CHAPTER SEVEN: TRANSPORTATION PLAN

MAJOR THOROUGHFARE STREET PLAN

The Major Thoroughfare Plan classifies public highways and roadways within the City based upon their function. The Plan also establishes access control standards and guidelines, which set forth minimum distance separations between intersections and driveways along arterial and collector roads.

Individual roads and streets do not serve trips independently. Rather, most trips involve movement through a network of connected roadways. A highway and roadway functional classification system provides a method of planning for street improvements in a logical, efficient and orderly manner in conjunction with land development and/or redevelopment.

ROADWAY CLASSIFICATION SYSTEM

The existing road and highway network is classified by function. Roads and highways are grouped into classes or systems according to the service they provide. The factors that identify roadway classifications are:

- the level of through-traffic movement; and
- access to adjacent land or individual properties.

Roadways are not classified by the amount of traffic they carry; however, higher traffic volumes are usually consistent with upper level roadway classifications. Lower level roadways, such as local or collector roads, provide more direct access to property than do higher level roadways, such as arterial roadways or freeways. The functional classification for roadways uses a hierarchical structure to identify the operation of all roadways within a transportation system. The hierarchy of road types in ascending order is:

1. local roads,
2. collector roads,
3. arterial roads, and
4. expressways/freeways.

Roadway classifications dictate the design standards for construction of a roadway. The function of a roadway, traffic volume, and adjacent land use determine the type of roadway which should support daily traffic activity. General roadway design standards have been developed by the American Association of State Highway Transportation Officials (AASHTO) as defined in "A Policy of Geometric Design and Highways and Streets". The ability to improve an existing roadway by constructing additional lanes or other improvements to AASHTO standards, however, may be constrained by the existing development in the Growth Areas. The AASHTO standards are summarized below for arterial, collector, and local roadways.

Local. Local roadways provide direct access to private property. The ideal traffic volume for local roadways is less than 1,500 vehicles per day. The recommended width for a local roadway is 28 feet and the recommended minimum right-of-way is 50 feet. If a local roadway is constructed without an enclosed storm water system, the right-of-way should be increased to 60 feet in width so that the open storm water drainage system will be located entirely within the right-of-way. On-street parking is usually permitted. However, in order to meet fire codes which require a 20-foot path for equipment, parking should be limited to one side of the roadway.

Collector. Collector roadways are best classified as two-lane collector roadways and three-lane collector roadways.

The two-lane collector roadway functions to collect traffic in residential neighborhoods. Because traffic volumes on two-lane collector roadways may range between 1,500 and 5,000 vehicles per day, residential properties abutting the collector road may not be as desirable as those abutting a local road. The road width should accommodate two 16-foot lanes and curb and gutter for a width of 36 feet. To accommodate sidewalks and street lighting, a right-of-way of 60 feet is needed. Parking and private access to the collector should be discouraged. If needed, parking should be allowed on one side only.

A three-lane collector roadway section is appropriate for collecting traffic in commercial land use areas, such as a business park or shopping center where traffic demand is expected to range between 1,500 and 12,000 vehicles per day. This road section includes two 12-foot through lanes, and can be widened by adding one 12-foot center left turn lane. The recommended road width for a three-lane collector including curb and gutter is 40 feet. Sidewalks should be provided on both sides. The right-of-way width to allow for the roadway, sidewalks and street lighting should be a minimum of 70 feet. On-street parking should be prohibited.

Arterial. Arterial roadways are further classified into minor arterial roadways (four-lane) and major arterial roadways (five-lane). Minor arterial roadways are appropriate for carrying traffic through primarily residential land uses without directly accessing any of the properties. A minor arterial road section includes four 12-foot through lanes and should provide an additional left turn bay at all signalized intersections and any major intersections. A minimum road width of 52 feet and right-of-way width of 80 feet are recommended. Sidewalks should be provided on both sides. Only public roads should be allowed to access a four-lane arterial road and road spacing should be related to design speed as per a five or six-lane roadway. The ideal range for traffic volume on a four-lane arterial roadway is between 12,000 and 25,000 vehicles per day.

