IV. SERVICE AND CAPITAL PLAN

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SCENARIOS SUMMARY

	Expand Service Area	Expand Service Hours/Miles	Expand Peak Fleet	Increase Fares	Maximize Tax, Other System-Generated Revenues	Implement Cost Cutting Strategies	Technology Improvements	Joint Development	Expansion of Role
Scenario 1 **Maintain Current System**	○	○	○	○	○	○	○	○	○
Scenario 2 **Modest Growth**	◑	◑	◑	◑	●	●	◑	◑	◑
Scenario 3 **Expanded Role**	●	●	●	●	●	●	●	●	●

○ – Does not implement ◑ – Partially implements ● – Fully Implements

THE SERVICE AND CAPITAL PLAN PRESENTED IN THE EXECUTIVE SUMMARY WAS DEVELOPED THROUGH A SCENARIO ANALYSIS

- A scenario analysis develops different pictures of the future, from which the desired future can be selected

- MTD decided to examine three primary scenarios for future service:

  - Scenario 1: Maintain Current System – This provides a baseline for analysis and determines what resources are required to maintain the current system into the future. It establishes a lower range for risk assessment in preparing for the future

  - Scenario 2: Modest Growth – This scenario determines the maximum resources that would be available if MTD fully leverages existing opportunities (e.g., fares, pass fees, rent, advertising, interest, local tax, state funds and federal funds) and applies these resources to achieve service expansion within, and potentially outside current District boundaries. It establishes a middle ground in preparing for the future

  - Scenario 3: Expanded Role – This scenario expands MTD's role to include airport operation, bike and pedestrian access, other non-single occupant vehicle services, and significantly expands service levels and boundaries and estimates the resources required to fulfill this role (i.e., not financially constrained). It represents an upper range of growth for future planning

THE SCENARIO ANALYSIS PRESENTED IN THIS CHAPTER DESCRIBES POSSIBLE FUTURES FOR MTD TO REALIZE ITS VISION

- Scenarios are not a projection of what will happen in the future – they represent futures which MTD can act to pursue
- Scenarios contain examples of potential service improvements and expansions which are generally supported by known needs and demands
- Actual delivery of individual projects, investments and service improvements is dependent on funding availability, results of future planning studies, and future decisions to be made by regional partners and MTD
- Scenarios are intended to provide an illustration of the kinds of services, roles and delivery systems MTD could pursue
- The strategic plan is intended to provide direction and guide decisions today, while preserving tomorrow's decisions for the appropriate time

THE PREFERRED 10 YEAR SERVICE AND CAPITAL PLAN IS COMPRISED OF COMPONENTS FROM EACH OF THE THREE SCENARIOS

- Each of the three scenarios examines revenues, service, costs, and roles consistent with varying levels of travel demand growth in general and MTD growth specifically

- Though grouped into three different future operating states, the scenarios are not intended to be exclusive. The preferred service and capital plan is made up of components selected from all three scenarios

- Plan components must be consistent with each other. For example, a desire to increase service levels or introduce new technology would require at least modest revenue growth over the next ten years

- The service and capital plan should also be consistent with and supportive of the strategic policies being developed

- By picking and choosing elements of the three scenarios, MTD has targeted a future that is not only achievable but produces the greatest benefits for the community

SERVICE FEATURES VARY BY SCENARIO

SERVICE FEATURE	MAINTAIN SYSTEM	MODEST GROWTH	EXPANDED ROLE
Peak Vehicles	79	Growth as permitted by revenues	Match or exceed growth in total travel demand (maintain market share)
Annual Revenue Hours	Current Levels appr. 204,000 - Bus 20,000 - DR	Growth as permitted by revenues	Match or exceed growth in total travel demand (maintain market share)
Annual Revenue Miles	Current Levels appr. 2.5m - Bus appr. 217,000 - DR	Growth as permitted by revenues	Match or exceed growth in total travel demand (maintain market share)
Routes	Maintain Current Route Structure	Modify routes to meet growth	Add routes to new service areas
Service Area	Maintain Current Boundary	Expand boundary to go coterminous with municipalities	Expand service area as required and allowed to match planning boundary
Planning Boundary	Plan within existing service boundary	Expand planning boundary to match CUUATS planning area	Expand planning boundary to match CUUATS planning area
Stop Amenities	Maintain current amenities	Incrementally add amenities such as buses, shelters and route information	Add amenities system-wide and incorporate technology (as identified below)

COST AND REVENUE ELEMENTS VARY BY SCENARIO

FINANCIAL ELEMENT	MAINTAIN SYSTEM	MODEST GROWTH	EXPANDED ROLE
Cost per Hour	Cost growth at inflation rate	Use peer analysis to find opportunities to lower cost; cost growth at inflation rate	Use peer analysis to find opportunities to lower cost; cost growth at inflation rate
Fares	Current fare levels (minor increases to offset inflationary pressure on costs)	Match fare price to inflation	Increases fares 2-3% faster than inflation
Pre-paid fares	Current fare levels (minor increases to offset inflationary pressure on costs)	Match inflation	Increase 2-3% faster than inflation
Other system generated revenues (rent, advertising, interest, joint dev't.)	Maintain current levels (about 6.4% of total revenue)	Maximize revenues to best of peers	Maximize revenues to best of peers (applied to larger system)
Local tax authority	Continue to assess according to recent trends	Apply full authority to coterminous boundary	Apply full authority to expanded boundary
State/Federal Funding	Maintain current level	Apply half of historical growth trend	Apply historical growth trend

