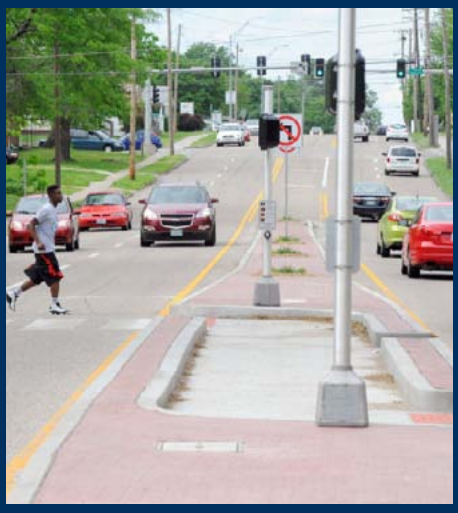

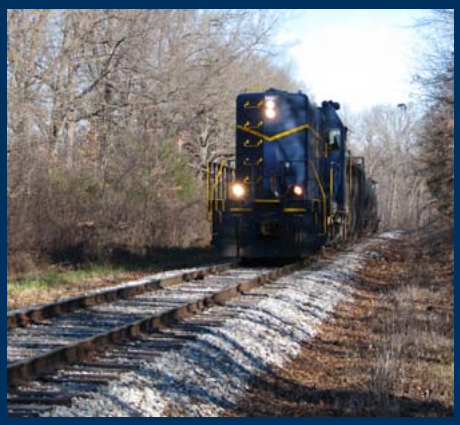

2040 Long-Range Transportation Plan

Columbia Area Transportation Study Organization (CATSO)

Approved by the CATSO Coordinating Committee February 27, 2014

Disclaimer: This plan was adopted by the Coordinating Committee of the Columbia Area Transportation Study Organization (CATSO) on February 27, 2014. The plan document was prepared for CATSO by the City of Columbia, Department of Community Development, and was financed in part through the use of Combined Planning Grant (CPG) funds from the Federal Highway Administration and Federal Transit Administration, under the provisions of Moving Ahead for Progress in the 21st Century (MAP-21), the federal surface transportation act passed in 2012. The opinions, findings and conclusions expressed in this publication are those of the authors and not necessarily those of the Missouri Highways and Transportation Commission, the Federal Highway Administration or the Federal Transit Administration.

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2040 CATSO LONG-RANGE TRANSPORTATION PLAN

APPROVED BY CATSO COORDINATING COMMITTEE- FEBRUARY 27, 2014

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SECTION ONE CATSO Transportation Systems and Planning Issues

CHAPTER ONE:
2040 TRANSPORTATION PLAN

"Columbia and central Missouri, a growing urban community, will have a modern transportation system, which allows its citizens to move about freely within the region using whatever means are desired – automobile, bus, bicycle, walking – and to do so safely, within a reasonable time frame, and without encountering needless congestion."

--- Vision Statement, Transportation Citizen Topic Group, Imagine Columbia's Future (2007)

1.1 Introduction

Transportation planning in the Columbia area has enjoyed a long history beginning with the adoption of "A City Plan for Columbia, Missouri" in 1935. The first Major Thoroughfare Plan depicting the location of future roadways in Columbia and Boone County was developed by the Columbia Area Transportation Study Organization (CATSO) in 1968. In 1994, CATSO revised and adopted the 2015 Transportation Plan. In 2001, CATSO adopted a revised 2025 Transportation Plan. The Major Roadway Plan (MRP) element of the 2025 Plan was amended by CATSO in 2005, 2006 and 2007. In 2008, CATSO adopted a revised 2030 Transportation Plan. The MRP element of the 2030 Plan was last amended by CATSO in 2012.

Over the years this series of transportation plans have provided guidance for the development of facilities that serve the transportation needs of Boone County and the City of Columbia. The plans' goals have been to move people and goods within and through the community in an efficient, cost-effective manner, and to minimize disruption to neighborhoods and other sensitive areas. The implementation of a transportation plan has a direct effect on the form and character of a community, and therefore its overall livability, by influencing development decisions. For this reason, land use and land use planning have traditionally been tied to transportation issues and opportunities.

The Intermodal Surface Transportation Efficiency Act (ISTEA) passed by Congress in 1991 brought about significant changes in the Metropolitan Planning Organization (MPO) transportation planning process. The ISTEA planning process required updates to transportation plans for twenty-year time horizons, and placed emphasis on reducing the growth in vehicle miles traveled (VMT) by individuals, implementing Clean Air Act requirements, intermodal means of transportation, and examining the land use implications of transportation decisions. Equally significant was the ISTEA requirement that the transportation plan be financially constrained. Funding for transportation investments (roads, transit, and bicycle/pedestrian) identified in the plan must be shown to be available over the twenty-year period.

The intent of this plan is to continue the transportation planning processes, requirements and best practices outlined by ISTEA, and continued under the 1998 Transportation Equity Act for the 21st Century (TEA-21), the 2005 Safe, Accountable, Flexible, Efficient Transportation Act: A Legacy for Users (SAFETEA-LU), and presently Moving Ahead for Progress in the 21st Century, or MAP-21, to develop a plan that meets the needs of Columbia and Boone County up to 2040. MAP-21 was passed by Congress in July, 2012. This legislation creates a streamlined and performance-based surface transportation program and revises a number of the various programs and policies originally established by ISTEA. The 2040 LRTP, for the first time, now utilizes a performance-based system for tracking plan implementation.

1.2 Guiding Principles for the CATSO 2040 Long Range Transportation Plan

Moving Ahead for Progress in the 21st Century Act (MAP-21), signed into law in July 2012, is the current national transportation legislation providing the guiding principles behind transportation decision-making throughout the United States in metropolitan areas. MAP-21 reaffirms the requirement that the metropolitan areas carry out a transportation planning process that considers the following eight Planning Factors:

A. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
B. Increase the safety of the transportation system for motorized and non-motorized users.
C. Increase the security of the transportation system for motorized and non-motorized users.
D. Increase the accessibility and mobility options available to people and for freight.
E. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns.
F. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.
G. Promote efficient system management and operation.
H. Emphasize the preservation of the existing transportation system.

In addition to these eight Planning Factors, MAP-21 sets a new direction in transportation planning and programming calling for a performance-based approach to transportation decision-making, focused on:

- **Safety** – to achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- **Infrastructure Condition** – to maintain the highway infrastructure asset system in a state of good repair.
- **Congestion Reduction** – to achieve a significant reduction in congestion on the National Highway System.
- **System Reliability** – to improve the efficiency of the surface transportation system.
  Freight Movement and Economic Vitality - to improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.

1.3 Study Organization Overview

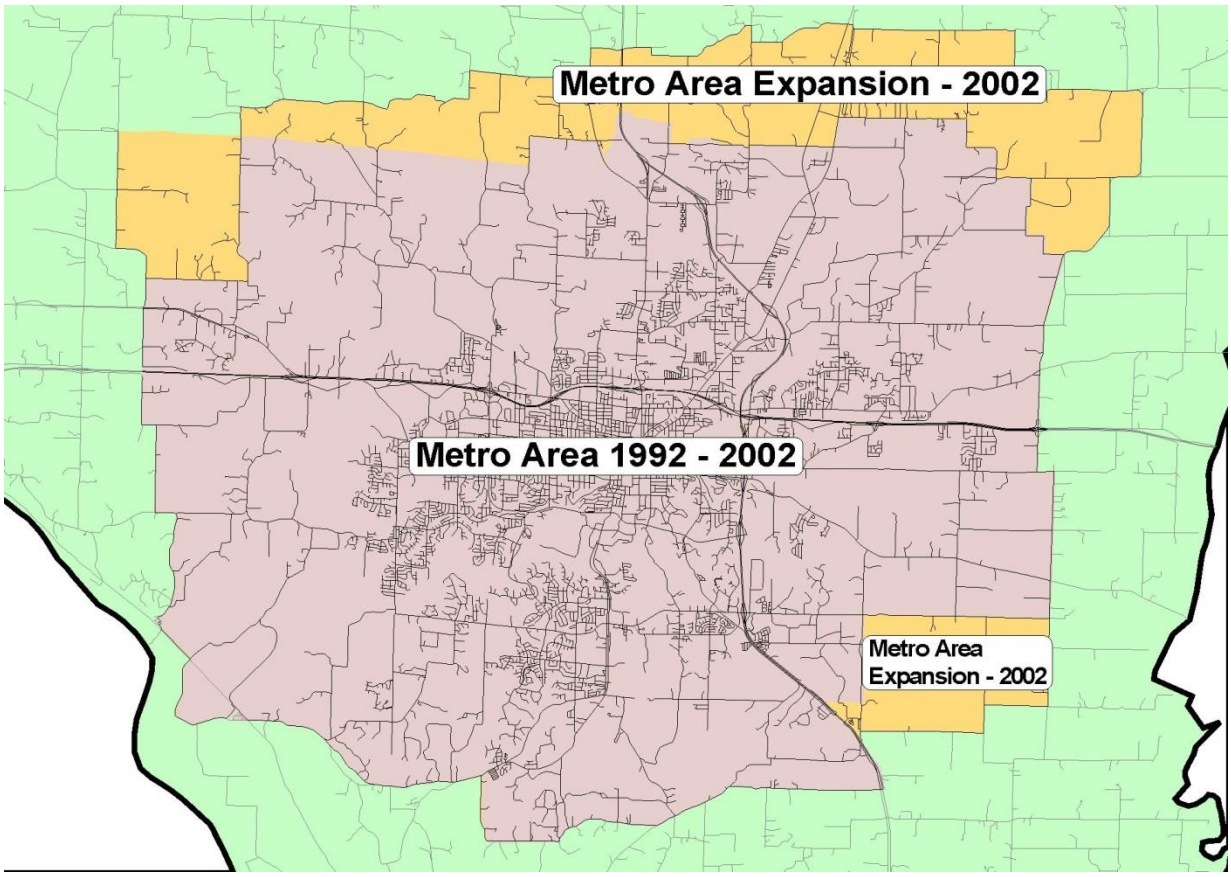
In November 1964, the Columbia Area Transportation Study (CATSO) was designated by the Governor of Missouri as a Metropolitan Planning Organization (MPO). The MPO designation provides access to federal funds for street and bridge improvement projects as well as a responsibility to perform transportation planning in accordance with the federal "3-C" process. The "3-C" process of continuing, cooperative and comprehensive planning is funded in large part by the Federal Highway Administration and the Federal Transit Administration, and is required in order to continue to receive federal/state capital and transit operating monies.

The Columbia Area Transportation Study Organization relies on two committees to perform its 3-C planning. The technical committee is comprised of staff level planners, engineers and other transportation professionals from the Missouri Department of Transportation, Boone County, and the City of Columbia, who, as the name implies, undertake technical aspects of plans, studies and reports for the metropolitan area. The coordinating committee is made up of upper level city and county staff members, local elected officials, Missouri Department of Transportation staff, Federal Highway Administration staff and Federal Transit Administration staff. This is a policy making group which directs the activities of the technical committee and approves documents prepared on behalf of the MPO. Staff support for CATSO is provided by the City of Columbia Community Development Department.

1.4 Study Area

Map 1: Columbia Metropolitan Area; shows the City of Columbia and the portion of Boone County addressed by this plan. The Metropolitan Planning (Metro) Area includes the City of Columbia and the surrounding areas in unincorporated Boone County that are projected to urbanize within the next 20 years. The current Metro Area boundary was adopted by the Coordinating Committee in 2002. Transportation Analysis Zones (TAZ's) have been developed for the entire area for eventual traffic analysis. Much of the data found in this report are a mix of Columbia and Boone County statistics which were extracted from 2000 and 2010 Census information or have been developed for the entire area for eventual traffic analysis.

Map 1: Columbia Area Transportation Study Organization – Metro Area Boundary



1.5 Travel demand model

CATSO uses a travel demand model to develop estimates of the future usage of existing and future roadway corridors. Additional discussion of the travel demand model is presented in Chapter 7 – Future Project Plan. A full update of the model/roadway network will be accomplished at a later date.

CHAPTER TWO:
POPULATION AND EMPLOYMENT: 2040

This chapter states the underlying assumptions of growth in the Metropolitan Planning Area for transportation planning purposes. Transportation planning responds to assumed growth in the number of jobs, probable employment locations, projected population growth, and probable housing locations.

2.1 Population Forecast: 2040

There are several methods and sources available for projecting population growth for Boone County and the Metro planning area to the year 2040. Population projection methods rely upon assumptions based upon historic trends, migration, birth and death rates, age cohorts and other factors.

From 2000 to 2010, the Metro Area population grew by 30,479 people, a percentage increase of29.3%. After considering a variety of potential growth rates, the CATSO Coordinating Committee elected to use a more moderate projection rate than was seen in the previous decade; the chosen projection was based on a percentage of population growth that is near the mid-range of the 1980s (1.15%), 1990s (2.05%), and 2000s (2.93%) Metro Area growth rate.[1] The projection assumes an average effective annual growth rate of 1.5%. The choice of projection rate to forecast population growth for the Columbia Metro Area for the year 2040 was also based on local housing and other demographic data, including data from the 2010 Census, and building permit information from Boone County Resource Management and the City of Columbia.

Using 2010 Census data as the base population for the Metro Area (134,592) and Boone County (162,642), a 1.5% annual growth rate results in a projection of 210,347 and 254,222 people in the year 2040 for the Metro Area and County, respectively. This is an increase of 75,775 people in the Metro Area over the 30 year planning horizon.

The Metro Area population has historically been nearly 80% of the County population (76.9% according to 2000 population estimates, and 82.7% according to 2010 Census data). The Metro Area is expected to retain a similar share of the total county population, with a slight percentage gain possible for Metro Area Boundary expansion over time; other growth trends, such as higher growth rates in the City of Columbia than in Boone County, as was seen over the last decade, may also affect this percentage in either direction (from 2000-2010 the City population grew by 28.3% and the County population grew by 20.1%).

Table 1, presented below, shows population projections for the CATSO Metro Area, the City of Columbia, and Boone County from 2010-2040 using 2010 Census data for the base year, and a 1.5% compounding annual growth rate.

Table 1: Population Projections 2010-2040

	2010	*2015*	*2020*	*2025*	*2030*	*2035*	*2040*
CATSO METRO AREA	134,592	144,994	156,200	168,271	181,276	195,286	210,378
CITY OF COLUMBIA	108,500	116,885	125,919	135,650	146,134	157,428	169,594
BOONE COUNTY	162,642	175,212	188,753	203,340	219,055	235,985	254,222

1.5% Growth Rate

[1]According to U.S. Census Bureau data, the estimated population for the Metro Area was 104,093 in 2000.

Regular monitoring of local growth trends will allow for the adjustment of these figures over time, and formal adjustment will occur as the transportation plan is updated every 5 years.

2.2 Employment Forecast: 2040

A number of sources were examined to arrive at 2040 employment projections. The U.S. Census, the Missouri Economic Research Information Center, and the Show Me Model developed by the University of Missouri Community Policy Analysis Center show a steady relationship between population and employment throughout the planning period. In 2000, there was a ratio of .56 jobs per person in Boone County. This ratio has increased to .67 jobs (roughly 2/3) per person in 2010. Factors influencing this ratio include more women entering the work force, a large number of workers who commute from other counties, and more workers delaying retirement.

These sources indicate decreasing rates of growth in employment. For these reasons, the plan uses a slightly lower rate of growth in employment versus population growth, applying 1.3% positive growth annually to 2010 Boone County employment figures. As applied to the 2010 total County employment figure of 110,698, Boone County is projected to have 163,088 jobs in 2040. It must be emphasized that this number does not represent the total number of employed persons residing within the county. The job number is a representation of employment within the county, regardless of employee place of residence. Numerous persons employed within Boone County have places of residence in surrounding counties. The total employment figure and employment locations provide essential data needed for transportation modeling. Additionally, roughly 90% of job growth in Boone County has occurred within the Metro Area, while in recent years, only about 80% of the County's population growth occurred in the Metro Area.

Since the Columbia Metro Area is the principal job generator of the county, it is projected that employment growth in the Metro Area will continue to occur at a faster rate than in the rest of Boone County due to in-commuting to employment centers. The jobs total in the Metro Area in 2010, 99,628, was 90% of the total County employment of 110,698. Assuming approximately 90% of the County's jobs will continue to be in the Metro Area in 2040, the plan suggests 146,780 as the projected employment figure for 2040. With this assumption, employment in the Metro Area would increase by 47,152 jobs by 2040.

Table #2: Employment Projections 2010-2040

	2010	2015	2020	2025	2030	2035	2040
BOONE COUNTY	110,698	118,083	125,960	134,364	143,327	152,889	163,088
CATSO METRO AREA	99,628	106,275	113,364	120,927	128,994	137,600	146,780

1.3% Growth Rate

For 2040, it is projected that the above classifications will have minor changes, with some percentage growth in government and services, and minor declines in industrial/manufacturing and commercial industries. The following percentages are estimated for the new jobs to be created through 2040:

Table #3: Projected Metro Area Population and Employment Growth through 2040 by Type

Growth Category	2010	2040	Net change 2010-2040
Metro Area Population	134,592	210,347	+75,755
Employment - Total	99,628	146,780	+47,152
AGRICULTURE	149	220	+71
MINING	27	40	+13
TRANSPORT & UTILITIES	1,886	2,779	+893
CONSTRUCTION	3,367	4,960	+1,593
INDUSTRIAL	2,507	3,694	+1,187
COMMERCIAL	18,693	27,540	+8,847

SERVICES	26,344	38812	+12,468
FINANCE/ INSURANCE/ REAL ESTATE	4,361	6426	+2,064
GOVERNMENT[2]	42,293	62309	+20,016

Source: Community Policy Analysis Center, University of Missouri; CATSO Projections

Both the CATSO Technical and Coordinating Committees reviewed potential alternatives for forecasts and gave approval to staff suggestions.

It should be noted that trends in sector growth change over time with technological changes, demographic trends, economic trends and incentives, fuel costs, and other variables which directly and indirectly affect economic and employment environments. Sector type growth figures will be evaluated every five years to readjust the data to fit trends. Overall and historically, the local economy is service based, with most jobs in services, education or government, and retail (commerce).

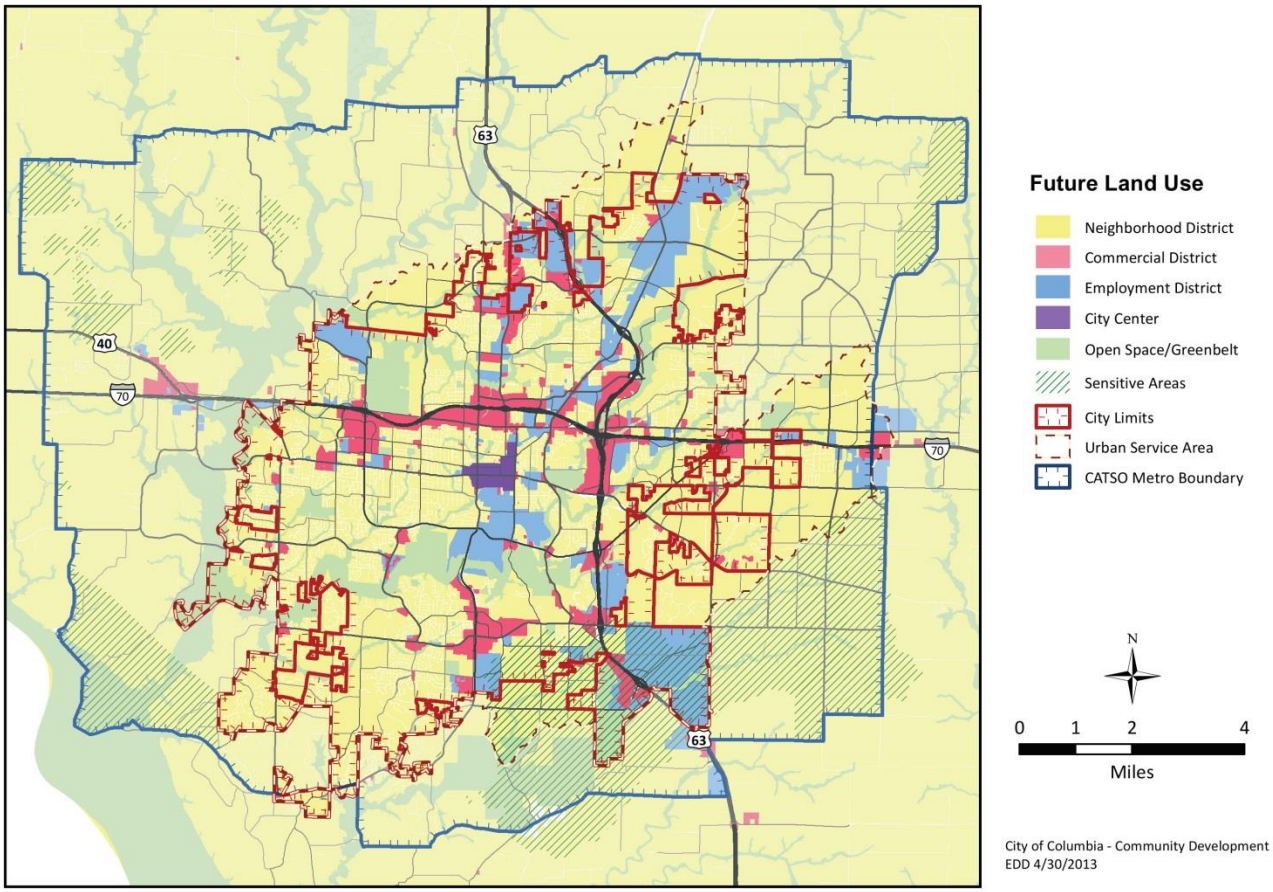
2.3 Metro 2040 Land Use Forecast

To plan for improvements to the transportation system, it is necessary to anticipate where the 2040 population will live and work. For travel demand modeling purposes, the projected increase and location of future housing and employment is allocated by Transportation Analysis Zone (TAZ). At the time of this plan update, the estimated allocation of future travel demand was affected by the timing of the 2010 U.S. Census Journey-to-Work information from the Census Transportation Planning Package (CTPP). As CTPP data will be included with the growth allocation model (e.g. data is used with a travel demand model to produce trip generation estimates and to assign trips to a model street network), a supplemental update to this plan is anticipated in late 2014 or early 2015. Once this data is available, future population (dwelling units) and employment will be re-allocated to individual TAZ's within Columbia and Boone County. For unincorporated portions of the study area, Boone County Planning Department officials will be consulted. For TAZ's within the Columbia Metro Area, the City of Columbia's *Columbia Imagined: The Plan for How We Live and Grow* Comprehensive Plan (adopted in 2013) and the Plan's Future Land Use Map (FLUM), will provide a base for the allocation based upon the Plan's recommended land uses.

The *Columbia Imagined* FLUM is presented on the opposite page. This land use forecast is based upon population and employment growth projections, infrastructure availability (including, but not limited to, transportation facilities), environmental considerations, land use and policy considerations, and how and where the public has indicated growth and development should occur.

[2]Government sector includes education services and state, local, and federal employment.

Map 2: *Columbia Imagined* Future Land Use Map (FLUM):



Using data collected and analyzed in *Columbia Imagined* via a variety of sources and means, preliminary information regarding the Metro Area Land Use Forecast is presented in the following section, with an expectation this data will be refined following the updated growth allocation model as updated CTPP data becomes available.[3]

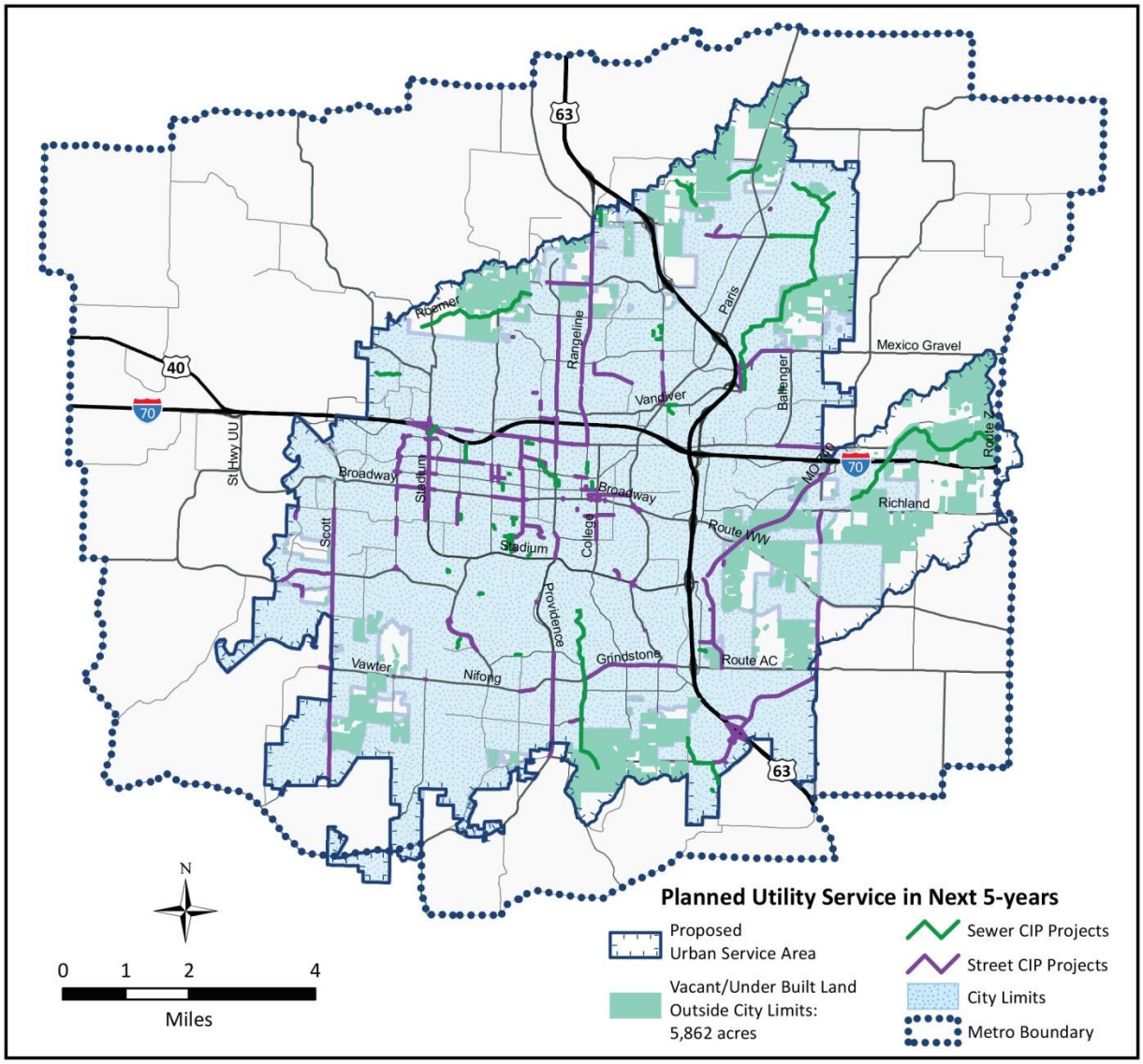
Using the 2040 Metro Area projected population of 210,348 persons, a growth of 75,755 persons over the plan's horizon, it is anticipated 32,946 new housing units will need to be built to accommodate housing needs (projected to be one housing unit for every 2.3 persons using historical trends). These 32,946 housing units will require a total of 12,672 acres (*Columbia Imagined* projects 2.6 housing units per acre across all housing types- single, double and multi-family). Where these housing units are likely to be built is projected by *Columbia Imagined* based upon availability of urban services, utilities, infrastructure, and developable/appropriately zoned land.

It is anticipated that most new housing units in the Metro Area will continue to be built within the City of Columbia boundary. There are currently 5,324 acres of available vacant land within the City and Metro Area with existing or planned utility service (within the next 5 years) which can accommodate 13,928 housing units, or 42% of the anticipated housing units needed by 2040. Map 3 indicates these areas which are likely to develop prior to areas without public utility service due to lower development costs. Only 4% of the presently available 5,324 acres (219 acres) is Metro Area land outside the City limit. To

[3] Note: *Columbia Imagined's* land use, population and employment forecasts are projected to 2030. Using *Columbia Imagined's* raw data and projection methods, numbers were calculated to 2040 to meet the 2040 LRTP planning horizon.

accommodate growth through 2040, it is anticipated that an additional 7,348 acres of land presently outside the City limit will be developed over time; much of it annexed within the City by the time of development based upon prior annexation, utility extension and development trends.

Map 3: Planned Sewer Utility Service in Next 5-Years in Metro Area



As referenced above in section 2.2 Employment Forecast: 2040, a net gain of 47,152 jobs is anticipated by 2040 for a total of 146,780 jobs. Estimated acreage requirements vary by the type of employment classification. For the purposes of estimating the acreage necessary to accommodate new employment, the employment types described in Table 3 are combined and assigned to either office, industrial, or commercial categories.

Industrial (3,757 new jobs) includes manufacturing, construction, transport & utilities, agriculture, and mining. Office (28,314 new jobs) includes government and finance, insurance, and real estate and fifty percent of the estimated employment for services. Commercial (15,081 new jobs) includes retail and non-retail uses such as hotels and fifty percent of services. Office uses are estimated to have, on average, 29 employees/acre, industrial uses an estimated 18 employees/acre, and commercial uses an estimated 20 employees/acre.

To accommodate the projected additional 47,152 employees in the Metro Area by 2040, it is estimated that a total of approximately 1,939 acres will be needed. This includes; 209 acres for industrial, 976 acres for office, and 754 acres for commercial.[4] As technology advances, acreage needed for each category is anticipated to change, necessitating careful recalculation at each five year interval. For example, a rise in telecommuting/working may affect office acreage needs.

2.4 Future Efforts

The 2010 Census was undertaken in the spring of 2010. The provision of new Census data for the Columbia Metro Area provides an opportunity to review the Metro Area boundary. Minor boundary increases are anticipated following adoption of the 2040 Plan due to 2010 Census-identified increased population densities in outlying areas; however, the anticipated changes will have little effect on the Metro Area population and housing projections.

While income, population, race, age, family size and status, and other demographic data from the 2010 Census was incorporated into the 2040 LRTP update, the late release of the Census Transportation Planning Package (CTPP) necessitates an additional update to the transportation model at a later date. June 2015 is the estimated date for the additional update/supplement to the 2040 LRTP reflective of all available land use and transportation data updates to the current 2030 model TAZ geography.

Once the model update work is completed, CATSO staff will revisit the 2040 population and employment projections for possible modifications using the improved data and tools available. The 2030 TAZ map is attached for reference in Appendix I.

As discussed in this plan, the City of Columbia adopted a new comprehensive plan, *Columbia Imagined*, in fall 2013. *Columbia Imagined* calls for changes in land use and growth management policies within the Metro Area based upon citizen-identified priorities, goals and objectives. Many of these priorities, goals and objectives are incorporated in this plan, and if realized, may greatly affect how and where growth occurs in the future. Thus, CATSO anticipates using the *Columbia Imagined* Future Land Use Map as a component of the model TAZ geography update to better understand and project the relationship between existing trip origins and trip destinations, and the projected locations of future residences and work places in the Metro Area. Reciprocally, the CATSO model will continue to be used to evaluate new growth and development proposals in terms of the capacity of the CATSO Major Roadway Plan and non-motorized and transit facilities plans, and to inform other land use decisions.

[4] *Columbia Imagined's* acres by land use model was used to determine the acreage needed to accommodate Metro Area employment to 2040.

CHAPTER THREE:
EXISTING TRANSPORTATION FACILITIES AND SERVICES

This chapter describes the existing improvements and associated services that make up the CATSO transportation system. Later chapters analyze the relationships between different modes of transportation and planned improvements to maximize performance of the system in the future.

3.1 Streets, Roads, and Highways

Within the Metro Area, there are approximately 1,123 total miles of public roadway of all categories. Roughly 42% of the miles of existing public roadway in the Metro Area are included in the major roadway plan (MRP). Most local residential and local non-residential streets are not included in the MRP. The majority of roads maintained by the City of Columbia and Boone County, approximately 60% and 63% respectively, are local roads.

Boone County is responsible for maintaining approximately 26% of the street miles in the Metro Area, the City of Columbia maintains approximately 51% of the street miles, and the State of Missouri maintains approximately 23% of street miles, many of these being highway miles (including Interstate 70). Note that Freeway miles are calculated as “lane miles,” not “centerline miles.” The mile numbers were provided by the City of Columbia Public Works Department and the Boone County Public Works Department. Table 4 provides a breakdown of centerline miles of arterial and collector streets by jurisdiction. Local and freeway miles are not included as not all jurisdictions maintain these roadway types.

Streets within the Metro Area are planned and designed according to the hierarchy of functional classification. The MPO uses a somewhat different classification system than the State of Missouri and the Federal Highway Administration, but the intent of the classification system is the same. Roadways are classified in order of function, such as property access, length and purpose of trip, traffic volumes and relationship to the rest of the system. Highways and expressways, for example, typically carry the highest volumes of traffic, carry through trips or cross-town traffic, offer limited access to adjoining property and are the "receivers" or "senders" of large amounts of traffic to and from the rest of the system. Arterial streets are the next in order of importance; collectors carry traffic from and to neighborhoods and activity centers, while local streets carry low volumes of traffic and provide direct access to adjoining property. This concept is meant to achieve efficiency and order in the street system.

The Missouri Department of Transportation (MoDOT), Boone County, and the City of Columbia are the three agencies in the metro planning area responsible for the maintenance and construction of the transportation infrastructure. The following table provides a summary of the arterial and collector street mileage by agency (as of 7/2013):

Table 4 Major Street Mileage by Jurisdiction

AGENCY	Miles of Arterial Streets	Miles of Collector Streets
MoDOT	54.29	42.26
Boone County	26.30	76.83
City of Columbia	35.69	91.14
Totals	116.28 miles	210.23 miles

Highways on the state and federal systems provide much of the roadway network structure and capacity in all the roadway corridors in the Metro Area.

There are private streets in the system of roadways but most serve to connect a single development, often a small group of dwellings, to the public roadway system. Many are dead-end roads that resemble shared driveways.

The University of Missouri-Columbia also has jurisdiction over several local streets through campus, such as Carrie Franke Drive, Missouri Avenue, Virginia Avenue, Mick Deaver Memorial Drive, Monk Drive, Hospital Drive, and Providence Point. The University has funded signalization where UMC roads meet MoDOT roadways. One notable contrast between city- and university-maintained streets in the campus area is that city streets often include metered parking whereas the university does not maintain parking spaces on its streets.

Appendix A: Functional Classification of Roadways; provides a summary of the total mileage of roadways in the Columbia Urbanized Area, and the mileage by functional classification for streets and highways in the CATSO Major Roadway Plan.

The private automobile is by far the preferred mode of transport on the Columbia Metro Area street network.

3.2 Public Parking

The availability of compact public parking is a key factor in the creation of walkable destinations, such as the City of Columbia central business district and the University of Missouri-Columbia campus. Bike parking facilities also facilitate transportation options and encourage walkability.

A. City of Columbia

The City of Columbia parking utility owns and operates six multi-level parking structures with 2,308 spaces in the downtown in addition to surface parking lots and on-street parking spaces. The City maintains 1,724 on-street and 302 off-street meters, 3,623 permit spaces in lots or garages and 278 hourly garage spaces. An inventory of downtown parking facilities is available online at: http://www.parkinthedistrict.com/

There are approximately 7,700 bike parking spots throughout the City, with most in the downtown core or nearby on the University of Missouri campus.

A study completed in January 2007 for the University of Missouri, Stephens College, and the City of Columbia by the Sasaki Group, *Campus-City Downtown Land Use Opportunities Study*, endorsed the concept of “park once” to support downtown redevelopment. Because the central business district is compact and organized in short blocks with wide sidewalks and centralized parking in parking structures, as well as on-street parking, this allows visitors and employees to park once for any number of visits to buildings. The city zoning ordinance allows a waiver of on-site parking in the central business district and in fact requires a conditional use permit for any proposed off-street, on-site surface parking.

Additional city-owned parking is available at city parks and city buildings for the convenience of city customers and city employees. Parking is generally provided according to the anticipated demand of the facilities as required by the city zoning ordinance. The zoning code allows parking requirement reductions for the provision of additional bicycle parking spaces in excess of those required.

The City is currently working towards implementation of the 2001 study’s suggestion to provide additional parking on the north side of Broadway; in addition to the relatively new Fifth and Walnut parking garage, the Short Street and Broadway garage is anticipated to be complete in 2014.

B. University of Missouri-Columbia

The university maintains six parking structures and several surface parking lots on its campus, with additional long-term commuter lots off Stadium, Providence and Ashland Road. The campus parking utility administers approximately 23,000 off-street spaces. Metered on-street parking, maintained by the City of Columbia, is available on city streets within the campus. The university does not install parking meters on university-owned streets, given the prohibition of on-street parking on those streets. The university does have approximately 3,000 metered spaces off-street. The majority of the university-owned parking is by assignment, mostly by permit.

3.3 Transit

A. Columbia Transit

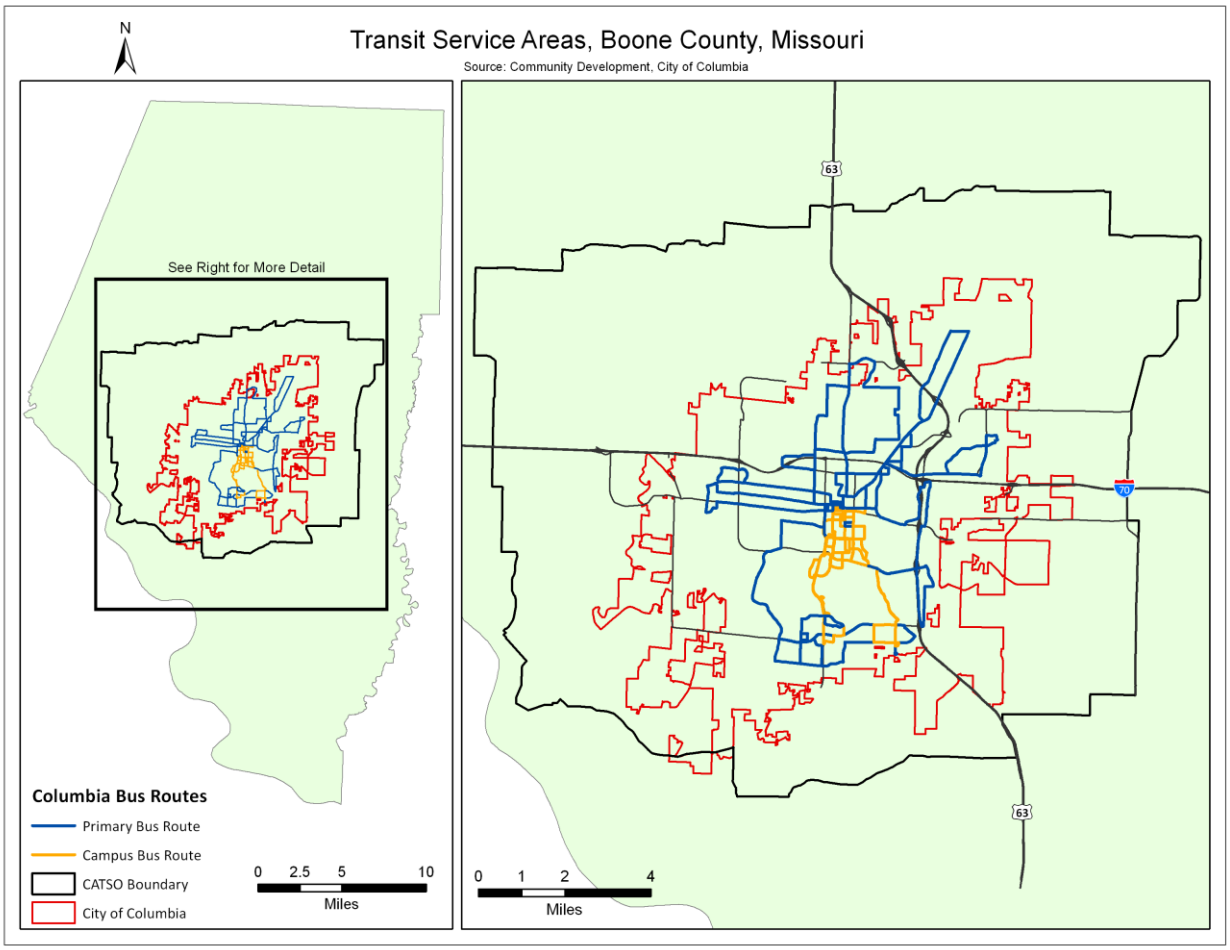
Columbia Transit is the general public provider in the City of Columbia. Service began nearly 50 years ago in 1965. Under the umbrella of Columbia Transit, several services are offered: fixed-route, FastCAT, Paratransit, and MU shuttle services. Columbia Transit provides over two million passenger-trips annually. Columbia Transit is under the administration of the Columbia City Manager and Public Works Department.