Major arterial roadways serve major activity centers and carry a high proportion of traffic on a limited number of roadway miles. This road section includes two 12-foot through lanes in each direction and between a 12-foot and 16-foot center two-way left turn lane. A minimum road width of 65 feet and right-of-way of 100 feet are recommended. Traffic volumes on this type of roadway range between 25,000 and 35,000 vehicles per day

Expressways/Freeways/Major Highways. Area highways are a vital part of the Pleasant Hill transportation system. The main arteries through the City are Highway 7 and Highway 58. Another State Route, VV, is also an important collector in the north part of the community. Approximately 6 miles north of the city limits, Highway 7 intersects with Highway 50, a major divided highway running east to west across the state. Highways 7 and 58 also provide access to other nearby highways, including US 71 to the south and M-291 to the west.

Pleasant Hill is included in the transportation planning area of the Mid America Regional Council (MARC), which is the metropolitan planning organization for the Kansas City area. Transportation committees at MARC prioritize projects and approve the allocation of federal and state transportation funds for KC area projects. Pleasant Hill has been very involved in this process, and has received significant funding for improvements to 7 Highway in Pleasant Hill. Funds have been approved to extend the 7 Highway turn lane north to 163rd Street, and south to Richland. Funds have also been allocated to improve a section of Route VV at the Lexington Street intersection.

Additional improvements to the highway systems serving Pleasant Hill are envisioned in the MARC Long Range Transportation Plan (LRTP). As the attached map indicates, a four lane project on 7 Highway from Pleasant Hill to M-50 is planned between now and 2010, and an improved two lane is on the list for 2010 to 2020. Improvements planned for other area highways will also contribute to the transportation system in Pleasant Hill.

CITY OF PLEASANT HILL ROADWAY CLASSIFICATIONS

The roadway classifications described above are applicable to the major roadways within the City. These roadways are classified based on their function that corresponds with the description of the roadway classifications. **Table 7.1** classified all major roadways within the City using the AASHTO Standards as a guide. Roads that are not identified as either a "collector" road, "arterial" road or "expressway/freeway" are classified as local roads. As development occurs, other roadways need to be classified as either collector or arterial roadways.

The City of Pleasant Hill should implement its Major Thoroughfare Plan as new subdivision plats are considered. In order to provide a complete thoroughfare network, road improvements that should be addressed include the following:

- New collector connection between South Francy Road and South Carnes Road;
- New collector connection between S. Boardman Road and Campbell Street;
- New collector connection between Country Club Street and Broadway Street; and
- New collector connection between Broadway Street and the Richland Business Park Lots.

Table 7.1: Examples of Roadway Classifications

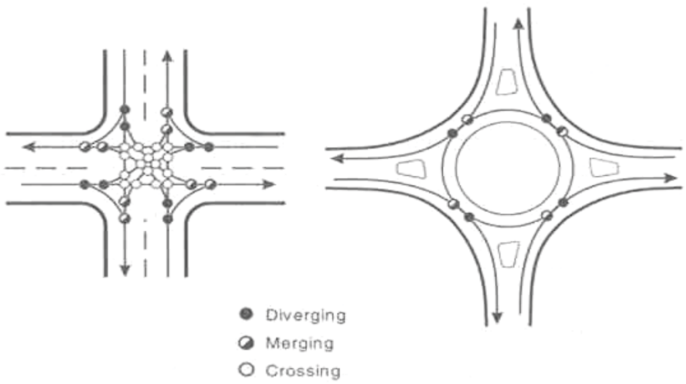
Name of Roadway	Roadway Classification
State Highway 7 and Highway 58	Minor Arterial
State Route VV	Collector
175th Street	Collector
163rd Street	Collector
179th Street, Country Club Street	Collector
Broadway Street	Collector
S. Knorpp Road, S. Lexington Road	Collector
S. Boardman Road	Collector
Campbell Street	Collector
Welsh Street	Collector
S. Francy Road, S. Carnes Road	Collector

TRANSPORTATION OUTLOOK 2030

The ***Capacity Projects by Time Period*** graphic on the facing page is published by Mid-America Regional Council (MARC) to intricate Transportation Improvement Program (TIP) funding from 2002-2006, then for time period to 2030. these are for the Metropolitan Planning Organization's long range transportation planning region around the Kansas City metropolitan area. The project s that most affect the City of Pleasant Hill in clued M-7 improvements and M-58 Highway improvements.