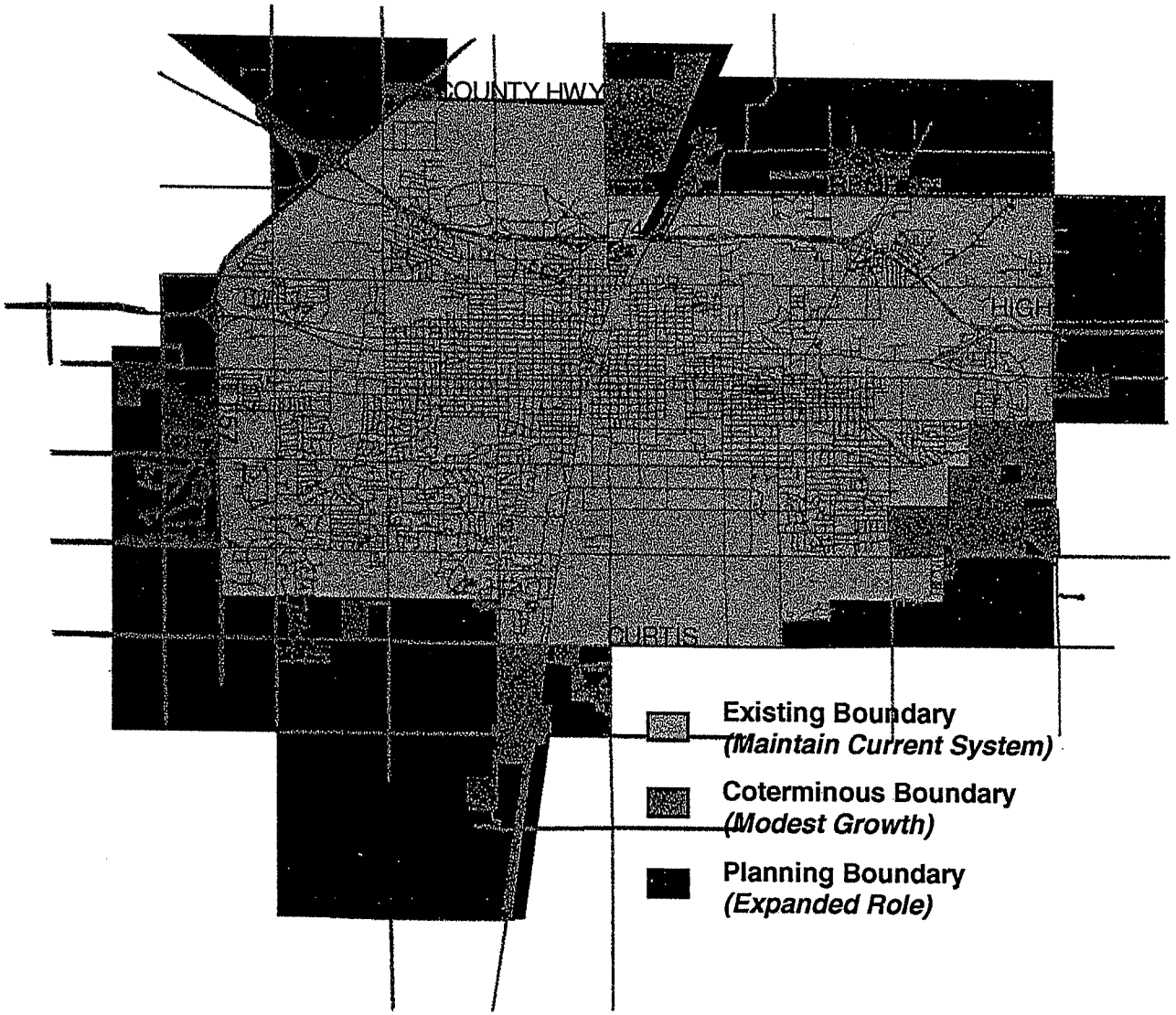
TECHNOLOGY AND CAPITAL FEATURES OF THE FUTURE MTD SYSTEM VARY BY SCENARIO

TECHNOLOGY/ CAPITAL FEATURE	MAINTAIN SYSTEM	MODEST GROWTH	EXPANDED ROLE
Fleet Mix	Continue with low-floor bus procurements	Introduce small buses for lower productivity areas	Consider modified rapid bus with vehicles distinct from regular fixed-route vehicles
Fuel technology	Diesel	Diesel	Mix of diesel and alternative fuel
Technology	Current funded programs only including video security cameras	Add technology including GPS, APCs, voice enunciators	Add technology including CMS, real-time and web-based information. Covers all aspects of customer service, cost efficiency, and service quality
Park n' Ride/Transfer Centers	Maintain current facilities	Incrementally add facilities and/or add amenities	Add amenities and technology system-wide
Bike n' Rides	Not part of current system	Incrementally add facilities and/or amenities such as lockers	Add amenities and technology system-wide

MTD'S ROLE IN THE TRANSPORTATION COMMUNITY VARIES BY SCENARIO

ROLE	MAINTAIN SYSTEM	MODEST GROWTH	EXPANDED ROLE
Transit Service	Regional operator	Regional operator	Regional operator
Paratransit	Regional operator	Regional operator	Regional operator
SafeRides	Regional operator	Regional operator	Regional operator
Pedestrian/Bikeway	No role	Advocate	Lead role
TDM/TSM/HOV	No role	Advocate	Advocate
Airport	No role	No role	If requested, MTD becomes the operator/contract management oversight agency

SERVICE AREA



EARLIER DISCUSSIONS ABOUT THE SERVICE AND PLANNING AREA POLICY HAVE ALREADY DETERMINED THE PREFERRED SERVICE AREA COMPONENT OF THE SERVICE AND CAPITAL PLAN

- MTD's current service area does not cover all incorporated areas of the three municipalities it serves, but does cover some areas outside those jurisdictions

- As part of the Service and Planning Area Policy, MTD Board and staff decided to extend MTD's service area to include the areas of Champaign, Urbana, and Savoy currently outside the service area (subject to annexation regulations)

- In addition to extending the service area boundary, MTD will use the current CUUATS (Champaign-Urbana Urbanized Area Transportation Study) boundary as its planning boundary. The planning area boundary will be the sphere of influence within which MTD will coordinate transit service plans with other transportation improvement plans

- In making service decisions, MTD will consider needs within the entire planning area, and also note impacts of development in the planning area on service within its boundaries

- Over time, MTD will seek to further extend the District's service area boundary to be consistent with the regional transportation planning boundary (i.e. CUUATS boundary), subject to annexation regulations and development patterns