Services:

- Fixed-Route: Fixed-route bus service within Columbia's city limits uses seven routes designated by number and color. Bus service starts at 6:25 a.m. and operates on various schedules ending anywhere between 6:30 p.m. and 1:30 a.m., with scaled-back Saturday service. No service is provided on Sunday. Fixed-route service provides over 1.1 million annual passenger-trips. Passengers currently can flag down any fixed-route bus at the end of a block for a ride, where safe to do so.
- Paratransit: Columbia Paratransit provides specialized van service for persons with disabilities and elderly who are unable to use the fixed-route bus system. Service is provided curb-to-curb within the City limits of Columbia. Riders must meet eligibility requirements and become certified riders. The one-way fare is $2.00. Paratransit service is offered during the same hours as the fixed-route service. The service provides approximately 41,000 annual trips.
- FastCAT: FastCAT is Columbia Transit's newest route and is geared towards student riders. There are 24 stops in a loop around campus and downtown which runs every fifteen minutes. Service days, times and amenities are expanded beyond the other service routes offered by Columbia Transit; FastCAT runs seven days a week and, until 2:30 AM Thursday through Sunday morning during the University of Missouri and Stephen's College regular academic calendar. Free transfers and group rate discounts are available.
- MU Tigerline Service: The final service Columbia Transit provides is contract shuttle service with the University of Missouri. Service is provided with three day and three evening routes which cover the main campus and commuter parking lots. This service is operated seven days a week during the fall and spring semesters only. Over 880,000 annual trips are provided. Service is provided through student fees.

These routes are shown on the opposite page in Map 4: Transit Service Areas for Columbia Metro Area.

Map 4: Transit Service Areas for Columbia Metro Area (2012)



Financial
Columbia Transit is funded through a combination of Federal Transit Administration FTA 5307 (urbanized) operating funds, a state of Missouri annual grant, the City of Columbia dedicated ½ cent transportation sales tax, fares, advertising and contract revenue. The new category of FTA Section 5339 will be utilized for vehicle purchases and other capital projects. The ½ cent sales tax is a permanent tax so is a stable source of revenue for the system. Total operating costs are approximately $5.7 million dollars annually. See Table 14 for the projected revenues available to Columbia Transit over the 2013-2039 plan horizon.

Facilities
Columbia Transit operates out of two facilities. The first is the *Wabash Station* located at 126 North 10th Street in Columbia. This facility is the main transfer hub for both fixed-route and Paratransit routes. It serves as the bus dispatch center and is the main administrative office of Columbia Transit. Formally the Wabash Train Station, the building celebrated its 100th anniversary in 2010. With the help of an FTA Capital grant, the facility was completely refurbished in 2007 and became the City's first Leadership in Energy and Environmental design (LEED) certified building.

The second facility is the *Grissum Building*, located at 1313 Lakeview. This is a shared maintenance and storage facility for the Public Works Department, of which Columbia Transit is a division. This facility is used to store, fuel, maintain, and clean all Columbia Transit vehicles that are maintained through the Fleet Operations Division of the Public Works Department.

System Statistics
Columbia Transit's baseline system performance data is shown below in Table 5. The performance data reflect the ridership, vehicle miles and hours, and cost breakdown/allocation provided by Columbia Transit. Tracking these indicators shows cost and ridership trends over time. Projected ridership trends to 2040 are available in Section 7.7 of this plan, Transit Projects.

Table 5: Columbia Transit Service Data and Cost Allocation (2012)

Columbia Transit Service Summary						
Route/Service	Annual Passenger Trips	Annual Vehicle Miles	Annual Vehicle Hours	Service Cost	Cost per Trip	Cost per Mile
Fixed Route	1,145,596	550,710	48,809	$3,505,395	$3.06	$6.36
Para-Transit	41,655	207,599	23,228	$1,302,479	$31.27	$6.27
MU Shuttle	882,332	184,463	18,444	$1,095,843	$1.24	$5.94
Total Service	2,069,583	1,009,775	91,049	$5,903,717		

Capital (Vehicles)
Columbia Transit has a fleet of 48 passenger vehicles. Table 6, as presented below, provides a listing of those vehicles including make and year. Projected transit fleet needs to 2040 are available in Section 7.7 of this plan, Transit Projects.

Table 6: Columbia Transit Vehicle Inventory (2012)

Columbia Transit Vehicle Inventory			
Type	**Year**	**Number of Units**	**Use of Vehicle**
Chevrolet Pick Up	2005	1	Support
Van (no lift)	1992	1	Support
Toyota Prius	2005	1	Support
Diamond Cutaway	2001	1	Paratransit
Diamond Cutaway	2004	2	Paratransit
Diamond Cutaway	2006	1	Paratransit
Ford E450	2008	2	Paratransit
Ford V10	2011	2	Paratransit
Ford V10	2012	2	Paratransit
Ford Collins	1999	1	Paratransit
Ford Champion	2002	1	Paratransit
New Flyer (40')	1995	2	Fixed route
New Flyer (40')	2000	2	Fixed route
New Flyer (40')	2001	7	Fixed route
New Flyer (30')	2001	6	Fixed route
Gillig (40')	2007	2	Fixed route
Gillig (40')	2010	5	Fixed route
Gillig (40')	2011	3	Fixed route
Gillig (30')	2012	3	Fixed route
Gillig (40')	2012	3	Fixed route
Total Units		48	

The City of Columbia policy on providing transit service is:

1) Provide public transportation in the most cost efficient manner possible;

2) Develop public confidence in the public transportation system;

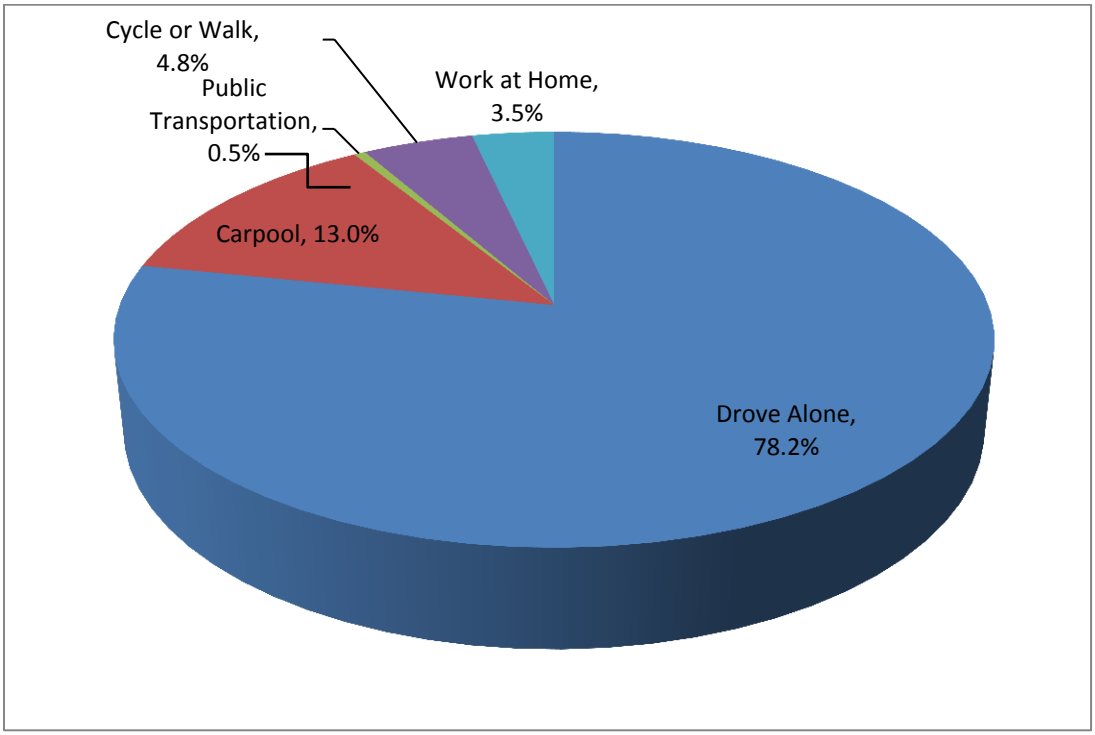
3) Establish and maintain a direction for growth of the public transportation system and a level of commitment to future service; and

4) Encourage the use of public transportation as an alternative to travel by automobile to promote the preservation of the environment through the conservation of fossil fuel resources and improved air quality, as well as decreased congestion.

The US Census American FactFinder 2007-2011 describes Travel-to-Work Mode Splits for the City and County. About .5% of Boone County commuters and .7% of Columbia commuters get to work using public transportation (Figure 1). This is a very small percentage, but it only takes commuters into account. It does not include people too young to work, retired people, and people whose disability makes them unable to have a job, all candidates for transit usage. *Columbia Imagined*, which estimates travel to work data for the Metro Area using 2010 Census block group data, paints a similar but slightly more multi-modal picture than the FactFinder data: driving alone to work is the predominant type of work trip (76.7%), followed by carpooling (12.3%), bicycling or walking (6.8%), working at home (3.0%), and public transportation (0.9%).

The average commute time in Boone County is 18.4 minutes, and 16.6 minutes in Columbia across all modes (2010 U.S. Census). Previous household surveys have indicated for transit to begin to attract ridership from other modes, the average travel time will need to be approximately 21 minutes or less. The current bus system uses a pulse system with 40 minute headways.

Figure 1: 2010 Boone County Travel-to-Work Mode Split



US Census American FactFinder 2007-2011

Historical Ridership Trends
The annual ridership in 1980 was 1,100,000+. From that high in 1980, ridership declined from 1981 to 1990. The decline in ridership followed the national trend of reduced transit ridership. Locally, the decline in fixed route ridership was off-set by an increased number of riders from the University of Missouri Parking Lot Shuttle Bus. The combined ridership in 2006 was 1,408,280 (up from 1,100,000 in 1993), and was just over 2 million rides in 2012. This service is provided by Columbia Transit under a 5-year contract with the University signed in 2013. Staff presumes that this contract will be renewed as needed through the LRTP period as the service is important to the University's parking utility, which does not have the vehicle inventory to provide it.

CoMO Connect
As a part of a strategic planning effort, in mid-2013 Columbia Transit began work to redesign and rebrand the bus system based upon a shift to a multi-hub connector system using advanced routing, GPS-tracking, and other user-oriented technologies. If fully implemented, the CoMO Connect system will utilize a network of routes with shorter travel times, expanded service hours, and 35 transfer nodes throughout the city. Additional information on CoMO Connect is available online at:
www.gocolumbiamo.com/PublicWorks/Transportation/comoc.php

Funding needs and other transit projects are further discussed in section 7.7: Transit Projects. The preliminarily proposed routes for CoMO Connect are shown on the map on the next page.

Map 5: Proposed CoMO Connect Routes

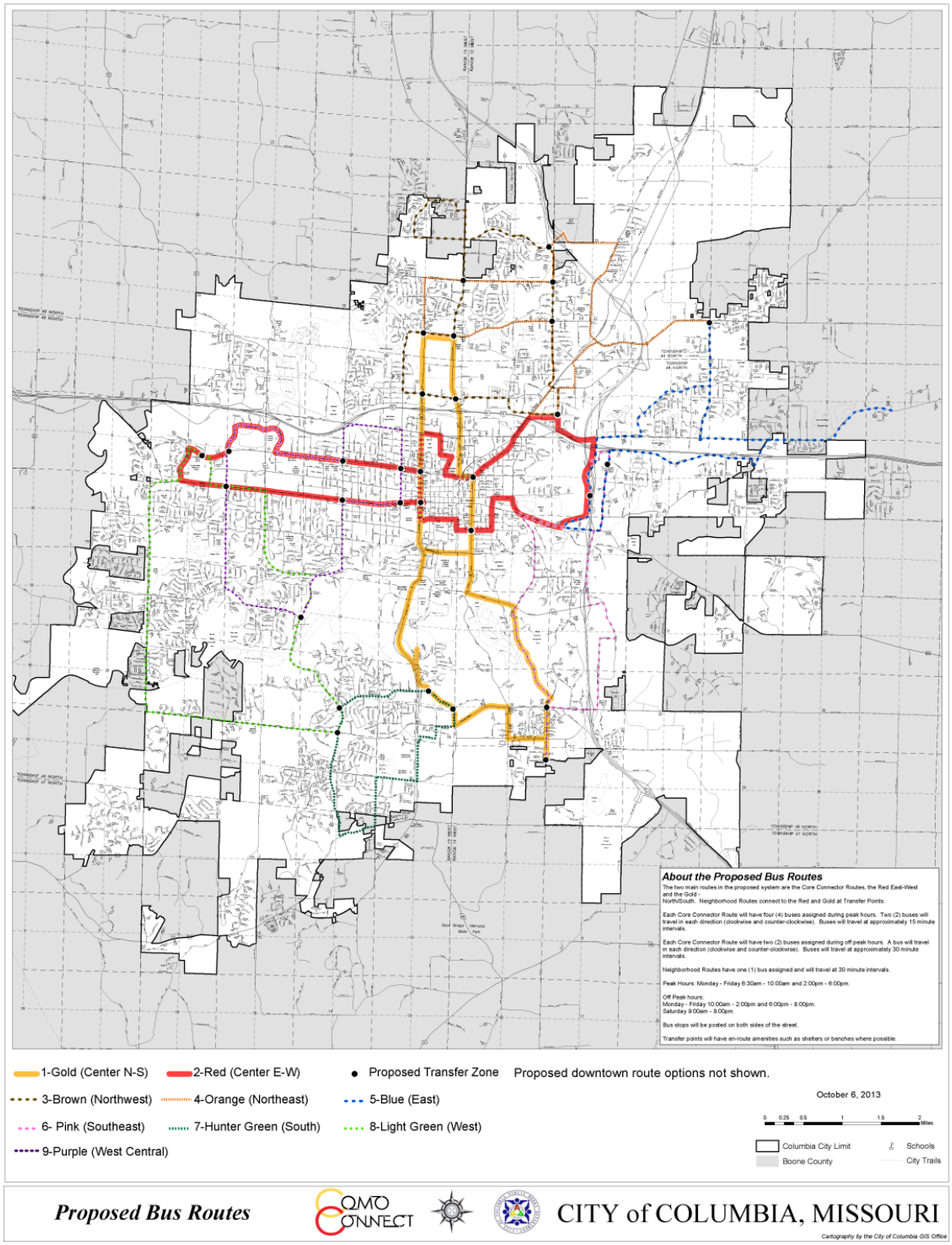


Table 7 – Columbia Transit Ridership 1998-2012[5]

Year	Total # of Riders
1998	697,444
1999	645,952
2000	480,575
2001	517,387
2002	536,820
2003	456,961
2004	491,019
2005	1,317,356[6]
2006	1,408,280
2007	1,583,159
2008	1,796,832
2009	1,957,371
2010	2,006,855
2011	2,214,593
2012	2,012,739

Table 8: City of Columbia Paratransit Ridership 1998-2012

Year	Total # of Riders
1998	25,498
1999	26,335
2000	28,877
2001	29,940
2002	29,697
2003	24,821
2004	23,647
2005	23,742
2006	23,079
2007	22,444
2008	31,998
2009	33,481
2010	34,860
2011	36,089
2012	41,690

B. School Bus

School buses are a major part of daily transit patterns. The Columbia Public School District is a K-12 school district with an enrollment of approximately 17,000 (2012). It covers an area of 302 square miles including most of the Metro Area. The Hallsville School District serves part of the northern Metro Area. First Student is the provider of transportation services to Columbia Public Schools. It uses three tiers of buses for a total of 336 routes (130 buses on first tier for 6 middle schools and 7 elementary schools, 91 buses on the second tier for 12 elementary schools, and 115 buses on the third tier for 4 high schools) carrying approximately 8,400 students to 29 schools in the district, of which 28 are in the Metro Area. First

[5] Total ridership for all routes excluding Paratransit.
[6] Note: in 2005, CT began including rider numbers from the Campus shuttle routes to the Fixed Route ridership totals.

Student also provides service to a career center building, a gifted building, two early childhood buildings and one special needs building.

The Columbia School District Board of Education approves bus routes each year. By policy, students residing more than one-mile from their assigned school are eligible for free bus transportation. The District also will furnish free transportation to students residing within one mile of a school if the route to school is considered hazardous. Disabled students are eligible for free transportation anywhere in the district.

C. Private Transit Services

Several private organizations provide paratransit and other transportation services. According to the *Coordinated Public-Transit Human Services Transportation Plan* (2013), 15 transportation and human service agencies actively provide some form of transportation services in Boone County. The majority of these organizations are active in the Columbia Metro Area.

OATS, Inc. is a private, nonprofit specialized transit provider which operates in 87 Missouri counties. Its mission is to provide reliable service for transportation to disadvantaged Missourians so they can live independently in their own communities. OATS has been in operation since 1971 and provides door-to-door transportation services to individuals with little or no alternative form of transportation. Service is open to the general public.

OATS is funded by a combination of federal, state, and local funds. Government funding through contracts with various agencies covers the cost for the elderly/disabled riders. General public riders are charged a fare for their trip.

OATS provides service Monday through Friday 7:00 a.m. to 5:00 p.m. in Columbia along with six schedule days of services for residents living in rural Boone County. OATS Mid-Missouri Region's annual ridership is approximately 25,000 one-way trips. The Boone County program costs approximately $428,000 annually to operate.

3.4 Bicycle Facilities

Facilities for bicycle travel include dedicated trails, multi-use sidewalks ("pedways"), bike lanes, and bike routes. The City of Columbia has approximately 24 miles of trails, consisting of the MKT Nature and Fitness Trail, the Hinkson Creek Trail (2.25 miles is maintained by the University of Missouri), the County House Trail, the Hominy Branch Trail, the South Providence Trail, the Scott's Branch Trail, and the Bear Creek Trail. The City also has four connector trails: 1) Garth Avenue, which links Lathrop Road and Clarkson Road to the MKT Trail; 2) Blue Ridge Road, linking Blue Ridge Road to the Bear Creek Trail; 3) Python Court, linking the Vanderveen Subdivision to the Bear Creek Trail; and 4) Greenbriar, connecting Greenbriar Drive to the Hinkson Creek Trail. Boone County maintains 3.5 additional miles of the MKT trail within its jurisdiction.

The State of Missouri's Katy Trail, a part of the 225-mile long Katy Trail State Park from Machens to Clinton, crosses the southwest Metro Area between Route K and Highway O, a distance of approximately 2.25 miles. The City of Columbia has a Trails Plan element in its Park, Recreation, and Open Space Master Plan that lists 16 additional future trails within stream corridors as primary acquisition targets. Included in these are extensions of the existing Bear Creek and Hinkson Creek Trails, miscellaneous trail "connectors," and a trail parallel to the Columbia Terminal Railroad (COLT). Several of the trails have been programmed for design and construction in the City Capital Improvements Program (CIP) which will expand the trail system. Fourteen additional projects are listed as secondary acquisition targets, with twenty-three projects in the tertiary acquisition listing. The Master Trail Plan is a component of the Parks & Recreation Master Plan noted above and was updated in 2013. The principal source of revenue for these projects in recent years has been the GetAbout Columbia (Non-Motorized Pilot) program, which is entirely funded with federal dollars. The principal local source of funding is the 1/8 cent temporary parks sales tax, most recently reauthorized by Columbia voters in 2010 for extension to April, 2016.

Multi-use sidewalks are present along several major roadways. The CATSO Bicycle and Pedestrian Network Plan (Appendix B) identifies numerous corridors as "Pedways" and the City of Columbia street standards, Appendix A of the Subdivision Regulations, include an eight-foot "pedway" sidewalk on one side of the street in several of the optional street design cross sections. Locations of pedways are typically determined on a case-by-case basis.

Together, trails and pedways are sometimes identified as "Class I" bike routes, or routes designed for exclusive use by bicyclists, pedestrians, and wheelchair users.

Bike lanes, varying in width from 4 to 6 feet, are located on nearly 75% of arterial roadways in the City of Columbia, including several roadways under MoDOT jurisdiction. Sixty-three miles of these "Class II" bicycle routes are within city-maintained right-of-way. Specific locations for future bike lanes are planned as part of the GetAbout Columbia Project Working Infrastructure Plan (an additional 5.1 miles of bike lanes are expected in FY2014 alone). The City street standards also include provisions for bike lanes in several of the optional cross-sections.

There are 23 miles of "Class III," or on-street bike routes, in the City of Columbia. On-street routes are designated on streets where dedicated trails, pedways, or bike lanes are not present or are not feasible, and where street conditions and destinations are conducive to bicycle travel. The City currently has one east-west Bike Boulevard through downtown, and is in the public input stage of a north-south connector.

Finally, bicycle parking is required for new development in the City of Columbia and the city has installed bicycle parking in its downtown parking structures. A portion of the non-motorized transportation pilot project federal funds has been spent or is designated towards bicycle parking installations in centers of significant activity, such as the central business district.

The City of Columbia established the Commission on Bicycling in 1977, in response to citizen concerns about bicycling issues. The Commission serves as an advisory board, examining problems relating to bicycling and suggesting solutions. A Bicycle Master Plan developed by the Commission and Staff was adopted by the City Council in November, 1993. The Commission also assists in the development of updates to the Sidewalk Master Plan.

After renaming it the Bicycle & Pedestrian Commission (BPC), two ordinance revisions resulted in an increase of membership to 11, then another revision set the membership at 10 in 2013. The Commission now has responsibility for advising the City Council on pedestrian issues, as well as on matters pertaining to bicycling. As such, the BPC oversees the Bicycle and Pedestrian Network Plan and Sidewalk Master Plan development/update processes.

In summary, Columbia has three types of existing and proposed bicycle routes (Table 9).

Table 9: Miles of Existing Dedicated Bicycle Routes in the Metro Area[7]

Facility Type	Class I Bicycle routes used exclusively by bicycles and pedestrians	Class II Bicycle lanes within public streets	Class III Signs on public streets designating bicycle routes	Total
Length in miles	23.35 miles of trails	63 miles	23 miles	109.35 miles

The Bicycle/Pedestrian Network Plan element of the 2040 Long Range Transportation Plan updates the 2030 Network Plan element, which was the initial comprehensive Bicycle/Pedestrian Network Plan, and is

[7] Figure includes all trails in the Metro Area including City, County, University, and State-maintained trails. This figure does not include "pedways," which in the City of Columbia refers to a wide (typically 8 foot) sidewalk designed for use by cyclists and pedestrians.

the principal plan for bicycle transportation. This network includes both major streets and greenbelt trails. The Bicycle and Pedestrian Network plan includes approximately 446 miles of corridors. The 2040 network added new facilities totaling approximately 71 miles to the 2030 plan, with most additional mileage resulting from the extension of existing urban trails/pedways to match population growth in the southwest and eastern portions of the Metro Area, and the addition of the Cow Branch and Harmony Creek (northwest), Gans Creek (southeast), Boone Femme (southwest) and Colt Railroad (northeast) trail corridors from the 2013 Parks and Recreation proposed trails map. See Chapter 7 for additional information on the 2040 Bicycle & Pedestrian Network, and Appendix B to view the Map.

The latest Network plan addresses the need to eliminate the fragmentation of the existing system of bicycle routes. It proposes a number of Class I bicycle routes (also called shared use paths), some of which would follow the course of the major creeks in the area ("greenbelt trails"). The use of these greenbelts is the most workable way of accommodating Class I routes. Unlike the 1993 Plan, the Network contains the connections necessary to facilitate bicycling as a serious mode of travel. The Class I routes have greater recreational potential than other types of routes, in addition to providing a facility for non-recreational travel.

Additional Class I routes will be constructed along the major roadways included in the Network Plan where implementation is practical. The pedways serve as the Class I routes in major street corridors. Part of the network will be implemented with Class II routes in those locations where Class I routes cannot be built.

As of 2013, the Columbia area has six Class I routes in greenbelt corridors, as described below:

1. The MKT Trail, which extends to the southwest approximately 9 miles from the Fourth and Cherry Street intersection to the statewide Katy Trail near the town of McBaine.
2. Hinkson Creek Trail. This extends for 3.7 miles from Old 63 to the MKT Trail. A 1.8 mile trail extension north from Old 63/Grindstone Nature Area to Stephens Lake Park is under construction. This extension will connect to a pedway on East Broadway, which will then link to the Hominy Branch Trail.
3. Hominy Branch Trail (Phase I), now under construction. This trail provides a connection across US 63 and Broadway/Route WW to Woodridge Park. A second phase of this trail is under design.
4. The Bear Creek Trail which currently extends 3.4 miles across northern Columbia from Cosmo Park to Albert-Oakland Park.
5. Scott's Branch Trail. Two phases of this project in southwest Columbia are under construction, providing a connector between Rollins Road and Scott Boulevard and then on to Perche Creek.
6. County House Branch Trail. This route currently extends along the College Park Drive corridor north across Stadium Boulevard/Route 740.

Numerous Class I routes are planned for the future. Other projects, such as Cow Branch, and future phases of Hominy Branch, Hinkson Creek, County House Branch, and Bear Creek, are in the planning and design stages. The latter would extend the trail from its existing terminus south of Blue Ridge Road to the Boone County Fairgrounds. Other trail projects, including Perche Creek and other creek corridors, are in the planning stages.

Other Class I routes are also present in non-greenbelt locations, with notable examples including Broadway between Old 63 and Brickton Road, and Brown School Road east of Route 763.

A number of locations present problems for bicycle travel. Some of these are so-called "pinch points," frequently bridges, where the narrowing of the road makes bicycling dangerous. Others are major roadways or intersections which present a barrier to bicyclists.

In 2003, the Bicycle and Pedestrian Commission identified 20 such problem areas on the existing street system in a bicycle ratings map they prepared with staff assistance. Included are a number of narrow bridges, such as the Paris Road bridges over I-70 and the Business Loop. Other problems include the Forum Boulevard-Nifong Boulevard and Stadium Boulevard-Bernadette Drive intersections, both of which pose serious obstacles to cyclists attempting to cross them. Along with identifying pinch points, the map

also rated various street routes for their suitability for bicyclists of varying abilities. An updated map was completed in March, 2007. This information was included in the GetAbout Columbia Bicycle Route Map. This map is set to be updated by the Bicycle and Pedestrian Commission and GetAbout staff in late 2013, and is available online at:
www.gocolumbiamo.com/PublicWorks/GetAboutColumbia/Biking/documents/Map_Front_oct12outlines_final.pdf

In 2005, the City of Columbia was named a recipient of Non-Motorized Pilot Program funds as part of the SAFETEA-LU transportation legislation. The City received $22,435,421 during the FY 2006-2009 period to be used for the construction of facilities for pedestrian and bicycle travel, with an additional authorization of $5,929,975 for Phase 2 of the project with the goal to "develop a network of… transportation facilities, including sidewalks, bicycle lanes, and pedestrian and bicycle trails", in order to test the degree to which walking and bicycling can take the place of motorized trips. The City's project is entitled GetAbout Columbia. A number of bicycle facility construction projects have been funded with this federal money, and are outlined in the GetAbout Infrastructure Working Plan. The Infrastructure Working Plan includes over 100 miles of facilities, including bike lanes, bike routes, multi-use paths (trails), bike boulevards, and pedestrian facility projects. Additional projects now in the planning stages will be funded under Phase 2.

In 2005, the City engaged the services of a consultant who performed a "walking audit" and produced a report on suggested techniques to make roadway intersections easier and safer to cross on foot, by wheelchair or by bicycle. Some of the intersections studied have been included in a consultant contract for pedestrian and bicycle design improvements, funded by the Non-Motorized program. More information on pedestrian and bicycle construction projects funded by GetAbout is online at:
http://www.gocolumbiamo.com/PublicWorks/GetAboutColumbia/

3.5 Pedestrian Facilities

In order to accommodate walking as a mode of travel, both residential and other types of subdivisions need to provide facilities for pedestrians. Most important is a sidewalk system along public street right-of-way, allowing pedestrians to be separated from vehicle traffic.

Within the Columbia Metro Area, a system of sidewalks exists mainly within the boundaries of the City of Columbia. Outside the city limits, few facilities are present. Current city subdivision regulations require sidewalk construction on both sides of new streets. In the early part of the century, sidewalks were constructed as urbanization took place. There was an extended period after World War II, however, during which sidewalks were not constructed as part of new development. In 1974, new city subdivision regulations took effect which required sidewalk construction on both sides of new streets as new development occurs, except in industrial areas. A "complete streets" policy mandating multimodal facilities on all street classifications was adopted in 2004.

In addition to those areas developed during the noted time period in the previous paragraph, there have been large areas of unincorporated land annexed over the past 40 years. The most notable example was a 1969 involuntary annexation which nearly doubled the physical size of the City. This and other annexations added residential subdivisions developed under Boone County standards, which did not include a requirement for sidewalk construction until subdivision regulations were adopted in 1995 to requires sidewalks in residential subdivisions with densities higher than one unit per 0.5 acre.

As a result of the years of development without sidewalks, there are a number of neighborhoods that have no sidewalks, or only a partial sidewalk system. This has left gaps between the older central parts of Columbia and newer neighborhoods. A Master Sidewalk Plan adopted in 1976 attempted to address this problem.
The most recent Master Sidewalk Plan for Columbia was updated in 2012 and adopted in 2013. The Sidewalk Master Plan Project Listing and Map is included in Appendix C. The amended plan identifies 42 new sidewalk construction projects. These potential projects fall into two categories: 1) Sidewalk projects along major roadways in generally developed areas; and 2) Safe routes to school which may be on any

class of street serving as a route to an elementary or middle school. The plan focuses on improving the existing system by constructing important connections, particularly near transit stops, schools, parks and other facilities where pedestrian traffic can be expected. The plan proposes sidewalk construction along a total of 19 miles of improved streets. All of these projects are effectively retrofits of existing older residential and non-residential subdivisions. Also included are 9 existing street reconstruction projects for which sidewalks will be built as part of the project.

Implementation of the 2012 Sidewalk Plan is already underway. $50,000 in Community Development Block Grant funds have been recommended for the design of pedestrian infrastructure improvements, including two sidewalks on the 2012 project listing (Elleta Blvd. and North Garth Avenue by Oak Towers).

Surface Transportation Program Enhancement (TE) funds have been awarded for a project to construct a sidewalk on the east side of Garth Avenue along with a pedestrian crossing near Parkade Elementary School. This is another Sidewalk Plan project. TE funds have also been provided for a pedestrian crosswalk and median refuge construction project on College Avenue (Route 763) adjacent to the University of Missouri campus.

In summary, a large percentage of the street mileage (City, County and MoDOT maintained) within the Metro Area has no sidewalks. This is true in all categories of streets as classified by the Major Roadway Plan. There are a total of 555 miles of sidewalk within the Metro Area on one or both sides of a street, most on local streets, with roughly half of all arterial and collector street segments in the Metro Area lacking a sidewalk on at least one side. The approximate 94 miles of Interstate-Freeways and Expressways in the Metro Area, as limited-access roadways, mostly do not and are not recommended to have sidewalks for safety reasons. Sidewalk widths in the Metro Area vary from 36” to 120” (known as shared-use paths or pedways). The current minimum standard for new sidewalk construction is 5’ wide.

3.6 Inter-regional Transportation: Moving Goods and Passengers

There are a number of ways in which goods and services are transported in and out of the Columbia Metro Area. The majority of the freight and passenger movement is accommodated by the area's highway system, principally Interstate 70 and US Highway 63, with other state routes, such as Route B, carrying large volumes of traffic through the region. Other types of interregional transportation that serve the region are described in the following sections.

3.7 Railways

Freight service to the area is provided by the Columbia Terminal Railroad (COLT), which is owned and operated by the City of Columbia. The city acquired this line from Norfolk Southern in October 1987. The railroad serves the communities of Centralia, Hallsville, Browns Station, and Columbia.

The COLT is a class III railroad, has two locomotives and generally uses a two-man or three-man crew for train operations. The COLT infrastructure consists of its track, right-of-way, bridges, signals, crossings, culverts and all other items related to railroad operation.

The railroad's main track runs between Columbia and Centralia and has 21.34 miles of mainline track. The entire main track is maintained to FRA Class II standards, which allows for speeds up to 25 mph for freight trains. Train speeds are limited to 10 mph in selected areas of Columbia and Centralia.

The COLT handles over 1,500 carloads of freight per year.

The COLT has 39 at-grade public highway/rail crossings and 23 private crossings. The average number of public highway/rail crossings per mile is 1.8, which is the second highest concentration of all railroads operating in Missouri. There are 13 public crossings with active warning devices.

The former at-grade highway/COLT rail crossing on U.S. Highway 63 was the location of several accidents as a result of the requirement for buses and select commercial vehicles to come to a complete

stop prior to proceeding through the crossing. This safety hazard was eliminated with the completion of a new COLT Railroad US 63 overpass bridge in October 2010.

A rail to truck trans-load facility, or Rail Terminal, has been in operation on the COLT since January 2004. The facility allows the transfer for freight between trucks and rail cars and allows for storage of materials for later delivery. The Rail Terminal is located on a 15 acre parcel of City owned land in north Columbia, which is leased long term to a private rail facility operator. Steel, lumber, auto parts, and other products have been handled through the facility for about 18 different customers in Columbia and mid-Missouri. Future railroad traffic growth is expected to come primarily from further development of rail to truck trans-load freight markets.

3.8 Inter-regional passenger rail service

The nearest inter-regional passenger rail service is located approximately 30 miles south of the Metro Area in Jefferson City. AMTRAK operates four trains daily on track owned by the Union Pacific railroad between Kansas City and St. Louis and connecting to points beyond. Other AMTRAK service is available at La Plata, approximately 80 miles north of the Metro Area, on tracks owned by the Burlington Northern Santa Fe railroad.

3.9 Pipelines

There are three energy transportation pipelines within the Columbia Metro Area. One is the Williams Pipeline Company line which runs east-west and crosses US 63 southeast of Columbia, and which carries gasoline and fuel oil. The second is the Southern Star gas line which runs east-west near Old Plank Road. The third line belongs to Panhandle Eastern Company, and is located several miles north of Columbia. It runs east-west and has a spur line which runs south to the Prathersville area. This line carries natural gas.

3.10 Interstate Freight

The Columbia Metro Area's location along Interstate 70 provides access to a major east-west route for interstate freight movement. Up to thirty percent of the daily traffic on sections of I-70 through Columbia is multiple-axle trucking. US Highway 63 provides north-south access to the area. A number of motor freight companies have terminals located in Columbia. These companies are listed in Appendix D: Local Freight Haulers.

Local freight companies had several concerns related to the condition and design of roadways and intersections in the Metro Area. The primary issue was geometrics at intersections which do not meet the requirements of truck movement. Inadequate intersection geometrics restrict or prohibit a truck from making a turn. This situation creates traffic delays, breaks down curbs, and can damage vehicles. A list of problem intersections in the urbanized area will be developed for future attention.

3.11 Airports

The Columbia Metro Area is served by the Columbia Regional Airport, which is located approximately 5 miles southeast of the Metro Area boundary. The airport is owned and operated by the City of Columbia, and consists of approximately 1,516 acres.

Initial construction at the site was completed in 1968, with the passenger terminal building being constructed in 1969 and the air traffic control tower in 1973. Major east-west highway access to the Columbia airport is provided by Interstate 70. Principal access to the airport is provided by US Highway 63, and State Route H provides direct access to the airport access road on the west side of the facility. This access road is an internal circulation road providing access to the facilities, including the terminal, on the west side of the airport. It forms a one-way loop around the vehicle parking lot west of the terminal, and also accesses the general aviation area, the FAA Automated Flight Service Station, the US Postal

Service facility and the maintenance hangar. Another road provides access to the air traffic control tower on the east side of the airport. Access to this road is provided by Range Line Road.

Terminal facilities include the terminal building, ramp, hangar storage, auto parking, fuel facilities, and aircraft servicing areas. The terminal area includes almost 21,000 square feet of space for lease purposes. Parking facilities are included for the public, employees, and rental car operations. Public parking is provided for about 270 vehicles, with about 30 spaces for employee and rental car parking. The facility also has an overflow parking lot containing about 50 spaces.

The airport facility includes two runways. At present, one commercial airline, American Airlines, is providing regularly scheduled passenger service. Central Missouri Aviation, Inc. (CMA) provides aircraft charters, rentals, maintenance and repairs, aircraft and aviation fuel sales, and flight instruction. CMA also provides terminal handling for unscheduled air freight shipping and receiving. The airport is served twice daily by Airborne Express, an air freight service. The airport's plans for rehabilitation and expansion are detailed in the Airport Master Plan.

According to a recent study, the airport has a catchment area of over 400,000 persons, and draws users from a nine-county area; however, the airport captures only five percent of passenger air travel within the catchment area. A study found that, due to a lack of surface transportation access from the east and west, the airport does not capture its share of air travelers, who often drive to the international airports in Kansas City or St. Louis. However, the airport has seen a recent increase in passenger traffic, and currently provides commercial flights to and from Dallas-Fort Worth and Chicago O'Hare on American Airlines.

A US 63 reconstruction project to improve airport access and roadway safety was completed in 2012. This included the relocation/new construction of 4.8 miles of US 63 southbound lanes along with the construction of a new US 63/State Route H interchange/overpass. Previously US 63 intersected with Route H, the main access road for the commercial terminal, at grade, requiring southbound traffic to turn across the northbound lanes to reach the airport. The new interchange improves roadway safety significantly for airport access and other traffic needing to access Route H.

Both Hertz and Enterprise car rental agencies are based in the passenger terminal.

3.12 Regional Bus Lines

Regional bus service through the Columbia Metro Area is provided by the Greyhound Bus Lines, averaging seven buses a day traveling east and west and providing connections to Kansas City and St. Louis. Greyhound also provides north-south service through Columbia from Springfield, Missouri and north to Iowa. Megabus also provides coach bus service to Kansas City and St. Louis, continuing to its Chicago hub. MoX, located at 303 Business Loop 70 East, provides daily shuttle transportation between Columbia and the St. Louis and Kansas City Airports.

Charter services are available from a variety of vendors, including Show-Me Coaches, White Knight Coaches, and First Student Transportation Services.

CHAPTER FOUR:
LAND USE & TRANSPORTATION FACILITIES

This chapter describes the land use and transportation relationship. Urban areas are organized into districts, zones, and neighborhoods, and the intensity and character of land use within these areas affects demand for transportation services and improvements and the manner in which facilities are designed.

4.1 Land Use and Access

Traffic movement and land access are two necessary functions of roadway systems which are often conflicting. A variety of roadway designs are utilized to provide the movement/access function. Freeways and expressways are designed with limited access to provide entirely for the efficient movement of traffic. Arterial streets are primarily intended for the movement of through traffic. Collector streets, residential or commercial, provide equal service to the access and through movement functions. Local streets provide access to individual properties at the expense of through traffic movement.

Access must be provided to residential areas and to trip destinations where people work and shop. Along the desired travel paths, mobility is the most important feature.

4.2 Transportation System Connectivity

The phrase “transportation connectivity” refers to the continuity of the roadway system within each of the functional classifications and the compatibility of design and capacities of the roadways within the metropolitan planning area. To ensure system continuity, the requirements for main lane capacity, functional classification, roadway design and access must be balanced into a roadway system which will provide continuous travel paths and avoid abrupt transitions between these elements along the length of the roadway.

The classifications of roadways within the Metro Area relate to both the service function and access function the road provides. The basic roadway types and their functional descriptions are shown in Table 10: Roadway Function by Facility Type.

Table 10: Roadway Function by Facility Type

Classification	Principal Function	Trip Length	Land Use Linkage
Freeway	Through movements Access by frontage roads and ramps only.	3 – 5 miles	Central Business District Major Generators
Expressway	Through movements. Interchanges at major Intersections. Restricted driveway access.	3 – 5 miles	Central Business District Major Generators
Arterial	Through movements. Limited driveway access.	1 – 3 miles	Central Business District Secondary Generators
Collector	Through movements and land access.	1 mile	Local areas
Local	Land access.	½ mile	Individual tracts

The access and through movement functions described form the basis for designing the future transportation system. System continuity along an individual roadway may address the alignment, functional classification, the length of the roadway, and the roadway design cross-section. The methodology for estimating the functional classification and lane requirements for the 2040 roadway system are initially based on a segment-by-segment assessment of traffic volumes produced from a computerized travel demand model. The projected traffic volumes for 2040 are compared to the assumed

capacities of compatible roadway designs and matched by both functional classification and ability to adequately serve the projected demand.