INNOVATIVE TRAFFIC DESIGN—ROUNDABOUTS

Figure 7.1 Vehicle to Vehicle Conflict Point Comparison for Single-Lane Approaches



Merging and diverging conflicts – caused by the joining or separating of two traffic streams. Common crashes are sideswipes and rear-end crashes.

Crossing conflicts – caused by the intersection of two traffic streams. They result in the most severe conflicts and the most likely to result in injuries or fatalities. Common crashes are right-angle and head-on crashes.

When considering roundabouts, a distinction between modern roundabouts and historic traffic circles must be made. Since the distinctions in the two may not always be obvious, the negative aspects of older rotaries or traffic circles may be mistaken by the public for a roundabout. Therefore, the ability to carefully distinguish roundabouts from traffic circles is important in terms of public understanding.

Roundabouts can be considered for a variety of reasons that range from community enhancement and traffic calming, to safety improvements and operational benefits. For example, because of the configuration of a roundabout, vehicles are generally required to slow down as they enter the intersection. These lowered speeds associated with roundabouts allow drivers more time to react to potential conflicts, reducing the number of severe accidents. Roundabouts also have fewer conflict points in comparison to conventional intersections. As compared to a typical four legged intersection, roundabouts reduce the vehicle to vehicle conflict points from 32 to 8 – 75 percent fewer vehicle conflicts (see figure 2). As with reductions in speed, this reduction in conflict points also reduces accidents.

The important difference between roundabouts and other forms of traffic circles is the reduction of absolute and relative speeds between users. As opposed to traffic circles, roundabouts require conformance to common practices to ensure safe, optimal operation including:

- Traffic control – All entering traffic must yield to traffic in the circulating lanes – circulating vehicles have the right-of-way.
- Parking – No parking is allowed in the circulatory roadway or at the intersections.
- Circulation – All vehicles circulate counter-clockwise and exit to the right of the central island. No left turns are allowed.

Public perception of roundabouts is important as they are often perceived as foreign and difficult to navigate. Although, a "learning curve" is often experienced initially, the roundabout design features still results in reduced injury rates. A case in point is the recent design[1] and construction of a roundabout intersection in Parkville, Missouri. The roundabout is located at the intersection of Missouri Highway 45 (Tom Watson Parkway) and National Drive. Upon its opening in 2000, it was the first roundabout designed for a Missouri Highway Department system. Although the first of its kind and the first in the area, no accidents have been reported in the two years following construction.

ACCESS CONTROL

Just as the design of a roadway helps to move traffic efficiently, controlling access to the roadway system can help do the same. The lack of an adequate access control policy or plan increases the probability of having traffic hazards and increased traffic congestion. Traffic hazards and traffic congestion reduce the capacity of the roadway to accommodate the traffic volumes for which it is designed. Traffic congestion and traffic hazards increase the pressure to widen roadways which requires additional public funds.

Roadway capacity can be increased or decreased in a number of ways. The method utilized most frequently to increase capacity is to widen a road to provide additional travel lanes. In some instances, however, it is not feasible to add additional travel lanes due to abutting land uses on either side of existing roadways. In these instances, other methods of increasing roadway capacity may be more appropriate. Other methods include constructing intersection improvements, turn bays, medians, restricting road and driveway access or providing traffic signal timing improvements. Conversely, road capacity can be decreased by adding cross roads, driveways, traffic signals, or other traffic control devices. By developing an access control policy, road capacity can be maintained to accommodate future development.
Specific design characteristics associated with each functional classification depend on factors such as projected traffic volumes and local access control policies. Higher traffic volumes, for example, those exceeding 20,000 vehicles per day, warrant construction of a four or five lane arterial road. Traffic volumes of 10,000 or 15,000 vehicles per day can be accommodated by a four-lane arterial road or by a two-lane arterial road which includes turn bays, good signal and intersection spacing, and private driveway access control. In many cases, a well-built two-lane arterial road can function as well as a four-lane road at approximately half the cost.