MTD PEERS

Bus and Demand Response Operators

Ann Arbor Transportation Authority (Michigan)
Knoxville Area Transit – K-Trans (Tennessee)
Long Beach Transit (California)
Lansing – Capital Area Transportation Authority (Michigan)
Lexington-Fayette – LexTran (Kentucky)
Greater Lynchburg Transit Company (Virginia)
Madison Metro Transit System (Wisconsin)
Olympia Intercity Transit (Washington)
Centre Area Transportation Authority (Pennsylvania)
Winston Salem Transit Authority (Oregon)

Bus Only Operators

Santa Monica Municipal Bus Lines (California)
Westchester Liberty (New York)

PEER ANALYSIS WAS USED TO DETERMINE HOW COST PER HOUR COULD BE IMPROVED UNDER THE MODEST GROWTH AND EXPANDED ROLE SCENARIOS

- Peer analysis can lend significant insight into how well an agency is performing
- A peer comparison evaluating MTD's cost per hour against transit agencies of similar size was performed to identify potential areas for achieving greater operating efficiencies
- While MTD is being run efficiently as reflected in its very low rate of growth in cost per hour for bus and demand response service, efforts to maintain or even lower the cost per hour would free up resources for service expansion, and capital and technology improvements under the growth scenarios
- MTD's peers include agencies from around the country that are similar in size and/or have operating characteristics similar to MTD

COMPARISON OF MTD OPERATING COSTS WITH PEER OPERATORS: COST PER REVENUE HOUR BY MODE

Mode	Comparison	Operations	Maintenance	Administration	Total
BUS	MTD	$29.15	$13.05	$6.00	$48.20
	Peer Mean (13 peers including MTD)	$34.56	$13.84	$9.91	$58.31
	Rank:	4th	9th	2nd	4th
DR	MTD	$23.05	$5.29	$3.60	$31.94
	Peer Mean (11 peers including MTD)	$24.85	$5.21	$6.96	$37.02
	Rank: 4th of 11 operators	5th	7th	4th	4th

Bus Peers include the operators listed on the preceding page.

DR Peers include the operators listed on the preceding page.

Regional cost of living adjustments are reflected in all the above costs. The exact summation of costs may not be reflected in the totals due to rounding.

Source: 1998 National Transit Database

COMPARED TO ITS PEERS, MTD IS AN EFFICIENTLY RUN ORGANIZATION BUT THERE MAY BE ROOM FOR IMPROVEMENT WITH RESPECT TO MAINTENANCE FUNCTIONS

- MTD's cost per hour for both bus and demand response service is lower than the average peer cost:
  - Bus - $48.20 versus $58.31 (MTD ranked 4th of 13 peers)
  - Demand Response - $31.94 versus $37.02 (MTD ranked 4th of 11 peers)
- The lowest cost (per hour) operator for both bus and demand response is Lynchburg Transit at $44.26 and $23.92
- Analysis of transit functions – operations, maintenance, and administration – reveals that MTD may have room for improvement with respect to the maintenance function
- For bus service, MTD was the fourth lowest total hourly operator but only the ninth with respect to maintenance (vehicle and non-vehicle) functions. MTD's maintenance cost per hour was still lower than the peer average, however, due to exceptionally high maintenance costs at Capital Area Transit Authority in Lansing ($19.69) and Ann Arbor Transportation Authority ($18.69)
- MTD maintenance cost per hour for demand response service was higher than its peers but by only a couple of percentage points. Six of MTD's peers have lower demand response maintenance costs per hour of service

COST PER HOUR
2001 AND 2010

Mode	Year	Maintain System	Modest Growth	Expanded Role
BUS	2001	$54.74	$54.41	$54.41
	2010	$71.43	$70.99	$70.99
DR	2001	$38.65	$37.61	$37.61
	2010	$49.36	$48.03	$48.03

Costs grow by 3 percent per year. Cost per hour as reported in 1999 NTD report used as the base - $51.60 for bus, $36.43 for demand response.

UNDER ALL THREE SCENARIOS, COST PER HOUR GROWS AT THE RATE OF INFLATION BUT THE MODEST GROWTH AND EXPANDED ROLE SCENARIOS INCORPORATE MINOR COST SAVINGS

- The inflation rate has averaged just over 3 percent since 1986:

	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99
Rate	1.1%	3.7%	3.6%	4.5%	5%	4.1%	2.7%	2.6%	2.9%	3.1%	3.3%	2.4%	1.5%	2.3%

- Under the Maintain System scenario, a 3 percent inflation growth rate per year results in a bus cost per hour of $71.43 and a demand response cost per hour of $50.43 by 2010

- Lowering maintenance costs to that of the next best performing peer for bus and demand response results in cost savings of just 0.7 percent and 2.7 percent respectively over those under the Maintain Current System scenario. Achievable cost savings are probably quite low given the efficient operation of MTD

- Bus cost per hour under the Modest Growth and Expanded Role scenarios is $71 by 2010, with demand response cost per hour reaching just over $49

OPERATING REVENUES
2001 AND 2010

Source (in 000's)	Maintain System		Modest Growth		Expanded Role	
	2001	2010	2001	2010	2001	2010
Fare Revenues[1] (fares, contract fees, purchased transportation fares)	$3,361.3	$3,361.3	$3,566.0	$4,652.9	$4,146.7	$6,377.8
Other System Generated Revenues[2] (advertising, interest income, charter fees)	$537.5	$690.6	$1,086.2	$1,550.8	$1,208.1	$1,858.1
Property Tax[3]	$3,779.6	$5,813.3	$3,968.6	$6,104.0	$4,233.1	$6,510.9
SUBTOTAL – SYSTEM GENERATED	*$7,678.4*	*$9,865.2*	*$8,620.8*	*$12,307.7*	*$9,587.9*	*$14,746.8*
State Funds[4]	$6,362.9	$8,296.8	$6,350.9	$8,651.8	$6,381.9	$9,062.7
TOTAL – OPERATING REVENUES	***$14,041.3***	***$18,162***	***$14,971.7***	***$20,959.5***	***$15,969.8***	***$23,809.5***

1 Fare Revenues remain constant under the Maintain System scenario, increase with inflation (3%) under the Modest Growth Scenario, and increase 2% faster than inflation under the Expanded Role scenario.