There are six different roadway classification/designs and three lane configurations which were assessed for the transportation plan. The description of design elements and access management are included in the following examples:

1. Freeway - 4, 6, or 8 travel lanes with a minimum of 400 feet of right-of-way. A limited access roadway with full grade separated interchanges. On-off roadway access is accomplished by ramps connecting to frontage roads or interchanges. Access is limited to interchanges and driveways on frontage roads. Interstate 70 and Highway 63 are freeways.

2. Expressway - 4 or 6 travel lanes with a minimum of 250 feet of right-of-way. A high volume, high capacity arterial roadway with widely spaced signalized intersections at minor intersections. Major intersections are grade separated. Limited or no direct access to the main lanes from property fronting the roadway with access limited to right in-right out movements when access is available. Stadium Boulevard is an expressway.

3. Major Arterial - 4 or 6 lanes with 90 to 150 feet of right-of-way. A high volume roadway with at-grade street intersections and regulated driveway access. Signalized at significant intersections with priority given to the arterial through movement. A raised center median with a minimum spacing requirement for median breaks or a flush median may be provided depending on the access requirements of the properties fronting the arterial. Providence Road north of Stadium is an example.

4. Minor Arterial - 2 or 4 lanes with 90 to 120 feet of right-of-way. A secondary arterial facility to provide access to major arterials or limited access roadways. Serves localized circulation and access needs. The roadway may be either divided or undivided and typically supports the access requirements of concentrations of commercial or residential development. Vandiver Drive is an example.

5. Major Collector - 2 or 4 lanes with up to 90 feet of right-of-way. Lower capacity roadway to provide local access and circulation to the arterial network. Most of Creasy Springs Road serves as a major collector.

6. Neighborhood Collector - 2 lanes with up to 66 feet of right-of-way. A low volume, low speed roadway to provide access for local residential traffic to the major collector and arterial network. Texas Avenue is an example.

The design and functional classification of each roadway in the Major Roadway Plan must be appropriate to provide for the following; 1) design continuity, 2) adequate main lane capacity, 3) access for adjacent tracts, and 4) functionality with the roadway network.

On State maintained roadways, MoDOT requires right-of-way (R.O.W.) consistent with the adopted highway design standards. The state standards for R.O.W. are substantially greater than those of the City of Columbia or Boone County, especially for “rural” roadways which are not constructed with curb and gutter but rely on ditches to provide drainage. The right-of-way requirements for the roadways under the jurisdiction of the City of Columbia have been established by City policy through the Public Works Street Design Standards and the City of Columbia subdivision regulations. For roadways under the jurisdiction of Boone County, R.O.W. has been established by County Commission policy through the County Street Design Standards and Boone County subdivision regulations. Appendix E: Agency Street Design Standards provide the adopted right-of-way standards for each agency. All R.O.W. must be adequate to allow for the roadway pavement, sidewalks, utility easements, street lighting, traffic control devices and signage, drainage, and bicycle/pedestrian facilities.

The connectivity of streets is a major concern for public transit, delivery, service, and emergency service providers. Collector streets should be through streets, not winding cul-de-sacs, to provide efficient access for bus routes. The street design should include adequate intersection geometrics to accommodate the turning movements of buses, fire trucks, and service vehicles used for trash collection

and curbside recycling. One parameter that may be used for comparative purposes is the connectivity ratio. This ratio is determined by dividing the number of intersections, or “nodes,” in an area by the total number of dead end streets plus intersections. The closer the ratio is to one, the better the connectivity.

4.3 Street Standards

The streets in the roadway system in the Metro Area must be designed to safely perform the intended access/mobility function. The right-of-way width, number of lanes, lane width and geometric design features reflect the traffic volumes and speeds anticipated on the roadway. Provisions for transit, pedestrian, and bicycle facilities must also be included in the roadway design.

In the Columbia Metro Area, Boone County, the City of Columbia, and the Missouri Department of Transportation have responsibilities for the design and construction of roadways under their jurisdictions. A review of the street standards indicates that MoDOT design standards do not include sidewalks or bike lanes on any classification of roadway. The City of Columbia has “complete streets” standards which call for sidewalks and bike lanes on all classifications of streets. Appendix E: Agency Design Standards provides an outline of each agencies street design requirements.

4.4 Multi-Modalism

Multi-modalism is defined as the utilization of transportation facilities and corridors for more than one mode of transport. Some degree of multi-modal activity occurs on most facilities, such as pedestrian, transit, and bicyclist use of major streets designed principally for motor vehicles. TEA-21 placed emphasis on developing a street system that accommodates pedestrians, bicyclists and buses as well as vehicular traffic and SAFETEA-LU and MAP-21 continue that emphasis.

The planning and provision of transportation facilities to address the specific needs of alternate transportation modes of public transportation, walking, and bicycling include:

1. Provide continuous street connections to accommodate point-to-point travel;
2. Provide facilities for persons traveling on foot or bicycle along or on the roadway;
3. Eliminate or minimize barriers to pedestrian and bicycle movement; and
4. Provide for ADA accessibility in all public transportation facilities.

Providing for non-auto modes on the street and the elimination of barriers to travel is intended to provide the same unrestricted access that is available to motorized vehicles. High volume and high speed auto traffic on arterial and collector streets frequently create a barrier for pedestrians and bicyclists who must cross the facility. Transit use is also affected, since pedestrians are a supporting mode for mass transit, and need access to transit stops.

4.5 Livability

Livability is about tying the quality and location of transportation facilities to broader opportunities such as access to good jobs, affordable housing, quality schools, and safer streets and roads. The LRTP has a strong emphasis on the relationship between transportation planning and system maintenance, economic development, land use and safety to provide a better quality of life for residents within the Metro Area, and to encourage the economic competitiveness of the region. On the federal level, the interagency Partnership for Sustainable Communities, which includes the Department of Transportation, Department of Housing and Urban Development, and Environmental Protection Agency, has developed a Livability Initiative to coordinate and leverage federal housing, transportation, water, and other infrastructure policies and investments. The Partnership for Sustainable Communities developed the following principles to guide efforts: Provide more transportation choices; Promote equitable, affordable housing; Enhance economic competitiveness; Support existing communities; Coordinate policies and leverage investment; and Value communities and neighborhoods.

CHAPTER FIVE:
TRANSPORTATION SYSTEM MANAGEMENT

5.1 Congestion and Congestion Management

Traffic congestion and travel delay are among the most visible manifestations of an area's transportation problems. Drivers experience congestion for the most part as a personal annoyance although traffic congestion is a problem that wastes time, consumes energy resources, and contributes to lowered air quality.

Traffic congestion in the Metro Area is typically confined to the weekday morning and evening peak hours of travel. Delays from congestion occur at specific locations such as interstate ramps, signalized intersections, and bridges. Congestion in the Metro Area lasts less than 30 minutes in the morning and evening. In the Columbia area, travel times have grown only slightly in the last 20 years: the average travel time to work in Boone County was 18.4 minutes in 2010, 17.8 minutes in 2000, and 16.7 minutes in 1990. An examination of national trends points to the consistency of the average travel time while the duration of traffic congestion during the peak hours increases.

Expanding the capacity of roadways is not the sole solution to congestion. The new roadways, bridges, and highways built to relieve congestion satisfy latent and shifted demand for travel. Congestion management research shows that widening roads to add capacity often fails to reduce congestion or make it worse.[8] The use of alternate modes, land use regulation, access management, and improvements to intersections and traffic signals can all contribute to an overall program to manage traffic congestion.

There are two major methods of gauging congestion, facility-based measures and travel time. The facility-based congestion methods focus on the road itself, and usually are based on traffic volume and capacity comparisons. Such comparisons may include volume-to-capacity ratios and traffic volume per lane-mile. The travel time method of measuring congestion indicates the same conclusion, however. These trip-based measures, which are tied to the individual traveler's congestion problems, are oriented to the length of the trip. Average travel time to work is an example of one such measure.

A 1994 National Research Council report notes that changes in individual behavior keep congestion from getting worse, as travelers make route and other changes to avoid delay. So travel times do not necessarily increase in proportion to congestion on particular sections of roadway. With continued population growth, and with residential development spreading further into outlying areas, vehicle trips have been increasing. Existing streets are forced to carry greater volumes and an examination of individual streets would likely show that capacity is not keeping up. The conclusion might be drawn that congestion is worsening in the Metro Area as more roadways are becoming crowded.

A number of indicators may be used to gauge and manage congestion in the Columbia area.
These are divided into four categories:

1. Facility-based measures:
Average vehicle speed in peak hour
Ratio between peak volume & nominal capacity (V/C)
Total vehicle-hours of delay
Proportion of daily travel by speed or V/C range
Frequency and duration of incidents
Average daily traffic (ADT) per freeway lane

[8] Litman, Todd, 2013. Smart Congestion Relief: Comprehensive Evaluation of Traffic Congestion Costs and Congestion Reduction Strategies. *Victoria Transport Policy Institute.* Retrieved November 22, 2013. http://www.vtpi.org/cong_relief.pdf

2. Personal travel effects:
Proportion of personal travel by speed range
Delay added to average person trips by time of day, travel purpose
Delay added to average person trip by place of residence
Delay to transit vehicles
Number of accidents due to congestion

3. Effects on the economy:
Delay added to average commuter trip by place of work
Percentage of truck travel by speed or V/C range
Vehicle-hours of delay to trucks/delivery vehicles
Truck scheduling costs attributable to travel time uncertainty
Market perceptions of congestion as an influence on economic activity

4. Environmental impacts
Extra vehicle emissions due to stop-and-go conditions
Extra gas consumption due to stop-and-go conditions

1. Levels of Service
Level of Service is defined as conditions within a traffic stream as perceived by the users of a traffic facility. In practice, levels of service have been defined by measures of effectiveness for each facility type, relating more to speed, delay and density than to qualitative factors or safety.
The following describes levels of service, according to the Highway Capacity Manual.

Level of Service A describes primarily free flowing operations at average travel speeds usually about 90 percent of the free flow speed for the arterial class. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Stopped delay at signalized intersections is minimal.

Level of Service B represents reasonably unimpeded operations at average travel speeds usually about 70 percent of the free flow speed for the arterial class. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome.

Level of Service C represents stable operations. However, ability to maneuver and change lanes in mid-block locations may be more restricted than in LOS B, and longer queues and/or adverse signal coordination may contribute to lower average travel speeds of about 50 percent of the average free flow speed for the arterial class.

Level of Service D borders on a range on which small increases in flow may cause substantial increases in approach delay and, hence, decreases in arterial speed. This may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free flow speed.

Level of Service E is the point at which the roadway has reached its maximum capacity. Traffic operations are unstable, speeds and flow rates fluctuate, and there is little independence for driver speed selection or maneuvering.

Level of Service F characterizes forced flow at extremely low speeds below one-third to one-quarter of the free flow which will drop to zero at times. Intersection congestion is likely at critical signalized locations, with high approach delays resulting. Adverse progression is frequently a contributor to this condition.

The CATSO Technical Committee has adopted Level of Service C as the goal for traffic movement in the community. This is a commonly accepted goal in most communities. Level of Service D is acceptable at certain critical locations during the peak hour of flow at certain locations, but is not considered a design goal for new facilities. The Level of Service at signalized intersections was evaluated using the observed stopped delay method described in the Highway Capacity Manual.

Level of Service metrics are recommended to be developed for bicycling, pedestrian, and bus facilities as a performance measurement (see section 10.9, plan recommendations).

Congestion problem locations in the Metro Area include the I-70/MO 740 (Stadium Boulevard) interchange area; MO 740/MO 163 intersection; Broadway/Route WW-US 63 interchange/Keene Street intersection area; and the US 63/Route PP (Clark Lane) intersection. Several traffic studies have been performed since the last transportation plan that identify existing and proposed conditions and recommended improvements. Work is now complete on a “diverging diamond” design at the western I-70/MO 740 interchange area and improvements to the MO 740/MO 163 intersection are under design. Additional work is ongoing in the Stadium corridor south from the I-70/MO 740 interchange south to Broadway.

5.2 Access Management

The management systems outlined in the MAP-21 legislation improve or maintain the ability of the roadway system to move traffic safely and efficiently.

An important aspect in maintaining roadway capacity is the effective control of driveway and street access to arterial roadways. The functional classification for roadways is based on the movement versus access concept. Arterial streets are primarily intended for the movement of through traffic. Local streets provide access to individual tracts at the expense of through traffic movement. Freeways and expressways are designed with limited access to provide entirely for the efficient through movement of traffic. Collector streets, residential or non-residential, provide equal service to the access and through movement functions. However, uncontrolled land access often produces conflicts that compromise the movement function of a roadway system.

Although arterials are designed for higher speeds and serve longer travel distances than do collectors or local streets, they often become heavily used for short distance trips as well. The higher traffic volumes are attractive to commercial interests, especially if driveway access is available to the property fronting the arterial. Uncontrolled driveway access for commercial land uses significantly reduces the capacity of an arterial to carry traffic. Depending upon the number of turning movements, number of travel lanes and the arterial traffic volumes, a driveway permitted access to an arterial street will reduce roadway capacity by up to 25%. The movement function of the arterial is quickly degraded to that of a collector street.

Although access to abutting property generally is permitted from arterial streets in the Columbia area, less permissive driveway regulations are needed to control the turning movements into and out of the properties in order to minimize the interference with traffic on the arterial streets. Turning movements from driveways are typically controlled by regulating the spacing, width, and curb return radii of driveways. Left turns into or out of commercial driveways can be a major source of congestion and accidents. Left turns may be prohibited or driveways designed for "right in - right out" movements, although it is difficult to successfully implement either remedy. For full effectiveness, a raised or barrier median is required. Left turn access to abutting properties may be permitted at predetermined median breaks with protected left turn storage provided within the median.

5.3 Right-of-Way and Corridor Preservation

The preservation and acquisition of right-of-way for planned roadways, roadway expansions, and planned trails is the most important element in implementing the 2040 Transportation Plan. The corridor alignments for the planned roadways are identified in the CATSO 2040 Roadway Plan in order to guide the reservation of future right-of-way and avoid the preemption of the roadway by new construction or subdivision activity within the right-of-way corridor. The corridor alignments for the planned roadways are general in nature and subject to adjustment to meet engineering and land use requirements. Planned trail alignments are illustrated in the CATSO Bicycle & Pedestrian Network Plan (Appendix B) as originally shown in the 2013 Parks & Recreation Master Plan.

The acquisition of right-of-way by Boone County and the City of Columbia is typically accomplished during the subdivision process or as part of a site plan process for planned commercial zones. The right-of-way is dedicated to the City or County by the developer in order to comply with subdivision regulations and zoning. However, right-of-way dedication cannot be required when a building permit is issued even though a site plan is required. Boone County and the City of Columbia should consider developing regulatory mechanisms that require developer dedication of right-of-way at all phases in the development process or establish a pool of capital for the County or City to use for purchasing right-of-way.

5.4 Energy Conservation

There are a number of options available to policy makers to reduce the energy consumption of the transportation system. Such options fall into three general categories:

A. Economic Incentives

These include direct taxes, the granting or elimination of tax breaks, subsidies, regulatory exemptions, and making pricing more efficient. The imposition of efficiency standards, zoning, fuel use requirements, speed limits, inspection and maintenance requirements, and travel restrictions can have an impact on energy use. A more recently developed incentive is the so-called parking cash-out. In this program, an employer pays its employees a monetary bonus calculated to be the market value of the employee's parking space, in return for the employee giving up use of the space. The employee then will utilize mass transit, carpool, or some non-motorized mode of travel for work trips.

Some of the above policy options are beyond the scope of the governments of the City of Columbia and Boone County. For example, gasoline taxes and automobile fuel economy standards are mechanisms which may be used by the state and federal government. But others have possibilities for influencing energy use in the Columbia Metro Area, the parking cash-out technique being a prime example. This mechanism is also noted in the transportation demand management section. Another example used by the City is the zoning regulation provision which allows for a reduction in required automobile parking by providing increased bicycle parking facilities. For fiscal year 2014 (the City's fiscal year begins on October 1), the City of Columbia began providing Columbia Transit bus passes to all employees. This additional benefit is to provide employees greater transportation options, while potentially reducing traffic congestion, energy consumption, and decreasing the impacts on parking facilities.

B. Public Investment

Investment in new transportation infrastructure (such as new types of mass transit systems), maintenance and rehabilitation of existing transportation systems, urban development, and research and development are examples of this category.

Mass transit systems are frequently touted by their advocates as having major potential for reducing fuel consumption. This potential could only be fully realized, however, with a shift to transit of a substantial percent of existing work trips.

In addition to the high costs, there are questions whether most American transit systems, as they currently exist, save a significant amount of energy over the amount of consumption that would occur in their absence. Statistics indicate that fuel-use per passenger mile of bus systems increased by 70% from 1970 to 1989. This was primarily due to lower passenger loads, growing urban congestion, and a greater orientation to suburban services that require low or no revenue backhauls. Higher passenger numbers per transit vehicle would obviously increase the amount of energy savings and reduce subsidies necessary for transit system operation. The City of Columbia is also exploring the benefits and costs (financial, environmental impacts and energy conservation) of compressed natural gas buses and is considering a complete transit overhaul (see section 3.3).

In Columbia, peak hour commuter routes, one of which serves south Columbia, are an example of the suburban type of service. These routes are higher mileage, as they serve outlying parts of the city, and usually have minimal ridership.

There is no doubt that under the right circumstances, transit systems can save substantial amounts of fuel. These circumstances may include high passenger loads; private vehicles operating in congested conditions, particularly with single occupancy; and transit operating on its own R.O.W or lane, or sharing a high occupancy vehicle (HOV) lane. Obviously the above conditions are dependent on a number of other factors in order to occur. Fuel savings realized from bus system operations will vary from the fuel efficiencies created by light rail networks. The Columbia Metro Area does not currently have the population to support the operation of such a rail system.

C. Regulatory Incentives

The presence of public transit alone does not guarantee that the system can function as a viable transit option. A sufficient density of land uses, particularly residential density, is needed to enable transit systems to operate efficiently. Centralization and a mix of land uses also are important factors in determining the extent to which public transportation is utilized, in addition to being critical to pedestrian and bicycling travel modes on bicycle and pedestrian facilities.

Cities with high residential densities (e.g. >12 persons/acre), a centralized focus, and a mix of residential, commercial, and employment land uses show a tendency to have a low per capita travel rate and relatively high utilization of public transit, walking and bicycling. This is in contrast to cities with lower densities, widely separated land uses, and a lack of a centralized downtown or major commercial/office area, which tend to have much higher overall per capita travel rates and lower use rates of public transportation, as well as lower rates of walking and bicycling.

In order to increase the opportunities for use of transit, walking, bicycling, and other more energy-efficient modes, the distances required to provide access from residential areas to other types of land uses must be compressed. In order to reduce the travel distances and consequently the energy consumption, there must be a shift in land use patterns to accommodate alternative forms of development.

In the Columbia area, changes to Columbia and Boone County zoning ordinances to allow higher densities and a greater mix of land uses would be one step towards establishing a new pattern of development more compatible with alternative modes of travel. A combination of policies focused on providing better facilities for walking and bicycling, improving transit services, and increasing land use density could potentially reduce auto travel and give substantial energy savings. *Imagine Columbia's Future* and *Columbia Imagined* include several references to mixed-density; mixed land use zoning concepts that tend to generate fewer and shorter automobile trips. This is discussed in detail in Chapter 10.

5.5 Transportation Demand Management

Transportation demand management (TDM) is a strategic response to roadway capacity deficiencies that does not rely on the construction of new or expanded roadways. TDM actions are calculated to reduce vehicle demand by increasing vehicle capacity or providing an alternate mode. While new construction to eliminate traffic bottlenecks and expand roadways is the most direct and effective practice to immediately resolve congestion, this approach does not offer a complete solution. A variety of strategies are available to reduce congestion by providing incentives to individuals to use alternative modes of transportation or to eliminate the need to make a trip.

The following outlines several approaches that may be taken:

1. Increase Vehicle Occupancy
    a. Ridesharing programs, local and regional

b. Transportation management associations which coordinate opportunities and incentives for shared travel, usually through employers or business associations.
c. Cash-out parking subsidies; which allow employees to convert employer paid parking subsidies to transit subsidies or cash.
d. Restrict availability and/or increase parking cost for single occupancy vehicles.

An example of this strategy is in evidence at the park-and-ride lot located at the southeast corner of US 63 and Route AC. Owned by MoDOT, the commuter lot provides Columbians the opportunity to park their car and share a ride with another motorist traveling to Jefferson City.

2. Enhance Access to Alternative Modes
a. Mixed use development conducive to walking, cycling and transit alternatives to the private automobile.
b. Transportation enhancements such as the construction of more and improved bicycle paths and pedestrian facilities to improve choices available to commuters.
c. Staggered work hours to more evenly distribute the number of commuters on the road throughout the day.
d. Telecommuting; which allows employees to work out of a home base on at least a part-time basis.
e. Electronic commerce; which allows individuals to conduct personal and business transactions electronically without physically making a trip.

5.6 Transportation System Management

Transportation system management (TSM) encompasses a broad range of strategies intended to operate the existing roadway system in the most productive, safest, and cost-effective manner. Whereas travel demand management addresses the congestion by reducing vehicle demand on the roadway system, TSM focuses on engineering improvements which increase the vehicle capacity on the roadway system. Typical traffic engineering improvements for TSM include:

Left turn lanes
Right turn lanes
Intersection widening
One-way streets
Improved signage/pavement markings
Coordinated traffic signal systems
Signal timing optimization
Actuated traffic signals
Roundabouts

These improvements improve the capacity of the street or intersection, reduce travel time, and improve motorist safety.

5.7 Signalized Intersections

There is a physical limit to the number of through movements and turning movements that can be safely accommodated by a signalized intersection. When the demand for any movement at the intersection exceeds the available capacity, congestion and delays ensue; reducing the average travel speed and increasing the travel time. There are three basic strategies available to contend with intersection delays; 1) construct a grade separated interchange, 2) construct a new roadway to divert traffic from the congested intersection, and 3) accept the delay and provide mitigation to improve safety and access.

To preserve the capacity of the major arterials, it is essential that the distances between intersecting roadways with signalized intersections are adequate to provide for smooth, uninterrupted flow of traffic. Signalized intersections are directly responsible for most of the delays experienced on the roadway system. Appendix F: Existing and Future Signalized Intersections, identifies appropriate and anticipated signal locations in the Metro Area.

SECTION TWO CATSO Transportation Planning Projects, Programs, Goals, Objectives, and Strategies

CHAPTER SIX
Development of Goals and Objectives

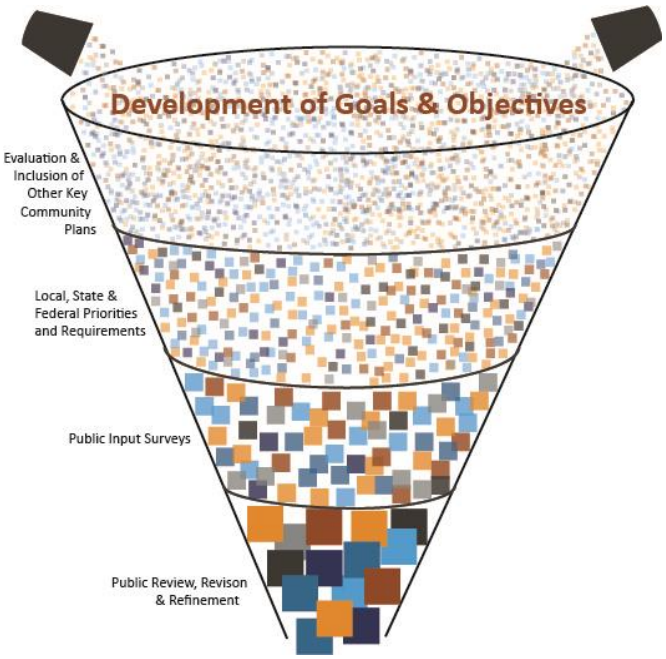
6.1 Introduction

The priorities, needs, goals and objectives for the Columbia Metro Area are identified through the following sources: cohort land use and transportation plans and the existing 2030 Long Range Transportation Plan's (LRTP) long-term project list, stakeholder and public input, CATSO's planning partners, and local, state and federal initiatives and policies. As the LRTP utilizes a 25+ year plan horizon, plan updates must reflect changes in priorities, needs, goals and objectives over time as shifts in population, financial resources, safety, infrastructure and other changes occur. Additionally, the use of performance measures (see Chapter 10) allows for systemic evaluation of the plan's effectiveness and implementation over time and directs plan evaluation and updates.

The process by which the plan's goals and objectives were developed is represented in the graphic below and described in detail in sections 6.2 through 6.4. The goals and objectives are presented in section 6.5.

In summary, the plan was evaluated critically in terms of which of the plan's stated priorities, needs, goals and objectives were in need of revision, addition or omission to reflect changing times, conditions, and needs. Cohort community and planning partner plans identifying transportation priorities were evaluated and incorporated as well, as were local, state and federal transportation priorities and plan requirements, in particular, the planning requirements outlined by MAP-21 as described in Chapter 1. Public and stakeholder input surveys, written comment, and public testimony further informed the Metro Area's needs, priorities, goals and objectives development, and provided a means of vetting the plan drafts during the public participation process. This public participation process followed the procedure described by CATSO's Public Participation Plan as described in section 6.3 below.

Figure 2: Development of Goals, Objectives, Priorities and Needs for the CATSO Metro Area



6.2 Applicable Land Use and Transportation Plans

The Long Range Transportation Plan (LRTP) was developed based on recommendations and goals from the Metro Area planning partners' various land use and transportation plans. While each of the various plans identifies individual goals and recommendations of its respective scope, there are themes common to all the plans. All the plans advocate making basic changes in the way the community grows and functions in the future. Those changes include, but are not limited to: guiding development into new compact patterns that will enable public transit to compete with the automobile, ensuring the connectivity of existing and proposed roadways, and preserving the character and quality of the area while accommodating its anticipated growth and development. Adopting these changes will allow for more convenient and cost-effective transportation choices and make the urban area more livable. The 2030 LRTP plan priorities, needs, goals and objectives were revised to include recommendations from the following plans:

CATSO Public Participation Plan:
The CATSO *Public Participation Plan (PPP) was last updated in 2011.* The PPP serves as the guiding document for CATSO's public engagement process for the LRTP and all other plans, programs and activities. The role of the PPP in the LRTP's public input process is described in detail in section 6.3, Public Input, of this plan.

CATSO Major Roadway Plan:
The CATSO *Major Roadway Plan (MRP)* is a key planning component of the LRTP as roads are the primary feature of the CATSO area transportation network. The MRP may be updated independently of the five-year LRTP update by the CATSO Coordinating Committee to reflect changes and needs in response to new development and other forces of change. The LRTP may then be amended as needed to reflect revisions to the roadway plan. For example, between the 2030 and 2040 LRTP plan updates, significant amendments in the northeast portion of the Metro Area were undertaken to reflect changing system needs to accommodate a newly-built high school, as well as a planned future elementary school and public park. The CATSO MRP as included in Appendix G impacts the future project plan as presented in Chapter 7 of this plan as the existing roadways shown on the MRP which are scheduled or projected for reconstruction/level of service upgrade work over the planning period are included in the project list by jurisdiction.

Imagine Columbia's Future (2007-2008)
The visioning process undertaken in 2007 and 2008 produced community visions for several elements (land use and the transportation system) inherent to the LRTP, with corresponding goals and strategies.

Columbia Imagined: The Plan for How We Live and Grow:
Columbia Imagined was adopted by the Columbia City Council in October 2013. An outgrowth of the visioning process, the plan is a metro-wide comprehensive plan providing common guidelines for citizens and decision makers in determining the city's future growth. The plan calls for creating a livable and sustainable community that promotes a distinct sense of place, a vibrant downtown core, safe and walkable neighborhoods with access to jobs, education, and services, efficient use of infrastructure, and the protection of natural and cultural resources.

CATSO Coordinated Public Transit-Human Services Transportation Plan (2013):
The Coordinated Public Transit Human Services Transportation Plan documents the existing resources and current needs for the provision of transit services within the Columbia Metropolitan Area. The plan discusses coordination of service and other alternatives for meeting needs into the future, identifies the barriers-both perceived and real-for successfully coordinating resources, and identifies areas of overlap and gaps to be addressed. This plan recommends the use of a Mobility Management System, whereby agencies and organizations work together to provide enhanced and efficient service, and also describes regional and commuter transit needs and opportunities.

Sidewalk Master Plan (2013):
The Sidewalk Master Plan prioritizes potential sidewalk projects where sidewalks do not exist and provides direction and prioritization for grant applications and capital budgeting decisions by identifying the most critical sidewalk improvements and construction locations throughout the City. Sidewalk Master Plan projects planned for the LRTP horizon are included in the City of Columbia Project listing.

CATSO Title VI, Environmental Justice and Limited English Proficiency Plan (2011)
This plan ensures compliance with federal Title VI, Environmental Justice, and Limited English Proficiency statutes throughout CATSO's transportation planning processes, including the LRTP development and implementation.

CoMET Community Conversations about Transit Final Report and CoMO Connect Strategic Initiative (2012 and 2013):
Building upon the community conversations held by Columbians for Modern, Efficient Transit (CoMET) in 2012, CoMO Connect is a strategic planning initiative for transit which was developed in 2013. CoMO Connect identifies the transit system needs and priorities in addition to a framework moving forward to meet these needs. A new long-range transit plan is anticipated to be developed beginning in the fall of 2014.

Parks and Recreation Master Plan (2013):
The Parks and Recreation Master Plan includes information on planned and prioritized trail connectors for the Metro Area. The Bicycle and Pedestrian Network Map (Appendix B) in this plan was updated using the master plan.

MoDOT Long Range Transportation Plan: A Vision for Missouri's Transportation Future (Draft 2013):
MoDOT's Long Range Transportation Plan *A Vision for Missouri's Transportation Future* was released in draft format in late 2013. This plan describes Missourians' vision for the future, and sets priorities to meet this vision. The plan's public input yielded four goals, with an emphasis on taking care of the existing system. The four goals of the plan are to 1) take care of the transportation system and services we enjoy today; 2) Keep all travelers safe, no matter the mode of transportation; 3) Invest in projects that spur economic growth and create jobs; and 4) Give Missourians better transportation choices.

Financial and Other Plans:
The City of Columbia Capital Improvement Program (CIP), Boone County long-term infrastructure capital improvement plan and MoDOT's Long Term Transportation Plan (*A Vision for Missouri's Transportation Future*) and State Transportation Improvement Program (STIP) are further described in section 6.4 below. These plans provide insight on financial sources, project prioritization, and other needs and opportunities by jurisdiction.

Examples of how other plans contributed to the goals and objectives in the 2040 LRTP:
Many of these plans provided project financial information or prioritization for the LRTP project listing, such as the Sidewalk Master Plan, Columbia CIP, Boone County CIP, STIP, and Parks and Recreation Plan. Many LRTP goals and objectives were also developed from these plans' recommendations, as referenced by the three examples shown on the opposite page:

Applicable Land Use/Transportation Plan:	***Columbia Imagined***	***CATSO Coordinated Public Transit-Human Services Transportation Plan***	**MoDOT Long Range Transportation Plan *A Vision for Missouri's Transportation Future***
Plan Goal/Objective/ Recommendation(s):	"Prioritize infill development: Incentivize infill; Remove incentives that favor suburban sprawl; and Develop specific development guidelines and standards that address common concerns related to impacts of infill development, particularly in relation to existing residential neighborhoods."	"Providers, agencies and CATSO will encourage regional-level transit planning and coordination to create a Mobility Management system."	"Keep all travelers safe, no matter the mode of transportation."
Corresponding CATSO LRTP Goal and Objectives:	**Goal 5: Encourage compact and infill development and redevelopment in under-invested areas** *Objective 1:* Focus on capacity improvements for all modes in areas of desired future growth and development that support the public's vision for the Metro Area *Objective 2:* Seek to eliminate/reduce current congestion and multimodal traffic flow restrictions on existing arterial and collector roadways *Objective 3:* Develop and modify the transportation system to respect and enhance the natural and built environment	**Goal 3: The public transportation system will be a viable transportation option throughout the Metro Area** *Objective 1:* Promote a mobility management public transportation system whereby all providers of public transportation work together to maximize efficiency and resources *Objective 2:* Support and promote the public transportation system *Objective 3:* Expand and redesign the existing transit system to meet ridership needs	**Goal 7: Provide safe and secure facilities and transportation infrastructure for residents, visitors and commerce in the Columbia Metro Area** *Objective 1:* Establish partnerships with federal, state, and local governmental agencies to promote continued interagency cooperation and planning for safety and security measures *Objective 2:* Reduce injuries, fatalities and property damage for all modes of transportation *Objective 3:* Minimize security risks on roadways and bikeways, and on public transportation facilities throughout the Metro planning area *Objective 4:* Provide resources for emergency situations and major disasters while improving security and safety-related incident(s) response

6.3 Public Input

CATSO is committed to ensuring that citizen input figures prominently throughout all planning processes and contributes to transportation problem identification through public comment periods, public meetings, and review of the draft LRTP document. Federal statute requires the public have reasonable opportunity to comment on transportation plans and programs. In accordance with the CATSO's *Public Participation Plan* (PPP) (2011), which sets policy to keep the public informed and involved at all stages of the transportation planning process, CATSO encourages early and ongoing public participation. Opportunities for participation are provided through a series of stakeholder meetings, press releases, direct mailings, and web postings. The PPP also describes how CATSO encourages the participation of low-income, minority, and elderly persons, and persons with disabilities or with limited mobility, Limited English Proficiency, and other stakeholders who may have special transportation needs.

This plan, and the goals, objectives, strategies, needs, priorities, and project listings contained within are vetted by the public at-large and specific stakeholders by request. CATSO's stakeholder list includes more than 150 individuals and organizations, including transportation providers, social service agencies, neighborhood associations, public agencies, representation of groups which may have special transportation needs,[9] freight and rail associates, and elected officials. These stakeholders were invited

[9] Persons who may have special transportation needs are encouraged to engage in the participation process of all transportation projects, policies, priorities, needs and programs. Special accommodations are available and are described in the PPP, as is CATSO's commitment to engaging persons who may have special transportation needs. These persons include, but are not limited to, low-income, minority, Limited English Proficiency, disabled, limited mobility, and elderly persons.

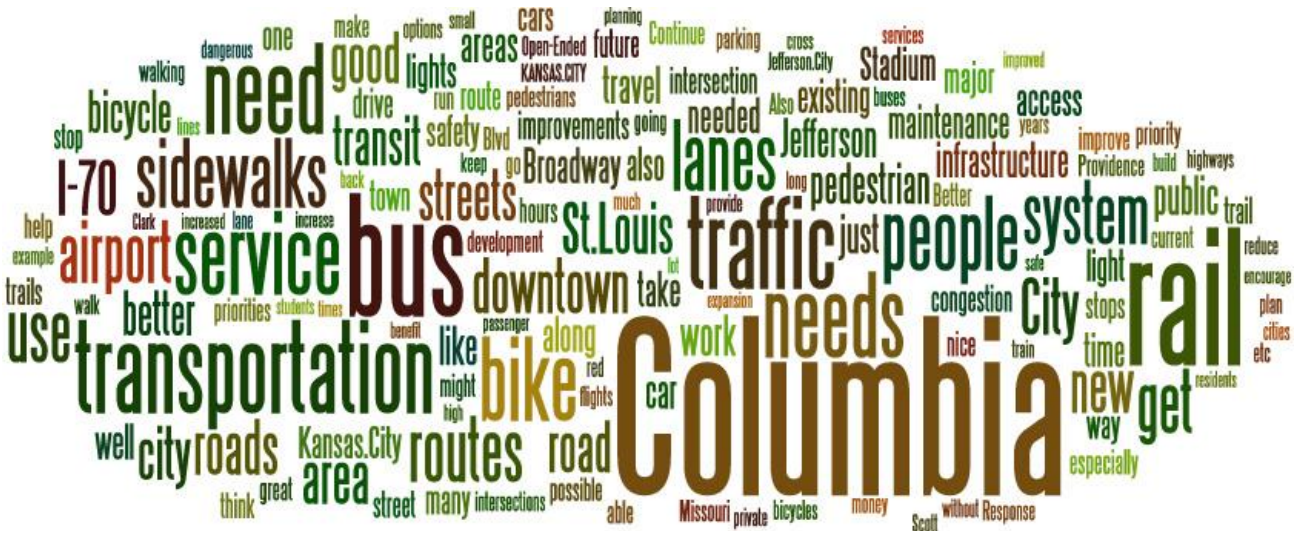
via letter to identify goals, objectives, priorities and needs from mid-June through August 31, 2013. CATSO staff also requested all applicable City Boards and Commissions (City Council, Public Transit Advisory Commission, Railroad Advisory Board, Disabilities Commission, Parks and Recreation Commission, Energy and Environment Commission, and the Bicycle and Pedestrian Commission), CATSO Coordinating and Technical Committee members, and subscribers of the Planning and Zoning and Neighborhood Associations list-servs to participate in an online survey or provide feedback directly to CATSO staff. CATSO Staff prepared a presentation on the goal and objective development process, which was presented by request to several groups and placed on the City website. A display ad was placed in the Columbia Tribune, a press release was issued, and a Facebook ad on the City profile page also invited participation in the goals and objectives. Eighty online surveys were received, and a public hearing was held on September 26, 2013 to further refine the goals and objectives.

The 80 surveys were then analyzed by CATSO staff using both qualitative and quantitative measures as described below.

The survey questions and the raw results of the goals, objectives, priorities and needs survey are available in Appendix H. These surveys were compiled by topic area and used to draft the proposed goals and objectives for the CATSO Metro Area to the year 2040.

The following infographic provides qualitative information on the greatest word frequencies from all of the survey results combined. This information was used to see the biggest trends in survey responses by them; quantitative analysis was then used to understand the nature of the responses related to these themes.

Figure 3: Goals, Objectives, Priorities and Needs for the CATSO Metro Area by Key Word Frequency



The words most used are the largest in the infographic. This infographic relates to the qualitative analysis of survey responses which indicate a high response of recommendations to strengthen the non-motorized components of the system, reduce traffic congestion, provide commuter options, improve existing infrastructure, improve public transit, and focus on a comprehensive transportation system for the region.

The survey asked one optional question each per topic area regarding the priorities and needs of rail, interstate freight (the movement of goods via truck or rail), streets/roadways/highways, bicycle facilities, pedestrian facilities, regional and commuter transportation, airport, transit, existing facilities, other/non-listed, and system-wide goals and objectives. The highest level of self-selected participation occurred for transit (60 responses), bicycle (55 responses), pedestrian facilities (53 responses),

streets/roads/highways (53 responses) and rail (52 responses). For transit, all but four responses indicated the bus system should be expanded or improved in some way (longer hours, more days, more routes, quicker/more reliable service, commuter service, and enhanced amenities); the other four responses indicated the bus service should stay unchanged or minimized. More specific survey responses were to expand regional transit throughout Boone County and/or provide commuter routes to Jefferson City, add specific routes or desired route changes, seek technological upgrades, and developing a university-centric system.

For bicycle and pedestrian facilities questions, survey responses generally favored the expansion of new sidewalks, trails and other facilities (bike lanes, pedways and bike boulevards), with 90% of respondents favoring improvement of either the existing system or expansion. Roughly 30% of responses to these two questions specifically placed a high emphasis on the need to improve the condition of existing infrastructure and other maintenance needs. Crumbling sidewalks was a common concern. Roughly 10% of responses did not favor expanding the pedestrian and bicycle infrastructure, particularly trails and bike lanes. Respondents in three instances suggested that money was better spent on other transportation needs.

Twenty-one out of fifty-three responses indicated that the Metro Area's streets/roads/highways were in need of maintenance or repair, with many responses prioritizing the existing infrastructure needs over new alignments or other upgrades. Specific projects were also mentioned for new construction or level of service upgrades, with Interstate 70 improvements mentioned most often (5 instances regarding on and off ramps, expanded lanes/truck lanes, and overall improvement). Safety and congestion issues were also common replies.