Acceptable traffic volumes on a major arterial roadway can range between 25,000 and 35,000 vehicles per day. This capacity, however, can be reduced by excessive curb cuts and mid-block turning movements. The center turn lane is appropriate because of frequent entrances into higher traffic generation land uses such as business parks and retail centers. A median can be constructed in locations where left-turns should be prohibited and on-street parking should not be allowed. For design speeds greater than 35 mph, or for peak hour right turn-in traffic volumes exceeding 100 vehicles, it is recommended that a right turn lane be constructed along the arterial roadway approaching the curb cut.

Intersection Spacing. Adequate distance between intersections is essential for the safe and efficient flow of traffic. Appropriately spaced intersections provide through-motorists an opportunity to respond to traffic entering the street from a side street. Table 7.2 shows the minimum standards for spacing intersections, determined by through-traffic speed.

Table 7.2: Minimum Intersection Spacing Standards

Through-Traffic Speed	Minimum Intersection Spacing
30 mph	210 feet
35 mph	300 feet
40 mph	420 feet
45+ mph	550 feet

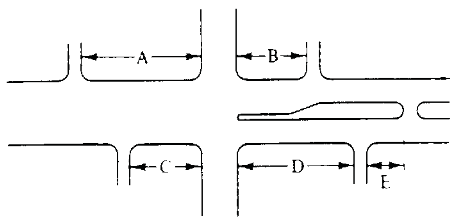
Source: Institute of Transportation Engineers

Driveway Spacing. Like a street, private driveways create an intersection with a public street. Conflicts and potential congestion occur at all intersections - public and private. Conflicts can be reduced by:

- Separating the conflicts by reducing the number of driveways and intersections;
- Limiting certain maneuvers such as left turns; and
- Separating conflicts by providing turn lanes.

No access drives should be located within the operations area of an intersection. Driver conflicts need to be spaced in order to eliminate overlaps between through traffic and right turns. It is recommended that driveway locations, at a minimum, should comply with the corner clearance criteria indicated in Figure 6.1 on the following page. Proper spacing of driveways permits adequate storage and stacking of automobiles on the public street. This distance may have to be increased in cases with high volumes to ensure that driveways do not interfere with the operation of turning lanes at intersections.

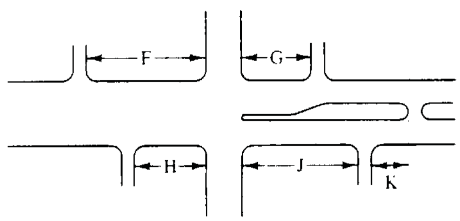
Figure 7.2: Corner Clearance



Minimum Corner Clearances*

Item	Functional Classification of Road		
	Arterial	Collector	Local
A	230	175	50
B	115	85	50
C	230	175	50
D	230	175	50
E	75	0	0

(a) Signalized intersection control



Minimum Corner Clearances*

Item	Functional Classification of Road		
	Arterial	Collector	Local
F	115	75	50
G	115	85	50
H	85	85	50
J	115	75	50
K	75	0	0

(b) Non-signalized intersection control

Corner Clearance. Specific minimum corner clearance guidelines are listed in Figure 7-1. These guidelines can be used to regulate new commercial developments which often are located along arterial or collector streets.

The number of driveways accessing undivided arterial roadways should be minimized. The following standards are based on AASHTO standards and the Institute of Transportation Engineers (ITE) Manual. The City of Pleasant Hill should adopt its own standards by using the guidelines listed in Table 7-3.

Table 7.3: Suggested Maximum Driveway Guidelines

Maximum Number of Driveways	Driveway Spacing	
	Undivided Arterial Streets Length of Lot Frontage	Divided Arterial Streets Length of Lot Frontage
1	0-399 feet	0-529 feet
2	400 - 899 feet	530 - 1199 feet
3	900-1,399 feet	1200 - 1859 feet
4	1,400-1,899 feet [1]	1860 - 2525 feet [2]

Source: Institute of Transportation Engineers (ITE) Manual

Notes:

[1] For each 500 feet above 1899 feet, one additional driveway is permitted.