2 Other system generated revenues remain as 7% of total system generated revenues under the Maintain System scenario, increase to 12.6% (1998 peer average) of total system generated revenues under the Modest Growth and Expanded Role scenario.

3 Property tax revenue grows at 4.9% per year under all three scenarios. Modest Growth scenario assumes a 5% increase and Expanded Role assumes a 12.5% increase to the tax base with annexation.

4 State funds remain as 55% of total operating costs.

MTD'S REVENUES COULD VARY FROM FIFTEEN MILLION TO THIRTY MILLION BY THE YEAR 2010

- The Maintain System scenario incorporates the most conservative revenue estimates:
  - Fare revenues are assumed to remain constant through 2010
  - Other system generated revenues (i.e., rent, concession, interest, advertising) are assumed to remain at 7 percent of total system generated revenues
  - Property taxes increase by 4.9 percent per year
  - State funding remains at 55 percent of operating costs
- Revenue assumptions are a little more optimistic under the Modest Growth scenario:
  - Fare revenues grow at the rate of inflation (3 percent per year)
  - Other system generated revenues increase to 12.6 percent (peer average) of total system generated revenues
  - Property taxes grow by 4.9 percent per year but reflect a larger tax base
  - State funding remains at 55 percent of operating costs
- The Expanded Role scenario incorporates the most optimistic revenue assumptions:
  - Fare revenues grow 2 percentage points faster than inflation
  - Other system generated revenues increase to 12.6 percent (peer average) of total system generated revenues
  - Property taxes grow by 4.9 percent per year but reflect a larger tax base
  - State funding remains at 55 percent of operating costs

SERVICE LEVELS
2001 AND 2010

Source (in 000's)	Maintain System[1]		Modest Growth[2]		Expanded Role[3]	
	2001	2010	2001	2010	2001	2010
BUS						
Service Hours	204,000	204,000	205,000	214,200	206,000	224,400
Service Miles	2,500,000	2,500,000	2,512,200	2,625,000	2,524,000	2,750,000
Peak Vehicles	79	79	80	83	80	87
DEMAND RESPONSE						
Service Hours	10,400	10,400	10,450	10,920	10,500	11,400
Service Miles	217,000	217,000	218,100	227,850	219,100	238,700
Peak Vehicles	13	13	13	14	13	15

1 The Maintain System scenario holds service levels constant through 2010.

2 The Modest Growth scenario expands service levels by 5% .

3 The Expanded Role scenario expands service levels to at least accommodate future travel demand (increase of 10%).

POTENTIAL REVENUE GROWTH WOULD ALLOW MTD TO SIGNIFICANTLY EXPAND SERVICE LEVELS OVER THE NEXT TEN YEARS

- Future service levels equal those provided today under the Maintain System scenario:
  - Bus – approximately 204,000 hours, 2.5 million miles, 79 peak vehicles
  - Demand Response – approximately 10,000 hours, 217,000 miles, 13 peak vehicles
- Service levels under the Modest Growth scenario grow by five percent over the next ten years – half the growth needed to accommodate the expected increase in travel demand
- The Expanded Role scenario grows service levels to accommodate the increase in travel demand (approximately 10 percent over the next 10 years)
- As shown on the following page, MTD could increase service levels and still maintain operating surpluses which could be applied to other improvements/enhancements

OPERATING SURPLUSES COULD BE USED TO FUND NEW TECHNOLOGY AND OTHER SERVICE-RELATED IMPROVEMENTS

	Maintain System	Modest Growth	Expanded Role
2001			
Operating Revenues	$14,041,300	$14,971,700	$15,969,800
Operating Costs	($11,568,900)	($11,547,100)	($11,603,400)
Depreciation Cost	($2,000,000)	($2,000,000)	($2,000,000)
Funds Available for Capital Expenditure/Reserve	***$472,400***	***$1,424,600***	***$2,366,400***
2010			
Operating Revenues	$18,162,000	$20,959,500	$23,809,500
Operating Costs	($15,085,100)	($15,730,500)	($16,477,700)
Depreciation Cost	($2,000,000)	($2,000,000)	($2,000,000)
Funds Available for Capital Expenditure/Reserve	***$1,076,900***	***$3,229,000***	***$5,331,800***

- Under all scenarios, there is a projected operating surplus. Even as service levels are expanded under the Modest Growth and Expanded Role scenarios, funds available for capital investment increase due to generous State operating assistance and other increased revenues

- Surpluses will be put into the capital reserve for future capital purchases (new and replacement)

MTD COULD USE A VARIETY OF TRANSPORTATION MODES TO PROVIDE TRANSIT SERVICE

- MTD currently provides a variety of transit services:
  - Fixed Route – general and campus service
  - Paratransit
    - ADA
    - Direct service
    - SafeRides
- Potential new service types/modes include:
  - Small vehicle fixed route – a hybrid of MTD's fixed route and Direct service. Smaller vehicles are used to provide fixed-route service in lower demand areas
  - Limited stop fixed route – the same route structure that MTD currently uses but buses stop at pre-determined locations rather than at every corner
  - BRT (Bus Rapid Transit) – uses full size buses operated in high demand corridors. Characteristics include more frequent headways and fewer stops than fixed route service
  - Rail – if demand warrants and opportunity presents itself
- MTD could also facilitate/offer improved pedestrian and bicyclist access to transit services