Thirty-seven out of fifty-two responses suggested increased passenger rail opportunities in the Metro Area, with roughly half of these respondents suggesting commuter rail between Centralia and Columbia, Columbia and Jefferson City, both, or other regional locations. High speed rail from St. Louis to Kansas City was also cited by roughly half of all respondents, with other regional opportunities suggested. Improvements to the COLT Railroad and existing infrastructure, including highway freight needs, was suggested in six survey responses.

Other common survey responses, following quantitative analysis, fit the qualitative themes described above, with emphasis on regionalism, system maintenance, multi-modalism, and an overall financially efficient and high quality system.

Once the goals and objectives section was developed, a second public survey was developed and input was solicited in the same manner for feedback on the goals and objectives, and the plan draft itself. These survey results were also provided to the CATSO Technical and Coordinating Committee members for their review, and are included in Appendix K: Survey Results on Plan Draft and Written Public Comments.

Examples of how public input contributed to the goals and objectives in the 2040 LRTP:
Three questions with examples of common themes emerging from the public input are shown in the table on the opposite page to illustrate the relationship between public input and the goals and objectives. Citizen quotes are shown in response to survey questions regarding priorities and needs for, respectively, interstate freight, regional transportation, and system-wide goals and objectives. These quotes were then developed into specific LRTP goals and objectives, as shown directly below each quote.

Survey Question	Q3. Interstate freight [movement of goods via trucks or rail] priorities and needs:	Q7. Regional Transportation [moving goods and passengers] priorities and needs:	Q12. System-wide goals and objectives:
Survey Responses (Quotes)	"Columbia is well connected by several highways. Rebuilding I-70 is a definite need. I hope that the rebuilding of I-70 does not bypass Columbia." "Intermodal facilities to pull all facets of the transportation system together." "Improving rail capacity might very well decrease the amount of truck traffic needed on the highways. A rail system that moving through Columbia, with large capacity would potentially help with congestion along I-70 and make it cheaper on manufacturers."	"Better coordination between entities so we avoid duplication of services." "Long range plan. Work with other regional Cities, and employers, to improve bus transportation between Cities, especially Jefferson City." "More rail, alternative transportation to cut down on the number of individual drivers that commute to and from Jeff City every day, public transportation to and from St. Louis and Kansas City. More affordable options to the airports is necessary as well."	"Improve access for rural communities. Make public transportation a more viable option for workers. Consider improvements that most benefit pedestrians and cyclists as a community health improvement. Long-term planning for potential challenges presented by growing population, expanding city limits, and environmental issues." "We should be looking at a balanced transportation system. Short journeys should be divided between active transportation, transit and private car, fairly equally. Medium journeys should be possible by private car, regional transit, and car share. Long journeys should be a choice between car, bus, train, and air."
Corresponding CATSO LRTP Goal and Objectives:	**<u>Goal 4:</u> Long-range land use and transportation planning will be coordinated on a regional and local basis** *Objective 1:* Establish policies and programs to reduce travel demand *Objective 2:* Develop a long-range plan for the establishment of commuter transportation systems serving the Metro Area *Objective 3:* All planning partners will address multimodal system and safety needs in all planning, design, and construction of transportation improvements *Objective 4:* Capitalize on common goals and needs in the region to reduce costs and promote efficiency in transportation improvements *Objective 5*: Increase freight movement and efficiency throughout the region *Objective 6:* Promote rail as a viable option for freight and passenger movement throughout the region		**<u>Goal 2:</u> The Metro Area transportation system will integrate and connect all travel modes** *Objective 1:* Encourage convenient intermodal transfers to maximize travel efficiency *Objective 2:* Encourage the use of the most efficient mode based upon the distance and characteristic of a particular trip *Objective 3:* Reduce reliance on automobile travel and better serve those who do not or cannot own and drive an automobile *Objective 4:* Improve and expand infrastructure for pedestrians, bicyclists and people with disabilities

6.4 Planning Partners and Local, State and Federal Initiatives

CATSO's member jurisdictions (MoDOT, Boone County and the City of Columbia) and ex-officio member organizations (University of Missouri, Federal Highway Administration and Federal Transit Administration) play a key part in the development of the 2040 LRTP goals and objectives, and the identification of priorities and needs. Local partners' infrastructure funding plan and prioritization are included by jurisdiction in the project listing, as explained below. Federal initiatives outlined in SAFETEA-LU and MAP-21 and the Title VI/LEP/EJ executive order and circulars guide this document's emphasis on safety, transparency, fiscal constraint, multi-modalism, the movement of people and goods, energy, economic development, and the transportation needs of all ages, abilities, incomes and ethnicities.

Description of the relationship between local and state priorities and the LRTP:
The Major Roadway Plan (MRP), a major component of the LRTP, provides information for the CATSO Transportation Improvement Program (TIP), the Statewide Transportation Improvement Program (STIP) and the City of Columbia Capital Improvement Program as projects are programmed. The MRP is a key planning component of the LRTP as roads are the primary feature of the CATSO area transportation network. The existing roadways shown on the MRP which are scheduled or projected for reconstruction/level of service upgrade work over the LRTP scope period are included in the project list

by CATSO jurisdiction. New MRP roadways projected to be constructed during the LRTP scope period are likewise included in a LRTP project list by jurisdiction. In some cases, these projects are labeled as "illustrative" to indicate that no funding is currently available and its future availability is questionable.

The City's CIP and annual budget typically include projects on roads included on the MRP network and the LRTP, although a number of non-MRP local street projects are also listed. The Sidewalk Master Plan is a source for sidewalk projects, and the Parks and Recreation Master Plan identifies trail and shared use facilities. The City's CIP and annual budget are source documents for projects listed in the LRTP and TIP. The TIP typically only includes funded projects, though a few illustrative projects may also be listed, while the LRTP is more flexible on illustrative projects given its longer scope. The TIP draws its projects from those included in the LRTP, both from specific project listings and from the MRP generally.

The TIP-STIP relationship is such that when a new TIP or TIP amendments are approved by CATSO, the document/amendments are incorporated into the STIP by reference. The CATSO listed TIP projects for the MoDOT system mirror those listed for the area in the STIP. STIP projects, like TIP projects, must be included in the LRTP project listing.

As described in section 6.2, MoDOT's Long Range Transportation Plan *A Vision for Missouri's Transportation Future* was released in draft format in late 2013. This plan describes Missourians' vision for the future and sets priorities to meet this vision. As MoDOT implements its LRTP, projects within the CATSO Metro Area need to be incorporated into the CATSO LRTP and vice versa.

Examples of how Planning Partners' and Local, State and Federal Initiatives contributed to the goals and objectives in the 2040 LRTP:

Many of these plans provided project, financial information or prioritization for the LRTP project listing, such as the Sidewalk Master Plan, Columbia CIP, Boone County CIP, STIP, and Parks and Recreation Master Plan. Goals and objectives were also developed from these plans, as referenced by the three examples below:

Applicable Local, State or Federal Initiative:	***MAP-21 8 Planning Factors***	**MoDOT Long Range Transportation Plan**	**CATSO Title VI, Environmental Justice & Limited English Proficiency Program**
Plan Goal/ Objective/ Recommendation(s):	1. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency. 2. Increase the safety of the transportation system for motorized and non-motorized users. 3. Increase the security of the transportation system for motorized and non-motorized users. 4. Increase the accessibility and mobility options available to people and for freight. 5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns. 6. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight. 7. Promote efficient system management and operation. 8. Emphasize the preservation of the existing transportation system."	Goals: 1. Take care of the transportation system and services we enjoy today 2. Keep all travelers safe, no matter the mode of transportation 3. Give Missourians better transportation choices 4. Invest in projects that spur economic growth and create jobs	Policy Statement: "The Columbia MPO (CATSO) assures that no person shall, on the grounds of race, color, or national origin, as provided by Title VI of the Civil Rights Act of 1964 and the Civil Rights Restoration Act of 1987 (PL 100.259), be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity. CATSO further assures that every effort will be made to ensure nondiscrimination in all of its programs and activities, whether those programs and activities are federally funded or not. In the event CATSO distributes federal aid funds to another governmental entity, CATSO will include Title VI language in all written agreements and will monitor for compliance. CATSO's Title VI Coordinator is responsible for initiating and monitoring Title VI activities, preparing required reports, and other CATSO responsibilities as required by Title 23 Code of Federal Regulations (CFR) Part 200, and Title 49 CFR Part 21."

Corresponding CATSO LRTP Goal and Objectives:	**Goal 6: Integrate land use planning with infrastructure development** *Objective 1:* Encourage future development and related transportation improvements to address capacity and connectivity needs proactively rather than reactively *Objective 2:* Land use planning will utilize the Pedestrian and Bicycle network plan to create a bikeway/sidewalk/greenbelt trail network that provides an alternative and complementary means of transportation to the street system *Objective 3:* Ensure that future development and related transportation improvements address transportation safety needs in planning and design *Objective 4:* Increase the geographic area in which people have convenient access to non-automobile modes of transportation	**Goal 1: the Columbia Metro Area will have a first class street, highway and non-motorized network that meets the short and long-term needs of the Metro Area** *Objective 1*: Design streets and highways that are safe and efficient to move vehicular traffic and accommodate transit, pedestrians and bicyclists with minimal environmental impacts. *Objective 2:* Invest in and preserve the existing transportation system *Objective 3:* Support an open, inclusive and participatory transportation planning process *Objective 4:* Identify and address the needs of minority and low-income populations in making transportation decisions

6.5 Goals and Objectives for Transportation Planning in the Columbia Metro Area

While Goals, Objectives, Strategies and Needs are reflected throughout this document, such as in the project needs list developed by the planning partners in Chapter 7, all of the input as described from the above listed sources may be summarized as shown below:

Goal 1: The Columbia Metro Area will have a first class street, highway and non-motorized network that meets the short and long-term needs of the Metro Area

Objective 1: Design streets and highways that are safe and efficient to move vehicular traffic and accommodate transit, pedestrians and bicyclists with minimal environmental impacts

Objective 2: Invest in and preserve the existing transportation system

Objective 3: Support an open, inclusive and participatory transportation planning process

Objective 4: Identify and address the needs of minority and low-income populations in making transportation decisions

Goal 2: The Metro Area transportation system will integrate and connect all travel modes

Objective 1: Encourage convenient intermodal transfers to maximize travel efficiency

Objective 2: Encourage the use of the most efficient mode based upon the distance and characteristic of a particular trip

Objective 3: Reduce reliance on automobile travel and better serve those who do not or cannot own and drive an automobile

Objective 4: Improve and expand infrastructure for pedestrians, bicyclists and people with disabilities

Goal 3: The public transportation system will be a viable transportation option throughout the Metro Area

Objective 1: Promote a mobility management public transportation system whereby all providers of public transportation work together to maximize efficiency and resources

Objective 2: Support and promote the public transportation system

Objective 3: Expand and redesign the existing transit system to meet ridership needs

Goal 4: Long-range land use and transportation planning will be coordinated on a regional and local basis

Objective 1: Establish policies and programs to reduce travel demand

Objective 2: Develop a long-range plan for the establishment of commuter transportation systems serving the Metro Area

Objective 3: All planning partners will address multimodal system and safety needs in all planning, design, and construction of transportation improvements

Objective 4: Capitalize on common goals and needs in the region to reduce costs and promote efficiency in transportation improvements

Objective 5: Increase freight movement and efficiency throughout the region

Objective 6: Promote rail as a viable option for freight and passenger movement throughout the region

Goal 5: Encourage compact and infill development and redevelopment in under-invested areas

Objective 1: Focus on capacity improvements for all modes in areas of desired future growth and development that support the public's vision for the Metro Area

Objective 2: Seek to eliminate/reduce current congestion and multimodal traffic flow restrictions on existing arterial and collector roadways

Objective 3: Develop and modify the transportation system to respect and enhance the natural and built environment

Goal 6: Integrate land use planning with infrastructure development

Objective 1: Encourage future development and related transportation improvements to address capacity and connectivity needs proactively rather than reactively

Objective 2: Land use planning will utilize the Pedestrian and Bicycle network plan to create a bikeway/sidewalk/greenbelt trail network that provides an alternative and complementary means of transportation to the street system

Objective 3: Ensure that future development and related transportation improvements address transportation safety needs in planning and design

Objective 4: Increase the geographic area in which people have convenient access to non-automobile modes of transportation

Goal 7: Provide safe and secure facilities and transportation infrastructure for residents, visitors and commerce in the Columbia Metro Area

Objective 1: Establish partnerships with other federal, state, and local governmental agencies to promote continued interagency cooperation and planning for safety and security measures

Objective 2: Reduce injuries, fatalities and property damage for all modes of transportation

Objective 3: Minimize security risks on roadways and bikeways, and on public transportation facilities throughout the Metro planning area

Objective 4: Provide resources for emergency situations and major disasters while improving security and safety-related incident(s) response

Corresponding performance measures for these goals and objectives are presented in Chapter 10 of this plan. Performance measures, as described below, are data which may be measured and tracked over time to evaluate progress in achieving the plan's goals and objectives.

Goals: End state brought about by LRTP implementation → **Objectives: Sub-goals that help organize the implementation into manageable parts** → **Performance Measures: Data used to evaluate progress toward goals and objectives**

Vehicle Miles Traveled (VMT):
A key metric for travel demand and mode shift will be the measurement of Vehicle Miles Traveled (VMT) for the Metro Area. Chapter 10 of this plan, specifically section 10.5, Additional Regulatory Changes and Strategies/Recommendations (including Table 17: Trip Reduction Strategies and Impacts), presents recommendations to reduce VMT for the Metro Area. VMT for the Columbia Metro Area was estimated at 2,768,000 miles daily for 2010 by the Federal Highway Administration. CATSO will begin tracking VMT with target goals for reduction throughout the plan horizon following the recalibration of the CATSO travel demand model in 2015. VMT reduction will be a key performance measurement for many of the goals and objectives presented in Chapter 10.10. Target reduction numbers and specific strategies will be a part of plan implementation.

6.6. Transportation System Strategies and Needs

The CATSO Metro Area transportation system is a product of individual actors, the local agencies building and maintaining the system, the quality and availability of infrastructure, and a variety of other inputs and outputs. Other agents of change include the environment, new technologies, security issues, federal policies, economic factors, and the availability of financial resources. Chapter 10 of this document describes the Metro Area's demographic profile, and identifies specific economic, social, environmental, energy system and land-use related impacts of this plan, and makes recommendations on the strategies this plan undertakes to address the needs of the transportation system. This chapter builds upon the evaluation of the adequacy of the Metro Area transportation system to the year 2040 as developed in Chapter 7, Future Project Plan, which discusses future travel demand, potential transportation projects of various modes, and related issues and impacts through 2040.

CHAPTER SEVEN
Future Project Plan

7.1 Introduction

To examine the adequacy of the Metro Area transportation system to the year 2040, it is necessary to develop a Metro Area forecast for the rate of growth, type of growth, the location of growth, and household travel characteristics.

Timing issues with the delayed release of the 2010 Census Transportation Planning Packing (CTPP), which provides Census data by Transportation Analysis Zones (TAZs), necessitated this plan update to occur without a modeling update. The data in this section of the Plan is anticipated to be updated in 2015 as a supplemental update to the 2040 LRTP. The following information in this section will rely upon 2000 Census CTPP and other data until a full update with 2010 CTPP data is possible.

In the preparation of this transportation plan, information on land use and population was obtained from Boone County, the City of Columbia, and the 2000 Census to establish a baseline for residential and commercial development in 2005. 2010 Census and residential and commercial development data and land use and population figures are used where possible. This section also compiles data from three major data collection projects which were conducted in 2004/2005 to obtain individual travel characteristics, time/delay and average speed on arterial streets, and peak hour and 24-hour traffic counts. The following databases, studies, and sources were used:

City of Columbia Existing Land Use Inventory
Vacant Land Inventory
City of Columbia Metro 2020 Plan
Columbia Imagined: A Plan for How We Live and Grow
Boone County Land Use Plan
MoDOT 2006 and 2009 Traffic Counts on Major Roadways
Household Survey of 1500 households for Work Trips by TAZ
City of Columbia Sidewalk Inventory and 2012 Sidewalk Master Plan
2000 Census and 2010 Census (as available)
2000 Census Transportation Planning Package
CATSO Employment forecast for 2030 and 2040
CATSO Population forecast for 2030 and 2040
CATSO Geographic allocation of 2030 population
CATSO Geographic allocation of 2030 employment

Products for all the aforementioned surveys and data sources contributed to the information necessary to develop a travel demand model for the Metro Area. This model was used to assess the ability of the existing transportation system and the adopted CATSO Major Roadway Plan to accommodate the anticipated growth over the next twenty-five years. The travel demand model will provide a full update in 2015 as 2010 CPTT data is released and allocated into the model. Additionally, CATSO will utilize the UrbanSim model to attribute data tables into TAZs. The CATSO Major Roadway Plan, most recently amended in 2012, is presented in Appendix G. The 2030 TAZ map is presented in Appendix I.

7.2 Forecasting Travel Demand

Travel demand modeling is a tool designed to test the performance of a transportation system based upon a given land use scenario. The assumed land use scenario dictates the total number and the origin and destination of person trips. The output from the model provides the data needed to determine whether the proposed transportation system can adequately serve the projected land use.

The adopted Columbia Area Transportation Study Major Roadway Plan served as the base highway network for the 2030 land use scenario (the most recent MRP line work will be used for the update to 2040 in 2015). Each roadway segment in the Plan was coded with distance, facility type, and

capacity\hour\lane. Travel demand forecasting relies on a series of mathematical models that produce four primary components; 1) trip generation; 2) trip distribution; 3) mode choice; and 4) trip assignment. This technique is known as the “four-step” approach to travel demand modeling.

Trip generation models translate land use and demographic information into the number of trips created by an area. For the 2030 plan update, the Columbia Metro Area was divided into 343 traffic analysis zones (TAZ) (see map in Appendix I). The boundaries of TAZs are generally existing roads and occasionally streams or other linear landscape features. Trips originating and or destined outside of the Metro Area (external trips) have been included. Estimated trips are calculated based upon TAZ information, including number of households, population, number of employees, number of vehicles per household and median income.

Trip distribution models estimate where trips will be made within the study area. The primary objective is to distribute the total number of trips originating in each traffic analysis zone among all possible destination zones. The distribution model used for this plan is commonly known as the gravity model. The gravity model assumes that trips are proportional to the number of attractions in all possible destination TAZ’s and inversely proportional to the travel time between the TAZ’s. The number of attractions in a TAZ is correlated with the number of employees in the TAZ.

Mode choice models assign trips to the various modes of travel available. The basic assumption of the mode choice models is that travelers make rational choices between the available modes based upon economic cost and the time.

Trip assignment models assign the distributed volumes of vehicle trips, by mode, to individual network links representing roadway segments. An incremental capacity restraint trip assignment model was used for this plan. This model assumes that the choice of route is based upon minimizing the total travel time. Using the network and its data, the model estimates the shortest paths between each TAZ and every other TAZ based upon travel time. The incremental capacity restraint assignment model assigns or “loads” a percentage of the total trips onto the network in a series of iterations. For this plan, a series of three iterations were used; 50 percent of the trips assigned in the first iteration, and 25% in the subsequent iterations. The travel times between TAZ’s are modified after each iteration to reflect congestion created by the cumulative traffic volumes assigned to each network link in the previous iterations.

The basic outputs of the travel demand modeling process are the travel forecasts. These forecasts are summarized by estimated 24-hour traffic volumes on each segment of the roadway network. These volume estimates are used to indicate whether the transportation system can adequately serve the forecasted land use and employment. The Traffic Analysis Zones Map is attached in Appendix I.

7.3 Capacity Constraints and Recommendations

Overall, the adopted CATSO Roadway Plan, when fully implemented, addresses roadway capacity needs for the Columbia metropolitan planning area in 2030, and is anticipated to continue to meet capacity needs in 2040. The CATSO Major Roadway Plan, however, does not address the congestion/timing problems at signalized intersections.

To preserve the capacity of the major arterials, it is essential that the distances between intersecting roadways with signalized intersections are adequate to provide for smooth, uninterrupted flow of traffic. Signalized intersections are directly responsible for most of the delays experienced on the roadway system.

Appendix F: Signalized Intersection and Roundabout Locations, catalogues the existing traffic signals and roundabout locations in the Columbia metropolitan planning area.

7.4 Future Roadway Projects

In the Columbia metropolitan planning area, there are several arterial roadways which should be considered for construction or improvement over the 2040 plan period. The issues related to the roadways include jurisdiction and ultimately funding. One of the many immediate planning challenges facing the City of Columbia and Boone County will be responding to the results of the East Columbia Transportation Study (MO 740 extension and alternatives), and also an EIS and follow up SEIS done for I-70. These projects are mapped in Appendix J: CATSO new Roadway Projects/Level of Service Upgrade Projects.

1. East Columbia Transportation Study. The Final Environmental Impact Study (EIS) was made available for public review in April, 2009, and formally approved by FHWA in December 2009. The Preferred Alternative extends MO 740 as an expressway to the Lake of the Woods/St. Charles Road Interstate 70 interchange. The Preferred Alternative also includes improvements to Route WW between US 63 and Olivet Road, classifying Route WW as an arterial. The extension of Ballenger Lane south, including an Interstate 70 overpass, to connect to the Stadium Boulevard extension at Richland Road, was reviewed as part of the EIS process, but is not formally part of the Preferred Alternative. It will be implemented as a local project.

2. The Improve 70 Study (2nd Tier Environmental Impact Study) recommended removal of the ramps on and off I-70 to Business Loop 70 East and a new interchange; The widening of I-70 was the preferred alternative to construction of an I-70 bypass.

3. A Supplemental Environmental Impact Study SEIS was formally approved by FHWA in August, 2009. This study evaluated the need for dedicated truck lanes on I-70 from Kansas City to St. Louis. Part of a four-state U.S. Department of Transportation “Corridors of the Future” application, the EIS determined the feasibility of separation of freight and passenger vehicles along I-70 from Marietta, Ohio to Kansas City, Missouri. The FHWA decision gives formal approval of the study’s recommendation of the Truck-Only Lanes Alternative as the Selected Alternative for the I-70 Corridor, as opposed to the previous decision to widen the existing I-70 corridor to six lanes.

The issues generated by MoDOT’s plans for the expansion of I-70 have highlighted the need for an expanded arterial system to move local traffic within the Metro Area. Four roadways have been selected for examination; 1) Business Loop 70, 2) Broadway extension, 3) Providence Road extension, and 4) the creation of a circumferential roadway system.

A. Business Loop 70
Business Loop 70 is a primary arterial and an older commercial corridor within the Metro Area. The changes under consideration for the I-70/US 63 interchange and for the widening of I-70 will have impacts on the Business Loop. The following is a section by section description of the roadway issues.

1. Route E to I-70 Drive Southwest
This section of the Business Loop is built as a 2 lane major collector with a continuous center turn lane. Land uses in the roadway corridor include small office, retail, and industrial uses. The primary focus of activity is Cosmo Park and the soccer and baseball fields. While there are no roadway capacity problems along the majority of this roadway, capacity and traffic operations problems are experienced in the vicinity of the I-70/Business Loop 70 Interchange. Some of the deficiencies include:

a. Only two through lanes under I-70.

b. Roundabout with 4 approaches, plus on-ramp to I-70 westbound.

c. Business Loop 70 intersection with I-70 Drive SW and proximity to I-70 East bound ramps.

d. West Boulevard is terminated at I-70 Drive SW.

e. Lack of pedestrian access along roadway corridors and at intersections, especially a lack of access to Cosmo Park.

The majority of the operational problems occur on MoDOT roadways. Local traffic from Creasy Springs Road and West Boulevard are routed through the I-70 interchange intersections, which complicates traffic control and limits capacity.

The I-70 interchange is an important connection for Business Loop 70. The existing bridge structure on the interchange is inadequate to serve the present needs of the Business Loop.
In FY2014, MoDOT anticipates hiring an engineering consultant firm to perform an interchange study to develop a design which will eliminate many of the existing operational problems, provide improved collector street connectivity, and improve pedestrian access across the I-70 Corridor to Cosmo Park.

2. I-70 Drive Southwest to College Avenue
This section of Business Loop 70 is constructed as a four lane arterial with a flush median. Land uses along the corridor include shopping centers, restaurants, a high school, car dealers, a hospital, and fast food restaurants, as well as the driveways associated with these uses. The right-of way is crowded with utility poles and there are no sidewalks along most sections of roadway, which limits this corridor's ability to function as a walk-able commercial destination for the residential areas immediately south. The City of Columbia has initiated sidewalk installation, intersection improvement, and utility pole removal on selected segments of the roadway.

The capacity of this section of roadway is adequate, although the numerous driveways and the proximity of utility poles to the roadway is a safety problem.

Access management and utility relocation would be the key issues for this section of roadway. The *Revitalization Study for Business Loop 70* completed in September 2002 explored alternatives for consolidating access points and for providing underground utilities and the City is in the early stages of doing just that.

3. College Avenue to Old 63
From College Avenue east to Route B, this section is constructed as a four lane arterial with a flush median. Near Route B, the number of lanes drops to two (2) as the roadway passes under a bridge for the COLT Railroad and a second bridge under Route B. The two lane section continues to the signalized intersection at Old 63. There is an improved railroad crossing in place near the City of Columbia power plant. Land uses along the corridor are primarily industrial. One of the primary problems with this section of roadway is that it lacks a full direct connection to Route B.

While pedestrian access problems and the lack of sidewalks still persist in the vicinity of Business Loop 70 and Paris Road/State Route B, a pedestrian bridge along Paris Road/State Route B which crosses Business Loop 70 was completed in 2003, with Surface Transportation Program Transportation Enhancement funds assistance, at the time of improvements to the State Route B/Business Loop 70 crossing.

The CATSO Major Roadway Plan has been amended to provide for the realignment of Route B with Old 63 to create a four-way signalized intersection that provides the Business Loop direct access to Route B.

The MoDOT I-70/US 63 Major Investment Study (1999) and the Improve 70 Study (2002) recommended a possible new interchange for Business Loop 70 with I-70, just west of Route B. A further evaluation of the interchange options and potential realignment of Route B should be pursued.

4. Old 63 to Conley Road
At present, Business Loop 70 terminates at East Boulevard just east of the ramps onto I-70. The roadway is constructed as a two lane section with a turn lane at Old 63. Land uses along the corridor include retail and industrial uses.

The I-70/US 63 Major Investment Study (MIS) completed by MoDOT in 1999 recommended the removal of the Business Loop 70 ramps on I-70 to improve the operation of the I-70/US 63 interchange. Removing the ramps to and from I-70 will leave this section of the Business Loop as a cul-de-sac frontage road that serves only as access function until the planned extension of the roadway to Conley Lane can be constructed.

The extension of Business Loop 70 to Conley Road will require a bridge over Hinkson Creek and may be a challenge because the MoDOT preferred alternative for I-70 is to widen within the existing ROW. Right-of-way would need to be acquired from the Columbia Country Club golf course. As of this writing, the Broadway Marketplace Transportation Development District (TDD) is continuing its cooperation with MoDOT, Columbia Country Club, and the City to implement the extension project. Continuity of the planned Hinkson Creek Trail extension will be an issue during the design phase and water quality in Hinkson Creek will be an issue during the construction phase.

As identified in the I-70/US 63 MIS, the extension of Bus. Loop 70 East to Conley Road would improve area traffic circulation. When MoDOT determines the preferred alternative for I-70, a preliminary alignment and design should be developed for the extension of Business Loop 70.

B. Broadway (Route WW and TT)

1. West Broadway Extension (Route TT)

The CATSO Roadway Plan shows the extension of West Broadway as a major arterial from Route UU (I-70/Hwy 40 interchange) to Scott Boulevard. The extension of Broadway is intended to provide an alternative route for traffic entering Columbia from the west. Perche Creek and the associated flood plain present a natural barrier that must be bridged. At present, only I-70 and Gilliespie Bridge Road provide for east/west travel in the western portion of the Metro Area. Delays on I-70 during construction or due to accidents are magnified owing to the absence of a viable alternative route parallel to I-70. Local traffic with origins or destinations in southwest and west Columbia must use Stadium Boulevard to enter and exit I-70. The extension of Broadway to the I-70/Hwy 40 interchange would significantly reduce travel times and reduce traffic volumes on Stadium Boulevard, in addition to reducing delays on I-70.

Preliminary engineering would need to be completed to accommodate the proposed realignment of Scott Boulevard and Strawn Road to create a 4-way intersection with Broadway. Residential development limits the available roadway rights-of-ways (ROW) and need thus necessary ROW needs to be identified and protected from further encroachment. Crossing Perche Creek and the flood plain will require a bridge structure that will have a significant cost. The Major Roadway Plan shows the preliminary location of the bridge structure. The roadway extension involves multiple jurisdictions, MoDOT, Boone County, and City of Columbia. Construction of the Broadway extension will require cooperation to acquire right-of way and construct the roadway. Right-of-way will need to be surveyed and purchased through the Perche Creek bottoms to Route UU. Environmental concerns related to water quality and the karst/sinkhole topography in the area, especially during the construction phase, will need to be addressed. The City of Columbia has done a preliminary study of alternative alignments and secured commitment for some of the right-of-way in a future subdivision ("The Overlook").

The roadway corridor offers little development potential owing to the topography and flood plain. However, the scenic potential of the roadway should be evaluated and natural features preserved to create an attractive west entrance to Columbia. The benefits of the Broadway extension occur on the MoDOT system including the redistribution of traffic from I-70 and Stadium Boulevard that would be occur by connecting Route TT with Route UU and Highway 40/I-70. Residents of the Metro Area would benefit from significantly reduced travel times to south and southwest Columbia. MoDOT should consider designating the extension of Broadway west to Route UU as Route TT. The City of Columbia should consider assuming maintenance responsibility for Scott Blvd (Route TT) from Broadway south and for Strawn Road (Route ZZ). Should MoDOT choose to widen I-70 along the existing alignment, the Broadway extension would become a high priority to provide an alternative route during the construction of I-70.

2. **Completed Project:** East Broadway (Route WW) Widening

This widening project was completed in 2006.The CATSO Roadway Plan identifies East Broadway/Route WW as a major arterial from Garth Avenue to the eastern boundary of the Metropolitan Area. Implementation of this project made the roadway cross-section four lanes for the entire length between US 63 west to College Avenue. The inclusion of a four-lane bridge over Hinkson Creek as part of this project eliminated the merging traffic delays at the PM peak hour which disrupted traffic movement at the Broadway/Old 63 intersection east of the bridge. The new bridge also provides sidewalks for pedestrians and bicycle routes, as well as including a connection to the Hinkson Creek Greenbelt trail facility.

C. Providence Road Extension (**Partially Completed Project**)
This project was first shown in its current alignment in the 2025 CATSO Plan, which removed the northern connection to US Highway 63 and connects the northern terminus of the Providence Road extension to Route VV and downgrades the roadway to a minor arterial. The City has constructed the section of the Providence Road extension from Vandiver to Smiley Lane.

Land uses proposed in the corridor have transitioned from industrial to residential. Given the developing residential character, the connection to US Highway 63 is not needed to serve an industrial district. Traffic from US 63 to I-70 will use Rangeline Street (Hwy 763). But a parallel route to Rangeline, which is a commercial and industrial corridor, is needed to serve existing and future residential development, particularly the Clearview Subdivision. There is an existing power line easement with electrical transmission towers which interferes with the proposed roadway extension. In addition, development requests in the corridor have been encroaching on future ROW.

D. Circumferential Roadway System
The proposed Circumferential Roadway System builds upon many of the roadways already in place within the Metro Area. West of US 63, of the 12.2 miles of the proposed system, only .85 miles, or seven percent (7%) of the total length would be along a new street ROW. Beginning with Stadium Boulevard (MO 740) at US Highway 63, the loop would extend along Stadium Boulevard then north along Route E and Blackfoot Road, to Wilcox Road and Obermiller Road to Creasy Springs Road. From Creasy Springs Road, the Circumferential System proceeds northeast along a new alignment to meet Brown School Road east of Clearview Road and proceeds along the Brown School Road alignment to the interchange with US Highway 63.

East of US Highway 63, the Circumferential System follows Starke Lane to Brown Station Road. From Brown Station Road, a new roadway would be extended across the COLT railroad to Route B. From Route B, the roadway would follow a new alignment heading southeast to intersect with Route PP. From the intersection with Route PP, the Circumferential System would use the Ballenger Road alignment to Clark Lane, then extend across I-70 following the Ballenger Lane extension alignment to connect with the alignment for the extension of Stadium Boulevard (MO 740) to complete the system at U.S. Highway 63 in eastern Columbia. With the exception of the existing section of Stadium Boulevard and the section from Route PP to US 63, the Circumferential Roadway System would ultimately be constructed as a four lane, primary arterial with a raised barrier median to control access. The following sections provide a section by section description of the proposed system.

1. Blackfoot Road from Route E to Wilcox

At present, Blackfoot Road is a 18-20 foot paved collector street with substandard geometrics, inadequate right-of-way, steep grades, and poor horizontal geometrics (sharp turns). The existing rock quarry operation west of Blackfoot Road will generate industrial traffic, especially large trucks. The City of Columbia Public Works Department is in the process of negotiating for additional ROW on Blackfoot Road to upgrade the present roadway to an arterial cross-section. In addition, a proposal has been made to realign Route E to create a “T” intersection with Blackfoot Road. MoDOT is currently evaluating this proposal. Blackfoot Road would be upgraded to a Major Arterial. The City of Columbia should provide MoDOT with the supporting material to create a “T” intersection for Route E into Blackfoot Road. Sufficient right-of-way to accommodate a four lane major arterial should be acquired.

2. Obermiller Road from Wilcox to Creasy Springs Road

This section is a two lane roadway built to County standards. The existing roadway alignment has a 90 degree turn which may limit the design speed on this section of the Loop. Additional right-of way may have to be purchased to provide a minimum of 100 feet. Additional ROW should be acquired along Obermiller Road to provide a 4 lane roadway with raised barrier median. The curve on Obermiller Road should be engineered to accommodate 45 mph traffic speeds.

3. Northwest Arterial from Creasy Spring Road to Brown School Road and U.S. Highway 63

This is a new roadway alignment starting from the intersection of Obermiller Road and Creasy Springs Road. Using the platted ROW for Sanderson Lane from the intersection with Creasy Springs Road, the proposed Northwest Arterial section would be aligned to the northeast to meet the present alignment of Brown School Road approximately 1500 feet east of Clearview Road. Smiley Lane and Clearview Road would have “T” intersections with the Northwest Arterial, maintaining a minimum distance between the intersections of 1320 feet.

Inadequate ROW along the existing Sanderson Lane alignment is a problem, along with the proximity of several residences to the future roadway. Boone County is currently considering the construction of the extension of Smiley Lane. The Northwest Arterial relies on the Sanderson Lane portion of the Smiley Lane alignment and would have Smiley Lane form a “T” intersection. This section is the key piece of the western portion of the system. It completes the connection of US Highway 63 with I-70. If the extension of Smiley Lane is constructed to Obermiller Road, provisions should be made in the design to facilitate the construction of the Northwest Loop and create a “T” intersection for Smiley Lane.

4. Starke Lane from the US Highway 63 Interchange to Route B

The construction of the interchange at US 63/Oakland Gravel Road in the early 1990’s improved access to the Boone County Fairgrounds and prompted changes to the road alignments of Oakland Gravel Road, Roger I. Wilson Memorial Drive, and Brown School Road. Brown School was subsequently upgraded from a collector to an arterial road.

At present, Starke Lane is a narrow, two lane roadway that ends at Brown Station Road. The primary land uses along the corridor is the Boone County Fairground. East of US 63, Oakland Gravel Road and Starke Lane meet at a “T” intersection with Brown School Road just 200 feet east of the north bound ramps of US 63. The present intersection configuration requires all vehicles heading east across US 63 to stop and then turn. To eliminate this intersection configuration and provide for through traffic along the proposed arterial loop, the 2025 CATSO Roadway Plan realigned Starke Lane and its extension eastward to Route B. Starke Lane was shown realigned through the Fairground property to serve as an extension of Brown School Road.

In 2006, the CATSO Coordinating Committee voted to amend the Major Roadway Plan to show the existing alignment of Starke Avenue as the plan alignment. This minimizes impact of the roadway to the Boone County Fairgrounds in the future but it creates a number of challenges. Starke is a critical segment of the northern loop circumferential system. If the “T” intersection at Starke and Oakland Gravel Road remains, the continuity of the northern loop will be interrupted. CATSO will need to revisit the Starke Corridor as planning of the northern loop advances.

Most of the available roadway corridors for the extension are developed with small residences and duplexes. Acquiring ROW to construct the Starke Avenue extension would most likely involve the purchase on a number of residential properties. Boone County is the key stakeholder in this corridor. Improved access to the Boone County Fairground and surrounding property would be a direct benefit of the roadway realignment. To accomplish the realignment, a significant quantity of fill will be required east of US 63. Oakland Gravel Road would be shifted east to create a new intersection with Starke Avenue.

5. Northeast Collector from Route B to Route PP

From Route B, the Northeast Collector would run east, then turn south as a major collector to intersect with Route PP. The roadway would cross Hinkson Creek and its flood plain. The area adjacent to the proposed roadway corridor is sparsely developed with residences. Industrial uses on the east side of

Route B limit the opportunities for intersection locations for the Northeast Collector. A major bridge would be required for the crossing of Hinkson Creek.

Water quality in Hinkson Creek will be an issue during the design and construction phase. This section is the key piece of the eastern portion of the loop. It completes the connection of US Highway 63 with service roads in the I-70 corridor. Access to a future Hinkson Creek Trail should be provided from the Northeast Loop, as well as sidewalks on the Hinkson Creek Bridge.

An alignment study needs to be completed for this section of the Circumferential Roadway System to evaluate the alternatives, costs, and impacts.

6. Ballenger Lane Extension from Clark Lane (Route PP) to St. Charles Road

The Ballenger Lane Extension would cross I-70 via an overpass to intersect with I-70 Drive SE and with St. Charles Road on the south as a major arterial. The overpass at I-70 would also bridge Hominy Branch Creek. The extension of Ballenger Lane was added to the Roadway Plan in 1997 in response to the growing traffic volumes and delays being experienced at the Clark Lane (Route PP) US Highway 63 intersection and the need to identify and preserve a possible alignment for the planned extension of Stadium Boulevard (MO State Route 740). Currently, there is a 2.1 mile interval between crossings of I-70 at St. Charles Road (Lake of the Woods) and US 63 which inhibits efficient circulation of traffic. The key feature is an overpass over I-70 to provide north/south access for the northeast Columbia area. The proximity of the overpass to the existing I-70/US Highway 63 interchange limits the addition of ramps to create a new interchange for Ballenger Lane or Stadium Boulevard.

There is considerable development pressure and subdivision activity in what would be the roadway corridor, especially adjacent to I-70 Drive SE and Clark Lane. At present, there is no existing development that would be directly impacted by the proposed arterial street; however, the proposed alignment does divide several large residential tracts developed with a single residence. The Ballenger Lane Extension will require a bridge crossing of Hominy Branch Creek and the City of Columbia's Hominy Branch Greenbelt. The greatest threat to the water quality of Hominy Branch Creek and downstream at Hinkson Creek will occur during the construction of the street and bridge structure.

The construction of the I-70 overpass was included in the MoDOT I-70/US 63 (East Columbia) Environmental Impact Statement (EIS) as an important improvement for relieving congestion to the I-70/US 63 interchange. The cost and responsibility for the roadway and overpass is a significant issue. MoDOT did not include this roadway section in the State's Long Range Transportation Plan. This project was included in the discussion of the preferred alternative of the EIS, but is not included in the cost of the preferred alternative, which includes both the Stadium Boulevard (Route 740) extension and improvements to Route WW (US 63 to Columbia urban limit). It was determined that the Clark Lane extension/I-70 overpass would be the responsibility of local jurisdictions. The City's CIP shows this project as a future (6-10 Years out from FY 2014) with an estimated cost of $25,000,000. No funding source has been established for the implementation of the project.

A number of MRP amendments approved for the northeast area have resulted due to the construction of a new High School on St. Charles Road and related development activity in the area. Boone County and MoDOT jointly reconstructed the intersection at Route Z and St. Charles Road to address safety concerns in 2013 prior to the opening of the school. Some of the new roadway alignments were also developed in the Northeast Columbia Area Plan.

E. Stadium Boulevard (MO 740)

The extension of Stadium Boulevard (MO-740) is described as part of the Circumferential Roadway System (MO 740 eastern terminus to Richland Road) and is identified as an expressway from Richland Road to the Lake of the Woods interchange with I-70. The extension of MO-740 has been in the CATSO Major Roadway Plan for several decades.

