an organization could be responsible for:

- the exchange and monitoring of information by local communities and transportation interests,
- the development and dissemination of local policy positions and statements with regard to federal and State regulations,
- the provision of a framework through which local communities and organizations can meet on a "neutral ground" to develop appropriate mutual aid and transportation agreements,
- the development of technical plans and information to solve problems common to many local governments or to the region as a whole,
- the execution of a public information program which would make the most efficient use of regional media such as the major newspapers, television, and radio, and
- the establishment of a single point of contact for the region in communications with federal and State agencies.

Finally, a word of caution should be given to the assumption that sufficient fuel will be available to maintain or expand existing transportation services, not to mention the establishment of new facilities in suburban areas. If this problem cannot be resolved through the actions suggested in Chapter V, the options available to maintaining the mobility of the local population could be severely restricted. For example, there would be no reason to establish a new park-and-ride service or to procure the use of school buses if no fuel were available to run these services. While suggested solutions to this problem cannot be proposed until a specific situation is identified, this concern is raised here because the availability of fuel is an essential consideration in any agreements made by individual local government entities in preparation for a fuel shortage.

Local Roles in Strategy Implementation

Table VI-2 lists the major communities and agencies involved in the strategy implementation and suggests the time frame for the initiation of these measures. Page numbers are given with the action items to refer the reader to the discussion of the measures in the report.

VII. Conclusions and Recommendations

The findings of this study indicate that the following major local problems could be experienced during a near-term future energy shortage:

- A 10 percent to 25 percent gasoline and diesel fuel shortfall is expected depending on the nature and time of the supply interruption. Transit systems and other public transportation providers may not be assured sufficient fuel supplies.
- It will be essentially impossible to obtain additional buses when they are needed to meet service increases in the event of a fuel shortage. The existing transit resources in the area at the time must be assured.
- Because a transit ridership increase of 10 percent to 40 percent is expected, existing Dallas Transit System service and transit vehicles will not be sufficient to handle this influx of passengers, especially at the upper level of increase. It appears, however, that through the total combined effects of a carpooling program, taxicab routes, reserved bus/carpool lanes, modified operating procedures, and SURTRAN bus use, that the maximum estimated demand for transit in Dallas could be accommodated in a severe near-term energy shortage. In Fort Worth, CITRAN, on the other hand, apparently can accommodate the estimated transit demand increases but only with certain inconveniences to its passengers.
- Local inequities are likely to develop with regard to allocated gasoline supplies, gasoline availability, coupon prices and coupon redistribution. Although total gasoline supplies available to the area under rationing appear to be adequate, an estimated \$750,000 per month will change hands as central city residents sell their coupons to suburban residents.
- Differences in gasoline station sales policies and sales times will produce public confusion and uncertainty in purchasing gasoline.
- Carpool programs and transit park-and-ride services appear to be the best approaches to providing transportation energy conservation options to areas outside the central cities, and such measures are expected of local

governments by the citizens of the region. The provision of such services are expected to reduce, but not eliminate, the purchase of gasoline rationing coupons by suburban residents.

- While federal and State agencies will be better prepared for any future energy problems, it is expected that local governments will still bear the bulk of the responsibilities for contingency actions.

The solutions to these problems, as identified in Chapter V, can be characterized as actions which would (1) secure additional fuel supplies, (2) maintain transportation operations if adequate fuel cannot be acquired, or (3) contend with an increased demand for public transportation. The following is a set of recommendations drawn from these possible solutions which, it is felt, will effectively address the problems at minimal administrative and financial expense. These strategies require actions by transit and paratransit operators, local governments, and segments of the private sector.

Recommendation 1: Establish Public Transportation Priorities in Fuel Allocation

At present, it appears that transit operations and emergency municipal services would fare worse during a period of severe allocation than during rationing because fuel supplies would not be guaranteed to those end users. This may occur because no mandatory priority treatment of these fuel users has been incorporated in the fuel distribution regulations, either at the federal or state allocation levels. In addition, paratransit vehicles (taxicabs, elderly and handicapped services) would be given only 90 percent of their base period needs under rationing. It is, therefore, recommended that local governments, through their elected representatives, pursue the appropriate changes to these regulations at both legislative levels.