[2] For each 665 feet above 2525 feet, one additional driveway is permitted.

OTHER TRANSPORTATION MODES

Aviation

While there is no airport within the city limits of Pleasant Hill, the community is well served by aviation facilities in the area. General aviation needs are met by a number of nearby airfields, including the municipal airports in Lee's Summit and Harrisonville. Commercial aviation and major air freighting is available at Kansas City International Airport.

Smart Moves

The *Smart Moves* project is a cooperative project between the Mid-America Regional Council, the Kansas City Area Transit Authority, Johnson County transit and the Unified Government Transit (Wyandotte county/Kansas City, Kansas). It aims to provide new and improved transit system, with integrated service, throughout the seven-county metropolitan area. The three tier system of a *Local Link,* a *Rapid Rider,* and a *Freeway Flyer* is designed for speed and efficiency.

The *Smart Moves* draft proposal envisions:

- A new and improved transit system with integrated service throughout the seven-county metropolitan area;
- Transit centers providing amenities and convenient connections; and,
- Service tailored to the needs of communities within the region, including:
  - Convenient connections to employment sites using *Freeway Flyers*, comfortable buses specifically designed for longer commutes.
  - *Rapid Rider* service connecting major attractions and providing fast, convenient service using new technologies. Rapid Rider service (the bus rapid transit prototype)

is currently being designed between the Missouri River and the Plaza, with other Rapid Rider routes to follow in corridors throughout the region.

- Improved *Local Link* routes that provide frequent service and more evening and weekend services

METROGREEN

MetroGreen is a proposed 1000-mile interconnected system of public and private open spaces, greenways and trails designed to link seven counties in the Kansas City metropolitan area. MARC has led the effort. MetroGreen proposes preservation and restoration of important natural streamways and environmental resources; auto-alternative travel for area residents commuting from home to work or school; it heightens awareness of recreation facilities throughout the region and improves access to them; it unifies the seven counties in the metropolis; and it connects economic, cultural and historic destinations throughout the region. **Figure 7-3** shows the regional linkages of MetroGreen.

MetroGreen will make use of abandoned rail lines by creating trails that connect the towns of Belton, Peculiar, Harrisonville, and Pleasant Hill. Perhaps, the greatest benefit to developing greenways in Cass County will be connecting to the nationally recognized KATY Trail. Someday Kansas Citizens will have a continuous trail across Missouri that connects them to St. Louis and many towns along the way. In Cass County the following trail segments have been proposed:

- Ca01– This Priority 2 trail of 10.1 miles will be an extension of the popular KATY Trail that stretches across the State of Missouri. This segment will follow the Rock-Island railroad corridor northwest from the county line to Pleasant Hill.
- Ca02– Is an extension of Ca01. The trail is Priority 2 and continues the KATY Trail 5.58 miles to Pleasant Hill.
- Ca03– This Priority 2 rail-trail of 10.42 miles will serve as a pedestrian and bicycle connection for Cass County between Harrisonville and Peculiar (Ca05).
- Ca04– This Priority 3 segment will stretch 11.16 miles between Harrisonville and Pleasant Hill.
- Ca05– This Priority 1 rail-trail spans 8.29 miles and connects Peculiar (Ca03) to Belton.
- Ca06– A Priority 2, this 15-mile rail-trail will proceed eastward from Harrisonville to the Johnson County (MO) Line where it will connect with Ca01.