From its intersection with Richland Road, Stadium Boulevard would run southwest to intersect with Broadway (Route WW) just east of Grindstone Creek as an expressway. The CATSO Roadway Plan

indicates a preliminary alignment which has been selected for this section of the Circumferential Roadway System. There is subdivision activity in the roadway corridor. The connection of this section with the I-70 overpass was included in the MoDOT I-70/U.S. 63 study as an important improvement for relieving congestion to the I-70/U.S. 63 interchange. Agency responsibility for this roadway has not been determined.

From the intersection with Broadway (Route WW) just east of Grindstone Creek, Stadium Boulevard would run southwest to connect with its existing eastern terminus near US Highway 63 as an expressway. The proposed roadway corridor is developed with single family residences on large acreages.

Right-of-way will need to be purchased and will likely require the acquisition of property by condemnation. Existing development at and near the Lake of the Woods interchange will likely require the purchase of businesses and homes. Issues related to water quality and impacts on the greenbelt are likely given the proximity to Grindstone Creek.

The eastern portion of the U.S. Highway 63/Stadium Boulevard interchange is developing as a commercial center, as well as multi-family residential. At that location, Maguire Boulevard has been extended north to Stadium Boulevard, completing an old plan to provide northern access to the Concorde Industrial Park.

F. Gans Road
From Providence Road to U.S. Highway 63 along the existing alignment as a minor arterial with a new alignment east of Bearfield Road to an interchange at U.S. Highway 63. The intersections of Gans Road with Ponderosa Street, Bearfield Road, Rock Quarry Road, and Hwy. 163 are identified as future signalized intersections.

Gans Road is designated as a minor arterial due to the limited development potential of the areas south of the roadway. The roadway is located in the drainage area for Clear Creek which flows into Rockbridge State Park. The construction phase presents the greatest threat to the water quality of the creek and potential impacts to Rockbridge State Park.

Gans Road should be considered for local designation as a scenic road, to create an attractive southern entrance into south Columbia and preserve the unique character of the corridor. The City and County, using Section 303 of the Clean Water Act 60/40 federal/local funding, in 2007 initiated a geomorphic stream study of Gans and Clear Creeks. The findings of the study should be taken into account in future roadway planning and design.

G. MO 163 (Providence Road)
The widening of MO 163 from Southampton Drive to Route K to four lanes. The right-of-way for the widening is available, although additional right-of-way may be required for the intersection of MO 163 with Route K and Old Plank Road.

MO 163 is identified as part of the Pedestrian and Bicycle Network Backbone and provisions to accommodate the appropriate pedway design need to be included in the widening project. Four-foot wide shoulders were constructed on the existing road in 2013.

7.5 Other Roadway Improvements and Plan Amendments

Major Roadway Plan Amendments
A number of arterial and collector streets have been added to the updated Major Roadway Plan. A number of existing Boone County collector streets are included, as well as additional local non-residential streets (for connectivity purposes) in the Route 763 corridor. Additional roadways have been added in the northeast, southeast, and southwest portions of the Metro Area. The MRP uses symbology to indicate which corridors are existing roadways, and which are proposed new alignments or facilities.

Roadway projects plus additional long-term needs are depicted on the Major Roadway Plan, depicted in Appendix G. This includes amendments approved by the CATSO Coordinating Committee through June, 2012.

7.6 Bicycle/Pedestrian Facilities

A. Bicycle and Pedestrian Network Plan

The Bicycle and Pedestrian Network Plan (Appendix B) is a comprehensive pedestrian/bicycle network for the entire Columbia metropolitan planning area . The map in Appendix B serves as a planning document which identifies existing pedestrian and bicycle facilities and proposed new connections and extensions to provide additional connectivity within the network. Its implementation will ultimately create a comprehensive network for non-motorized travel. The pedestrian/bicycle network includes 133 miles of trails, 259 miles of pedways[10] and 388 miles of bicycle routes and lanes. It incorporates the City's Parks and Recreation Master Plan (2013) facilities and proposes additional connections outside of the City limits within the Columbia Metropolitan Area boundary. The CATSO Ped/Bike map also indicates roadways which are key to enhanced movement within the Metro Area and connectivity of non-motorized modes onto and off the bike/ped network. Given this function, these roadways lacking complete streets features (bike lanes, sidewalks and/or pedways) should be built or retrofitted as such.[11]

Aligned with the publically expressed goals and objectives gathered through the public input phase of this plan, the updated pedestrian/bicycle plan is designed to provide greater opportunities for bicycle and pedestrian travel throughout the City and Columbia metropolitan planning area through the construction of a system connecting to all parts of the area. In particular, it will be designed to allow children, the elderly, and the disabled to walk or bicycle across the community in safe and attractive surroundings. The Bicycle and Pedestrian Commission held three public meetings to update the map's network connections and to identify active transportation facility needs on-and-off the roadway system.

The development of the plan seeks to leverage all facilities to enhance the overall connectivity of the system throughout the Metro Area. While the construction of the trails system will provide an entirely separate transportation system for bicyclists and walkers to use in moving from one part of the Metro Area to another, the trails system complements existing sidewalks and bicycle routes, as well as the pedways that are part of the pedestrian/bicycle network. The sidewalk system includes two types of facilities. Pedways are paved, typically eight-foot to ten-foot wide sidewalks. Conventional sidewalks are typically five feet wide except in the central business district (10 feet) and exceptional corridors like Broadway (six feet is recommended).

The map displays three primary classifications of facilities, as described below:

Classifications:

- Existing Bicycle & Pedestrian Network (Existing or Underway): This classification includes trails, pedways and other shared-use facilities which are presently built or are funded/underway. This classification is considered the backbone to which new additions to the network should be built. This broad classification includes a variety of facilities, from the MKT Trail to the South Providence Pedway to the existing Bear Creek Trail segments.
- Proposed New Additions to Bicycle & Pedestrian Network: This classification includes proposed new trails along creek/greenbelt corridors and the Columbia COLT Railroad right-of-way, the expansion of

[10] Pedways are shared-use paths for all non-motorized modes of transportation. They are typically 8-to 10-feet wide and paved. While often adjacent to roadways, unlike bike lanes, pedways provide separation from road traffic. Pedways are often called shared-use paths or urban trails.

[11] Complete streets are those designed to accommodate all modes of transportation. They include bicycle and pedestrian facilities such as sidewalks, pedways, bike lanes, refuge medians and often ancillary treatments such as traffic calming measures and street trees. The City of Columbia adopted a complete streets policy in 2004.

existing trails such as Bear Creek Trail, and planned pedways. This classification includes the bicycle and pedestrian facilities recommended in the Parks and Recreation Master Plan (updated in 2013).

- Roadways Key to Bicycle and Pedestrian Connectivity: These roadways either have existing bike lanes and sidewalks, or are recommended to be built/rebuilt as complete streets due to the connectivity they provide throughout the Metro Area and their relationship between the bike/ped network as built/planned.

While the Bicycle and Pedestrian Network Plan does not presently contain information regarding the Level of Service (LOS) each facility provides, GetAbout Columbia and the City's Bicycle and Pedestrian Commission maintain a route map which describes on and off-road facilities based upon the ease or comfort of average riders (based upon geography, skill/experience, traffic and other factors). This map is presented in Appendix T: GetAbout Bike/Multi-Use Routes Map. A LOS ranking similar to those for roads as presented in section 5.1 is a powerful tool for describing the functionality of new and existing bicycle and pedestrian facilities and as a network performance measure. LOS may also be explored for the transit system.

B. Sidewalks

As stated in Chapter Three, the existing street system is inadequately served by sidewalk facilities. Since 2012, the City has maintained a digital sidewalk inventory to better map sidewalk locations. It is anticipated this database will be expanded to include sidewalk condition information (slope, cross-slope, width, structural condition, maintenance needs, etc.).

The 1997 City of Columbia Master Sidewalk Plan revision proposed 41 projects, including 25 individual sidewalk projects, and 16 sidewalks to be built in conjunction with a street reconstruction project. These totaled 19.7 miles of new sidewalks. The Plan focused on identifying those segments in most critical need of sidewalks. As of 2007, when an updated sidewalk plan was approved, twenty of the previous plan projects had been completed adding 9.5 miles of new sidewalks.

The new 2012 Sidewalk Master Plan contains 42 individual projects and continues the increased emphasis on sidewalk construction on major streets. Thirty of the forty-two total individual projects are on streets included in the MRP. Nine of the sidewalk projects to be built in conjunction with street reconstructions remain from the 2007 plan. The focus on major streets is to facilitate improved connectivity and safety for pedestrians, which hopefully will result in increased numbers of walkers and reduced numbers of vehicular trips. See Appendix C for a complete listing and map of 2012 Sidewalk Master Plan projects.

Boone County requires sidewalks on new streets only if the lot sizes are urban in character (i.e., 7,000 square feet to 0.49 acres), the subdivision is for "multi-use" development, or when administering development of a subdivision that is subject to a City of Columbia "pre-annexation agreement" (i.e., an annexation agreement on property that is not yet contiguous to City boundaries).

The City of Columbia's latest capital improvements program lists 27 individual sidewalk projects scheduled for funding by the Non-Motorized Transportation Pilot Program (GetAbout Columbia) funds. A number of policy recommendations are relevant for improving the pedestrian environment within the Columbia Metro Area. The provision of continuously connected walkways is a major factor in accommodating pedestrian traffic, as connectivity is critical for walking to be a serious travel mode. Sidewalks should be provided on both sides of major streets, particularly major traffic ways such as arterial streets. Walkways should be a minimum of 5 feet wide to allow disabled persons access, and should be built with ADA-accessible slopes, cross-slopes, crossings and curb cuts. A separation from the roadway should be provided, with a 6 to 7 foot space recommended by the accessibility guidelines of the Americans with Disabilities Act (ADA).

The minimum width of five feet would likely apply in residential areas, while in areas of greater pedestrian use, such as downtown Columbia and other commercial areas, wider walkways are appropriate. A 50/50

ratio of vehicle space to pedestrian space is suggested for public spaces in downtown areas, both for public safety and to maximize economic development.

Intersections are significant locations for pedestrian travel, and pedestrian safety needs to be a prime consideration in intersection geometry. A suggested maximum length for pedestrian street crossings is 48 feet. The intersection design should incorporate features such as medians to minimize pedestrian exposure to vehicle traffic. General roadway design needs to keep vehicle turning speeds to safe levels, below 20 mph for left turns, and below 10 mph for right turns. It is suggested that left turns be minimized or even eliminated in downtown areas and other locations with large numbers of pedestrians. Pedestrian signalization should be timed for a maximum walking speed of 3.5 feet per second. Intersection approaches and pedestrian crossing and waiting areas should be well illuminated, ideally creating backlighting to make pedestrians clearly visible to approaching vehicles.

On major streets, particularly those with four lanes, the construction of raised medians provides a refuge for pedestrians from traffic, and allows them to more safely cross the street. The median should be cut at the crossing point to meet ADA requirements.

To maximize student safety, school areas need specific pedestrian access points, including some which avoid crossing points with vehicles. Roadway design needs to minimize vehicle travel speeds to 15-20 mph. Raised crossings, traffic diverters, and on-street parking are some of the possible methods for slowing traffic. All school approaches should have curb and gutter sections, and street geometry should insure maximum sight distance on all pedestrian accesses and crossings.

Commercial and office areas should provide independent access ways for pedestrians separate from vehicle access. Ideally, there would be direct pedestrian access for adjacent residential areas. Site planning should minimize the amount of walking that must occur in vehicle parking areas, to lessen the chances of collisions with pedestrians as vehicles back out of spaces. Side lot and on-street parking are two ways to avoid having vehicles back over walkways. Another possibility, particularly for the downtown area, is to restrict vehicle traffic to particular spaces or times of day. Such auto restricted zones (ARZ's) offer protection for pedestrians. Limiting parking and instituting true cost parking measures are further incentives to encourage walkers.[12]

The use of access management, ARZ's, parking restrictions, and other such mechanisms alone will not provide for functional commercial or office developments. An example can be found in the communities that closed downtown streets and eliminated parking to create pedestrian malls. Shoppers then found it less convenient to get to the downtown, since the majority of them were traveling by auto. The result was frequently the deterioration of the downtown. To counter this possibility, methods for restricting auto access and protecting pedestrians need to be combined with land use planning that emphasizes walkable scale development and multi-modal options. A critical element is the provision of a variety of residential options within walkable distance of commercial and office areas. The proximity of a mixture of land uses is necessary to promote the pedestrian mode. Without such land use planning, restricting auto access to commercial areas will only lead to a loss of function.

Walkable scale land use planning needs to be employed in all types of land uses, in both new and infill developments, to maximize the benefit to pedestrians. Mixed use developments and traditional neighborhood designs are two ways of achieving this. Land use ordinances should provide for neighborhood schools, pocket parks, and neighborhood-scale commercial areas. Seating should be provided throughout retail areas and other pedestrian corridors. Ideally, commercial and office uses should front on sidewalks, with parking in side or rear areas.

C. Programs and Policies

Education and promotion programs will be an important part of the pedestrian/bicycle network transportation implementation plan. Such programs are key factors that complement pedestrian/bicycle

[12] True cost parking measures charge a price consistent with the actual cost of maintaining a parking space, especially on on-street spaces.

network transportation infrastructure. Per studies in other cities and as a part of the pedestrian/bicycle network Non-Motorized Transportation Pilot Program (NMTPP – known locally as GetAbout Columbia – federally funded in four areas including Columbia), transportation mode shift can be accelerated with the use of targeted programs. Including education, PR and Marketing, clinics, events, etc. into the transportation plan can reduce single user vehicle travel. The results of the NMTPP will be used to plan and implement programs shown to be effective. Columbia will be addressing certain policy issues, such as possible City maintenance of sidewalks ("complete streets" concepts) that could enhance pedestrian and wheelchair transportation.

7.7 Transit Projects

Transit Needs
Two primary transit system needs have been identified by Columbia Transit to address the goals, objectives and priorities expressed by the public for transit in the LRTP and other recent planning processes (including *Columbia Imagined*). The first is a comprehensive redesign of the bus route system, and the second is the development of a long-range transit master plan. This first objective is underway, with the implementation of CoMO Connect anticipated in early 2014 (see below), and the second objective, a long-range transportation plan for transit, is anticipated to begin as soon as 2015.

The goals and objectives for this plan, as described in Chapter 6, show a disconnection between transit needs and transit funding over the plan horizon. Using fiscal constraint, transit revenues are shown as mostly flat year over year. In order to expand the system's routes, days and times to meet citizen-expressed demand and increase efficiency, improve route amenities and intermodal transfer facilities, and other needs such as regional commuter options, the amount of funding and ways in which transit is funded will necessitate reconsideration and greater investment. As further described below, the 2040 LRTP recommends the identification of additional funding sources and mechanisms for transit and regional collaboration.

As a part of a strategic planning effort, in mid-2013 Columbia Transit began work to redesign and rebrand the bus system based upon a shift from a single hub system to a multi-hub connector system using advanced routing, GPS-tracking, and other user-oriented technologies. Once fully implemented, the "CoMO Connect" (short for Columbia, Missouri Connected) system will utilize a network of routes with shorter travel times, expanded service hours, and more than 30 transfer nodes throughout the City.

CoMO Connect is the product of an intensive public dialog with customers to identify system-wide needs. Through route changes, enhanced technology and amenities, CoMO Connect is designed to expand service throughout more of the day and throughout more of the City.

CoMO Connect will be funded in part through the City's Parking Utility. A "park and ride" system where parking permit holders are provided with a bus pass, and small increases in parking permit and meter fees to match demand, will generate additional transit funds to leverage FTA grants for operations. Additional grants are being sought for other needs such as bus stops, maps, and technology.

While CoMO Connect will provide a first and pivotal step in better meeting the region's transit needs, the 2040 LRTP goals and objective call for greater system expansion and enhancement, including geographic expansion beyond the City limits, and regional transit/commuter options. To meet the associated capital, operating and maintenance costs for such extensive system expansion and enhancement, the 2040 LRTP recommends the identification of additional funding sources and mechanisms for transit and regional collaboration.

Additional information on CoMO Connect is available online at:
www.gocolumbiamo.com/PublicWorks/Transportation/comoc.php

After the CoMO Connect process is implemented, a new long-range transit plan will be developed, starting in 2014/2015. This plan and the implementation of the CoMO Connect will identify additional

transit needs and projects including route facility and amenity needs, operating, maintenance and capital costs (such as buses) and technology requirements.

Ridership Projection
A preliminary ridership projection to 2040 was developed by CATSO staff and Columbia Transit to identify anticipated ridership throughout the plan horizon. Ridership projections will be reevaluated as a part of the long range transit plan development process and once the impact of CoMO Connect's implementation can be assessed. Using trend data from the last five years, the number of fixed route rides is expected to increase by 10% in the first full year after CoMO Connect is implemented (based upon Columbia Transit's past experiences with route changes and expansion, and the geographic expansion of the routes reaching more potential riders) and then by 5% thereafter. As Paratransit will be mostly unaffected by CoMO Connect (Columbia Transit offers rides to the City boundary for Paratransit Riders so CoMO Connect's route expansion will not affect the Paratransit territory), there is not an anticipated initial jump in ridership following its implementation. The five year growth trend for Paratransit was actually moderated some with the thought that the improvement in the fixed route (and even some geographic expansion outside of the City limits) may make the fixed route more appealing for traditional Paratransit riders. Paratransit ridership is thus shown to increase by 6% annually over the plan horizon.

As described above, the growth in transit ridership is expected to exceed the overall population growth for the Metro Area throughout the plan horizon (5 and 6% for fixed route and Paratransit rides vs. 1.5% growth in population overall). However, it should be noted that ridership is shown in terms of *rides* not *riders*, so if the system is more efficient and makes transit use more appealing, it is anticipated that those already riding transit will ride for more trips, impacting ridership numbers to a bit of a higher degree than new riders coming into the system (although the growth in new riders is also expected to exceed the average annual growth rate due to the demographic trends of the Metro Area, and with a better system, new riders will ride more as well).

Increasing ridership growth trends over total population growth has been occurring over time as changing social desires for how and where people want to live, demographic shifts including a larger degree of students and older residents, economic trends, and Metro Area's desirability for those with disabilities due to exceptional medical care, have made transit more desirable. Responding to transit needs in populations likely to use public transit, and making the system desirable for all citizens, is likely to support this anticipated growth throughout the planning timeline of the LRTP.

Projected Transit Ridership to 2040:

2012	2,012,739
2020	3,115,338
2030	5,074,558
2040	8,265,920

Projected Paratransit Ridership to 2040:

2012	41,690
2020	66,448
2030	118,997
2040	213,106

Capital Needs
Capital needs throughout the planning horizon come from the following sources: bus facilities, technologies, route amenities and intermodal transfer facilities identified by the CoMO Connect plan, and analysis of fleet replacement needs and average capital expenditures projected over time.

It is the goal of the CoMO Connect plan to add illuminated bus schedules, with real-time schedule information, provide bicycle storage for the commuter "park and ride" facilities, and improve security lighting to shelters. The improvements planned for CoMO Connect include proposed shelter designs with "next-bus" electronic signs that will be solar-powered. Providing detailed and relevant information to customers regarding where they are, when the next bus is coming, and how long it will take them to arrive at their final destination while riders stay warm and safe in a protected place.

Energy efficient solar light-emitting diode (LED) bus shelter lighting systems are also needed to enhance passenger safety. Solar-powered lighting allows the City of Columbia to install lighted bus stops without the expense and construction of connecting the facility to the regional power grid and LED technology consumes far less power than typical lighting systems. New shelters designed to discourage loitering are also needed. Clear sight lines are one of the top design criteria to ensure safety for patrons. Perforated mesh and expanded metal walls give bus patrons visibility, and cut wind and rain. Basic shelters cost from $10,000 to $15,000 (based on 2011 reports), while larger models for busier bus stops and park-and-ride locations are from $25,000 to $100,000. As orders increase and manufacturing ramps up, it's expected that costs can be reduced. With roughly three new dozen transfer points, shelter needs may exceed $.5 million to completely outfit the CoMO Connect system.

The largest capital expenditure for the transit system is buses. Replacement schedules anticipate that every bus in the existing fleet will be replaced at least once, if not twice throughout the plan horizon. 40-foot flyer busses have a replacement schedule of 12-15 years, 30' flyer buses at 10-12 years, and 35-40' Gillig buses have a 20 year lifecycle. Paratransit vehicles, typically Diamond Cutaway vehicles, have an even shorter lifespan due to increased idling, stopping, and vehicle design. Paratransit vehicles cost roughly $100,000, and 35-40' buses are $400,000 to just over half a million dollars depending upon type, electronic and other technologies, and number of units purchased. When looking at the fleet replacement schedule needs for Public Transit to 2040, capital costs will likely exceed $20,000,000 for busses alone, even at the current rate of replacement exceeding recommended timeframes. The upcoming Public Transit Master Plan (2014/2015) will undertake additional analysis on long-term capital needs and costs for buses and other capital needs which will then be adopted by reference into the CATSO LRTP.

7.8 National Environmental Policy Act (NEPA) Requirements

Major transportation improvements for which usage of federal funding is being considered are subject to a NEPA determination. Depending on the finding of the determination, some projects require an environmental impact statement (EIS). The purpose of the EIS is to examine the impacts and consequences of a proposed transportation projects. The EIS process involves the evaluation of alternative investment strategies, a draft environmental analysis, and the involvement and input of local governments, citizen organizations, and interested members of the public.

Projects that require an EIS would include highway or transit improvements receiving federal funding that have a substantial cost and are expected to have a significant effect on facility capacity, traffic flow, level of service or the mode share. The EIS must include a purpose and need section, quantitative and qualitative information on costs, benefits, and environmental impacts to evaluate alternatives, and a baseline "no build" alternative.

The CATSO Major Roadway Plan includes two projects for which an EIS was required:
The MoDOT I-70 Improvement Study and the eastward extension of State Route 740/Stadium Boulevard to I-70. These studies include planned construction and improvements along both corridors that will result in effects on traffic flow. Improvements to I-70 will also enhance levels of service. If built as planned, both projects will have substantial costs.

A. Interstate 70 - Additional Travel Lanes
Interstate 70 is a four lane freeway which serves as the major east/west thoroughfare through the Urbanized Area, the region, and the State of Missouri. The CATSO Major Roadway Plan shows I-70 as a freeway, without specifying the planned number of travel lanes.

MoDOT completed the Route I-70 Feasibility Study in December, 1999. This study identified the need for eight travel lanes through Columbia. In 2000, MoDOT began the Environmental Impact Statement (EIS) process for the I-70 improvement. Following this and several rounds of public input, the First Tier EIS was completed in late-2001. The first tier Environment Impact Statement identified 3 options for providing the eight lanes through Columbia; 1) a northern relocation of I-70 with 4 travel lanes, 2) an inner relocation of I-70 approximately 2 miles north of the existing alignment, and 3) I-70 to be reconstructed as an eight lane freeway with frontage roads.

By 2001, it was determined that a widening of the existing I-70 would be the preferred alternative when weighed against two other options that addressed I-70 traffic around Columbia. While costly in that it would require the reconstruction of all the interchanges and bridges as well as the acquisition of significant additional right-of-way, this alternative had the benefit of being a both a "known location" for I-70 as well as potentially less of an impact on rural, semi-rural and suburban areas north of the existing City limits. This determination was made as part of the Second Tier EIS, which refined the original study with more local detail. As part of this study, the alternatives of bypass routes through the Metro Area were eliminated, and more definition provided to the eight-lane section on the existing alignment. This study was completed in 2006.

MoDOT also prepared a supplemental EIS which examines the feasibility of separate truck lanes for the I-70 corridor.
A supplemental Environmental Impact Study (SEIS) was formally approved by FHWA in August, 2009. This study evaluated the need for dedicated truck lanes on I-70 from Kansas City to St. Louis, and was part of a four-state U.S. Department of Transportation "Corridors of the Future" application. The comprehensive study determined the feasibility of separation of freight and passenger vehicles along I-70 from Marietta, Ohio to Kansas City, Missouri. For Missouri, the FHWA decision gives formal approval of the study's recommendation of the Truck-Only Lanes Alternative as the Selected Alternative for the I-70 Corridor, as opposed to the previous decision to widen the existing I-70 corridor to six lanes.

Design
The result of the travel demand modeling forecast for the year 2030 produced 24-hour traffic volumes in the range of 75,100 to 85,600. In 1997, 24-hour traffic volumes on I-70 ranged from 37,200 to 54,100 vehicles. This represents an increase of 8.0-9.5 percent from 1992. Truck traffic accounts for approximately 15-30 percent of the total volume.

As constructed, the present capacity for I-70 is 4,000 vehicles per hour (VPH) at the peak hour. The preliminary MoDOT long range plan calls for 8 lanes, although the previous Fifteen Year Design Program indicated 6 lanes. The six lane configuration would provide adequate capacity to accommodate the 2030 forecast traffic volumes.

The widening of I-70 will require the reconstruction of all the affected interchanges and bridges. Of particular concern is the design of the interchange at I-70 and Business Loop 70 and whether additional design features or improvements need to be incorporated into the I-70/U.S. 63 interchange.

Right-of-way
The existing right-of-way through the urbanized area varies from 200 feet to 300 feet. The final design for the additional lanes may require a R.O.W. greater than 400 feet to accommodate slopes, to construct sound barriers, provide frontage roads, and to provide landscaping.

Natural Environment
The EIS includes an environmental report incorporating the principles and requirements of the National Environmental Policy Act (NEPA). The report identifies the affected environment, quantifies potential environment impacts and addresses the environmental consequences of the I-70 widening while providing mitigation options. The potential for significant environmental impacts examined included surface water, ground water, native habitat, rare & endangered species, critical environmental features, cultural and historic sites, and air quality and noise.

Noise intrusion into existing neighborhoods is a primary concern, as well as potential surface water contamination from pavement runoff and siltation during the construction of additional travel lanes and interchanges.

Existing Development
Residential and commercial development is more or less continuous in the corridor adjacent to I-70 and in the corridors shown for the relocation alternatives. There are significant concentrations of single family

residences and mobile homes in the segment of I-70 between Business Loop 70 West and MO 763. The Parkade subdivision, residences along Clark Lane, and the Rainbow Village Mobile Home Park would all be directly affected by the reconstruction project and possible noise impacts. In addition, highway-oriented businesses such as hotels, restaurants and convenience stores/gas stations have continued to spur in-fill or redevelopment on tracts which, as recently as the 2025 Transportation Plan, were vacant parcels or parcels with buildings in need of demolition or repair. As a result, right-of-way acquisition that affects these newly developed sites will potentially be more costly to acquire than previously anticipated. In October 2004 the Economic Development Research Group released a study, *Assessing the Economic Consequences of Widening I-70 for the City of Columbia.*

Subdivision Activity
With the exception of areas located along the corridor segment west of Stadium Boulevard to Perche Creek, the majority of the property adjacent to I-70 is platted and developed. Recent subdivision activity in this area has been slow and primarily for small commercial or office uses.

Cost and cost-sharing of I-70 improvements
I-70 is part of the National Highway System and designated as a freeway in the FHWA functional classification. As such it is eligible for Federal assistance. MoDOT would be responsible for funding the remaining part of this project.

I-70 Recommendations
Due to lack of funding, the I-70 Improvement Project has not progressed. To move the project forward, the voters within the State of Missouri will need to decide whether to make the financial commitment through an increase in sales or gas taxes or through the implementation of another funding mechanism such as toll roads before I-70 can be substantially improved. Until that time, the Columbia Area Transportation Study Organization will continue to assist and review MoDOT proposals for the I-70 project. Should the state legislature approve a funding alternative, the project could potentially commence.

B. MO 740 (Stadium Boulevard) - Eastern Extension
The eastern extension of MO 740 from its current terminus east of US 63 to the I-70/Lake of the Woods interchange is shown in the Major Roadway Plan (MRP) as an expressway. The number of lanes and pavement width are not specified in the current CATSO Major Roadway Plan. The planned MO 740 extension is approximately three miles in length. In 2009, MoDOT completed an Environmental Impact Study ("East Columbia Transportation Study"), which determined the preferred alternative to be an extension/connection of Stadium Boulevard (MO 740) to the Lake of the Woods I-70 interchange.

Projected Demand
The result of the travel demand modeling completed as part of the MIS for the I-70/US 63 interchange, 24 hour traffic volumes on the MO 740 extension were in the range of 26,000 ADT (*MoDOT estimate, prepared for one of several alternative alignments*).

Design
Expressway. Four lane divided roadway with median on 200 - 300 feet of R.O.W. Signalized, at-grade intersection with Route WW (Broadway) and at Richland Road.

The planned capacity for MO 740 is 2,000 vehicles at the peak hour LOS C. A four lane arterial configuration would provide adequate capacity to accommodate the 2030 forecast traffic volumes. An expressway designation exceeds the design requirements for this roadway. Design alternatives for MO 740 should include provisions for bicycle and pedestrian access in the right-of-way.

Right-of-way
All of the right-of-way through the urbanized and metropolitan area will vary from 200 feet to 300 feet. The final design for the MO 740 extension may require a R.O.W. greater than 300 feet to accommodate slopes, to construct sound barriers, provide for landscaping, and to accommodate bicycle and pedestrian

facilities where appropriate. Access rights will need to be purchased to eliminate the potential for private driveways and non-arterial street connections.

Natural Environment
The potential for significant environmental impacts to be examined will include, but are not limited to surface water, ground water, native habitat, rare & endangered species, critical environmental features, cultural and historic sites, air quality, and noise. The proposed alignment for MO 740 will have noise impacts and may have significant impacts on surface water resources.

Existing Development
A number of residential and commercial developments are located along St. Charles Road corridor. The area at I-70 and St. Charles Road/Lake of the Woods Road interchange has a concentration of commercial uses along with the Lake of the Woods subdivision located south and east of St. Charles Road. A large commercial area is in the process of being developed at the southeast corner of Lake of the Woods/I-70 interchange. In addition, two mobile home parks are within the corridor; Renner Trailer Park and Richland Heights.

Subdivision Activity
In the past five years, subdivision activity has picked up somewhat within the vicinity of the possible corridor for State Route 740. Specifically, the area around I-70 and the St. Charles Road/Lake of the Woods Road interchange and Highway 63 and Stadium Blvd. interchange has seen both residential and commercial development. This has occurred in the subdivision known as Eastport Village, which is generally bounded by Richland Road (south), Grace Lane (west), St. Charles Road (north) and undeveloped land within Boone County to the east. Commercial subdivision activity is expected to increase in the I-70 corridor, particularly in the Eastport Centre area and at Stadium Blvd. and Lemone/Highway 63 intersection. The Domain, a student housing complex, is already built. Potential additional multi-family residential development is the planning stages.

In addition, residential growth is continuing in two large subdivisions along State Route WW/East Broadway: The Vineyards and Old Hawthorne. Since necessary public utilities are now available in this area, it is likely that additional growth will be occurring in this area in the coming years.

Fiscal Impact
MoDOT estimates total engineering, right-of-way acquisition and construction costs for the extension of MO 740 as much as $75 million. MO 740 is designated as an expressway in the FHWA functional classification within the urbanized area and is eligible for Federal assistance. MoDOT would be responsible for funding the majority of this project.

CHAPTER EIGHT:
FINANCING TRANSPORTATION IMPROVEMENTS

8.1 Introduction

The CATSO 2040 Transportation Plan is a financially constrained plan prepared for the Columbia urbanized area. The evaluation of the area's financial capacity is based upon estimates of reasonably anticipated funding from federal, state, Boone County, and the City of Columbia, and of the system maintenance and capital improvement costs through 2040.

MAP-21 requires that funding be available for all elements included in the 2040 Transportation Plan that are in the Columbia Metro planning area. Revenue to pay for the planned improvements and maintenance comes from five sources:

1. Federal funding for roadways and transit;
2. State funding for roadways;
3. Boone County;
4. City of Columbia;
5. Special districts, for example Transportation Development Districts and Community Improvement Districts

The twenty-six year revenue projections included in the Plan were provided by the Missouri Department of Transportation, Boone County Public Works, and the City of Columbia Finance Department. These revenue projections are available in Appendices O, M, and N respectively. Due to the variability of revenues from TDD and CID sources, potential funds from these sources are not included. This chapter summarizes the primary methods and conclusions of the financial capacity analysis for the CATSO 2040 plan.

8.2 Funding for Transportation Projects

Funding for streets and highways in the Metro Area comes from a combination of federal, state, and local sources. The majority of state programs are financed from federal funds with additional revenues from state motor fuel taxes, and user fees. Local programs rely on state sub-allocations of motor fuel tax revenue, property and sales taxes, general fund allocations, and other local fees with some assistance from federal funds for highways and bridges.

Most major capital projects would not be possible without federal participation. The use of federal funds significantly increases the ability of state and local governments to complete construction projects by providing 80% of the funding for eligible projects. The remaining 20%, also known as the "local match" is provided by the agency requesting the funds. Historically, most federal funding has been divided into specific program categories which restricted the use of the funding to a particular type of roadway or to a single mode. The earlier transportation legislation,TEA-21, broadened the program categories and placed fewer restrictions on the use of the funds, allowing for funds traditionally reserved for highways to be used for transit, bicycle and pedestrian facilities, historic preservation, and landscaping. This policy continues under SAFETEA-LU and MAP-21.

8.3 Boone County

In 1993, Boone County residents passed a 1/2 cent sales tax to fund roadway improvements. The 1/2 cent assessment was in force for a five year period through 1998. In 1998, the electorate voted to extend the 1/2 cent assessment for an additional ten years. Voter approval for another extension of this tax was given on a ballot issue in November, 2007. To provide a consistent approach to funding for the plan and only for the purposes of this plan, the assumption has been made that the 1/2 cents sales tax will be retained by the electorate through 2040.

Boone County also receives reimbursements from the State of Missouri from revenue collected from State motor fuel tax, sales and use tax, and licenses and fees. A one percent annual growth in tax revenue is factored into the sales and property tax revenue estimates for the plan period. Revenues from the gasoline and motor vehicle taxes are assumed to be flat across the plan period.

Federal Highway Administration funds come to Boone County through the Missouri Department of Transportation. Appendix M, Boone County Revenue Projections, outlines the annual projected revenues from the sales tax and all other revenue sources to estimate the dollar amount available for transportation projects. The MAP-21 regulations permit the inclusion of revenue that can be reasonably anticipated during the 25 year planning period.

8.4 City of Columbia

Funding for transportation improvements in the City of Columbia comes from a variety of sources such as property tax, development charges from new construction, user fees, special assessments, the sale of general obligation bonds, and the City's 1/2 cent Transportation Sales Tax. In addition, the Columbia receives revenue from Boone County as part of a County rebate ordinance and reimbursements from the State of Missouri from revenue collected from State motor fuel tax, sales and use tax, and licenses and fees.

Federal highway and transit funding comes to the City of Columbia through the Missouri Department of Transportation. From these sources the City allocates the funding for street construction, street maintenance, and the capital and operating requirements of the Columbia Regional Airport and the Columbia Transit System.

As a result of the passage of the SAFETEA-LU transportation legislation in 2005, the City of Columbia became a one of four recipients nationwide of federal Non-Motorized Pilot Program funding. This program provides funds for the implementation of non-motorized transportation facilities to encourage a shift into modes other than the private motor vehicle. Columbia has used these funds to construct a number of new sidewalk and pedestrian/bicycle trail projects. Additional funding has been made available and will be utilized for more non-motorized projects in the initial years of the LRTP scope period.

Specifically for transit, the City of Columbia receives approximately $2.3 million annually in federal Section 5307 operating funds to use for Columbia Transit management and operation expenses. The City also receives approximately $15,000 annually from the State of Missouri for use in transit operations.

Appendix N: City of Columbia Revenue Projections; outlines the annual projected revenues from the transportation sales tax and all other sources to estimate the dollar amount available for transportation projects.

The MAP-21 regulations permit the inclusion of revenue that can be reasonably anticipated during the 25 year planning period. To provide a consistent approach to funding for the plan and only for the purposes of this plan only the fixed funding sources have been included in the revenue forecast, however it is assumed that all or parts of the roadways will be financed through general obligation bonds and private development interests.

A. City of Columbia - Special Districts

Since completion of the 2030 Transportation Plan, special district financing of transportation improvements has continued in the Metro Area. As of 2013, the City of Columbia had fifteen Transportation Development Districts (TDDs) within its borders (see Appendix L for the TDD Map). The Downtown District is also a community improvement district (CID) and has two Tax Increment Finance (TIF) Districts or Missouri Economic Stimulus Act (MODESA) Districts.

Transportation Development Districts are autonomous taxing districts enabled by state law to capture up to one percent in additional retail sales tax to fund transportation improvements related to the district. The

City of Columbia has enacted a TDD policy which encourages TDDs to enter agreements with the City to better coordinate their projects and to allow the City to administer the disbursement of sales tax receipts. To date, Columbia TDDs have assessed not more than one-half of one percent (0.5 %) in TDD sales tax. Several improvements on the Major Roadway Plan will be or have been constructed using TDD funds as a revenue source. A map of existing TDDs is attached in Appendix L.

Community Improvement Districts provide for the assessment of special property taxes to fund improvements within the district including transportation infrastructure. Formation of a district requires a minimum of 51 percent of the properties by area and by number to petition for its formation.

Tax Increment Financing (TIF) is a well-established creative financing technique to enable revitalization and redevelopment of areas which may include expenditures for transportation infrastructure. To qualify as a TIF District, an area must be a "blighted" or "conservation" area as those terms are defined in the state statute, and projects must pass the "but/for" test – but for the TIF funding, the project would have an unsustainable gap in its private-sector financing. Once established, a TIF district freezes property tax assessments and sales tax at a base year level. Taxing jurisdictions continue to collect taxes at the base level, but incremental increases in tax revenue due to new development and capital projects are captured by the TIF and used to pay project expenses, pay off bonds & etc. MODESA, a relatively new program, operates on similar principles but in addition to property and sales tax sharing allows for capture of a portion of withholding tax (state income tax) created by new jobs in the MODESA project area.

8.5 State Funding for Transportation Projects

Funding for state roadway maintenance and constructions comes primarily from the $0.17 per gallon motor fuel tax levied by the State of Missouri, and secondarily from sales and use tax, and licenses and fees. Funds are annually programmed from projects in the three year Transportation Improvement Program (TIP) for each district based upon the district's stated needs, population, mileage on the state and federal roadway system, safety, anticipated growth, vehicle miles traveled, and other criteria. Appendix O: Projected State Funding; outlines the projected revenues from all state sources.

The Missouri Department of Transportation, *Missouri's Long-Range Transportation Plan* (2007) describes "the fork in the road" in state transportation funding. Statewide, Missouri previously invested approximately $1.3 billion annually in programmed, construction-related activities; however, the amount has fallen to roughly $800 million after the Amendment 3 bonding program ended in 2010. The plan states:

> *"If nothing is done-If Missouri's transportation revenues remain the same, Missourians can expect to see a state transportation program that consists primarily of projects that…*
> - *Take care of the existing transportation system,*
> - *Provide some safety improvements,*
> - *Fix only a few of the worst traffic bottlenecks, and*
> - *Provide no additional services for other modes of transportation."*

Declining revenue and increased costs are further discussed in the MoDOT *A Vision for Missouri's Transportation Future: Long Range Transportation Plan* (draft 2013; adoption anticipated in 2014). The Plan states:

> *"A declining transportation funding mechanism combined with a growing list of needs and inflationary costs is the biggest challenge facing Missouri's transportation future. A tremendous gap exists between the funds available and the large list of transportation wants, needs and projects we have heard from Missourians. Each year the gap grows larger as fuel tax receipts decline and the purchasing power of each dollar diminishes as goods and services cost more due to inflation. Meanwhile, the transportation wants, needs and projects from Missourians continue to grow."*

CATSO should support in concept legislative action that provides new sources of revenue dedicated to increased state investments in transportation.

8.6 Federal Funding for Transportation Projects

Federal funding for roadway maintenance and construction comes primarily from the national $0.184 per gallon motor fuel tax on gasoline, as well as the $0.244 per gallon tax on diesel fuel, and secondarily from excise taxes on tires and batteries. The revenue collected from the fuel and excise taxes is placed in the Federal Highway Trust Fund (FHTF) and allocated to each state using a funding formula under the provisions of MAP-21.