Recommendation 2: Maintain the Present Metropolitan Carpool Programs

To save the time and expense of reestablishing the carpool programs at the onset of an energy contingency, it is recommended that the present Dallas and Fort Worth carpool programs be maintained. Although it cannot be precisely determined how effective

these programs are in terms of reducing energy consumption, providing an alternative to the individual automobile, or alleviating central city transit loads, the programs are cost-effective, i.e., more money is saved in travel costs than the cost of the programs, and the public expects such programs to be conducted. A review of the existing programs should also be accomplished to determine whether improvements can be made.

Recommendation 3: Expand or Develop Fuel Storage Capacity

Transit and paratransit operations, as well as municipal fuel users not dependent on retail supplies, should evaluate their fuel use and adequacy of current fuel storage supplies, if any. Wherever feasible, new storage facilities should be constructed to increase each user's reserve to approximately a one month's fuel supply. In addition, fuel users which do not currently have any reserve capacity should examine the feasibility of developing such storage.

More specifically, it appears that current DTS fuel storage would not permit the maintenance of the existing level of service during a fuel shortage. It is, therefore, suggested that DTS seriously consider expanding fuel storage capacity to approximately one month's supply.

Recommendation 4: Designate a Local Energy Coordinator

During another severe fuel shortage, it is expected that each community will be affected in different ways and to varying extents. There will undoubtedly exist an information gap with regard to public inquiries and problems. It is, therefore, recommended that a "local energy coordinator", on the county level and possibly at the city level, be designated from an existing administrative position. Functions of this local energy coordinator would include:

- Responding to public inquiries regarding local problems with fuel allocation and coupon distribution or redistribution.
- Publishing local coupon prices.

- Coordinating a local public information program.
- Reporting problem areas to local governing bodies and suggesting solutions to the problem.

Major private institutions may wish to appoint a coordinator as well.

Recommendations 5: Encourage Flexible Work Hours

The participation of local employers in staggered or flexible work hour programs should be encouraged by local governments. Such an action would diffuse peak hour ridership on transit facilities, thereby reducing the necessity to acquire additional vehicles for peak hour service as well as reducing energy inefficiency caused by downtown congestion during these times. Since this program would require a relatively long lead-in time, it is recommended that it be considered by the Cities of Dallas and Fort Worth for immediate action. It is further suggested that the existing carpool offices, in conjunction with the chambers of commerce of both cities, manage this program.

Recommendation 6: Increase Bus Availability

If transit demand exceeds capacity, transit systems should increase their operable fleet size by accelerating bus repairs and, thus, reduce the number of "out of service" buses. In addition, transit systems should now explore the possibilities of renting buses from other sources as well as the problem of obtaining additional drivers. Shifting SURTRAN buses to regular transit use could accommodate part of this vehicle need.

Recommendation 7: Modify State Law to Permit Public Use of School Buses

When the available options of additional bus procurement on a short-term basis become inadequate to deal with transit demand during a severe energy shortage, it is suggested that public school buses be made available for general transit use. Because the State

Education Code currently prohibits the use of school buses for such purposes, it is recommended that the necessary legislative changes be made to modify these regulations.¹

Recommendation 8: Investigate Role of and Impact on Taxicabs in Energy Shortage

While taxicabs are a potentially important public transportation resource in an energy crisis, this form of paratransit appears to be particularly vulnerable to increased fuel costs and federal gasoline allocation regulations. It is recommended that a "taxi-route" plan be developed to supplement transit service, particularly in Dallas, should a fuel shortage appear imminent. In addition, a study of the impact of higher fuel prices on area taxicabs should be included as part of future paratransit studies.

Recommendation 9: Develop Regional Park-and-Ride/Exclusive Lane Plan

A detailed regional plan for park-and-ride transit services and exclusive bus/carpool lanes should be developed. This planning effort should produce proposals for both the existing situation with respect to fuel price and availability as well as for possible contingencies.