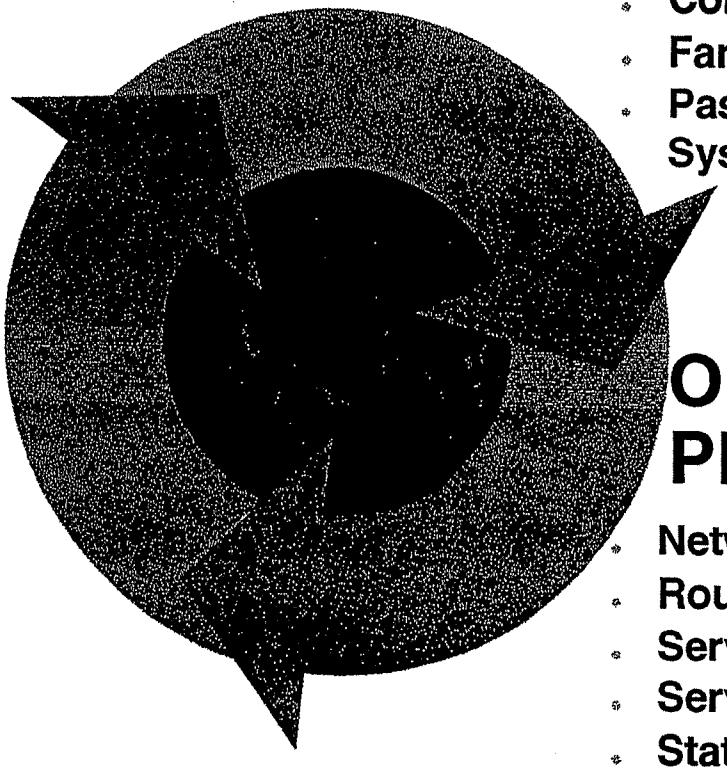
THE INTEGRATION OF THREE CORE COMPONENTS DEFINES BUS RAPID TRANSIT

TECHNOLOGY

- Vehicles
- Guideway
- Control Systems
- Fare Systems
- Passenger Information Systems

CUSTOMER INTERFACE

- Fare Structure
- Marketing Strategy
- Safety and Security
- Travel Information
- Physical Design
- Urban Design



OPERATING PLAN

- Network Structure
- Route Structure
- Service Frequency
- Service Span
- Station Spacing
- Integration with other Modes

THERE ARE SEVERAL BASIC PRINCIPLES WHICH SHOULD GUIDE MTD'S INVESTMENT IN TRANSIT TECHNOLOGY

- Purchase the technology which provides the capabilities desired, including speed, capacity, operating performance, size, noise, environmental performance and the like

- Consider maintenance facility capacity and design as part of vehicle technology decisions – can the fleet be maintained in current facilities, or are new facilities required?

- Technology does impact performance and cost. Focus on purchasing equipment which best meets passenger and operational needs at an affordable cost. Consider intelligent transportation system (ITS) technologies like global positioning systems (GPS), automatic passenger counters (APCs), powertrain performance monitoring, smart cards in fare collection, voice/data/text messaging radios, voice enunciators, and advanced passenger information systems where the value of additional capability exceeds marginal cost

TRANSIT TECHNOLOGY IS AN IMPORTANT COMPONENT OF MTD'S 10 YEAR STRATEGY

- The technologies selected for MTD's operations over the next 10 years have significant implications for operational flexibility and control, capital and operating cost, and overall system performance

- Vehicle technology addresses the types of vehicles to be used by MTD in meeting future transit demand

- Systems technology addresses additional capabilities of MTD, and includes signaling, fare collection, radio, vehicle location and operations, and customer information systems

- This section explores alternative technology and recommends direction for future investments in technology

BUS LENGTHS AND CAPACITIES

	Length (meters)	Seated Capacity	Total Capacity (Seated and Standing)
Mini-buses	6-6.4	8-16	14-40
Midi-buses	9.1-9.3	17-40	30-60
Standard	10.6-12.2	32-47	81-106
Low Floor Standard	10.6-12.2	30-44	79-102
Articulated	16.5-18	40-63	140-165
Low Floor Articulated	16.5-18	38-61	136-160

IN THE TRANSIT INDUSTRY OVERALL, BUSES COME IN A VARIETY OF SIZES AND CAPACITIES

- Transit buses generally fit into one of four categories – mini-buses, midi-buses, standard, and articulated

- These four types of buses differ in capacity and are often used to serve different transit markets:

  - Standard buses (40 foot coaches) generally serve as the backbone for most transit systems. These vehicles are well-suited to urban travel and can accommodate substantial passenger loads

  - Mini-buses and midi-buses are often used for community circulators and low density routes. These buses are better suited to narrower suburban streets, are quieter than large buses, and cost less to purchase and operate

  - Articulated buses have high capacity and are often used on very high passenger volume routes. They offer higher capacity at a lower cost than two standard coaches, and operationally allow operators to avoid bunching of coaches by widening headways slightly

- All the bus types are available in low floor designs, which are intended to speed boarding and alighting for all passengers. In addition, low floor coaches are easier to access for persons with disabilities, elderly patrons and patrons carrying heavy loads

MTD HAS MADE A FLEETWIDE DECISION REGARDING LOW FLOOR DESIGN

- MTD staff have decided to purchase low floor vehicles
- All four bus types discussed previously are available in low floor designs
- Low floor vehicles tend to expedite boarding for all passengers, offering the potential to reduce dwell time and increase speeds of transit services
- Further, low floor vehicles allow ADA access without the need for wheelchair lifts. People with disabilities, the elderly and passengers carrying heavy loads all experience quicker and easier access to vehicles with low floors
- Transit operators using low floor vehicles surrender some passenger capacity (e.g., 1 to 4 passengers)
- Low floor vehicles cost slightly more than high platform vehicles, but saves the cost of wheelchair lift purchases, operation and maintenance. Overall, data is insufficient to make a net life cycle cost comparison between low and high floor vehicles

MTD IS COMMITTED TO THE PROVISION OF HIGH QUALITY TRANSIT SERVICES TO THE CHAMPAIGN-URBANA REGION

- The expanded role scenario for the service and capital plan would integrate new technologies and capabilities with direct passenger service benefits at a reasonable cost

- Specific systems technology investments for the expanded role scenario include:

  - Data and voice radio communications, enabling voice and messaging communications with the vehicle operator, and transmission of data from other vehicle systems
  - Global positioning system and automatic vehicle location, with links to traffic signals for preemption or priority as appropriate
  - Advanced customer information systems including on board stop announcement, station and major transfer facility vehicle arrival time, and web site arrival information
  - Automatic passengers counters for the bus fleet