The total dollar amount available annually from the FHTF varies due to fluctuations in revenue because of such factors as economic conditions, and Congressional limits on the percent of funds to be allocated. MAP-21 provides a funding formula for each program element which may use the state population, roadway mileage, vehicle miles traveled, and other relevant factors related to the program objectives. The State of Missouri receives funding from the Federal Highway Trust Fund through the U.S. Department of Transportation (USDOT). The Missouri Department of Transportation then allocates the federal funds to the larger Metropolitan Statistical Areas and the other urbanized areas under 200,000, based on a formula determined by population.

MoDOT determines the allocation amount of federal urbanized funds made available for projects in the Columbia metropolitan planning area. The utilization of federal funding for state system projects is determined by MoDOT, in collaboration with the local Metropolitan Planning Organization (MPO), which is CATSO. CATSO has the responsibility of planning for those projects in conjunction with its member jurisdictions. Appendix P: Projected Federal Funding, outlines the projected revenues from all federal sources, including those from the Federal Transit Administration for operating and capital assistance.

The City of Columbia since 1974 has been an entitlement community in the Community Development Block Grant (CDBG) program administered by the U.S. Department of Housing and Urban Development (HUD). As such, it has received annual formula funds to provide “decent housing in a suitable living environment with increased economic opportunity to low and moderate income households.” The City of Columbia Council policy includes allocating 30-50% of annual CDBG funding for public improvements including streets and sidewalks (funds have also been used for a COLT Railroad improvement project and transit improvements qualify) in the “eligibility area”, an approximately 18 square mile area that qualifies for CDBG investment by virtue of its demographic and housing characteristics. The total amount of CDBG funds have declined in recent years due to greater austerity at the federal level. Columbia’s annual grant, typically greater than $1 million in the years before 2004, declined to $774,000 in 2011. However, funding has increased to $886,000 in 2013 due to Census data results. Transportation-related CDBG expenditures have averaged between $250,000 and $300,000 annually.

CHAPTER NINE:
2040 TRANSPORTATION PLAN PROJECTS AND COSTS

9.1 Introduction - Financially Constrained Improvements

The absence of financial constraints in developing a transportation plan can result in the inclusions of projects and programs that are unrealistic or unjustified. A strategic approach to addressing future transportation projects requires that priorities be established to allocate limited resources among competing needs.

For the past twenty-five years the CATSO Transportation Plan for the Columbia Area has been focused on maintaining the existing infrastructure and proceeded on the assumption that the resources to maintain and expand the transportation system would be found as needs arose.

The CATSO 2040 Transportation Plan places its priorities on investing in long term solutions to existing transportation needs and providing adequate capacity to accommodate future growth while preserving the existing investment in transportation infrastructure. This is a continuation from the policy perspective stated in the 2030 Plan. The ability to fund maintenance and provide for planned investments is a major controlling factor in the decisions made about the future of the Metro Area transportation system. CATSO plans prior to 1994 identified needs and proposed solutions without regard to the ability of state or local governments to fund the new projects or examine the costs. In contrast, the CATSO 2040 Transportation Plan and the current TIP are authoritative statements of the area's transportation investment strategy; a product of planning and engineering assessments of transportation projects limited by financial constraints.

9.2 Cost Estimates for Transportation Improvements

Estimates were developed for the cost of all the roadways, transit improvements, pedestrian and bicycle facilities covered in the Plan through 2040. Likewise, estimates of revenues from various sources for transportation improvements have been developed through 2040. The estimates for new construction, reconstruction and annual maintenance were provided by the Missouri Department of Transportation (MoDOT), Boone County Resource Management and the City of Columbia Public Works Department.

Appendix Q: CATSO 2040 Roadway Plan; provides a segment by segment description of the planned improvements and an estimated cost.

The methodology used to develop the cost of the planned roadway improvements is the cost of right-of-way acquisition and construction. Specific cost estimates could not always be calculated given the absence of detailed construction plans for these roadways. It is the normal procedure to use a standard cost per linear foot or per mile to estimate the total construction cost. Because each roadway is unique, additional construction money is added for bridges, culverts and for any additional features needed for individual roadways. Approximate costs for engineering (design, surveying, and administration), inspection and testing are based on the estimated construction cost data for the mid-Missouri area. The total engineering and construction cost shown for each roadway reflects the estimated cost of building the entire facility to the adopted design standard for its classification. For new roadways, all estimates are based on the most advantageous roadway alignment that could be determined at this preliminary stage of the project development. Minor adjustment to the alignments may be made during the design phase of each roadway.

The general cost factors used in preparing these estimates are shown in *Table 11: Estimated 2013 Roadway Costs Per Linear Foot for New Construction.*

Table 11: Estimated 2013 Roadway Costs Per Linear Foot for New Construction.

Street classification	Estimated cost per linear foot
Neighborhood Collector	$633/L.F.
Major Collector	$ 759/L.F.
Minor Arterial	$ 1,139/L.F.
Major Arterial	$ 1,392/L.F.

The cost factor used in preparing these estimates include excavation and grading, utility contingencies, flexible base, surfacing, curb and gutter, drainage, engineering design, administration, inspection and testing, and basic site restoration. Additional costs for bridges, culverts, overpasses, and major intersections are included on individual roadways as needed. In all cases 15% was added for miscellaneous construction items and contingencies. All cost estimates were done in 2013 dollars, using a 3% annual inflation rate from the base estimates initially developed with year 2007 project costs. The cost of right-of-way acquisition was considered for each roadway. Land costs vary widely due to a variety of factors such as existing uses, zoning, the desirability of the area, and the perceived potential for future development. When available, recent sales of property were considered when estimating ROW costs. Purchasing ROW to permit the widening of an existing roadway is almost always more expensive than constructing a new roadway through vacant tracts. As a general rule for new construction, approximately 5% of the parcels necessary will be dedicated at no cost. Approximately 80% of the parcels will be purchased for the appraised value offered. The remaining 15% of the necessary parcels will end up in condemnation proceedings, with the cost sometimes greater than their appraised value.

9.3 Maintenance and Operating Costs

Maintenance of the existing transportation infrastructure is an important aspect of SAFETEA-LU continued by MAP-21. Estimates for maintenance through 2040 were developed by MoDOT, Boone County, and the City of Columbia. Cost estimates were developed for each functional classification on a per mile basis.

Table 12: Maintenance and Transit Operating Costs outlines the projected costs of maintaining roadways in the Metro Area through 2040 and operating and maintaining public transit.

Table 12: Maintenance and Transit Operating Costs

Category	MoDOT	Boone Co	Columbia	Total	% of Total
Streets & Sidewalks	$53,460,000	$92,886,372	$272,635,669	$418,982,041	73.9%
Transit Operations	$405,000	NA	$147,421,055	$147,826,055	26.1%
Total	$53,865,000	$92,886,372	$420,056,724	$566,808,096	100.0%
Percent of Total	9.5%	16.4%	74.1%	100.0%	
NA = Not Applicable					

9.4 Construction and Capital Costs

The CATSO Major Roadway Plan identifies the major roadways in the Metro Area and provides a functional designation based upon future needs and function. Within the Plan, each roadway segment is evaluated and given the designation of new construction, level of service upgrade or no change. The new construction designation identifies roadways which will be constructed on a new alignment as a relocation of an existing facility, extension of an existing facility, or a new roadway on a new alignment. On existing roadways, the level of service upgrade designation indicates that improvements to a roadway, such as the construction of turn lanes or additional travel lanes, are planned. For existing roadways which provide adequate capacity to meet future needs, the designation of "no change" is assigned.

Table 13: CATSO Transportation Project Needs; provides a summary of the estimated costs of the projects identified by roadway classification and by agency. Included are the costs of new roadway construction on new alignments and upgrading the level of service of existing roadways, as well as costs associated with the acquisition of transit vehicles. A listing of the construction costs for fiscally constrained projects is included in Appendix Q: CATSO 2040 Major Roadway Plan.

Table 13: CATSO Transportation Capital Project Needs - Year 2013 $ (Unconstrained)

Roadway Classification	MoDOT	Boone County	Columbia	Total
Interstate	$270,000,000	$0	$0	$270,000,000
Freeway/Expressway	$82,727,000	$0	$0	$82,727,000
Major Arterials	$7,867,735	$0	$177,352,342	$185,220,077
Minor Arterials	$0	$62,400,857	$82,129,802	$144,530,659
Major Collectors	$0	$34,044,819	$64,521,399	$98,566,218
Neighborhood Collectors	$0	$32,100,311	$13,374,312	$45,474,623
Other Streets	NA	$1,483,250	$2,921,983	$4,405,233
Capital Preservation/All Classes	$113,086,080	NA	$1,983,000	$115,069,080
Streets Sub-total*	$473,680,815	$130,029,237	$342,282,838	$945,992,890
Other				
Transit Vehicles	$0	$0	$20,000,000	$20,000,000
Pedestrian/Bicycle Facilities	$0	$0	$50,955,771	$50,955,771
*Total	$473,680,815	$130,029,237	$413,238,609	$1,016,948,661

9.5 Total Revenues

The total highway and transit revenues projected for the Columbia Metro Area through the planning horizon are displayed in Table 14: Highway and Transit Revenues by Source: 2013 - 2039. The possibility exists that the projected totals, especially gasoline tax revenues, will be reduced due to increases in the retail price of gasoline and the subsequent reduction in demand (in addition to the proliferation of more fuel-efficient vehicles). It may be assumed that at some time during the 27 year period covered by the Plan, additional revenue in the form of capital improvement bonds will be issued for specific transportation improvements. The issuance of such bonds is subject to voter approval. Renewal of temporary sales taxes is also subject to voter approval.

The projected revenues must provide for roadway maintenance, transit operation, capital replacement, new construction, system expansion, rehabilitation projects, and reconstruction.

Table 14: Highway and Transit Revenues by Mode/Type: 2013-2039
(Year 2013 $ are the base for revenue projections)

	MoDOT	Boone County	Columbia	Total	% of Total
Mode Category					
Total Roadways & other ROWs	$189,308,000	$131,525,232	$617,654,712	$938,487,944	85.3%
New Construction/Level of Service upgrades	$22,594,735	$38,538,860	$345,019,043	$406,152,638	
Maintenance/Capital Preservation	$166,713,265	$92,986,372	$272,635,669	$532,335,306	
Total Transit	$0	$0	$162,134,534	$162,134,534	14.7%
Capital	$0	$0	$14,308,479	$14,308,479	
Operating	$0	$0	$147,826,055	$147,826,055	
Total Revenues	$189,308,000	$131,525,232	$779,789,246	$1,100,622,478	100.0%
Percent of Total	17.20%	11.95%	70.85%	100.0%	
Note: Above totals include projected federal funding for capital projects and federal Interstate Maintenance/Bridge/other programs for MoDOT, as well as federal funding for transit operations and capital projects for Columbia Transit					
Note 2: City of Columbia projected for Columbia Regional Airport operations are not included, as expenditures					
and revenues above represent those dedicated only to surface transportation					
Source - Columbia Community Development Department					

9.6 Long-Range Transportation Plan Projects

The focus of the CATSO 2040 Transportation Plan is the continued movement toward a more diverse transportation system that supports the use of walking, bicycling, and buses as an alternative to the automobile. This multimodal strategy relies on the construction of bike and pedestrian facilities and monitoring their usage. Financial support for transportation facilities can then be based upon the demonstrated demand. Over the next five years, CATSO is committed to facilitating the development of engineered alignments for all new roadway construction to be cooperatively implemented by Boone County and the City of Columbia and to improving access for bicycles and pedestrians.

The CATSO 2040 Transportation Plan retains most of the roadways in the current CATSO Roadway Plan as adopted. Several new planned roadways have been included in the Plan to reflect MRP changes made since the 2030 Plan was approved in 2008. Implementation of the recommendations from the MoDOT Major Investment Study for I-70/US 63 interchange, the East Columbia Environmental Impact Study (Route 740 extension), and the Scott Boulevard/I-70 Access Justification Report/Environmental Assessment will have substantial impacts on the transportation system in the future.

Appendix Q: CATSO 2040 Major Roadway Plan; show the adopted roadway system for 2040. Appendix B: CATSO 2040 Bicycle/Pedestrian Network Plan; shows an integrated system of trails and pedways. All of the long range projects for MoDOT, Boone County, and the City of Columbia have been identified and cost estimates have been prepared. All the dollar figures are in year 2013 dollars. The highest priority is placed on maintenance of the existing system. New construction and system expansion are funded only if revenue is available.

A. Missouri Department of Transportation (MoDOT) Long Range Project Description - Constrained	Estimated Cost by Anticipated FY
Illustrative Projects	
New Construction	
Freeways/Expressways	
MO 740: U.S. Highway 63 to I-70	
Estimated Cost $68,000,000 - includes Route WW reconstruction	
from US 63 to the urban limit	
Level of Service Upgrades	
Interstate	
Interstate 70: West urban limit to East urban limit	
Estimated cost $270,000,000	
Fiscally Constrained Projects	
Level of Service Upgrades	
Freeways/Expressways	
MO 740: I-70 Drive NW to Broadway (Route TT) - 3 projects	$14,727,000
(FY 2013)	
Major Arterials	
Route PP: Robert Ray Drive to East urban limit. (FY 2022)	$7,867,735
Sub-total - Level of Service Upgrades	**$22,594,735**
System Capital Preservation/Major Maintenance	
MO 163 Pavement Improvement: I-70 to Route 740	$914,000
Interstate 70 Bridge Improvement - West Blvd	$9,835,000
Interstate 70 Pavement Improvement: Lake of Woods int. to east	$3,193,000
Route Z/Interstate 70 Bridge Improvements	$2,453,000
Interstate 70 Pavement/Bridge Improvement - westbound lanes	$1,412,000
Route 763 Pavement Improvements	$492,000
Business Loop 70 Pavement Improvements	$1,003,000
Route B Bridge Improvements	$772,000
Route E Bridge Improvements	$1,532,000
MO 163 Pavement Improvement: Route 740 to Route K	$1,675,000
Route 63 Pavement Improvements: Route WW to east	$10,608,000
Route UU Bridge Improvement (Sugar Creek)	$543,000
Interstate 70: Job Order Contracting for Pavement Repair	$269,000
US 63 Safety Improvements	$1,614,000
Route 63 Pavement Improvements: Route WW to Route 763	$388,000
Route WW Pavement/shoulder Improvements: Columbia to east	$3,089,000
Route WW Bridge Improvements: various	$2,177,000
Various locations: Job Order Contract for guard cable/guardrail	$546,000

Various locations: Safety Improvements	$724,000
(Note: Projects above will all be implemented in FY 2013-2016)	
Interstate 70/Garth Avenue Bridge Upgrade (FY 2018)	$4,637,096
Interstate 70/Route 763 Bridge Upgrade (FY 2019)	$4,776,209
US 63 Outer Roadway Gans Creek Bridge Improvements (FY 2021)	$760,062
US 63 Outer Roadway Bonne Femme Bridge Improvements (FY 2020)	$1,106,886
Various Pavement Improvements on Minor Routes 2017-2021	$5,627,544
Various Pavement Improvements on Major Routes 2017-2021	$5,796,370
Various Pavement Improvements on Minor Routes 2022-2026	$6,719,582
Various Pavement Improvements on Major Routes 2022-2026	$6,921,169
Various Pavement Improvements on Minor Routes 2027-2031	$7,789,837
Various Pavement Improvements on Major Routes 2027-2031	$8,264,238
Various Pavement Improvements on Minor Routes 2032-2039	$8,767,530
Various Pavement Improvements on Major Routes 2032-2039	$9,030,556
Sub-total - System Capital Preservation	**$113,086,082**
Total Estimated Project Costs	**$135,680,817**

Note: Cost estimates for all projects for all future years included in plan period are available in Appendix R – Long-range street project estimated costs based on inflation factor.

MoDOT Plan Status:
The majority of MoDOT project dollars shown are "illustrative". Of the $459,022,964 in projects identified as needed up to 2040, the estimated revenue available for new construction, level of service upgrades, and capital preservation is $135,848,000. Funding is in year 2013 dollars unless otherwise identified.

B. City of Columbia Long-Range Projects	**Estimated Cost by Anticipated FY**
Streets	
Illustrative Projects	
New Construction	
Major Arterials	
Scott Boulevard extension and I-70 Interchange	$68,000,000
Estimated cost - $68,000,000	
Illustrative Projects Total	**$68,000,000**

Fiscally Constrained Projects	
New Construction	
Major Arterials	
Ballenger Lane: St. Charles Road to Route 740 Ext. (FY 2021)	$34,214,226
Brown School Road: Creasy Springs to Providence (FY 2027)	$4,329,191
Minor Arterials	
Waco Road: Brown Station Rd to Oakland Gravel Rd (FY 2029)	$3,558,664
Providence Road: Smiley Lane to Brown School Road (FY 2029)	$13,194,982
Major Collectors	
Lake Ridgeway Drive: Clark Lane to Vandiver (FY 2030)	$4,884,380
Discovery Parkway: Gans to New Haven (FY 2017)	$7,253,123
Neighborhood Collectors	
Southampton Drive: Sinclair Street to terminus. (FY 2027)	$1,798,909
Woodhaven Drive: Gans Road to Nifong Boulevard. (FY 2031)	$7,698,103
Woodridge Drive: St. Charles Road to terminus. (FY 2031)	$10,129,083
Locals	
Maguire/Warren to New Haven	$2,541,983
New Construction Sub-total	**$89,602,644**
Level of Service Upgrades	
Expressway	
Stadium Boulevard & Old 63 Intersection	$462,050
Stadium Boulevard & Audubon Intersection (FY 2037)	$768,991
Major Arterials	
Broadway: Garth to West Boulevard (FY 2023)	$8,708,094
Nifong: Providence to Forum Boulevard (FY 2026)	$30,803,860
Providence Road corridor: Burnam Intersection	$2,302,211
Richland Road: St. Charles to Grace (FY 2022)	$9,251,527
Nifong/Vawter/Old Mill Creek Intersections (FY 2017)	$877,394
Nifong/Sinclair Intersection (FY 2017)	$877,394
Scott Boulevard Phase 2: Vawter to Brookview	$5,918,781
Vandiver Drive and Paris Road (Route B)	$100,000
Minor Arterials	
Scott Boulevard: Vawter School Road to Route KK (FY 2017)	$12,799,886
Fairview & Ash Intersection (FY 2024)	$669,663
Fairview & Chapel Hill Intersection (FY 2017)	$561,532
Forum & Green Meadows Intersection (FY 2022)	$426,994
Forum Boulevard: Chapel Hill to Woodrail (FY 2018)	$11,923,198

New Haven Road: Lemone to Warren (FY 2018)	$3,528,293
Clark Lane: Woodland Springs Ct to Ballenger (FY 2022)	$8,966,864
Creasy Springs Road: Bear Creek to Blue Ridge Road (FY 2023)	$14,210,345
Grace Lane: Richland Road to future Rte.740 extension (FY 2023)	$4,736,782
Vandiver and Parker Street Roundabout (FY 2018)	$547,494
Waco and Brown Station Intersection (FY 2022)	$1,103,067
Major Collectors	
Bearfield Road: Nifong Boulevard to Clear Creek (FY 2028)	$7,203,774
Bearfield Road: Clear Creek to Gans Road (FY 2035)	$3,791,870
Heriford Drive: Parker to Route B (FY 2035)	$1,163,725
Brown Station Road: Starke to Route B (FY 2023)	$8,141,817
Rock Quarry Road: Route 740 to Route AC (FY 2023)	$14,802,443
Sinclair Road: Nifong south 9,400' (FY 2022)	$14,944,774
Sinclair Road: Route K north 6,700' (FY 2022)	$9,536,189
St. Charles Road: Keene to Richland (FY 2022)	$11,386,494
West Boulevard and Stewart Roundabout (FY 2023)	$444,073
Ash Street 4-way stop removal (FY 2023)	$1,776,293
Neighborhood Collectors	
Northland Drive: Blue Ridge to Parker (FY 2022)	$5,373,002
Providence Road: Vandiver to Blue Ridge (FY 2025)	$2,401,548
Locals	
Highview Avenue: Jewell to Jefferson	$380,000
Level of Service Upgrade Sub-total	**$201,649,614**
Capital Preservation/Major Maintenance	
Major Arterials	
Broadway: Providence to Hitt Street	$347,000
Neighborhood Collectors	
Keene Street: Broadway to I-70 Drive SE	$287,000
Green Meadows road: Skylark to Oaklawn	$254,000
Locals	
Katy Lane: Forum to Limerick	$873,000
Rustic Road Improvement	$100,000
Royal Lytham Drive: Glen Eagle to Chadwick	$122,000
Capital Preservation/Major Maintenance Sub-total	**$1,983,000**
Fiscally Constrained Total - Streets	**$293,235,258**

*Cost estimates are in FY 2013 dollars unless otherwise noted in list.

New Sidewalk & Related Non-Motorized Projects City of Columbia	**Estimated Cost**
Sidewalk Projects Estimated for Implementation in 1-2 Years	
College Avenue Crosswalks & Median/Barrier	$823,875
Garth Avenue Sidewalk: Leslie to Parkade	$294,880
Ashland Road Sidewalk and Intersection: Campus Dr. to Stadium	$256,000
Downtown Ramps and Sidewalks	$89,000
Fairview Road Sidewalk: Broadway to Highland Drive	$152,900
Forum Blvd. Pedestrian Bridge at Hinkson Creek	$881,000
Manor Drive Sidewalk: Broadway to Rollins	$438,600
Nifong-Bethel: SW corner of intersection on south side of Nifong	$135,707
Providence Road pedway: Bus. Loop 70 to Vandiver	$550,000
Providence Road shoulder improvements: Stadium to Green Meadows	$170,000
Worley Street Sidewalk: Clinkscales to Bernadette	$204,500
Sidewalk Projects Estimated for Implementation in 3-5 Years	
Carter Lane Sidewalk	$430,000
Clark Lane Non-Motorized Improvement: Ballenger to Woodland Springs Ct	$540,303
Clark Lane West: Eastwood to Paris	$410,325
Oakland Gravel Sidewalk - Blue Ridge to Edris	$311,500
Sidewalk Projects Estimated for Implementation in 6-10 Years	
Audubon Drive: Shepard Boulevard to N Azalea	$152,000
Broadway & 5th Intersection	$375,000
Bus Loop 70: Garth Av-Providence	$325,000
Bus Loop 70: Providence to Rangeline	$410,000
Oakland Gravel Road: Vandiver north to existing sidewalk	$300,000
Primrose Drive: Stadium Boulevard to Sunflower	$615,000
Shepard Blvd: Old 63 to Danforth	$111,000
West Boulevard: Ash to Worley	$501,000
Sidewalks 10+ Years Implementation	
Bernadette Drive: Ash to Stadium	$384,750
Bourn Avenue: W Broadway to Rollins Rd	$312,000
Bray Avenue: Fairview Rd-Jake Ln	$251,440
Broadway: Maplewood to West Boulevard	$336,000
Broadway: Stadium Blvd to Manor	$363,000
Bus Loop 70: 7th St to Rangeline	$192,000
Bus Loop 70: Rangeline to Rte. B	$1,092,000
Chapel Hill Road: Fairview-Handley, Face Rock-Hillcrest	$420,000
Concord Street: Arlington to Yorktown	$36,000
Forum Blvd: Nifong to Mill Creek	$139,200

I-70 Dr. SW: West Boulevard to Clinkscales	$1,518,000
I-70 Dr. SW: Clinkscales to Beverly	$993,600
Leslie Lane: N Garth Av to Newton Dr.	$79,200
Maplewood Drive: Rollins Rd-Princeton Dr.	$150,000
Maplewood Drive: W Broadway-Rollins Rd	$324,000
Nifong Blvd Sidewalk: Sinclair Rd-Country Woods	$836,541
Oakland Gravel Road: Smiley to Blue Ridge	$506,400
Pershing Road: Gary to Pearl Av	$126,000
Proctor Drive: Bear Creek Village Subdivision	$570,000
Rock Quarry Road: Stadium Blvd to Hinkson	$568,038
Rollins Road: Stadium to Bourn	$15,600
Rothwell Drive: Rollins Rd to W Broadway	$331,200
Stadium Blvd: Bus Loop 70 to Primrose	$440,927
Sidewalk Total	*$18,463,486*

Shared Use Paths/Greenbelt Trail Projects City of Columbia	
Projects Estimated for Implementation in 1-2 Years	
Bike Blvd upgrade - Wabash Station to Hominy Trail	$250,000
Bike Blvd, MKT to Bus. Loop 70 and Providence Road	$460,000
Hominy Trail Phase II: Woodridge Park to Clark Lane	$882,000
Projects Estimated for Implementation in 3-5 Years	
Bear Creek Trail: Blue Ridge Road to Lange Middle School	$950,000
County House Trail Phase 2 West	$445,000
Hinkson Creek trail, Conley to 63	$555,000
Hominy Trail Connection (Pepper Tree Lane to Hominy)	$180,000
Cosmo Park Trail: Stadium Diverging Diamond to Bear Creek Trail	$700,000
Cow Branch: Providence to Auburn Hills	$1,820,000
Hinkson Creek Trail: Old 63/Shepard to East Campus Connector (Rollins)	$1,740,000
MKT Bridge Improvements Phase II	$300,000
MKT Providence Rd boardwalk replacement	$200,000
MKT Trail: Scott Blvd Improvements	$40,500
Perche Creek Trail Phase I: MKT to Chapel Hill	$2,000,000
Projects Estimated for Implementation in 6-10 Years	
Bear Creek Trail renovation: Creasy Springs Road to Skatepark	$1,106,886
Bear Creek Trail: CCRA to Blackfoot Rd.	$500,000
Bear Creek Trail: Lange to Fairgrounds	$2,600,000
COLT RR Trail Ph 1: Columbia College to Vandiver	$3,000,000
COLT RR Trail Ph 2: Vandiver to Hwy 63	$2,200,000

COLT RR Trail Ph 3: Hwy 63 to Brown Sta. Park	$800,000
Cosmo Park Bear Creek Boardwalk Renovation	$125,000
Hinkson Creek Trail: Stephens to Vandiver Pedway	$2,700,000
Hinkson Creek Trail: Vandiver pedway to Colt RR	$1,300,000
Hominy Creek Trail: Old 63 to Green Valley	$800,000
Perche Creek Trail Ph 3: Broadway to I-70	$2,600,000
Perche Creek Trail Ph 2: Gillespie to Broadway	$2,800,000
Starke Lane Connector	$800,000
Shared Use Path/Trail Total	*$31,854,386*
Pedestrian & Bicycle Projects Total	***$50,317,872***

Note 1: All Pedestrian & Bicycle project cost estimates are in FY 2013 dollars.
Note 2: Cost estimates for all projects for all future years included in plan period are available in Appendix R – Long-range street project estimated costs based on inflation factor.

Note 3: It is presumed that most new neighborhood collector streets will be constructed at developer expense as part of subdivision development.

City of Columbia Plan Status
With one exception, all of the projects shown in the CATSO 2030 Plan have estimated revenue to provide for the construction of the improvement over the twenty-five year planning period. Direct developer contributions to the construction of roadways will provide additional revenue beyond what is depicted.

C. Boone County Long-Range Projects	**Estimated Cost by Anticipated FY**
Illustrative Projects	
New Construction	
Minor Arterials	
St. Charles Road: Clark Lane to Route Z	$23,642,235
Kircher Road: Mt.Hope Road to Route HH	$9,456,894
Northwest Loop: Creasy Springs Road to Providence Road	$27,463,203
Providence Road: terminus to Hackberry Boulevard	$1,260,919
Sub-Total	$61,823,251
Level of Service Upgrades	
Major Collectors	
Akeman Bridge Road/Wilhite Road: Route J to Route VV	$34,044,819
Neighborhood Collectors	

Westlake Road: Boothe Lane to Locust Grove Road	$5,674,137
Hackberry Boulevard: Clearview Road to Providence Road	$6,808,964
Hatten Chapel Road: Route E to Locust Grove Road	$10,591,721
Bonne Femme Church Road: Old Highway 63 to Gans	$8,038,360
Creek Road	
Illustrative Projects Total	$99,518,049
Fiscally Constrained Projects	
New Construction	
Minor Arterials	
Waco Road: Highway 63 to City limits (FY 2013 & 2016)	$3,500,000
Gans Road: US Highway 63 to Bearfield Road (FY 2019)	$10,162,824
Neighborhood Collectors	
Gans Creek Road: South extension (FY 2022)	$987,129
Others	
Meyer Industrial Drive extension (complete FY 2013)	$1,200,000
New Construction Sub-Total	$15,849,953
Level of Service Upgrades	
Minor Arterials	
Gans Road: Bearfield Road to Providence Road (FY 2029)	$13,657,985
Neighborhood Collectors	
Highpoint Lane Bridges (Complete FY 2013)	$450,000
Others	
Meyer Industrial Drive/Outer Roadway intersection (FY2014)	$283,250
Rustic Road Bridge Replacement (FY 2014)	$270,000
Level of Service Upgrade Sub-Total	$14,936,235
Fiscally Constrained Total	$30,786,188

*Cost estimates are in FY 2013 dollars unless noted otherwise in the list.
Note: Cost estimates for all projects for all future years included in plan period are available in Appendix R – Long-range street project estimated costs based on inflation factor.

Boone County Plan Status:
All of the projects shown in the CATSO 2030 Plan have estimated revenue to provide for the construction of the improvement over the twenty-five planning period. Developer contributions to the construction of roadways, especially the Neighborhood Collectors, will provide additional revenue.

9.7 Conclusions

A review of the projected revenue, estimated maintenance costs, and cost for construction and capital indicate that all the member agencies have sufficient revenue to implement the CATSO 2040 Transportation Plan.

Table 15: CATSO 2040 Transportation Plan Projects and Revenue; provides a summary of the cost of new construction, transit costs, maintenance costs and the revenue available through 2040.

Table 15: CATSO 2040 Transportation Plan Projects & Revenues Summary Table (Constrained)

Costs 2013-2039	*MoDOT*	*Boone County*	*Columbia*	*Total*
Construction Total				
*Roadways**	*$135,680,817*	*$30,511,188*	*$293,235,258*	*$459,427,263*
*Bicycle/Pedestrian Facilities***	*$0*	*$0*	*$50,317,872*	*$50,317,872*
Transit Total	*$0*	*$0*	*$162,134,534*	*$162,134,534*
Capital	*$0*	*$0*	*$14,308,479*	*$14,308,479*
Operating	*$0*	*$0*	*$147,826,055*	*$147,826,055*
Total Maintenance (Streets)	*$53,460,000*	*$92,986,372*	*$272,635,669*	*$419,082,041*
Grand Total	*$189,140,817*	*$123,497,560*	*$778,323,333*	*$1,090,961,710*
Revenue	*$189,308,000*	*$131,525,232*	*$853,435,763*	*$1,174,268,995*
Surplus/Deficit	*$167,183*	*$8,027,672*	*$75,112,430*	*$83,307,285*
**Roadway projects include pedestrian and bicycle accommodations as part of construction*				
***Stand-alone pedestrian and bicycle projects*				
Note: the remaining local funds will be used for a variety of other transportation related Responsibilities. For the City of Columbia, this includes Columbia Regional Airport, for which an estimated $73.6 million is projected for its maintenance and operations over the plan period. It also includes other expenses, such as maintaining reserve funds. Future revenues received will be programmed for future transportation projects as prioritized by the local jurisdictions in the CATSO metropolitan planning area, as well as for additional maintenance as may be required.				

A. Missouri Department of Transportation

Table 13: CATSO Transportation Project Needs; identifies a total of $473,680,815 in new MoDOT projects. The available funding over the 25 year period of the Plan is $189,308,000, leaving an unfunded amount of $284,372,815. The majority of the deficit is attributable to the $270,000,000 estimated cost of construction of the Interstate 70 improvements in year 2013 dollars. The decision has been made to widen I-70 along the existing right-of-way through the Columbia Metro Area, should any major I-70 project improvement be implemented.

For the purposes of this plan, all I-70 improvements are considered "illustrative", which means no funding source has been identified, but if funds become available, the project could proceed.

Due to the imprecision of long-term forecasts and conservative revenue forecasts the two largest projects, in terms of cost, in the MoDOT portion of the plan are "illustrative". These two are the I-70 Improvement project and the Route 740/Stadium Boulevard extension project. Maintaining the illustrative roadway and system expansion projects in the Major Roadway Plan is necessary to identify the functional classifications and to provide system continuity for local transportation planning. The projects included in the Plan, along with the illustrative projects, meet the test for financial constraint.

B. City of Columbia

The City of Columbia shows transportation capital project and maintenance needs of $778,323,333 through 2039 with revenues of $779,789,246. This leaves a surplus of $1,465,913 through the 2040 plan period. There is additional projected revenue of approximately $74.2 million which is planned to be utilized for Columbia Regional Airport operations and capital needs that is not shown in the tables.

The City of Columbia has a history of successful elections to authorize general obligation bonds. The revenue from anticipated general obligation bonds and construction completed by development interests can reasonably fund any deficit for the City construction and transit projects contained in the CATSO 2040 LRTP, should an election occur. The City of Columbia portion of the LRTP reasonably meets the test for financial constraint.

C. Boone County

Revenue projections indicate that Boone County will have total revenues of $131,525,232 available for transportation projects in the CATSO Metro Area in the period to 2040. All additional revenue beyond that needed for maintenance, which is estimated to be $92,986,372, is shown as being applied to new construction projects. The forecast assumed continued voter reauthorization of the County 1/2 cent sales tax, such as the extension authorization that occurred In November, 2007.The majority of the projected revenue will be needed for maintenance and reconstruction projects throughout Boone County over the next twenty-six years.

CHAPTER TEN
PLAN RECOMMENDATIONS, PERFORMANCE MEASURES, AND IMPLEMENTATION STRATEGIES

10.1 Introduction

This chapter contains a review of the local tools required or recommended to implement the provisions outlined in Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and continued by 2012's Moving Ahead for Progress in the 21st Century (MAP-21). It also includes a performance measurement component, a new planning factor introduced by MAP-21.

As described in this chapter, MAP-21's performance measure mandate is intended to transform the federal-aid highway program and provide a means to the most efficient investment of federal funds by refocusing on national transportation goals, increasing the accountability and transparency of the federal-aid highway program and improving project decision making through performance-based planning and programming. At the local level, tracking performance measures will allow CATSO to monitor the performance of the transportation system within the Metro Area, to help refine the direction of future Long Range Transportation Plan updates, to measure the success of LRTP goals and objectives, and to update the public and partner agencies on key metrics.

The impacts of local policies are also described in this chapter. Providing for future roadways, the preservation of scenic corridors, the reduction of auto trips, and the management of roadway access to preserve capacity and reduce congestion are all elements that contribute balance between the land use system and the transportation system. Boone County and the City of Columbia are responsible for the construction and maintenance of their respective roadways and for the regulation of development in their jurisdictions. The range of permissible land uses are regulated by the zoning ordinances and the development of land is regulated by the subdivision regulations. It is through these ordinances that the balance between land use and the transportation may be achieved.

The policies and recommendations outlined in this section are intended to serve as a resource for future action. Many of the policies and recommendations come from cohort transportation and land use plans for the Metro Area described in Chapter 6.2, specifically the *Imagine Columbia's Future* visioning process and *Columbia Imagined*. All of the policies and recommendations shown below provide further support to the Goals and Objectives for the Columbia Metro Area transportation system, as shown in Chapter 6, and provides additional guidance for the performance measures developed to assess the implementation of the goals and objectives shown in section 10.10 of this chapter.

Section 10.11 of this chapter provides a preliminary prioritization process for regional projects subject to a competitive application or funding process. This preliminary prioritization process seeks to identify the extent to which projects address the goals and objective of the 2040 LRTP.

10.2 Effects and Impacts of the Plan

A. Social Impacts, Quality of Life and Livability

Quality of life and livability for residents is greatly enhanced by transportation options, beautiful and complete streets, and reduced congestion. The LRTP plays a role in recommending policies to improve quality of life and livability by enhancing the effectiveness and aesthetics of the collection transportation system, improving the connectivity and accessibility of the street, pedestrian, and bicycle networks, promoting urban density and efficient development patterns, and increasing the efficiency and convenience of the existing public transit system.

The 2040 Transportation Plan continues to recommend incremental changes to personal transportation habits and public policy in the Columbia Metro Area. Despite some reduction as evidenced by declining

fuel tax revenues over the last ten years (MoDOT attributes the reduction to fewer VMT and the rise in fuel-efficient vehicles),[13] the probability remains that the single occupancy vehicle will remain the overwhelming mode of choice for residents. While the plan continues to maintain the current focus of providing facilities for motor vehicles, it also seeks to give attention to other modes such as transit, bicycling, and walking (Goal 2). The expansion of mode choice comes from a variety of factors including availability and access, ease of use, cost, quality, infrastructure, and facilities. The CATSO Metro Area has seen small but significant increases in multi-modal use as a result of local, regional and federal policies and other trends such as telecommuting. For example, as described in Table 7: Transit Ridership 1998-2012, transit trips between 2005 and 2012 increased by 54%, while the City of Columbia population is estimated to have increased by 23%, and the total number of workers who drive alone to work in a vehicle dropped slightly from 75.2% in 2000 to 74.7% in 2010.[14]

The social impacts of a land use pattern designed around a transportation network for private vehicles have been the subject of much discussion and research. The street system is generally designed for traffic flow and vehicle mobility, not to promote social interaction among members of the community. Occupants of individual vehicles have no direct interaction with other persons outside their own particular vehicle. The fact that the majority of the auto trips are by single-occupancy vehicles makes for even greater isolation for individuals using the transportation system. Those individuals seeking privacy benefit from this system, but residents who want a more social experience are precluded from it by the emphasis on the private vehicle.

The focus on the automobile also puts those citizens using non-motorized modes at a disadvantage, in that the street system gives priority to vehicles and frequently does not provide adequate accommodations for pedestrians and bicyclists. Neighborhoods are not oriented towards pedestrian access and interaction, but have their design focused on auto access and traffic flow. This has negative effects on socialization among neighborhood residents.

More positive social impacts will be found through the implementation of land use designs that allow for transportation options that foster more social interaction and interpersonal contact. The establishment of a more compact development pattern (Goal 5) and thus the opportunity for more persons to be mobile without using a vehicle gives individuals greater choices in transportation (Goal 2). A more compact structure of land use also is more conducive to operation of the city bus system, providing the greater population density which transit needs to function efficiently. The continued operation of the bus system has major social benefits. It allows the transit dependent population, including physically handicapped persons and those unable to afford an automobile, the mobility necessary to get to their jobs and to take care of other personal needs (Goal 3). The presence of a transit mode also gives those persons who merely prefer this mode the opportunity to choose it. These elements were reflected in the most recent City-wide comprehensive plan, *Columbia Imagined: the Plan for How We Live and Grow,* which calls for mixed use, walkable neighborhoods with multi-modal access to services and community amenities and improvement in public transit.

> ***"An important element of a complete neighborhood is its construction at a walkable and bikeable human scale and meets the needs of people of all ages and abilities. Walkable, bikeable neighborhoods also encourage healthy lifestyles for community members… This policy will have positive implications for public transportation services by encouraging the location of high-density residential and commercial services along major road corridors that are easily served by public transit, thereby decreasing reliance on automobiles as a means of accessing basic commercial services."***
>
> ***…***

[13] MoDOT, 2013. http://www.modot.org/plansandprojects/construction_program/STIP2013-2017/documents/11_Sec05EstimatedFinancialSummary.pdf

[14] 2000 Census and 2006-2010 American Community Survey (ACS), Mode to Work estimates. Other modes (in addition to drove alone) include carpooling, public transportation, bike, walked and taxi/motorcycle/other means, and worked at home.

"Encouraging compact development near transit corridors and commercial hubs lends support to transit service feasibility. As the City grows and residential and commercial corridors become more established, public transit routes may be added as needed to better serve these areas and to enhance employment and living opportunities."

--- Chapter 4, Columbia Imagined (2013)

At a larger geographic scale, roadways do connect places and can foster increased social interaction between neighborhoods and activity centers such as employment and shopping districts, schools and parks.

B. Economic Impacts

1. Major Roadway Plan

"A network of safe roadways in and around the city will provide sustainable, efficient mobility to vehicular travel and other modes in a complementary manner."

--- Goal, Transportation Citizen Topic Group, Imagine Columbia's Future (2007)

A major economic impact of the roadway plan (Appendix G) will be in the construction involved in its implementation. Numerous jobs will be provided by the various street construction projects required to complete the network of streets shown in the roadway plan. Most new street construction and reconstruction projects are contracted out by the city and state, and so give work to private construction companies. This will have a positive effect on the local economy, particularly on contractors and their related suppliers. The employment provided as a result of these projects will have the usual multiplier effect on the local economy, in that the money spent at local establishments by project employees will provide or sustain additional jobs. A well-maintained road system should save individual motorists the expenses for maintenance and repair that might otherwise be incurred driving on a system in bad condition.