Recommendation 10: Draft Contingency Agreements

It is recommended that sample contingency agreements be developed for dissemination by the Steering Committee which would be applicable in the following situations:

- the establishing of transit service between local governments and public transit operators,
- the establishing of transit service between local governments and private transit operators,
- the establishing of taxi route agreements between public transit systems and taxi operators, and

¹On February 15, 1977, the Steering Committee voted to support HB349 in the Texas Legislature regarding the use of school buses for non-school purposes. This bill did not, however, pass the Legislature.

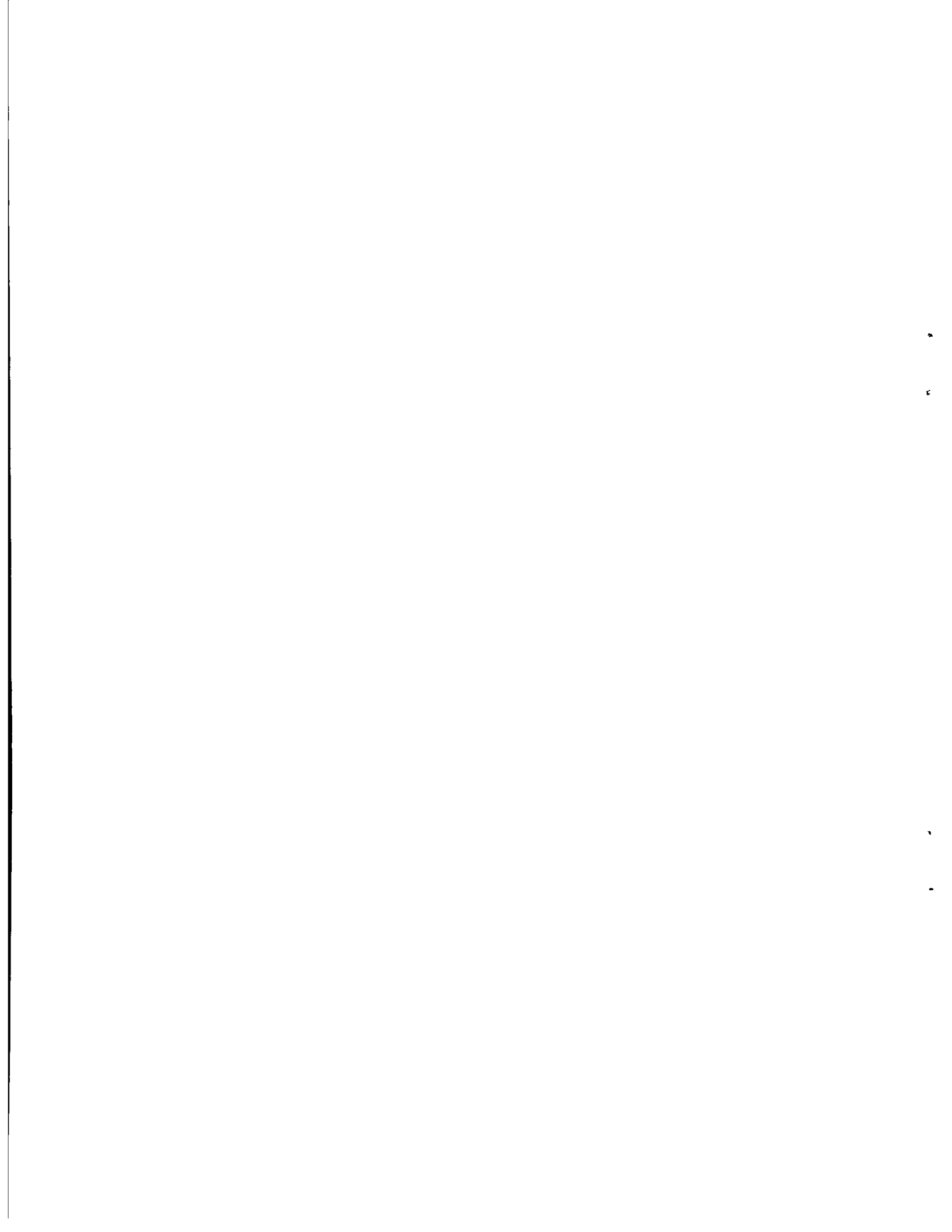
- the securing of land for downtown bus storage by transit operators from landowners.