MANY OF THESE TECHNOLOGIES ARE RELATED AND REQUIRE A BASIC INFRASTRUCTURE TO BE IN PLACE

MANY ITS IMPROVEMENTS REQUIRE SIGNIFICANT DATA THROUGHPUT BETWEEN BUSES AND THE OPERATIONS CONTROL CENTER

- Radio channels are in short supply in most urban areas. This is becoming a greater problem as commercial wireless services proliferate
- Data transmission is often used to shirt routine voice messages to "canned" data or information displayed on a data screen, reducing time on-air
- Data channels also support automatic vehicle location, computer aided dispatch, and other ITS applications
- Modern radio systems also allow ad-hoc messages to be written by dispatchers and transmitted to operators for display. Identical messages can be sent to an entire talk group (route or corridor) at one time (e.g., detours or traffic conditions)
- Data messages can also be transmitted to paratransit vehicles. Paratransit is typically a heavy user of voice channels, so this has the potential for significant reduction in voice traffic. Coupled with AVL and CAD, total improvements may occur in the use and productivity of paratransit vehicles
- If the radio system is trunked (a scheme that shares channels among users, rather than assigning channels to specific talk groups) a data channel is needed to control the system

GLOBAL POSITIONS SYSTEMS (GPS) AND AUTOMATIC VEHICLE LOCATION (AVL) OPENS UP POSSIBILITIES FOR MANY OTHER TECHNOLOGIES AND SERVICES

- Services:
  - Real-time management of in service operations with fewer supervisors
  - On-time performance improvement systemwide
  - Faster emergency response
  - Real time customer information (at station, bus stop, television and web site)
  - Coordinated transfers (e.g., hold bus for meets)
  - Dynamic scheduling and routing (respond to overcrowding)
  - Better data collection for improved scheduling and planning
- Technologies that depend on AVL:
  - Automatic Passenger Counters
  - Automated next-stop announcement
  - Traffic signal prioritization

PROPERLY IMPLEMENTED AND USED, AVL CAN BE ECONOMICALLY JUSTIFIED THROUGH ITS BENEFITS

- There are several core benefits to GPS/AVL technology which can help MTD improve operational performance:
  - Improved tracking and deployment of street supervisors (reduce on street supervisors, and related equipment)
  - Real time service information (e.g., minutes to next transit vehicle) which can be displayed at stations, bus stops, television and internet sites
  - Design service to meet passenger needs, requiring fewer vehicles
  - Increased reliability and knowledge of on-street conditions
  - Better on time performance (monitor all vehicles at all times)
  - Reduced accounting time for driver payroll (if smart card system is used)
  - Reduced risk management cost, with more information on where/when accidents occur, number of people on board (reducing "jump-ons") and other claims information

- Specific benefits will vary from one transit agency to another. There has been no recent study of before versus after results of GPS/AVL implementation. Baltimore and Toronto estimated operating cost savings at between 4 and 10% during the early 1990's on bus

- Most recent systems have been relatively inexpensive when installed as part of a new radio system that was needed anyway

IMPROVED SCHEDULING OFFERS POTENTIALLY LARGE BENEFITS

- While operators try to follow schedules, they typically drive at "reasonable" speeds given traffic conditions
- By tracking actual versus scheduled running time over a period, scheduled running time can be "fine tuned" and often reduced
- Reductions in running time allow agencies to reduce operating costs or gain more service for nearly the same cost
- Repeated over time, this can expand vehicle life, reducing maintenance costs, and yielding additional cost savings
- Improved scheduling is a significant customer benefit – patrons can rely on schedules to be accurate and travel requirements become reliably predictable
- Coupling time information with passenger loads is a valuable planning tool, allowing market based adjustments to service levels, frequency, bus size and even routing

AUTOMATIC PASSENGER COUNTERS (APCS) CAN IMPROVE SERVICE PLANNING AND SERVICE QUALITY

- APCs can reduce data collection cost for required Section 15 and service planning data (e.g., replace ride and point checks) and improve the quality and accuracy of data (moving from very limited samples to real data)

- APCs also provide more information than the occasional ride and point checks:

  - Data is averaged over a longer period, rather than a "snapshot", which may not be accurate
  - More frequent checking of data
  - Data is available by trip, by stop, by time, by day
  - Data is received electronically in a database allowing detailed analysis

- Another approach to passenger counting is to tag all fare transactions with the location. This provides even more information about rider behavior – when do discount riders travel? Do discounts significantly affect time of travel?