Additionally, the relationship between the transportation network, economic development and land use and development is described in *Imagine Columbia's Future:*

"The City's land use pattern is not only influenced by zoning and annexation policy, but also by roadway and utility corridors, utility service areas, and other environmental factors. The construction, availability, and placement of these features all influence the pattern of development within and around Columbia…

An example of how transportation infrastructure has influenced land use is found along the Old Nifong Boulevard corridor. Following the construction of Grindstone Parkway, commercial development replaced the existing agricultural and low density residential uses. The installation of this four-lane divided roadway enhanced accessibility to an area previously deficient in roadway infrastructure and provided opportunities for business growth".

One of the strategies developed by the Transportation citizen topic group during *Imagine Columbia's Future* was "*Develop and adopt a clear area-wide major roadway plan that carries the commitment of the City and County."* The commitment of city and county in recent years to promote more timely integration of the Major Roadway Plan into City and County comprehensive plans has been a step forward. Working with other regional economic development and growth drivers is a next critical step (Goal 4).

Development of the Major Roadway Plan, as it occurs through regional cooperation between MoDOT, the City of Columbia, and Boone County, touches on a key economic development policy expressed in *Columbia Imagined*:

"Policy One: Foster opportunities for economic growth partnerships. Promote Cooperation with the multi-jurisdictional political system to minimize cost, maximize efficiency, and ensure adequate support of community services that support all citizens.

--- Economic Development (includes Inter-Governmental Cooperation Goal, Policy 1, Strategy 1, Columbia Imagined (2013)

The action items identified in *Columbia Imagined* for this policy and strategy include other bodies, such as Columbia Public Schools and the University of Missouri, where increased cooperation in the greater transportation system will have positive economic and growth management benefits.

2. Bicycle and Pedestrian Elements

"Columbia will enjoy a safe, interconnected, non-motorized transportation network. It will be culturally supported by the citizens as it will encourage social interaction and healthy lifestyles. The roadway, sidewalk, public transit, and trail systems will all tie together into an effective integrated transportation network"

--- Goal, Transportation Citizen Topic Group, Imagine Columbia's Future (2007)

"It is important that residents have diverse transportation options. Allowing residents the ability to travel via means other than an automobile may lessen the effects of traffic (e.g. noise, congestion, and air pollution) on the surrounding environment, both built and natural. The City should identify corridors important not just for motorized transportation, but also non-motorized transportation improvement, and work with developers and local land owners to set aside or acquire areas for such use. Improving the multi-use trail network will connect neighborhoods and support future growth while simultaneously achieving environmental goals".

--- Land Use Policy 1- Mobility, Connectivity and Accessibility, Chapter 4, Columbia Imagined (2013)

Similar impacts will be felt from construction projects to implement the bicycle and pedestrian elements of this plan as shown in the Bicycle and Pedestrian Network Plan (Appendix B) and the Sidewalk Master Plan (Appendix C). Additional contracting jobs will no doubt result from the building of new sidewalks and bicycle routes. Some of these will be constructed as part of new street projects, but their inclusion will add to the economic impact, due to the additional expense and time involved in constructing these facilities. If bicycling becomes more popular, local bicycle retailers would enjoy increased sales and realize more revenue from providing additional repair and maintenance services to more customers.

The presence of more and better facilities for bicyclists and pedestrians will in theory provide financial benefits for individual households. Making it more convenient, safe, and attractive to use means of travel besides the automobile has the potential to provide residents cost savings. If household members were to walk and bicycle for a greater number of their daily trips, then they would reduce expenses due to less frequent gasoline purchases and lower auto maintenance bills.

On a more long-term level, lowering the annual mileage put on household vehicles could allow residents to keep vehicles for longer periods, saving the expense of a new vehicle and providing revenue for other means. A possible incidental economic benefit might occur for those individuals who begin a more regular routine of walking and/or bicycling. This additional exercise could realize individual health benefits and save on medical expenses. Planning and design for "active living" has become a major theme in architecture and city planning in the new century.

It might be noted that, in a very significant way, bicycling and pedestrian elements of the Transportation Plan are already having economic impacts on Columbia. In 2006, Columbia was named one of four cities to be included in the Non-Motorized Transportation Pilot Program. The purpose of the program is to demonstrate the extent to which bicycling and walking can carry a significant part of the transportation load, and represent a major portion of the transportation solution. Over the course of the program years (2006 to 2009, plus round two funds authorized in 2012), approximately $6 million per fiscal year has been made available for the City of Columbia to create and expand its network of non-motorized transportation infrastructure facilities, including sidewalks, bicycle lanes, and pedestrian and bicycle trails, that connect directly with transit stations, schools, residences, businesses, recreation areas, and other community activity centers. Dollars from this program have also been used to educate the community on the benefits of using alternate forms of travel, including but not limited to the bicycle. Upon completion, the City is to report how changes in motor vehicle, non-motorized transportation, and public transportation usage took place and assess how such changes decreased congestion and energy usage, increased the frequency of bicycling and walking, and promoted better health and a cleaner environment.

3. Transit Element

> ***"An efficient, innovative, accessible public and human services transportation system will be fully integrated with all other forms of transportation in Columbia and surrounding communities. It will be possible for all residents to live easily in Columbia without a vehicle."***
>
> ***--- Goal, Transportation Citizen Topic Group, Imagine Columbia's Future (2007)***

The transit element of this plan (supported by Goal 3) has positive economic benefits in that it allows those persons without any private means of transportation the mobility necessary to attain and hold employment, as well as to make shopping trips and fulfill other needs. This in particular affects those lower-income persons who, without bus access, would have no way to reach their jobs (see Goal 1). The community realizes an economic gain by having these persons filling a job, being self-sufficient, and having an income to spend locally.

A strongly-supported strategy recommended by the Transportation Citizen Topic Group, *Imagine Columbia's Future* (2007) is:

> "*Expand the public transit system, and identify and fill in existing gaps in that system to include longer hours of service, more frequent service, and greater coverage of the city."*

This goals, policies and strategies were supported in *Columbia Imagined*, with proposed specific action items as shown in the table on the opposite page.

Policy	Strategy	Actions	Participants & Stakeholder	Public Prioritization
Mobility, Connectivity, and Accessibility (Includes Inter-Governmental Cooperation)				
Policy Two: Improve transit service	Support and promote the public transportation system	• Connect bus routes with trails and greenways • Pursue new technologies and efficiencies to enhance the system • Encourage compact development near transit corridors and commercial hubs to support transit feasibility	Columbia Transit, OATS, Columbia Public Works, Services for Independent Living, Boone County Family Resources, Boone County Center on Aging, MACC, Bicycle and Pedestrian Commission,CoMET	High
	Expand the existing transit system to meet ridership needs	• Evaluate the existing transit system and opportunities for system improvements based upon ridership surveys • Evaluate different route system designs and models	Columbia Transit, OATS, Services for Independent Living, Boone County Family Resources, Boone County Center on Aging, MACC, CoMET, Disabilities Commission	Medium
	Affordable and efficient air travel into and out of Columbia Regional Airport will be supported and promoted	• Recruit nearby communities to support Columbia Regional Airport	Columbia Public Works, Airline industry, REDI, Central MO Municipalities, Airport Advisory Commission, State of MO, MU & Colleges, Chamber, private businesses	Low
Policy Three: Promote a mobility management public transportation system	Promote public transportation system expansion with regional considerations	• Focus on developing a transit system between Columbia, the Columbia Regional Airport, Jefferson City, and the Jefferson City Amtrak Station	Columbia Transit, OATS, Services for Independent Living, Boone County Family Resources, Boone County Center on Aging, State of Missouri, MACC, REDI, Boone County, surrounding counties and communities, CoMET	Low
	Identify funding to support regional transit development and create partnerships between regional stakeholders to produce an integrated transportation system	• Coordinate with MU, Columbia College, Stephens College, social service agencies, major employment center stakeholders, and Boone County	Columbia Transit, OATS, Services for Independent Living, Boone County Family Resources, Boone County Center on Aging, State of MO, MU & colleges, MACC, REDI, Boone County, surrounding counties and communities, other major employers, Disabilities Commission	Low

---Mobility, Connectivity, and Accessibility (Includes Inter-Governmental Cooperation) Policy 2 and Policy 3, Chapter 5 Implementation Table, <u>Columbia Imagined</u> (2013)

C. Energy

As first noted in the 2025 Transportation Plan, the majority of trips of all types in the CATSO Metro Area continue to be made by private motor vehicle, including 90.2% of all work trips. Of these motor vehicle trips, approximately 77% are single occupancy trips. The tendency for users to rely on the single occupancy vehicle as the primary means of getting around requires comparatively greater energy expenditure than other modes of travel. It also requires more energy and materials to be used to provide the additional street mileage, pavement width, parking facilities, and the like to accommodate vehicles carrying only one person.

The 2040 Plan inventories the existing street facilities and presents the Major Roadway Plan for the Columbia Metro Area (Appendix G). This plan assumes the construction of new collector and arterial streets which are anticipated to be needed as new development proceeds and more outlying areas of the Metro Area are annexed into the City of Columbia. As the population grows, the trend towards single family homes on large lots will further the physical spread of the community over a wider geographic area and produce additional VMT, the need for more street mileage, and additional gasoline consumption. The roadway plan anticipates this and attempts to provide major street facilities to handle the additional traffic (Goal 6). One beneficial impact is that the plan attempts to provide additional street connections that potentially will allow for shorter trips through more direct routes. Other aspects of the 2040 plan seek to reduce VMT by compact and infill development and better alternatives to passenger vehicle trips.

The 2040 Plan also makes recommendations to provide better facilities for the non-motorized travel modes of walking and bicycling, which potentially could provide energy savings should persons find this an attractive travel alternative to vehicle use (Goal 2). The Plan seeks to increase the bicycle's share of the Columbia travel mode by providing a more extensive and convenient system of bicycle routes across the city. These new recommended routes will provide additional access to areas previously inconvenient

for bicycle travel (Goal 6). The implementation of the planned bicycle route improvements will hopefully encourage more residents to use a bicycle for both work and non-work trips. According the 2006-2010 American Community Survey U.S. Census data (ACS), only 1.5% workers commute by bicycle, and only 1.1 of total work trips are made by bicycle in Columbia. An increase in the percentage of all trips made by bicycling could lead to a decrease in local gasoline consumption, or at least to a reduction in the rate of increase of fuel use in the Columbia area.

The Plan also seeks to improve pedestrian facilities in the Columbia Metro Area through the implementation of the Bicycle and Pedestrian Network Plan. This plan seeks to encourage and allow pedestrians access to all sections of the city by providing sidewalks and other pedestrian facilities and eliminating major barriers. One policy to be recommended is to provide sidewalks along both sides of arterial streets, to facilitate pedestrian use of these corridors. Walking is the second most common travel mode among Columbia residents, with 5% of work trips made that way according to 2010 U.S. Census data. Given these statistics and the energy savings realized by pedestrian travel, a greater emphasis on pedestrian safety and access is warranted.

The Plan also makes provisions for the continuation of the Columbia Transit System, which provides bus service in Columbia (Goal 3). The availability of bus service provides a means of transportation to those residents unable to afford a private vehicle, disabled persons who cannot drive or otherwise get around on their own, and those who choose transit purely on preference. It also provides the potential for additional energy savings should economic or other circumstances dictate that more residents switch from the automobile to transit use. Less than 1% of work trips are now made by public transportation facilities such as the bus, and the possibility exists for a much greater percentage of all trips to be made by transit. The CoMO Connect plan initiatives are supported by the 2040 LRTP, and CATSO should participate in its implementation and evaluation. Additionally, CATSO supports citizen desires for regional transit/commuting options.

D. Environmental

It is likely that worldwide trends and events will lead to major gasoline price increases and periodic shortages during the plan period. Increased or even constant world demand, instability in Middle Eastern oil producing regions, a failure to offset lower import availability through increased domestic production (shale oil, etc.), and an inability to increase worldwide oil production due to physical and capital constraints will contribute to an unstable energy situation. Partly in consideration of these factors, as well as numerous others expressed by public input (physical health, air quality, and congestion reduction), the plan gives increased emphasis to non-motorized modes of transportation.

The current Columbia Metro Area transportation system is primarily designed for individual vehicles, 77% of which contain only a single occupant according to 2006-2010 ACS data. In general, this system promotes many potentially harmful environmental consequences. Air pollution from vehicle exhaust is probably the most frequently cited problem, but there are others as well. Traffic noise impacts may diminish the quality of life, and the runoff of water from the pavement of streets, parking lots, and driveways degrades the quality of streams and groundwater. Additional ecological impacts result from the production cycle of the automobile industry, and from the disposal of junked vehicles. While promoting non-motorized modes and public transit, the 2040 Plan considers the impact if the current transportation network and mode preferences continue over the next twenty years, although potentially at a reduced rate depending on gasoline prices and availability. While this necessarily means that negative environmental impacts from the current system will remain, both beneficial and harmful environmental impacts may arise from the implementation of the 2040 Plan. Each of numerous elements of the plan may have positive and negative effects.

Transportation enhancements, which are transportation-related improvements that enhance the essential transportation system, can improve the aesthetic environment. The *Imagine Columbia's Future* (2007) vision planning Community Appearance Citizen Topic Group included a recommended strategy *to "Develop a streetscape plan through the use of landscape, site amenities, art, and thematic elements to*

create memorable and attractive boulevards and streetscapes (e.g., place utilities underground, clean up Business Loop and Providence, regulate billboards, and develop gateway/entryway plan)."

1. Major Roadway Plan

Construction of the street projects contained in the Major Roadway Plan will have some negative impacts on the specific neighborhood/area in which they are constructed, through the loss of green space and the addition of more impervious surface. The latter will increase stormwater runoff, as well as introducing runoff of pollutants such as oil and antifreeze from vehicle traffic.

There will also be air pollution and noise impacts on the immediate area around the road corridor. Construction impacts include soil compaction and disturbance, soil erosion from wind and water, noise impacts, and impacts to stream beds and floodplains at the major creek crossings. After completion of the projects, traffic noise impacts may be severe, particularly in the case of the widening of Interstate 70. Noise abatement to protect adjacent residential developments is needed along the existing sections of I-70, and will be even more critical on a widened facility.

Potential positive impacts from new street construction may include congestion reduction through the dispersal of existing traffic over a larger physical area, due to the provision of new alternative routes. Such new routes may provide shorter and more direct access for motorists, thus decreasing driving times and trip distances, as well as reducing traffic congestion. If this were the result, air and noise pollution across the area could be reduced, since idling vehicles produce a greater amount of exhaust. New street projects may allow for greater consideration to non-polluting traffic modes, through the inclusion of bicycle lanes and improved sidewalk facilities as part of new roadway construction.

2. Bicycle and Pedestrian Network plan

The 2040 CATSO Bicycle/Pedestrian Network Plan, shown in Appendix B, builds upon the Bicycle Plan adopted in the 2025 Plan and revises the 2030 CATSO Pedestrian and Bicycle Plan Map. The PedNet Coalition, a private organization, was instrumental in providing much of the field work necessary to develop the original 2025 bicycle/pedestrian network. CATSO staff worked with the City of Columbia Bicycle and Pedestrian Commission and PedNet representatives to create the pedway concept, which offers greater mobility, safety, and comfort for all non-motorized traffic. The 2040 network enhances the previous network through the addition of more links, including trails and trail connectors (links between trails and public streets) that are included in the 2013 Parks and Recreation Master Plan and the implementation plan for the Non-Motorized Transportation Pilot Program noted earlier in this chapter, through which a total of over $22 million in federal funding has been programmed for project construction, with an additional 5.9 Million in funding authorized in 2012.

The Bicycle/Pedestrian Plan adds to the traditional on-street bike lane by implementing a combined bicycle/pedestrian facility, or pedway. This is basically a wider version of a sidewalk, with a minimum width of 6', more typically 8' to 12', intended to serve both pedestrians and bicyclists with limited on-street abilities, such as children and the elderly.

The 2040 Pedestrian and Bicycle Plan Map reflects revisions made to improve connectivity, keep pace with growth areas, and establish a more complete network. The implementation of this element would largely have positive effects for the local environment. The accommodation of bicyclists in a comprehensive transportation system is a step towards reducing vehicle traffic volumes or at least lowering the rate of increase of traffic. Since bicycling is a non-polluting and quiet travel mode, the environmental benefits are numerous.

One impact that could be viewed as an environmental negative is if providing bicycle lanes requires the widening of existing streets, as well as building new streets to greater pavement widths than would otherwise be constructed. This could require the removal of trees and other vegetation that otherwise would be preserved, and the creation of more impermeable surface. These impacts would potentially be offset by the beneficial effects of greater bicycle ridership.

The pedestrian element of the 2040 Plan includes the 2012 Columbia Master Sidewalk Plan and gives attention to major pedestrian barriers across Columbia. As with the bicycling element, the provision of better facilities for pedestrians is one method of attempting to reduce motor vehicle traffic and its resulting noise and air pollution. The impacts of walking on the natural environment are minimal.

Creating an atmosphere more conducive to pedestrian travel can have beneficial effects for the community. As with bicycling, constructing more pedestrian facilities likely will involve the paving of a greater amount of street right-of-way, with the resultant loss of additional green space. The net environmental impact of more sidewalks and other pedestrian facilities would likely be positive assuming that any pedestrian trip replaces a trip that would have been made by automobile (Goal 2).

3. Land use

Positive ecological impacts could be realized through implementation of changes to local land use regulations. Land use is the most critical factor in structuring a transportation network. In order to achieve a more environmentally benign system for moving people and goods, land use controls must allow for a development pattern that allows methods of transport other than private vehicles to be convenient and efficient. The use of mixed-use developments, cluster and small lot residential housing, and in general allowing for more compact development within a geographical area is conducive towards providing residents viable alternatives to vehicle use. A mixture of different types and economic levels of housing, within walking or biking distance of each other and to employment and shopping opportunities, is a major step in fostering non-motorized transportation and a cleaner environment.

Again, *Imagine Columbia's Future (*2007*)* and *Columbia Imagined* (2013) recommend strategies for improvement of transportation efficiency through mixed-use land use concepts. The Visioning Development and Community Character Citizen Topic Groups recommended the following:

> "*Use the City's development planning process to promote socio-economically diverse, mixed-use neighborhoods that are supported by citywide bicycle, pedestrian, and transit systems to reduce the need for automobile commuting"* and *"Be pro-active, creative, and flexible about mixed-use zoning to encourage workable walking communities, and expand opportunities for farmers, gardeners, restaurateurs, service providers, and craft workers to sell and deliver produce and service."*

Chapter 4 of *Columbia Imagined,* which discusses Growth Patterns and Policies, also recommended the following:

> *"In order to sustain truly local neighborhood commercial service centers, higher densities of residential development must be built around them to facilitate enough local clientele to support the businesses within them. Five minutes (one quarter mile) is widely considered to be a reasonable walking time to reach services. Therefore, new neighborhood commercial nodes, or "urban villages," should ideally be spaced approximately one-half mile apart to provide walkable goods and services to surrounding residents".*

The environmental opportunities and constraints to transportation planning, design and construction are described in a number of standard and recently-developed sources:

- Flood plains: Flood Insurance Rate Maps (FIRM). An update of the 1983 map was recently made available for the Columbia Metro Area; however, additional information and the incorporation of local geodatabases may better reflect the impact of 30 years of development activity. The FIRM maps indicate a number of perennial streams coursing across the Metro Area, many flowing in a northeast to southwest direction.

- Streams and other surface water: Regulations and inventory information is available at the federal, state, and local levels. The City of Columbia has mapped the 27 watersheds and sub-watersheds

within the Metro Area. Individual assessments have been completed on several of the streams. The City-County Health Department monitors water quality in surface water. Boone County has completed the *Bonne Femme Watershed Plan* (2007), a 93-square mile watershed which includes several square miles of the southeast Metro Area. Boone County, the City of Columbia, and the City of Ashland have recognized the plan, which adopts a number of strategies to achieve natural resource management goals. Stream water quality is monitored and enforced by the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers has jurisdiction over modifications to streams deemed to be "waters of the United States."

- Wetlands: The U.S. Department of the Interior, Fish & Wildlife Service, National Wetlands Inventory (1993) maps indicate probable wetlands by type on an overlay of the U.S. Geological Survey topographic maps. Because the wetlands are mapped remotely, delineation studies and consultation of the latest regulatory literature is recommended before wetland determinations are made. But the National Wetlands Inventory provides a good basis for estimating the impacts of future transportation facilities on ground water recharge, wildlife, storm water filtering, storage, and treatment, and the other environmental functions for which wetlands are recognized.

- Forest: The City of Columbia, the University of Missouri, and CATSO produced a Natural Resources Inventory (NRI) which uses high resolution, "leaf-on" aerial photography to produce a database of forest cover as well as a means to assess the health and quality of vegetation. The NRI is relevant for the identification and interpretation of steep slopes, surface water and other sensitive environmental features.

- Soils: The U.S. Department of Agriculture, Soil Conservation Service/Missouri Agricultural Experiment Station, *Soil Survey of Boone County* (1998) is an atlas of soil associations with soil capability ratings that indicate relative strength, drainage, relief, and other properties of soil associations.

- Historic resources. The City of Columbia has several individual properties and four districts that are on the National Register of Historic Places. Use of federal funds for facilities near such places requires a Section 106 (of the National Historic Preservation Act) review to determine no significant impact on historic resources. The City has named four properties as local historic districts, subject to special zoning rules for any proposed alterations.

10.3 Environmental Justice

As shown below in Goal 1, Objective 3, a key component of the 2040 LRTP is to engage and address the transportation needs of all persons.

Goal 1: the Columbia Metro Area will have a first class street, highway and non-motorized network that meets the short and long-term needs of the Metro Area:

> ***Objective 3: Identify and address the needs of minority and low-income populations in making transportation decisions.***

Identifying the effects of all transportation programs, policies, and activities on "minority populations and low-income populations" is the essence of environmental justice as outlined in the 1994 Presidential Executive Order. The three fundamental environmental justice principles are:

> 1. To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations;
>
> 2. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and

3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

As the MPO for the Columbia area, CATSO should serve as the primary forum where MoDOT, Boone County, the City of Columbia, other agencies, and the public may develop transportation plans to meet local needs. To address the environmental justice concerns related to CATSO plans, programs, and other activities, CATSO will need to:

1. Provide enhanced demographic analysis to ensure that the Transportation Plan and the annual Transportation Improvement Program (TIP) comply with the provisions of Title VI federal regulations and the CATSO Title VI Plan;

2. Identify residential, employment, and transportation patterns of low-income and minority populations so that their needs can be identified and addressed, and the benefits and burdens of transportation investments can be fairly distributed; and

3. Evaluate and improve the CATSO public involvement process to reduce participation barriers and engage minority and low-income populations in transportation decisions.

As described in this plan, CATSO developed a *Title VI, Environmental Justice and Limited English Proficiency Plan* in 2011 to ensure compliance with federal Title VI, Environmental Justice, and Limited English Proficiency statutes throughout CATSO's transportation planning processes, including the TIP LRTP development and implementation. CATSO has a commitment to regularly updating this plan to meet federal requirements, updated demographic data, and to address local needs.

A. Demographic Profile

The 2010 Census and the 2006-2010 and 2007-2011 American Community Surveys (ACS) were the sources for the demographic profiles shown in Table 16: Target Populations and Thresholds. This table presently shows data, as available by year, for the City of Columbia and Boone County. The purpose of the threshold is to provide a standard to identify concentrations of the target populations.

Table 16: Target Populations and Thresholds Data Set (2006-2010)

Category	City of Columbia	Boone County
Total Population	108,500	162,642
Total Households	43,065 (2.3 average persons/household)	64,077 (2.4. average persons/household)
Minority Population	21.0%	17.20%
Population Living in Poverty[15]	22.90%	18.40%
Persons with a Disability	9,392 (9.5% of total)	15,599 (10.2%of total)
ADA Paratransit Eligible (9/13)	675 eligible clients/41,000 annual trips	*N/A. Paratransit does not go outside the City limits*
Zero Car Households/Average # of Vehicles per household	*Zero Car Households unavailable* 1.69 avg. vehicles per household	1,919 (2% of total)/1.83 vehicles per household

The geographic distribution of the 2010 data identifies the west and north central areas of Columbia as the areas with the highest concentrations of the target populations.

[15] Poverty thresholds are set for number of persons in a household. In 2010 the poverty threshold for one person under 65 was U.S. $11,344.

B. Identifying Transportation Needs

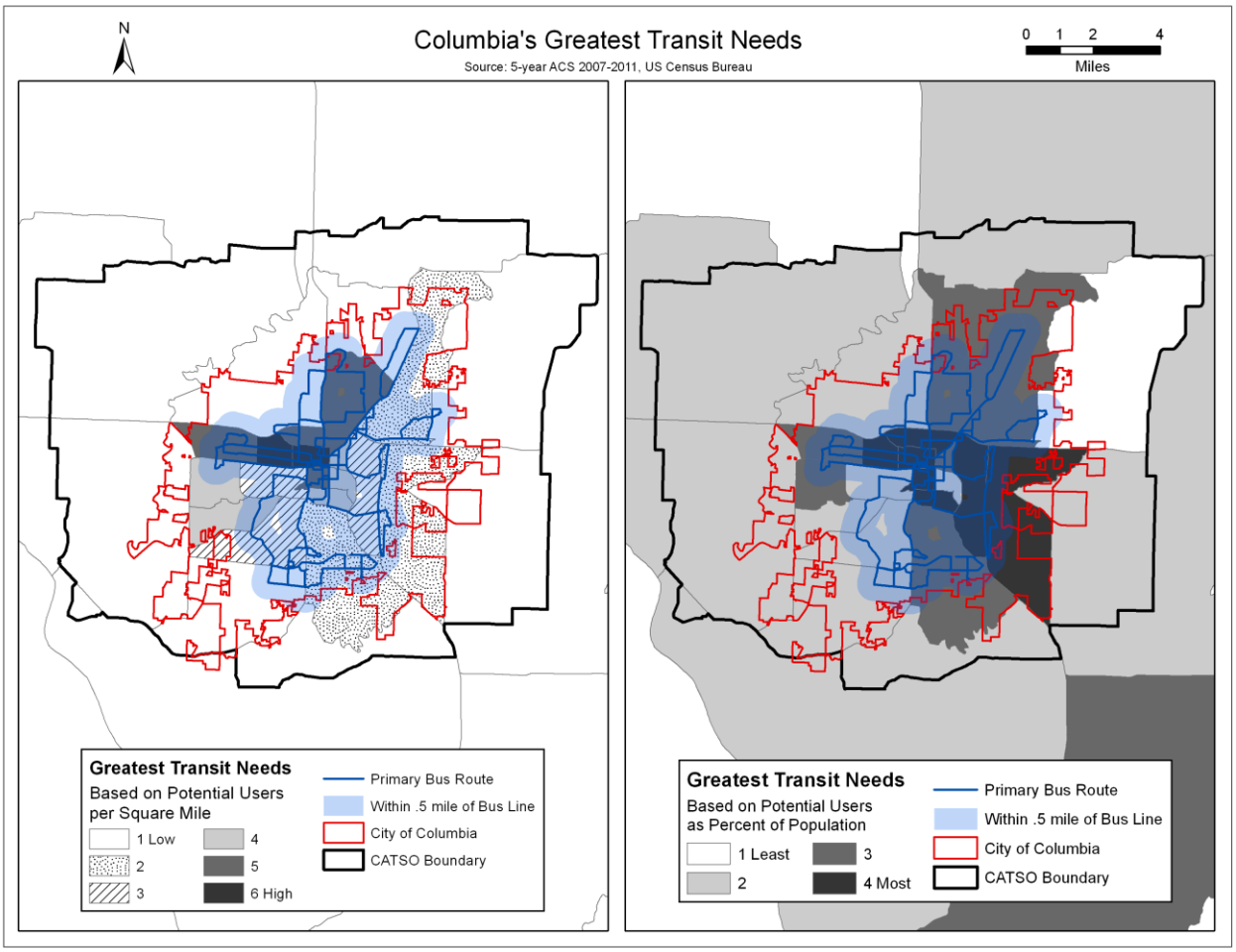
Identifying the transportation needs of the target populations is an ongoing process, much of which derives from agencies delivering social services and the use of Census data. Many social service agencies report their clients' need for transportation, and this information is generally captured in CATSO's *Coordinated Public Transit-Human Services Plan*. In general, the comments offered by agency personnel fall into the following categories:

1. The need for public transportation system that is reliable, accessible, affordable, convenient, and timely that can respond to an individual's full range of daily activities;
2. The lack of financial and other commitment to transportation services and public transit by employers and the general public; and
3. A lack of support for alternative modes of transportation.

The transportation needs of the disabled and low-income have been traditionally addressed by fixed route public transit and the Americans with Disabilities Act (ADA) required paratransit services. The transportation needs of the minority populations are not easily quantified. This emphasizes the need to involve members of the minority community early in the planning process to ensure they are not disproportionately adversely impacted as a result of any CATSO policies or plans.

Census data also allows for a preliminary spatial analysis of areas likely to have high transit needs based upon demographic characteristics and population density. The 2013 CATSO *Public Transit-Human Services Plan* evaluated available Census data to prepare a map of areas likely to have a greater transit need based upon the four types of limitations which often preclude persons from driving: (1) physical limitations, (2) financial limitations, (3) legal limitations, and (4) self-imposed limitations. This map is presented on the following page.

Map 6: Greatest Transit needs[16]



C. Public Involvement

Recognizing the importance of involving the public in planning for the future of the Columbia Metro Area, CATSO continuously reviews the adopted *Public Participation Plan*, to identify changes that would facilitate a more proactive planning process and provide for a greater role for community interaction.

The CATSO Transportation Plan and the Annual Transportation Improvement Program are made available to the public by the City of Columbia Department of Planning and Development, at the Regional Library, on the CATSO webpage, and upon request.

10.4 Specialized Transportation

Travel is essential for independence. In evaluating the transportation systems planned for the Metro Area, the proposed improvements do serve the majority of the travel needs through 2040. However, there are segments of the population that are under served or lack service. There are individuals who because of physical or mental disability, income status, or age are unable to transport themselves or to purchase available transportation and are therefore dependent upon others to obtain access to health care,

[16] Source: 5-year American Community Survey 2007-2011, U.S. Census Bureau, and Community Development Department, City of Columbia, Missouri

employment, education, shopping, social activities, or other life-sustaining activities. This also includes children who are handicapped or high-risk or at-risk. These individuals represent the transportation disadvantaged. The Americans with Disabilities Act (ADA) and the provisions of Environmental Justice have addressed some of the transportation barriers experienced by the transportation disadvantaged, however, not all the transportation needs are being meet. Access to public transportation is the key issue.

Strategies for expanding the public transportation to address the gaps in services should be developed and evaluated. Public transportation resources are often not coordinated and frequently duplicate expenditures and service efforts. The lack of cooperation and communication provides inadequate levels of service, variation in service quality, provide inadequate and unreliable information about service and costs, and have no comprehensive plan for meeting service needs. The fragmented system confuses consumers and fails to address the needs of many individuals who do not meet specific agency or program eligibility requirements.

The *Coordinated Public Transit-Human Services Plan* (2013) found a need for greater coordination of service providers in the area of human services transportation.

Coordination is one strategy for improving performance and increasing mobility. This involves the pooling of transportation resources and activities of several human service agencies with one another or with existing transit operations.

Coordination may be an effective strategy if one or more of the following conditions exist:

1. Substantial unused vehicle time;
2. Substantial unused vehicle capacity;
3. Opportunities for economies of scale in planning, administration, operations, purchasing, or maintenance.

Even where coordinated service results in better use of resources, having enough resources is crucial.

Locally, the fixed route transit provider is the Columbia Transit System (CTS), which is operated by the City of Columbia. Paratransit service is also provided within the corporate limits of Columbia for individuals qualifying for service under the definitions contained in the Americans with Disabilities Act.

Some pooling of transportation resources occurred in 1993, when the CTS initiated the paratransit service as required by the ADA. Several local agencies eliminated the van service they directly provided to their clients, in favor of utilizing the CTS service. In Boone County, the Older Americans Transportation System (OATS) provides curb-to-curb public transportation service to County residents. OATS resources are limited and trip scheduling is prioritized by individual need. Expanding the resources for public transportation is an obvious solution to meeting the needs of the public transportation dependent. Although the nature of the problem is clear, the magnitude is difficult to estimate.

Incorporated into and updated by the 2013 *Coordinated Public Transit-Human Services Plan*, an initial review of the available transportation services was completed in December 2006 by the Boone County Community Partnership, a local advocacy groups, in cooperation with a group of agency stakeholders. The results were published in the *Boone County Coordinated Transportation Study* by the project consultant who also prepared an assessment of the problems, obstacles, and potential solutions. The project was the initial step in creating a more coordinated transportation system. The study inventoried existing services, analyzed needs through extensive surveying, identified possible funding sources, and discussed coordination strategies and implementation steps. On the system side, the questions are how to provide service and what organization would deliver the service. On the resources side, the questions are whether the existing rolling stock can be more efficiently utilized and what sources of funding are available to provide expanded service.

The preparation of this plan fulfills the assessment and inventory portion of the SAFETEA-LU requirement for the development of a Coordinated Public Transit-Human Services Transportation Plan. The CATSO

plan was last approved in February of 2013, and identifies strategies to address gaps in service and realize efficiencies, as well as develop priorities for implementation of those strategies.

At present, the City of Columbia dedicates a portion of the half-cent City sales tax for transportation to transit uses. The half-cent tax is split between transit, roads and the airport with no required percentage for each category. Approximately 40% of the transit budget comes from local sources. In FY2014 this tax is estimated to generate $10,761,379 in revenue and provide $2,390,656 to transit for operating and capital needs. If Boone County was willing to participate in the shared cost of operating such a system, the creation of a county-wide transit authority to provide for public transportation needs in the unincorporated portions within the Metro Area, and throughout Boone County, would benefit all citizens within the CATSO area. An authority such as this one would also have the added benefit of serving residents within the CATSO area but outside the City of Columbia city limits in areas where there is sufficient residential density that public transit services would likely prove highly beneficial.

10.5 Additional Regulatory Changes and Strategies/Recommendations

A. Scenic Roadways

Beginning with the Intermodal Surface Transportation Efficiency Act (ISTEA) passed by Congress in 1991, and continuing in TEA-21 and SAFETEA-LU, the National Scenic Byways Program permits states to designate and conserve scenic roadways. Within the program, designations both for National Scenic Byways and for All-American Roads are included. In Missouri, the National Scenic Byways program is to be administered by the Missouri Department of Transportation.

The All-American Roads is a special category of scenic byways that meet higher standards for the quality and level of protection of their scenic resources. Scenic byways are typically defined as roads with significant cultural, historic, natural, or scenic features. Such roads are based on the presence of six types of intrinsic resources: scenic, historic, recreational, cultural, natural, and archaeological. Protecting these resources allows communities to also protect the potential for economic development and tourism. The designation of scenic roadways at the state level is limited to roadways under state or federal jurisdiction.

B. Local Scenic Roadways

Although the scenic roadways provisions of SAFETEA-LU apply to roadways on the state and federal system, local governments may designate scenic roadways within their respective jurisdictions. A local scenic roadway designation can range from a scenic roadway declaration to guidelines and standards to protect the roadway's scenic qualities. The scope of the regulatory measures depends upon the degree of preservation the local government chooses to pursue. A local scenic roadway designation could be used by the Columbia Area Transportation Study Organization as an additional factor when ranking projects for STP enhancement funding.

In order to implement a scenic roadway, a local process for administration of the scenic roads must be developed and the mechanisms for implementing the program, whether voluntary or regulatory, need to be in place. There are several regulatory options available to local governments to protect scenic roadways. Most rely on the use of zoning ordinances, building codes, and sign ordinances. Scenic America suggests focusing protection for scenic roads through the use of a corridor management plan.

Within the City of Columbia, several miles of Rock Quarry Road in the southeast quarter of the city are subject to the Scenic Roadway Area Overlay District. While the City of Columbia does not have a long-range plan to implement additional miles of "scenic roadway," it does have a zoning overlay district (Scenic Roadway Area Overlay District) which, at the discretion of the City Council, can be put into place.

In order to implement a corridor management plan to increase scenic roadways within the Metro Area, local jurisdictions are required to adopt a plan to protect and improve the corridor appearance. The National Trust for Historic Preservation lists three steps:

1. Determining what is valuable and worthy of protection about a particular scenic road,
2. Deciding what methods of protection are necessary or appropriate for the corridor, and
3. Making a committed effort to apply those methods. A corridor management plan would typically include:

> *a. Roads should have significant features of scenic, natural, cultural, historic, and/or archaeological importance.*
> *b. Such roads should have local support and citizen participation which is coordinated with relevant agencies and organizations in the locality.*
> *c. Roads should provide a relaxing travel experience, and scenic designation should not compromise the road's safety.*

Standards that require protection of the land generally adjacent to the road right-of-way can be enacted by 1) regulation of land use and development density, 2) detailed land use and site planning, 3) control of outdoor advertising, 4) control of land disturbance and landscaping, and 5) design and appearance of buildings and equipment.

Another manner of distributing development to protect a scenic road corridor is the transfer of development rights (TDR). Such a program entails the acquisition of the right to develop to a certain density in one area (the road corridor area to be protected) and transferring that right to another area away from the corridor, where increased density will be allowed. Usually TDR programs are applied over a broad area and not just the road corridor.

Tree protection policies must be developed as trees can be a significant contributor to scenic beauty along roadways. Tree and vegetation removal should be allowed only in special cases. One such tree protection provision limits tree branch and shrub trimming to circumstances when it is necessary for the safety of travelers. Selective trimming may also be given consideration for the preservation of historic views.

Controlling billboards and other outdoor advertising is critical to preserving the character and vistas of scenic roads. The banning of off-premise signs in rural areas, or the prohibition of all billboards along roads, is one method of control. A process may be established to buy and accept donations of land and easements along scenic roads. Acquiring easements protects the scenic quality of the road while maintaining the private ownership of the land.

Strong local participation/coordination should be developed with local agencies. Public participation needs to be part of the process. A public comment period for proposed changes to scenic roads allows time for analysis of the changes. Such public notification may encourage agencies to be more responsive in formulating policy. Regulations for general highway operations and maintenance work on scenic roads are helpful in guarding against activities that might alter the scenic nature of the road. Rules for such work as road widening, changes of grade, repaving, roadbed construction, and winter maintenance can protect the scenic qualities of the route.

A corridor management plan should be adopted for each roadway designated. Upon the recommendation of the review board, the Columbia City Council or Boone County Commission would formally designate scenic roadways and adopt corridor management plans. The use of overlay zoning could be appropriate for some road corridors. Coordination of scenic road legislation and zoning controls between Columbia and Boone County would be preferable. The MPO could serve to coordinate scenic roadway issues between Columbia and Boone County.

Additionally, the MPO may recognize scenic roadways via a roadway classification or overlay on the Major Roadway Plan. Public input in the 2040 LRTP update process indicated a desire for CATSO to pursue additional information on scenic roadway designations in other MPO major roadway plans. If a scenic roadway designation is added to the MRP (as described by Plan Recommendation #1), the

Coordinating Committee may work with the public to designate appropriate roadways and the potential restrictions and benefits such designation may confer.

C. Access Management

Access Management policies relate to two of the primary goals of the Columbia Metro Area:

Goal 1: the Columbia Metro Area will have a first class street, highway and non-motorized network that meets the short and long-term needs of the Metro Area; and

Goal 7: Provide safe and secure facilities and transportation infrastructure for residents, visitors and commerce in the Columbia Metro Area

The proliferation of driveways along arterial streets seriously reduces the capacity of the roadway to carry traffic. The delay caused by traffic turning into and pulling out of driveways impedes the flow of traffic on the arterial. As a result, the ability of the arterial to move through traffic declines and the accident rate increases.

Research on this has been completed by the National Cooperative Highway Research Program (NCHRP) in their publication "Report 420: Impacts of Access Management Techniques" (1999). This report summarizes research and studies conducted to measure the effects of various access management techniques. In it, more than 100 access management techniques were identified and grouped according to policy and roadway design features. The results were summarized in a Federal Highway Administration's brochure titled Benefits of Access Management (http://ops.fhwa.dot.gov/access_mgmt/docs/benefits_am_trifold.htm):

- Data show that each traffic signal installed above a frequency of two per mile (i.e., each signal placed closer than every half mile) increases travel time by more than 6 percent. A related point: increasing the distance between signals also can reduce the frequency of crashes; a review of crash data in seven states shows that the crash rate increased with additional signals per mile.