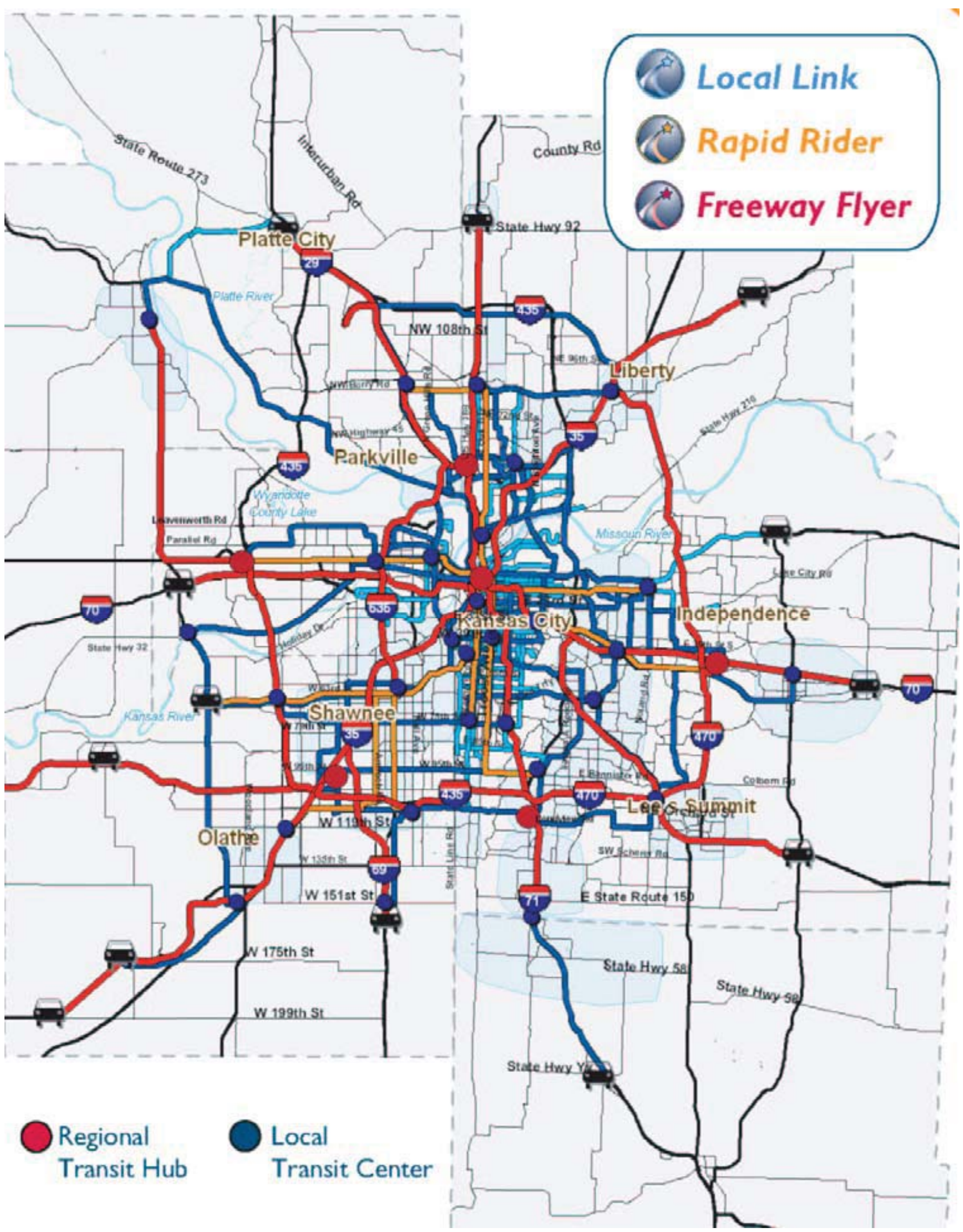
Regional Commuter Rail System

In the greater Kansas City area, the idea of a commuter rail transit system is of increasing interest. Along with playing a role in addressing the challenges of traffic congestion and the high costs of building and maintaining roads and bridges, commuter rail transit is now known to be a viable option in a wide range of communities -- including those with lower population densities like San Jose, CA and Nashville, TN. Further, commuter rail can have a significant economic impact, spurring development and renewal in areas near transit centers. **Figure 7.4** shows the proposed system in the Kansas City Metro area.