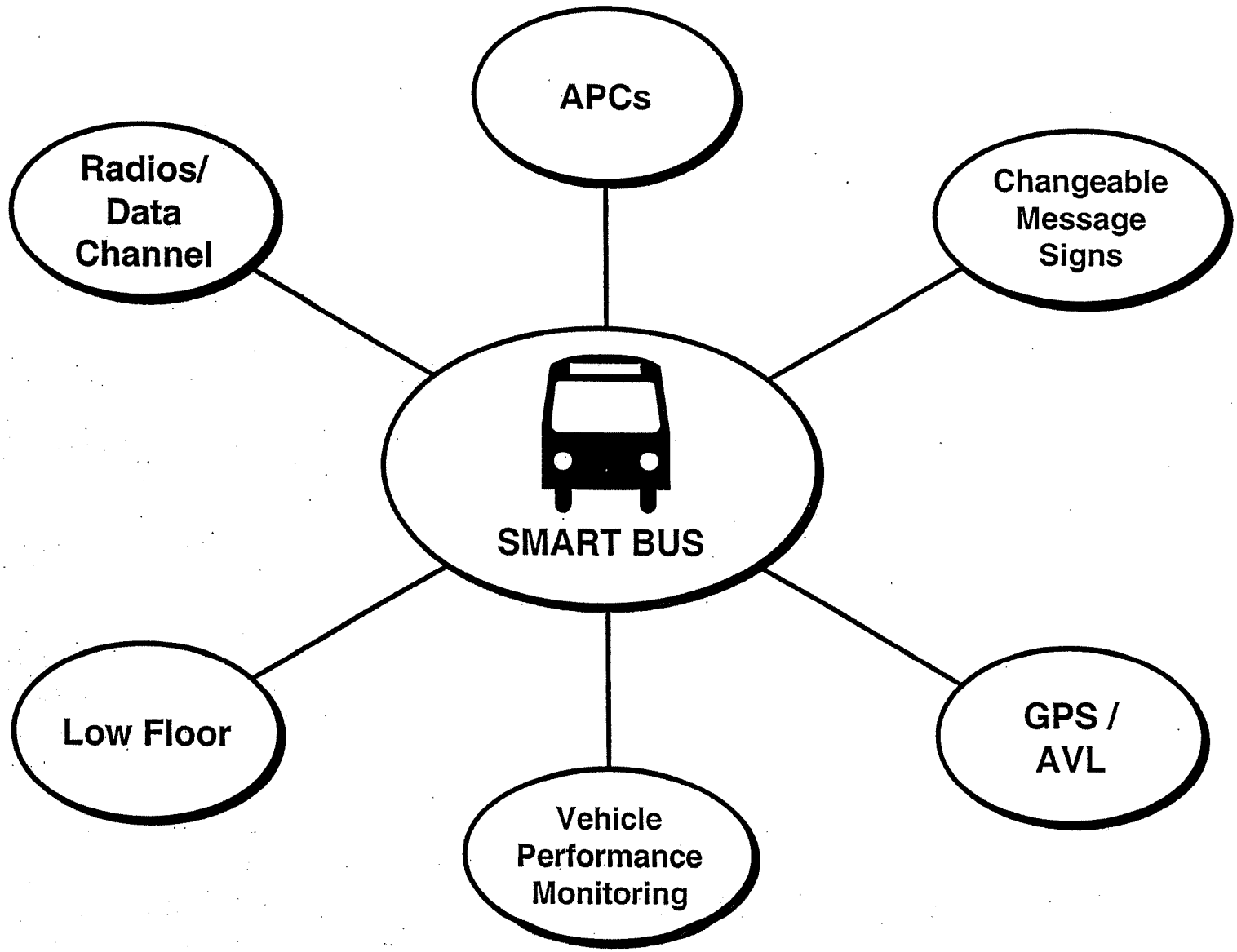
POWERTRAIN AND VEHICLE PERFORMANCE MONITORING CAN IMPROVE AVOIDANCE OF AND RESPONSE TO MECHANICAL PROBLEMS

- Most new buses are delivered with powertrain/vehicle monitoring – this can be linked to the radio/AVL system
- Bus operators sometimes fail to respond to engine problems (e.g., noise, "indicator lights", fluids, overheating). Drivetrain monitoring can alert Dispatch of impending failures, reduce the damage by having the driver shut down or change out at the end of the trip
- Dispatch can take pre-emptive action to send out a replacement vehicle prior to breakdown, or a mechanic to address the issue at trip end, avoiding negative passenger impacts and potentially realizing lower costs
- Improved service and vehicle reliability is a significant benefit to customers

SYSTEMS TECHNOLOGY WILL IMPACT ON CAPITAL AND OPERATING COSTS. WHILE MOST OF THE UNIT COSTS CAN BE IDENTIFIED, OPERATING COST BENEFITS ARE MORE ELUSIVE. THE PRIMARY BENEFIT IS LIKELY TO BE IMPROVED SERVICE QUALITY

SYSTEM	COSTS	BENEFITS
Improved Data Communication	Requires engineering analysis	Basic requirement to implement AVL/CAD and other options
Automatic Vehicle Location and Computer Aided Dispatch	$3-25k per vehicle, depending on existing infrastructure, and system features.	Real time passenger information, significantly improved on time performance, better scheduling, better control with fewer supervisors, operating cost reductions of 4-10% on bus.
Passenger Counters	$3-8k per vehicle, depending on availability of AVL.	Improved service planning and response to road conditions and overcrowding.
Powertrain Monitoring	≅$5k for new vehicles (often included in base price at no additional cost)	More reliable passenger service, improved response to road conditions, reduced engine failure, improved maintenance

FLEET TECHNOLOGY



TECHNOLOGY ENHANCEMENTS ON MTD'S BUS FLEET WOULD PROVIDE BENEFITS TO MTD AND ITS CUSTOMERS

- Low floor buses tend to expedite boarding for all passengers offering the potential to reduce dwell time and increase the speed of transit service

- Modern radio systems allow ad-hoc messages to be written by dispatchers and transmitted to operators for display. Data channels support automatic vehicle location, computer aided dispatch, and other ITS applications

- Changeable message signs allow for accurate, up-to-date transit service information to be communicated to passengers

- APCs (automatic passenger counters) can reduce data collection costs, and improve the quality and accuracy of data

- GPS (global positioning systems) and AVL (automatic vehicle location) have a number of benefits including real-time management of in service operations with fewer supervisors, improved on-time performance systemwide, faster emergency response, coordinated transfers, dynamic scheduling and routing, and better data collection

- Drivetrain monitoring can alert Dispatch of impending failures. Dispatch can take pre-emptive action to send out a replacement vehicle prior to breakdown, or a mechanic to address the issue at trip end, avoiding negative passenger impacts and potentially realizing lower costs

TRANSIT CENTER DESIGN

Feature	BASIC CENTER	PREMIUM CENTER
Parking Spaces	50-100 spaces	100-300 spaces
Lighting	street lighting	night security lighting
Passenger Wait Area	open shelters, benches	closed waiting area, seats
Bus Bays	2 to 4	4 to 8
Passenger Information	posted schedule	posted schedule, route brochures, video display
Restrooms	none	yes
Concessions	maybe news rack, pay phone	news rack, pay phone, vending machines
Joint Development Opportunites	none	auto servicing, video rental, other retail

MTD SHOULD CONSIDER A VARIETY OF DESIGN CHARACTERISTICS IN THE PLANNING OF FUTURE TRANSIT CENTERS

- The only existing transit center is the Illinois Terminal. Lot E-14 on the University campus is a key park n' ride facility

- Transit centers offer a higher level of service in terms of transit service and amenities than a simple park n' ride lot as illustrated by the difference between Illinois Terminal and Lot E-14