- For every 10 access points per mile, roadway speeds decrease by an average of 2.5 miles per hour, up to a maximum of a 10-mile-per-hour reduction.

- Research indicates that exclusive left-turn lanes at intersections reduce crashes by 50 percent on average and reduce rear-end collisions by between 60 and 88 percent.

- The use of indirect turns has been shown to reduce crashes by 20 percent, on average (35 percent if the indirect turn intersection is signalized). Examples of indirect turns include jug-handle left turns used in New Jersey and indirect U-turns (requiring a U-turn past an intersection followed by a right turn in lieu of a regular left turn) used in Detroit, Michigan.

- According to an analysis of crash data in seven states, raised medians reduce crashes by more than 40 percent in urban areas and by more than 60 percent in rural areas.

Based on data gathered from research and studies, NCHRP Report 420 presents several specific recommendations to states and localities when considering implementing access management techniques:

- Comprehensive access management codes should indicate where access is allowed or denied for various classes of roads, specify allowable spacing for signalized and un-signalized connections, and set forth permit procedures and requirements.

- There should be a sufficient network of supporting local and collector streets that provide direct access to adjacent developments. These secondary streets should connect to arterials at

appropriate and well-spaced locations. They make it possible to minimize direct property access on major arterials.

• Access should be provided from strategic and primary arterials only when reasonable access cannot be provided from other roadways. In such cases, access should be limited to right turns whenever possible.

• Left-turn and cross egress should be separated and placed at locations that fit into overall signal coordination patterns with high efficiency.

• Sound land use and development planning is essential to permit effective arterial traffic flow while allowing attractive property access. Access spacing standards (including corner clearance requirements) should be established in advance of actual development. Zoning, subdivision, and access spacing requirements should be consistent.

Finally, and perhaps most importantly, Report 420 recommends approaching access management in a systematic rather than a piecemeal or case-by-case fashion: Any access control or management plan must be done system-wide to avoid shifting problems. Many access management techniques deal with a single location (e.g., closing a median at a driveway). Some techniques (e.g., a continuous median) may transfer problems to other locations upstream or downstream from the location under consideration. In such cases, broader analysis of benefits and effects are essential.

Access management is not just an issue that relates to roadway functionality and safety; it can also have a profound impact on businesses that are located along arterial and collector streets. In 2000, the Center for Urban Transportation Research at the University of South Florida published a report, titled Economic Impacts of Access Management. This report synthesized several recent studies of the effects of access management efforts on nearby businesses. Most of the studies addressed the effects of restricting left turns through the installation of raised medians, while some looked at the effects of changes to driveway access.

According to the report, the construction of raised medians has little negative effect on businesses. While some businesses reported increased sales and others reported decreases in sales, most businesses reported that they saw no change in business activity as a result of the installation of a median restricting left turn lanes in the vicinity of their place of business. The studies showed that businesses perceived as ultimate destinations, such as restaurants and specialty stores, appeared to be less vulnerable to changes in access. By contrast, businesses that depend mostly on impulse stopping from traffic passing through the area, such as gas stations or convenience stores, appear to be more likely to suffer a business downturn.

While most access management projects may not have significant impacts on business activity in general, such projects can lead to increased anxiety on the part of area business owners and residents. To address this, the report pointed out the importance of involving the public in projects aimed at restricting access. The report discussed a study of public involvement in median projects in Florida. This study found that those Florida DOT district offices that followed an established public involvement process for median projects had to deal with fewer administrative hearings and also reported that they were more successful in achieving access management goals than districts without such programs in place. The reason for this greater success was perceived to be the use of a fair and open process for dealing with public concerns, including early public involvement in the design process and the use of informal open house type forums.

SAFETEA-LU regulations mandate better management of the existing investment in roadways by local and state agencies. Access management provides an inexpensive strategy to preserve the function and capacity of arterials. The current driveway standards, subdivisions regulations, and zoning ordinances for Boone County and the City of Columbia do not attempt to manage access on arterial streets. The existing driveway standards make little distinction between local, collector, and arterial streets. Planning for and

managing access on arterials requires a comprehensive regulatory approach; revisions to the zoning ordinances are a key element.

Some possible strategies to achieve more consistent access management include:

- Adoption of an access management policy
- Use Planned District zoning to negotiate access points
- Require minimum lot frontage requirements for all zoning districts, site plan requirement for all properties with arterial access.
- Require minimum site frontage of 700 feet along arterials for unsubdivided tracts. Prohibit individual driveway access for residential lots.
- Design Standards - Revise driveway spacing standards for arterial roadways.

1. Driveway Design Standards

Driveways accessing arterial streets should provide for safe ingress and egress and turn speeds of 5 - 10 mph, to minimize the speed differential between turning vehicles and through traffic. Recommended driveway standards for access onto arterial streets would be a minimum width 30 feet, maximum 38 feet.

Minimum curb return radii 15 feet - maximum 25 feet.

The Missouri Department of Transportation (MoDOT) controls access by the purchase or condemnation of rights of access to the highway from abutting property, has the authority to approve grants of access where MoDOT has acquired the right of access to a highway, and issues driveway or road approach permits where the adjacent property owner has a right of access.

Boone County regulates driveways through the use of design standards adopted by the County Road and Bridge Commission. The City of Columbia regulates driveways through the use of driveway design standards. The design standards are not adopted by ordinance but are set forth in the Public Works Department's *Street and Storm Sewer Specifications and Standards Manual* as provided for in Section 24-31 of the Code City for Columbia, Missouri.

On state routes in the City of Columbia, MoDOT issues driveway and street connection permits. The City of Columbia does not issue a driveway permit on a state maintained roadway, although on local streets connecting with a state roadway, the City does an inspection of the connection. The City of Columbia should issue a driveway permit on State roadways prior to MoDOT issuing a permit. If local driveway spacing and design standards are to be successful, MoDOT must require that the local regulations be met, even if the regulations are more restrictive than current MoDOT standards prior to issuing a driveway permit.

Compatible driveway design standards for MoDOT, Boone County and the City of Columbia should be cooperatively developed to support an access management program.

2. Driveway Spacing

The proper spacing for driveways along an arterial is a function of the design speed for the roadway. Vehicles turning into driveways must reduce speed in advance of the turn. The number of opportunities to turn at driveways should be limited with adequate distances between driveways to maintain higher average speeds on the arterial. For a typical arterial with an operating speed of 35 - 40 mph a minimum spacing between driveways of 200 - 300 feet should be adequate. At intersections, driveways should be located as great a distance as is practical from the operational area of the intersection based upon the turn lane configuration. As a minimum, driveways should be no closer than 350 feet from the points of intersecting right-of way on arterial streets.

3. Driveway Permits

The MoDOT District 5 Office should not issue any driveway permit in Boone County or the City of Columbia until a local driveway permit has been issued. This policy agreement should be signed with the District 5 Office.

4. Street Standards
Local street standards should be amended to provide for an arterial street designed with raised median and medians breaks for access. Driveways can align with median breaks. Minimum distance between median breaks is set by the design speed of the arterial, generally a minimum distance of 800 feet. The location and number of median breaks are fixed during the design phase for the arterial. Public streets are given priority for median breaks.

5. Recommendation
Boone County and the City of Columbia could consider adoption of a Primary Arterials ordinance which requires a site plan for all property accessing arterial roadways. The site plan would be a requirement at the time of rezoning or when applying for a building permit. The primary arterial ordinance should specify minimum driveway spacing requirements, require right-of-way dedication, and include standards for driveway widths. Subdivision regulations should be amended to prohibit the platting of residential lots with arterial access and require a minimum site frontage of at least 700 feet for new commercial lots with access to an arterial roadway. For lots within a commercial subdivision, joint use access rights should be granted to promote shared driveways and travel between parking lots for contiguous uses.

D. Right-of-Way Preservation
The ability to require the dedication of right-of-way is critical to provide for future transportation needs. The roadway alignments and right-of-way shown in the Major Roadway Plan depend upon the local government for implementation. In Boone County and the City of Columbia, subdivision ordinances are the primary tool for preserving and acquiring the right-of-way needed for new roadways. The planned office and planned commercial zoning districts offer the opportunity for right-of-way dedication as part of the approval process of the site plan required within the planned zoning districts.

1. Right-of-way Standards
Additional functional classifications and street standards for divided arterials should be examined and included as part of local subdivision regulations. Provisions should be made for a primary and secondary arterial classification. A standard width for the ROW for each street classification should be established to eliminate the range of width currently in use. The difficulty of acquiring ROW when a width range is used is that the minimum ROW often becomes the maximum ROW when requiring ROW dedication through the subdivision process. A variance from the standard ROW width could be requested if the full ROW width is not required to accommodate fill slopes, utilities, pedways, etc.

All ROW should be dedicated through the subdivision process or a site plan. Metes and bounds descriptions of ROW should not be accepted for public streets unless specifically requested by Boone County or the City of Columbia.

For Boone County, ROW acquisition occurs through the subdivision process at the time a preliminary plat is approved. Typically, Boone County can require a 1/2 width ROW along existing streets. On new alignments or planned extensions, ROW can be requested, but not required. The ability of Boone County to require ROW dedication for new roadways is limited by State statute. Set-backs from the future ROW can be enforced and construction within the future ROW can be prevented. The ROW must be donated or Boone County must purchase a ROW easement.

The implementation of the Major Roadway Plan in the County depends upon the Boone County Planning and Zoning Commission, which has the final approval for subdivision plats in the county. Although the Boone County Commissioners may adopt the Major Roadway Plan, plan implementation is subject to approval by appointed officials which may not support implementation of the Plan. Failure to implement the adopted Plan would place Boone County in a position which would require purchase of the necessary ROW or could preclude the construction of the roadway. This has the effect of having the appointed officials of the Planning and Zoning Commission control the County's transportation policy and creating a situation which would require the commitment of County funds.

It is recommended that administrative procedures for Boone County subdivisions be modified to forward any recommended deviations from the Major Roadway Plan by the County Planning and Zoning Commission for review and approval by the Boone County Commissioners prior to subdivision plat approval by the Boone County Planning and Zoning Commission.

2. Roadway Alignments
At present, there are no engineering alignments for the extensions of new roadways which fall jointly within the jurisdictions of Boone County and the City of Columbia. In years past, "plan lines" of roadway alignments were shown on plats and plans to indicate the path of the future roadway. However, legal challenges to the "plan line" approach have removed this technique from local practice. To address the need to maintain future alignments, preliminary engineering studies should be completed to select appropriate and cost effective alignments. The preliminary engineering alignments could be cooperatively developed by CATSO for use by all agencies.

3. Recommendations
Boone County and the City of Columbia need to support changes in state enabling legislation that would strengthen the ability of county governments to require ROW dedication along new alignments or planned extensions as part of the preliminary platting process.

Changes in the Boone County and City of Columbia zoning regulations should be evaluated as an approach to acquiring needed ROW. The requirement for a site plan, such as in the planned commercial districts in the current County and City zoning regulations could be expanded or amended to cover all properties accessing arterial streets.

E. Alternative Land Use - Mixed Use Zoning District

The structure of the overall transportation system, which is primarily the network of streets, is closely related to land use regulations. In the Columbia Metro Area, as well as numerous other communities, land use regulations tend to encourage development to spread out over a large geographical area. Boone County and City of Columbia zoning regulations mandate the separation of land uses, and allow for substantial large lot residential developments. These policies generally establish a land use pattern that requires residents to drive to make their daily trips to work, due to the distances between various uses. Other types of trips are similarly affected, as the distances between residential neighborhoods and shopping areas, medical facilities, and other types of services tend to be too large for most persons to consider alternative ways to travel.

In order to provide an alternative to the motor vehicle as the dominant mode of travel, it is necessary to have a land use pattern that allows trips of all types to be made on foot or by bicycle. This is particularly important in older central city areas where residents are increasingly being isolated from employment and services as these facilities are relocated to fringe areas.

Alternatives to the current land use plans and policies might allow commercial, office and other types of facilities that are neighborhood-oriented in scale to be intermixed with residential areas. Other revisions might be made to allow small lot developments. These would achieve greater population density, provide for more compact development, and reduce the mileage of street construction required to serve the area. These two recommendations are mirrored in *Columbia Imagined's* strategies to encourage mixed uses and density.

Another land use tool for reducing auto trips is mixed-use developments. Such projects put a variety of land uses on one site, ideally siting residential, service, commercial, and other uses within walking distance of one another. These types of developments are beneficial in that they allow residents to reduce their vehicle miles traveled as well as trip length and frequency. National studies have shown that the average length for renters' work trips is approximately 27% shorter than those for home owners. As employment location choices are generally more limited than choices for place of residence, a greater mix of housing options, including rental opportunities, would help to reduce work trip lengths. Revisions to land use regulations would afford developers the opportunity to construct projects of the type mentioned.

A land use pattern that incorporates mixed uses on a greater scale would not only allow residents more choices in choosing modes of travel, but would be more efficient as well, through cost savings on street construction and maintenance, utility extensions, and other services.

Studies show that land use planning is one of the most effective methods for reducing both total vehicle miles traveled (VMT) and the number of trips, both work and non-work. Table 17: Trip Reduction Strategies and Impacts; outlines the trip and VMT reduction potential of various alternate modes, and other strategies. Research indicates that revisions to current patterns of land use development offer the best potential to reduce both total VMT and trips by up to 5.2 percent.

Table 17: Trip Reduction Strategies and Impacts[17]

Trip Reduction Strategy	% VMT	% Trips
Employer trip reduction	0.2 - 3.3	0.1 - 4.1
Area-wide ridesharing	0.1 - 2.0	0.5 - 1.1
Transit improvements	0.0 - 2.6	0.6 - 2.5
HOV lanes	0.2 - 1.4	0.5 - 0.6
Park-and-ride lots	0.1 - 0.5	0.0
Bicycle/pedestrian facilities	(a)	(a)
Parking pricing		
work	0.5 - 4.0	0.4 - 4.0
non-work	3.1 - 4.2	3.9 - 5.4
Congestion pricing	0.2 - 5.7	0.4 - 4.2
Compressed work week (b)	0.0 - 0.6	0.0 - 0.5
Telecommuting (b)	0.0 - 3.4	0.0 - 2.8
Land use planning (b)	0.0 - 5.2	0.0 - 5.2
Signal timing	(a)	(a)
Incident management	0.1 - 0.0	0.1 - 0.0
Emissions/VMT tax	0.2 - 0.6	0.1 - 0.9
Buy-backs of older cars	N/A	N/A

In the discussion of development issues, a major topic recently has been the so-called neo-traditional form of development. This format emphasizes a mixture of land uses to make communities more accessible to pedestrians and bicyclists, and to reduce trip lengths both for commuting and for other types of trips. A typical neo-traditional neighborhood ordinance might include the following elements:

1. Residential, employment, civic, and commercial land uses are all located in close proximity within the same neighborhood, within walking or biking distance.
2. The street system is designed to serve the needs of pedestrians, bicyclists, and motorists equally.
3. Green spaces, plazas, and parks are interspersed throughout the neighborhood, providing for social activities and recreation.

[17] *Table 17 Notes:*
1. Numbers in parentheses represent increases in VMT (vehicle miles traveled) or trips.
2. Numerical estimates have been converted from the literature into common units and rounded to the nearest tenth of a percent. The estimates reflect the specific parameters for the case studied or the assumptions in any predictive model-all from existing literature. Actual impacts in specific regions will depend on the level of implementation and local circumstances.
(a) Impact is less than 0.1 percent.
(b) No literature reported impact as low as 0; literature indicated that the potential impact of this measure is highly speculative, and we have therefore reported a range starting at 0. Conversely, the upper end of the range may exceed that reported here.

4. The neighborhood is spatially limited in size to the degree necessary to permit convenient non-motorized travel. A suggested range for the physical size of the neighborhood is from 40 to 200 acres.

Most cities in Missouri were originally laid out with a grid system of streets to create tracts of land for development. This grid street system provided access to property and operated effectively with horse-drawn vehicles and the early automobile. As auto ownership and economic activity surged after World War II, the need to move large numbers of automobiles to and from the new employment centers and new subdivisions presented demands on the grid street system that it was not designed to serve. Established residential areas were not protected from adverse effects produced by the increasing volumes of through traffic.

The hierarchical arrangement of functionally classified streets grew from the concerns and shortcomings of the grid system. The advantage of the grid system is the dispersal of traffic in a number of directions. However, the grid system uses up to 40% of land area for streets. This adds to the cost of an individual lot, increases stormwater runoff due to the high percentage of impervious cover, and extends vehicle travel times.

In 1968, the Neighborhood Concept was adopted as a guide to transportation planning. It depicts the hierarchical arrangement by laying out major roadways on the edge of large neighborhoods, thereby keeping unrelated traffic away. Collector streets feed traffic to the arterials. One development trend in Columbia/Boone County has been the evolution of the neighborhood concept toward neighborhoods with cul-de-sacs and long loop streets, to permit even less through traffic within a neighborhood. The use of cul-de-sacs of is an appropriate design response to natural conditions, slopes and streams, although designing for privacy by excluding street connections is a response to the real estate market demands. Common practice in the Metro Area is to require developers to build the local streets in new developments. Other things being equal, developers have an incentive to recoup a premium on lots by designing the streets they adjoin as cul-de-sacs and loop streets. Public policy must solve the problem.

The lack of internal streets in a neighborhood erodes overall traffic circulation in an area and makes it difficult for residents to walk, jog, or bike within their own neighborhood. In addition, this lack of connectivity complicates providing bus service, trash pick-up, and emergency services.

The Neo-Traditional Approach to city and transportation planning is currently receiving attention by the planning community. This approach essentially calls for a return to a modified grid system, with streets designed not completely with the car in mind, but with non-auto circulation and neighborhood integrity needs in mind. It suggests more pedestrian and bicycle orientation and closer proximity of employment and service/retail centers to residences. The CATSO Transportation Plan offers this type of development scenario, and others, as alternatives to be examined for impact on the transportation system, the Columbia and Boone County Land Use Plans, development regulations, and community acceptance. Not only does this physical arrangement permit most residents pedestrian access to the town square mixed use area at the center of the neighborhood, it also facilitates the use of carpooling to employment locations outside the neighborhood.

10.6 Local Monitoring and Coordinated Planning

Traffic conditions and development change on a continuing basis. It is important that these changes are the subject of on-going study. This is supported by Goal 4: *Long-range land use and transportation planning will be coordinated on a regional and local basis.*

Monitoring traffic volumes and travel patterns is one element of a local program. In 1997, traffic count information was jointly collected for Metro Area roadways by the Missouri Department of Transportation, Boone County and the City of Columbia. The most recent Metro Area count presently available was completed in April 2009. Traffic counts were conducted in April of 2013 and are expected to be published in 2014 by MoDOT.

A local traffic count program should be developed and implemented for providing annual and seasonal counts in Columbia and Boone County. Development and subdivision activity are currently monitored by the City of Columbia Department of Community Development and the Boone County Resource Management. The information collected should be integrated to provide a complete database for growth in the metropolitan planning area.

10.7 Safety

Safety is a key component of transportation planning in the Metro Area for all modes and at all levels-local, state and federal. Transportation facility design is a key component, from the initial design of intersections, roadways and trails, to the installation of guard rails and rumble strips on freeways; however, safety includes more than just design. Safety measures may include, but are not limited to, identifying safe routes to school, education and enforcement with regards to safe behaviors, planning for emergency situations, the use of information technologies, and access management.

Several planning resources are available to promote increased safety in the transportation system. The state strategic highway safety plan is entitled *Missouri's Blueprint for Safer Roadways* (2007), which was revised and renamed *Missouri's Blueprint to Arrive Alive 2008*-2012. This plan outlines "targeted ten" strategies to improve safety on Missouri roadways:

1. Pass a Primary Safety Belt Law and Maintain and Enhance Existing Safety Laws
2. Increase Enforcement on Targeted Crash Corridors
3. Increase Public Education and Information on Traffic Safety Issues
4. Expand the Installation of Shoulder and Centerline Rumble Strips/Stripes
5. Expand, Improve and Maintain Roadway Visibility Features (pavement markings, signs, lighting, etc.)
6. Effectively Deter, Identify, Arrest, and Adjudicate Alcohol and Other Drug Impaired Drivers and Pedestrians
7. Expand Installation and Maintenance of Roadway Shoulders
8. Remove and/or Shield Fixed Objects Along Roadside Right of Way
9. Improve and Expand Intersection Safety with the use of Innovative Engineering Designs (e.g., J-turns, roundabouts), Technology and Enforcement
10. Improve Curve Recognition Through the Use of Signs, Markings, and Pavement Treatments

MoDOT has published the *2013 Highway Safety Plan and Performance Plan*, a statewide safety plan that follows up and implements parts of the *Blueprint.* The plan documents crash data at the county level and sets benchmarks, performance standards, and strategies in several categories ranging from specific types of incidents (alcohol and drug-related, motorcycle, vulnerable motorist, etc.) to education, to engineering and data collection. The overall goal of the plan is to reduce the number and severity of traffic crashes in Missouri.

Local officials should endorse the practices in *Missouri's Blueprint to Arrive Alive* and implementing plans such as the *2013 Highway Safety Plan and Performance Plan* for their multi-pronged, inclusive approaches to roadway safety.

MoDOT budgets for safety-related improvements and programs safety projects in the State Transportation Improvement Program (STIP). A notable recent safety initiative was the Safe and Sound Bridge Project, which spent $685 million 802 on new and repair bridges projects to bring state-maintained bridges up to acceptable standards. 12 bridges in Boone County (4 within the Columbia Metro Area) were reconstructed to an appropriate standard. CATSO should continue to work with MoDOT to monitor bridges and ensure that deficient bridges are reconstructed.

At the local and regional level, Boone County and the City of Columbia are midway through a notable safety initiative to standardize address identification. Way-finding in the Columbia Metro Area is difficult because of the an offset address grid between the city and the county, the proliferation of short streets,

major roadways that change names, duplicate street names, and a lack of system in the assignment of street numbers, names and types. The *Addressing Procedure Guidebook – Addressing Within a Regional Context* (2007) recommends best practices to improve the ability of citizens and service providers to find their way and especially improve the ability of emergency first responders to locate problems.

City and County decision-makers should adopt the *Addressing Procedure Guidebook* to improve the efficiency of services in general and the provision of emergency response services in particular.

The City of Columbia has installed several automated cameras at selected problem intersections to deter moving violations. Known as the "red-light cameras," the equipment allows the City to issue citations more aggressively to motorists that violate red lights at traffic signals. CATSO should encourage the use of available technology to promote safety improvements at intersections.

The aforementioned *Safe Routes to School* program, authorized by Section 1400 of SAFETEA-LU and administered by MoDOT, is a grant program to facilitate safe walking, bicycling, and disabled access to schools in the grade ranges K through 8. Eligible projects awarded grants may be reimbursed for 100 percent of project costs. The City, County, school districts, and eligible not-for-profits should continue to give strong consideration to Safe Routes to School applications to support needed capital improvements and planning, design, education and promotional programs.

10.8 Security

Security is an important component of the metropolitan transportation planning process and, as a result, metropolitan planning organizations have been charged with considering ways to increase the security of the transportation system for motorized and non-motorized users. This aligns with Goal 7 of this plan**:** *Goal 7: Provide safe and secure facilities and transportation infrastructure for residents, visitors and commerce in the Columbia Metro Area.*

In this instance, "security" is defined as finding methods to prevent, manage, or respond to threats to the region and its transportation system. Some of the threats to the CATSO area's transportation system may include potentially violent incidents on highways, bridges, and transit facilities or attacks on vehicle inventory such as buses. Providing for security also includes emergency management planning for natural disasters which may occur within or near the CATSO metropolitan planning area, and hazard mitigation planning to account for how to minimize the potential threats of manmade and natural disasters.

There are essentially four phases of emergency management – mitigation, preparedness, response, and recovery. These phases are usually ongoing, interdependent, and to some degree, overlapping. To ignore the actions required by any one of the four phases jeopardizes the jurisdiction's overall ability to "manage" disasters and emergencies. The purpose of this portion of the Plan is to consider a variety of tools to help CATSO be better prepared to mitigate hazards, prepare for emergencies, and enhance the response and recovery phases of any emergency situation.

In accordance with SAFETEA-LU, it is recommended that the following take place in order to implement a more complete security plan for the CATSO area:

- Review the current metropolitan transportation plan for emergency planning and security elements.
- Continue to implement and improve the transit system security program for Columbia Transit.
- Define the role of Columbia's public transportation system (Columbia Transit) and MoDOT in promoting security within CATSO-defined metropolitan area.
- Identify critical facilities and transportation system elements such as the Columbia Transit system, COLT railroad facilities, interstate systems (I-70) and national highway system routes (U.S. Highway 63)
- Develop security goals and strategies that apply to CATSO Area.

In addition, based upon SAFETEA-LU security plan provisions, the following three goals and strategies relating to transportation system security should be implemented (these have also been incorporated into CATSO' LRTP Goals and Objectives as outlined in Chapter 6):

- Establish partnerships with federal, state, and local governmental agencies to promote continued interagency cooperation (Goal 7, Objective 1).
  Strategies:
  • Provide timely and early opportunities for comprehensive public input into the development of plans and programs.
  • Establish regular collaborative decision making opportunities with emergency response stakeholders within the CATSO planning area to develop security plans and programs.
  • Identify and collaborate with other state and local agency efforts and/or private sector efforts to enhance security planning for the transportation system.

- Provide safe and secure facilities and transportation infrastructure for residents, visitors and commerce in the CATSO planning area (Goal 7).
  Strategies:
  • Reduce injuries, fatalities and property damage for all modes of transportation.
  • Minimize security risks on roadways and bikeways, at Columbia Regional Airport, and on public transportation facilities throughout the CATSO planning area.
  • Improve disaster, emergency and incident response preparedness and recovery.
  • Assess security vulnerabilities, while minimizing redundancies through agency coordination.

- Provide resources for emergency situations and major disasters while improving security and safety-related incident(s) response (Goal 7, Objective 4).
  Strategies:
  • Participate in regional planning for safety and security initiatives, such as evacuation measures and homeland security.
  • Assess existing resources, while periodically re-evaluating emergency preparedness procedures.
  • Improve protection of critical, security-related infrastructure key facilities (as noted in the next section).

SYSTEM SECURITY & IDENTIFIED CRITICAL ELEMENTS

Airport

The City of Columbia owns and operates the Columbia Regional Airport. The airport is located 13 miles south of Columbia off U.S. Highway 63, on Route H. Conveniently located between Columbia and Jefferson City, it serves as the primary gateway to central Missouri for air travel. The airport provides a direct link to Kansas City International Airport-providing a vital connection to the nation's air transportation system. Many area businesses, aviation enthusiasts, and students have benefited from the airport and the economic development the facility has and will continue to foster.

Highway

There are several agencies responsible for highway security in the Columbia Metropolitan Area. Agencies include the Missouri Department of Transportation (MoDOT), the Missouri State Highway Patrol, and local law enforcement within Boone County and the City of Columbia. Effective coordination and communication of these agencies is crucial during emergency situations. Security is provided through routine road patrols and crash and criminal investigations.

Critical Highway Facilities & Transportation System Elements within the CATSO area include:

• Columbia Terminal Railroad (COLT) from Columbia to Centralia. (In Columbia, the rail line is located just west of the Highway B industrial area, crosses Highway 63 approximately 2.5 miles north of Interstate 70 and ends south of Rogers Street near the center of town).

• Interstate 70 & Interchanges with State Route Z, St. Charles Road, U.S. Highway 63, Business Loop 70 East, State Route 763/Rangeline Road, State Route 163/N. Providence Road, Business Loop 70 West, State Route 740/N. Stadium Boulevard, and State Highway 40.
• U.S. Highway 63 & Interchanges with State Highway 163, Rolling Hills Road, Old Millers Road, Ponderosa Street/Huggard Lane, State Route AC/Grindstone Parkway/New Haven Road, State Route 740/E. Stadium Boulevard, State Highway WW/E. Broadway, Interstate 70, Clark Lane, Vandiver Drive, State Route B/Paris Road, Brown Station Road (overpass bridge only), Brown School Road, Prathersville Road, State Route 763/N. Rangeline Road, and Calvert Hill Road.

Transit Security
Local law enforcement and the Columbia Transit (CT) are responsible for providing security on the Columbia transit network. Transit security involves addressing issues such as the security infrastructure, gaps in transit security, and where security could be increased.

CT uses several methods to address transit security. Transit security initiatives include:
- Safety Manual, Safety Training, Safe Bus - Transit Watch Program
- Wabash Evacuation Plan (in case of emergency)
- Bomb Threat Procedures
- Vehicle Inspection Program
- Random Security Tape Review (to ensure drivers are following established policies and procedures in relation to bus operation)
- Transit continuity of service and moving operations from Wabash station in cases of emergency
- Homeland Security Transit Protocol
-GPS and AVL (automatic vehicle location) technologies

Since the specifics on each of these policies are too lengthy to be described here, citizens are welcome to obtain additional details one each of them from Columbia Transit personnel. In addition to the above mentioned security initiatives provided in the Transit System Security Program, Columbia Transit also administers specific safety and security requirements for all employees. CT also maintains a close working relationship with the Columbia Police and Fire Departments.

10.9 Recommendations for Plan Implementation

For the five year period (2013-2018) the CATSO should focus on the following plan implementation strategies:

1. Develop preferred alignments for new roadways in the CATSO 2040 Major Roadway Plan as needed and evaluate a scenic roadway classification/designation.

2. Continue to develop as needed preferred alignments and identify bridge locations, underpasses and trailheads for the backbone portion of the CATSO 2040 Bicycle/Pedestrian Network Plan.

3. Do additional review of the existing study areas for potential CATSO Major Roadway Plan amendments initially identified in 2005 and 2006, and proceed with amendments by individual study area as directed.

4. Update the CATSO Transportation Plan in 2018 for the year 2045 and evaluate plan implementation via the performance measures listed in section 10.

5. Examine and support options for expanding public transportation services in the incorporated and unincorporated portions of the Metro Area, specifically under the CoMO Connect plan and in accordance with the Coordinated Public Transit-Human Services Plan.

6. Evaluate and develop roadway access management guidelines which will help to ensure roadway functionality and contribute to motorist safety.

7. Continue assistance in implementation of all elements of the CATSO 2040 Bicycle/Pedestrian Network Plan and Sidewalk Master Plan, in particular those projects to be done as part of the GetAbout Columbia Project. Support the use of a level of service (LOS) measurement for existing and all new bicycle and pedestrian facilities as a performance measurement tool.

8. Support the implementation of the land use and transportation elements of *Columbia Imagined*.

9. Consider safety, security, economic development, system-maintenance and performance management in all aspects of transportation enhancement, project, programs and plans.

10. Support the adoption of a Complete Streets policy for the Columbia Metro Area to reflect public input and LRTP emphasis on non-motorized transportation modes.

11. Develop a process with specific metrics to prioritize regional projects to the extent to which they address LRTP goals and objectives.

10.10 Performance Measures

Table18, as presented below, lists the 2040 LRTP goals and objectives with corresponding performance measures. The performance measures provide benchmarks and targets by which to implement the plan's recommendations and goals and objectives.

Table 18: 2040 LRTP Performance Measures

GOAL	OBJECTIVE	PERFORMANCE MEASURE(S)
Goal 1: the Columbia Metro Area will have a first class street, highway and non-motorized network that meets the short and long-term needs of the area		
	Objective 1: Design streets and highways that are safe and efficient to move vehicular traffic and accommodate transit, pedestrians and bicyclists with minimal environmental impacts.	
		Improvement in citizen perception of the quality and livability of the built environment
		Reduction of negative impacts to the environment due to transportation (improvement seen in air quality, reduced noise levels, etc.)
	Objective 2: Invest in and preserve the existing transportation system	
		Increases in annual funding committed to system maintenance, including transit operations
		Improvement in state of pavement and bridge condition/rankings
	Objective 3: Support an open, inclusive and participatory transportation planning process	
		Improvement in public satisfaction related to transportation projects and improvements
		Higher levels of participation in transportation planning
		Use of new technologies and other participatory tools and options for transportation planning
	Objective 4: Identify and address the needs of minority and low-income populations in making transportation decisions	
		Increased numbers of minority and low-income populations participating in the transportation process
		Improvement in how projects and policies consider/address the needs of minority and low-income people
Goal 2: The Metro Area transportation system will integrate and connect all travel modes		
	Objective 1: Encourage convenient intermodal transfers to maximize travel efficiency	

		Increased number of multi-modal trips
		Reduction in travel time/delay for multi-modal trips
		Reduction in the cost of trips
	Objective 2: Encourage the use of the most efficient mode based upon the distance and characteristic of a particular trip	
		Increase in the number of people walking for trips one-mile or less
		Increase in the number of people bicycling for trips 10-miles or less
		Increase in the number of people riding the bus
		Increased size/participation in bike share and car share programs
	Objective 3: Reduce reliance on automobile travel and better serve those who do not or cannot own and drive an automobile	
		Reduction in number of person trips by automobile modes (reduction in VMT)
		Reduction in automobile ownership trends
		Increases in funding for transit and non-motorized travel
		Improvement in number of opportunities to travel for those who do not drive
	Objective 4: Improve and expand infrastructure for pedestrians, bicyclists and people with disabilities	
		Increased number of linear feet of sidewalks that connect to destinations/attractions
		Improvement in number and length of bicycle routes that connect destinations/attractions (implementation of Bicycle/Pedestrian Network Plan)
		Development of a plan and funding source to bring sidewalks, crosswalks and bus shelters up to ADA-compliance
Goal 3: The public transportation system will be a viable transportation option throughout the Metro Area		
	Objective 1: Promote a mobility management public transportation system whereby all providers of public transportation work together to maximize efficiency and resources	
		Reduction in the cost of trips
		Reduction in the cost of vehicle maintenance, capital and operating costs
		Increased number of collaborative partnerships and commuter options
	Objective 2: Support and promote the public transportation system	
		Expansion in funding sources, mechanisms and amounts for transit
		Expansion in marketing efforts and partnerships
		Improved public awareness/approval of bus system
	Objective 3: Expand and redesign the existing transit system to meet ridership needs	
		Increase in the number of routes
		Increase in service hours and days
		Increase in the number of points of entry/exit/transfer within the system
		Increase in bus system ridership
		Increase/improvement in the number, type or quality of transit facilities and technologies (buses, bus stops, map apps, etc.)
		Increase in annual operating/capital budget for bus system
Goal 4: Long-range land use and transportation planning will be coordinated on a regional and local basis		
	Objective 1: Establish policies and programs to reduce travel demand	
		Reduction in peak travel volumes

		Increase in the number of employees and students telecommuting
		Increase in the average number of passengers per vehicle per trip
	Objective 2: Develop a long-range plan for the establishment of commuter transportation systems serving the Metro Area	
		Expansion of commuter transportation options
		Reduction in single-occupant commuter automobile trips
	Objective 3: All planning partners will address multimodal system and safety needs in all planning, design, and construction of transportation improvements	
		Increase in number of multimodal projects to address safety needs
		All planning partners use of MoDOT's Blue Print for Safety guidelines
	Objective 4: Capitalize on common goals and needs in the region to reduce costs and promote efficiency in transportation improvements	
		Increase in the number of policies and projects co-sponsored by multiple jurisdictions
		Increase in the number of regional goals supported by projects and improvements
	Objective 5: Accommodate increased freight movement and increase efficiency throughout the region	
		Identify and promote the use of key freight corridors
		Improvement of on-time delivery through system efficiency
		System improvement to rail corridors and intermodal connector facilities
		Reduce truck traffic in residential neighborhoods and on lower street classifications
	Objective 6: Promote rail as a viable option for freight and passenger movement throughout the region	
		Increase the amount of freight moved by rail
		Develop passenger rail opportunities
		Support improvements to rail facilities/track expansion
Goal 5: Encourage compact and infill development and redevelopment in under-invested areas		
	Objective 1: Focus on capacity improvements for all modes in areas of desired future growth and development that support the public's vision for the Metro Area	
		Maximize number of transportation improvements planned, designed, and/or constructed in areas of desired growth
		Direct maximum % of growth and development (units and acres) to areas identified as priority areas in *Columbia Imagined*
		Support redevelopment and development of areas well-served by all transportation modes
	Objective 2: Seek to eliminate/reduce current congestion and multimodal traffic flow restrictions on existing arterial and collector roadways	
		Reduction in delay and travel time for automobile, buses, pedestrian and bicycles
		Improvement of congestion management outcomes
		Support access management policies
	Objective 3: Develop and modify the transportation system so that it respects and enhances the natural and built environment	
		Change in the environmental impact of the transportation system (built and future)
		Increase in use of environmentally-sensitive technologies and advancements
		Increase in the use of context-sensitive designs

		Expand the objectives of street design standards to include enhancement of the natural and built environment
Goal 6: Integrate land use planning with infrastructure development		
	Objective 1: Encourage future development and related transportation improvements to address capacity and connectivity needs proactively rather than reactively	
		Transportation improvements built prior to and concurrently with new growth and development (rather than reactive to)
		Corridor preservation: preserve motorized and non-motorized transportation corridors for future growth and to encourage desirable street network designs
		Coordinate land use planning for industrial and other land uses around freight corridors and intermodal connector facilities
	Objective 2: Land use planning will utilize the Pedestrian and Bicycle network plan to create a bikeway/sidewalk/greenbelt trail network that provides an alternative and complementary means of transportation to the overall street system	
		Increase the number of walking and biking users with trip purposes of commuting, shopping and entertainment
		Positive increases year over year in the linear feet of new trails and sidewalks built
		Increased focus on maintenance and upkeep of existing non-motorized network
	Objective 3: Ensure that future development and related transportation improvements address transportation safety needs in planning and design	
		Build transportation improvements prior to and concurrently with growth and development (rather than in reaction to growth)
		Change in crash frequency in areas affected by development and growth
	Objective 4: Increase the geographic area in which people have convenient access to non-automobile modes of transportation	
		Joint adoption of the CATSO Bicycle and Pedestrian Network by Boone County and the City of Columbia
		Expansion of public transit outside of the City limits
		Expansion of bike system mileage outside of City limits
Goal 7: Provide safe and secure facilities and transportation infrastructure for residents, visitors and commerce in the Columbia Metro Area		
	Objective 1: Establish partnerships other federal, state, and local governmental agencies to promote continued interagency cooperation and planning for safety and security measures	
		Increase in the consideration of security issues in existing system and proposed improvements
		Enhanced collaboration in the development and implementation of Emergency Response and Hazard Mitigation Plans
	Objective 2: Reduce injuries, fatalities and property damage for all modes of transportation	
		Reduction in the frequency of injuries and fatalities (all modes)
		Improvement of local enforcement of traffic laws and education of transportation system users
	Objective 3: Minimize security risks on roadways and bikeways, and on public transportation facilities throughout the Metro planning area	
		Identify locations for potential safety projects (high crash locations and mode conflict points)
		Increased use of Crime Prevention Through Environmental Design principles in public transit facilities
		Improvement in the number and locations of marked crosswalks
		Bridge and pavement conditions meet or exceed safety standards
	Objective 4: Provide resources for emergency situations and major disasters while improving	

security and safety-related incident(s) response	
	Improvement in emergency response time
	Increased resources available for emergencies and major disasters

10.11 Project Prioritization

As described in Chapters 7-9, most transportation projects in the CATSO Metro Area are funded by partner agencies using local or non-competitive/allocated funding sources. For example, Columbia Transit receives federal and state funds (in addition to local monies) for operations and capital expenditures and does not compete with MoDOT or Boone County for these funds as these planning partners do not provide transit services. However, in some instance, funding sources may be competitive or partner agencies may need to prioritize multiple projects for a single funding source. In these cases, CATSO may use a prioritization process to identify projects which most closely align with the goals, objectives and needs identified in the 2040 LRTP. A preliminary checklist is suggested below. For competitive project selection, each member jurisdiction may submit a project recommendation based upon a weighing of the five criteria factors described below. Project scores may then be averaged to assign the final prioritization.

Prioritization Criteria
Project Enhances Quality of Life and Livability
Project Promotes Economic Development
Project Promotes Multi-Modal, Interconnected System
Project Addresses Safety and Security Concerns
Project Promotes Transit

Recommendation 11 of section 10.9 of this chapter suggests CATSO further develop a process with specific metrics to prioritize regional projects to the extent to which they address LRTP goals and objectives. This development will necessitate additional public input.