Commuter rail between city centers and suburbs often serves two goals: One is to alleviate road congestion into the city center by getting people into trains and the other is to bring urban residents to the abundance of suburban jobs. Commuter rail can then serve both communities and a range of people including the elderly, non-licensed drivers and handicapped persons. Commuter Rail features are:

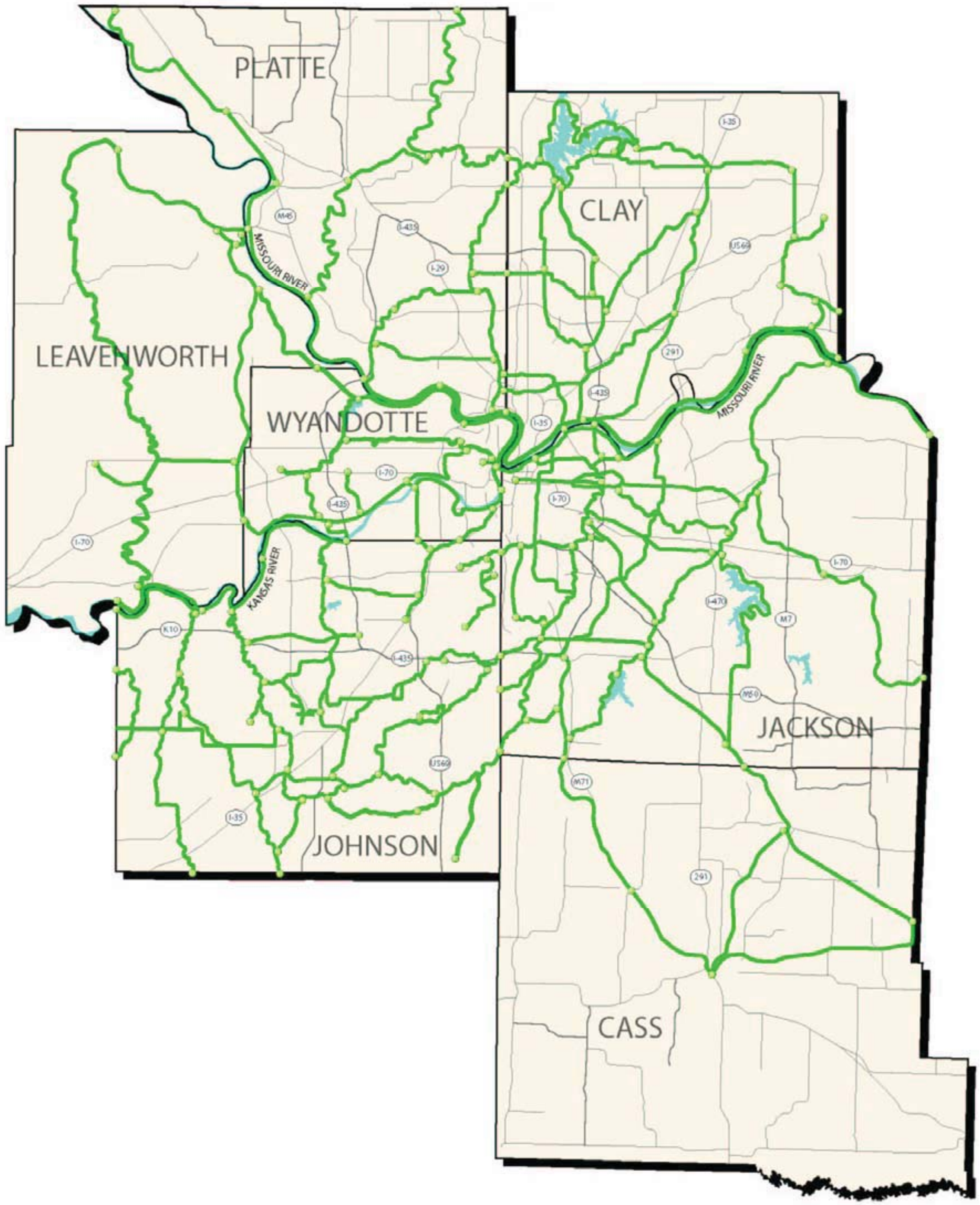
- Operates on traditional train tracks (this study is focusing on existing rail corridors);
- Diesel powered engines;
- Permanent stations;