Recommendation 11: Begin Intergovernmental Dialogue Regarding Energy Contingencies

Local governments should begin dialogue concerning anticipated energy-related transportation problems and possible cooperative solutions. Since fuel availability problems or increased costs may make the existing level of municipal services difficult to maintain, intergovernmental cooperation could develop agreements to share or exchange services. Local governments should also actively participate in State and federal energy conservation programs and plans.

Concluding Remarks

While even the complete execution of these recommended strategies cannot guarantee that transportation problems will not occur in North Central Texas, they will equip the area with a preparedness which few other areas may have. It must be remembered that these are merely temporary short-term solutions to the energy problem. Future study should address the area of long-range energy problems and solutions. And, most importantly, local planning efforts should reflect these long-range implications in their policy decisions and strive to implement them in conjunction with the continued growth of North Central Texas.



VI. PLAN DEVELOPMENT AND PHASING - WASHINGTON, D. C.

The final section is taken from the Washington Metropolitan Energy Conservation and Management Plan (Draft of March 14, 1979), prepared by the Metropolitan Washington Council of Governments. The Washington plan is unique in that it involves interstate cooperation from Virginia, Maryland, and the District of Columbia, in addition to the cooperation of local governments.

Because of the high level of intergovernmental cooperation in putting together the plan, the report gave considerable emphasis to the development of the plan and the tri-jurisdictional coordination required for developing a time sequence for initiating the plan. These subjects are described in this section. Also included are the measures to be implemented during an energy shortfall. They fall into sets of activities which are related to: (a) ridesharing; (b) transit; (c) the workplace; (d) community assistance and information.

Washington Metropolitan Energy Conservation
and Management Plan

PLAN DEVELOPMENT

In order to develop an appropriate response to fuel shortages that could occur in the next several months, a cooperative effort is necessary. Such groups as local, state and regional government entities, private sector employers, transportation agencies and fuel suppliers should be included. To coordinate these efforts in a way that is equitable and will lessen possible inconveniences is the purpose of this draft plan.

To accomplish this three questions must be answered:

- How will energy conservation and contingency measures be planned and implemented? What groups will be involved?
- What will the measures be? and;
- When will they be implemented?

Certain of these measures will require interstate coordination among the governments of Maryland, Virginia and the District of Columbia. It is possible that a "memorandum of agreement" approach identifying these areas of coordination would be the most effective procedural route to such coordination.

The Planning Process

The approach being followed is to involve those groups responsible for implementing the plan and those affected by it, in both the plan development and confirmation process. To accomplish this a two-step process has been initiated:

- Step One: Collecting technical information and formulating potential conservation and contingency measures.

- Step Two: Determining what specific actions will be taken.

Formulating Action Measures:

In response to the Chairman of the COG Board's request of February 14, 1979, the COG staff began to develop candidate conservation measures.

Many of the candidate measures and technical analyses are based upon those developed in the "Washington Metropolitan Air Quality Plan", approved by the COG Board of Directors on November 29, 1978. This effort also included suggestions and additions from the following COG Committees:

- Energy Technical Advisory Committee
- Energy Policy Advisory Committee
- Public Safety Policy Committee
- Transportation Planning Board Technical Committee
- Transportation Planning Board
- Health and Environmental Protection Citizen Advisory Committee

as well as representatives of the three state energy offices and private concerns.

This document is the initial product of this first step. It is not a plan at this point. Rather, it is a draft plan offered to decision-makers in the region to assist in developing and refining the individual actions their jurisdictions will be taking.

Determining Specific Actions:

This document, which should be thought of as a workbook or plan

development document, is being transmitted to the COG Board of Directors, to local, state and regional agencies as well as to the Federal Government, private employers and fuel suppliers. When the document is distributed, it is envisioned that involved parties will review the candidate measures through their individual decision-making and review processes. From these processes it is foreseen that these potential action measures will be:

- Reviewed;
- Expanded;
- Modified to meet individual circumstances; and
- Specific actions and confirmations made.

Regional cooperation should be maintained throughout this process and the COG staff will be available to provide technical information on specific measures and to provide coordination between the involved parties. This process is seen as beginning shortly after the COG Board meeting on March 14, 1979, and extending through mid-April. It is hoped that enough information will be developed by mid-April so that a report on confirmed fuel conservation actions will be available for the April COG Board meeting.