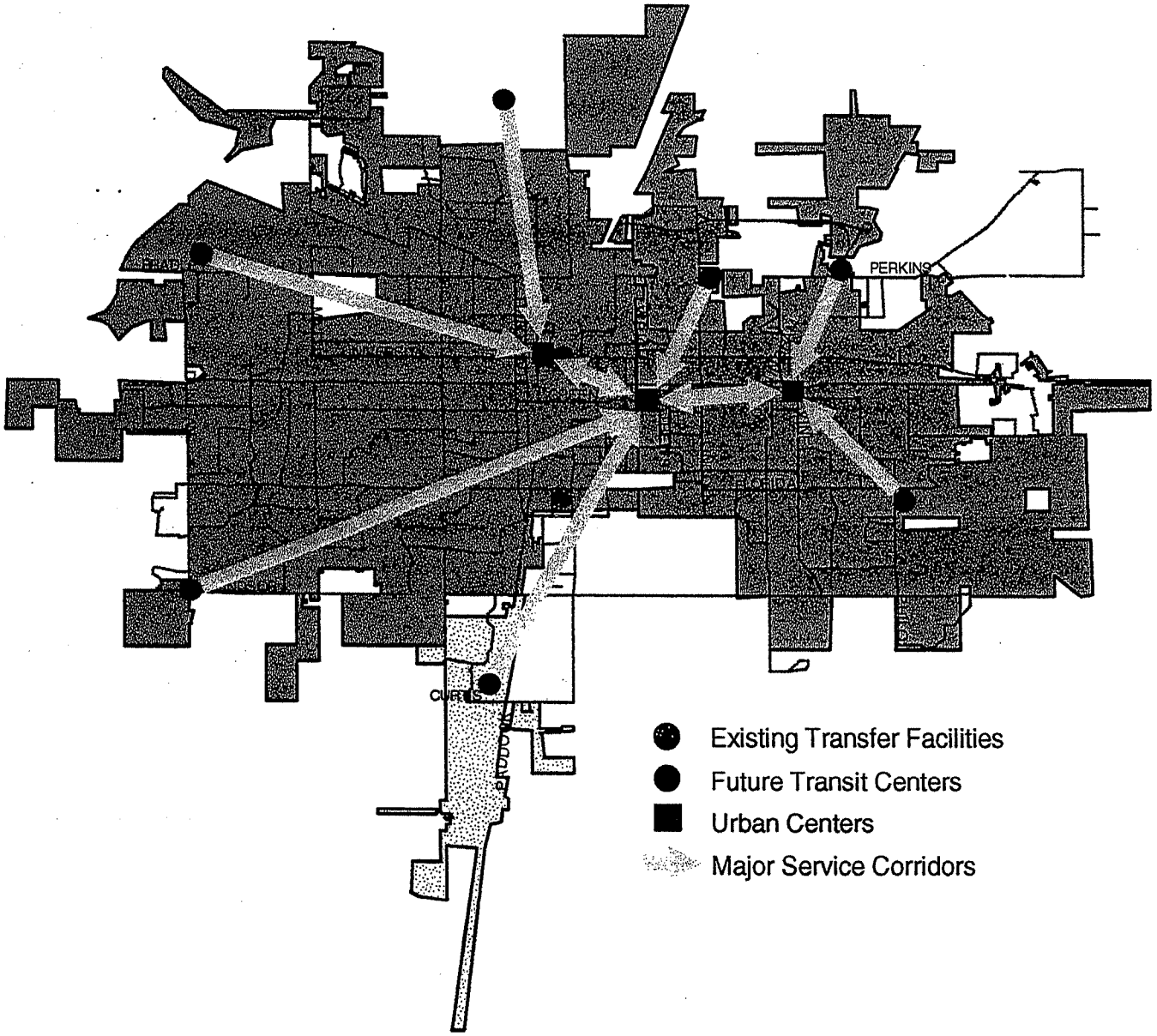
- The design of future transit centers varies significantly by scenario from a basic center to a full-service premium center

  - A basic center would provide a minimum level of service to transit patrons
  - A premium center would provided added amenities including concessions, enclosed waiting areas, and restrooms

- The future transit center system may include centers of both types depending on location and demand

- In addition to transit centers, a shelter replacement/improvement program should be implemented. Today, there is an inadequate number of shelters at key MTD bus stops and those that do exist are in need of replacement

KEY SERVICE CORRIDORS



MTD STAFF HAVE IDENTIFIED SEVERAL HIGH DEMAND SERVICE CORRIDORS

- The identified corridors connect key activity centers with areas on the periphery of MTD's service area. Key centers include:
  - Downtown Champaign
  - Downtown Urbana
  - University of Illinois
- Key activity centers and outer pulse points represent the most appropriate sites for transit centers. The level of activity at each center would dictate the design characteristics for the center
- Key corridors represent the travel corridors most appropriate for future BRT service

UNDER THE MODEST GROWTH AND EXPANDED ROLE SCENARIOS, MTD WOULD TAKE A PROACTIVE ROLE IN LAND USE AND DEVELOPMENT WITHIN ITS SERVICE AND PLANNING AREA

- Possible future expansion of MTD's service area and the impacts of development outside it's service area on the service it provides require MTD to look beyond its borders at land use/development issues

- There are a variety of resources and information available that document the benefits of transit-friendly development and design. MTD should collect and package these resources for dissemination to appropriate agencies/groups/organizations

- MTD should actively participate in the land use/development process:

  - County Planning Commission
  - City planning departments
  - City zoning departments (if different from planning departments)
  - Developers
  - Chambers of Commerce
  - University of Illinois
  - State legislature

- MTD should lobby for transit friendly development and sustainable communities

MTD'S REGIONAL ROLE HAS LARGELY BEEN DETERMINED BY ITS REGIONAL ROLE AND PARTNERSHIPS POLICY

- The three scenarios range from continuing solely as transit provider and advocate to playing a role in all regional transportation issues

Maintain System	Modest Growth	Expanded Role
Lead agency for transit service	Lead agency for transit service	Lead agency for transit service
Participate in regional forums with transit issues	Participate in regional forums with transit issues	Participate in regional forums with transit issues
	Advocate pedestrian/bicycle access improvements	Lead pedestrian/bicycle access improvements (as funds permit)
	Advocate all non-SOV improvements	Advocate all non-SOV improvements

- Participation (as an advocate or lead) in non-transit programs/initiatives would be on a "funds/resources available" basis