Figure 7.4: Smart Moves Transit Proposal



Source: MARC

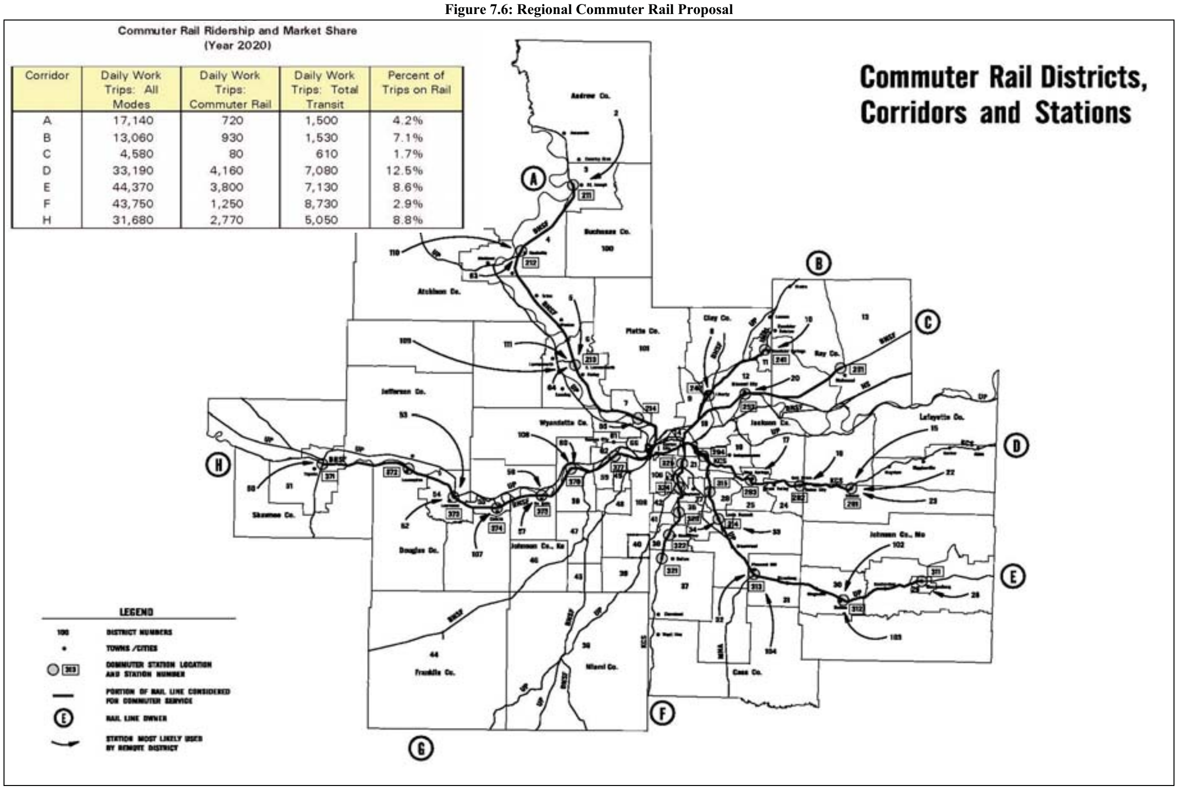
Figure 7.5: MetroGreen System Map



Source: MARC

- Flexibility in capacity by the addition or removal of cars;
- Ability to efficiently cover greater distances than other forms of mass transit; and,
- Links with other transit modes (i.e. light rail, buses, trams, subways).

Figure 7.6: Regional Commuter Rail Proposal



Commuter Rail Ridership and Market Share
(Year 2020)

Corridor	Daily Work Trips: All Modes	Daily Work Trips: Commuter Rail	Daily Work Trips: Total Transit	Percent of Trips on Rail
A	17,140	720	1,500	4.2%
B	13,060	930	1,530	7.1%
C	4,580	80	610	1.7%
D	33,190	4,160	7,080	12.5%
E	44,370	3,800	7,130	8.6%
F	43,750	1,250	8,730	2.9%
H	31,680	2,770	5,050	8.8%

Source: MARC

MAJOR THOROUGHFARE PLAN MAP