Two types of actions are seen as occurring:

- Planning activities; and
- Implementation activities.

Planning activities for many of the candidate measures, such as ridesharing and transit improvement, could begin immediately, Implementation could be based on phasing concepts discussed in the next section.

PHASING

An Intergovernmental Approach:

Probably the most important aspect of this energy conservation plan is the phasing schedule for implementing certain of the measures. While planning for these measures may begin immediately, an approach that would yield a regionwide schedule should be developed. All involved local, state and federal government agencies should participate and the following questions should be asked:

- Should a measure be voluntary or mandatory?
- Should the determination of when to implement be made by the federal, state or local governments?
- Should measures be implemented all at once or in a phased schedule? and;
- Should implementation be tied to specific fuel shortfall levels?

Tri-State Coordination

While the actual detailed implementation schedule for this plan should be worked out by all parties involved, a general coordinated approach developed by energy officials of Virginia, Maryland and the District of Columbia meeting with COG will be outlined for consideration.

The primary purpose of this approach is to have regionally coordinated actions in the metropolitan Washington region. The proposed form of this approach is based on two principles:

- (1) A phased approach to implementation based on gasoline supply; and
- (2) Mandatory and voluntary actions that may be implemented

by state and local governments should be phased in on the basis of their disruption to normal activities.

Phased Approach and Gasoline Supplies:

Implicit in this approach are "triggers" or pre-determined levels of gasoline supply shortfall at which point certain measures become effective. This Maryland plan includes a four-stage approach going from the present situation (Stage I) to mandatory rationing (Stage IV) with two intermediate stages of action based upon the level of gasoline supply reaching the state. The determination that a certain stage has been met is made by the Governor through executive order.

Such an approach could be used in the region with the concurrence of the two Governors and the Mayor of the District of Columbia.

Phasing of Activities:

The actual activities undertaken (developed from the preceding section) by governments, private employers and individuals should occur in a phased schedule based on their disruption of normal activities. Simply put, this means such activities as reducing government vehicle fleet travel by 10% or individuals reducing the number of discretionary trips should occur first. Then, if shortages increase in severity, more disruptive measures should be implemented.

This approach could be used by federal, state, local and regional agencies, employers and private individuals in deciding which of the conservation measures would be implemented at the

various stages of the plan.

Further Staging Development:

Within the next month, COG will be working with all involved parties in developing the staging of this plan. While this approach serves to define the approach, much work needs to be done on further defining levels of shortfall and the question of federal or state determination of such shortfalls.

Proposed Plan Elements

Through Step 1 of the planning process, thirteen measures were developed and grouped into four broad categories. These are:

Ridesharing Activities:

- (1) Expand formal ridesharing programs;*
- (2) Establish ridesharing staging areas and additional frings parking facilities; and
- (3) Encourage combining home-based trips for non-work travel.

Transit-related Activities:

- (4) Provide for increased use of mass transit such as through Sunday Metrorail operation and putting into a state of readiness the reserve Metrobus fleet and preparing a deployment program;
- (5) Increase supply and use of commuter rail and private bus service; and
- (6) Give preference to car/van pools at fringe parking lots.*

Workplace-related Activities:

- (7) Encourage compliance with building temperature adjustment program; accelerate local government conservation activities;
- (8) Expand use of flexible work hours;*
- (9) Invoke commercial parking rates for government and private sector employees;* and
- (10) Improve public sector energy efficiency through control over building and vehicle fleet operations.

Community Assistance and Information Activities:

- (11) Establish information services informing citizens of hours of operation of retail gasoline stations;
- (12) Promote consistent areawide approach to "odd-even" gasoline sales programs through tri-state coordination; and
- (13) Utilize state gasoline "set-aside" to maintain essential governmental, transportation and community assistance services.

* Activities already endorsed as elements of the Washington Metropolitan Air Quality Plan.

Information on each of these measures is presented in the following matrices and narrative sections. Estimates as to the potential benefits of the measures will be developed by COG staff on the basis of information collected and analyzed for the previously mentioned Air Quality Plan.

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