

4.0 ACCESS CONTROL PLAN - SH 14 (JEFFERSON STREET/RIVERSIDE AVENUE)

4.1 Existing Conditions

Roadway Physical Characteristics

Typical Sections

Jefferson Street

The existing typical cross-section for SH 14, hereafter referred to by its local street designation, Jefferson Street, is shown on Figure 4-1 and is comprised of four travel lanes averaging 10.5' in width with two 8' parking lanes. Sidewalk exists along most of Jefferson Street; however, the width varies between 4' and 12', and is both detached and attached, depending upon location. The existing right-of-way along Jefferson Street is 70'

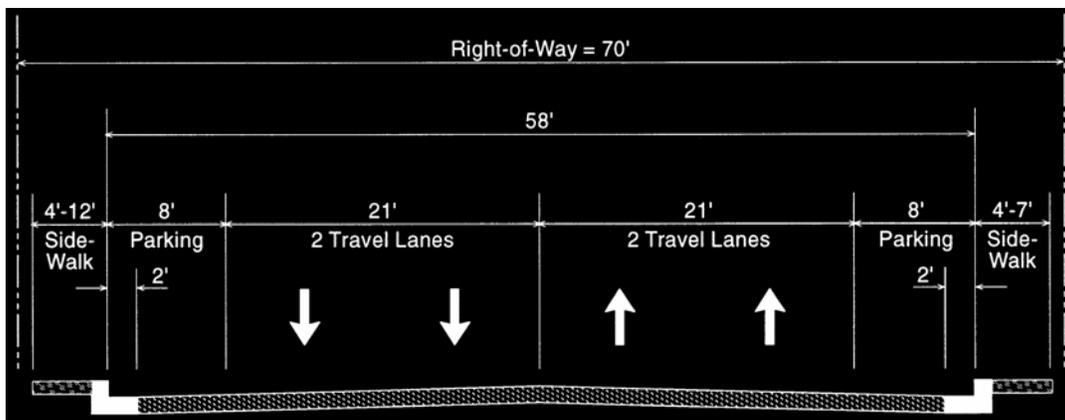


Figure 4-1
Existing Typical Jefferson Street Cross-Section

There are two through lanes provided for each direction of travel. At the Jefferson Street/North College Avenue intersection, the northernmost westbound lane becomes an exclusive right turn lane for movements onto North College Avenue, while the southernmost lane provides through movements onto Maple Street and left turn movements onto North College Avenue. Exclusive left turn lanes are not provided at Pine, Linden or Chestnut Streets, only at the Mountain Avenue/Lincoln Avenue intersection. Parking is allowed along both sides of the street except near the North College Avenue and Mountain Avenue/Lincoln Avenue intersections.

Riverside Avenue

The typical cross-section of SH 14, hereafter referred to by its local street designation, Riverside Avenue, is shown on Figure 4-2 and includes four travel lanes that average 11.5' in width. Exclusive left turn lanes are only provided at each end of Riverside Avenue, being at the Mountain Avenue/Lincoln Avenue and Mulberry Street intersections. Parking is not allowed along either side of the street. Sidewalks exist at only a few locations along the street and, when available, only along the southwest side of the street. The existing right-of-way along Riverside Avenue is 100' to 130'.

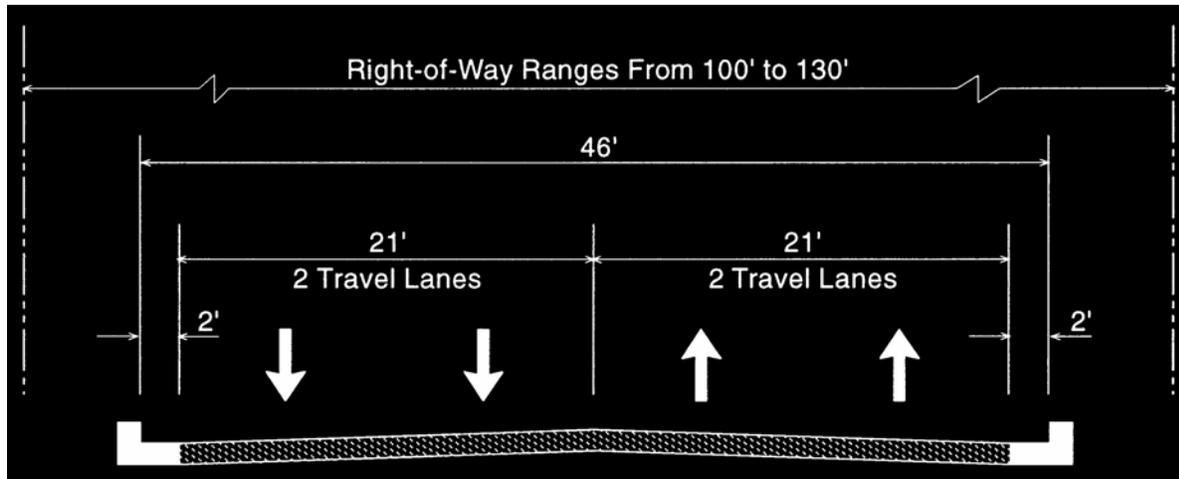


Figure 4-2
Existing Typical Riverside Avenue Cross-Section

Functional Classifications

Roadway segments are classified as a certain type of roadway based on the function that the roadway provides. Certain roadways are meant to provide for travel through an area and, therefore, mobility is the primary purpose. The primary purpose of some roadways, however, is to provide access to individual properties. Following is a description of the typical roadway functional classifications found in most communities:

Arterial roadways primarily provide mobility between two points. They can be two to six lanes wide, typically carrying significant traffic volumes at higher speeds and for longer distances. Access to abutting properties is a secondary function. An arterial functional classification is also typically divided into two sub-categories, major and minor arterials. As these classifications infer, roadway, laneage and right-of-way requirements and traffic volumes are typically greater for the major arterial classification.

A **Collector** roadway serves both access and mobility functions. A collector street can be either two or four lanes wide with speeds and traffic volumes less than an arterial street but greater than a local street. Major and minor collectors also differ in the laneage and right-of-way requirements, and traffic volume levels as their classifications imply.

Local roadways serve primarily as a means of access to adjacent land uses, whether residential, business or community facilities. They are typically low speed, two or three lanes wide (with a center left turn lane) and carry relatively low traffic volumes.

The City of Fort Collins has classified Jefferson Street and Riverside Avenues as Arterial Streets. In the foreseeable future, however, it is unlikely that the typical cross-section of an Arterial Street would be provided along these streets given some of physical roadway and historical building constraints. These streets, however, will continue to function as arterials.

The Transportation Commission of Colorado classifies Jefferson Street and Riverside Avenue as Principal Arterials. These roadways have also been designated by the Transportation Commission and the Federal Highway Administration as part of the National Highway System.

Access Code Category

In August of 1998, the Colorado Department of Transportation adopted a revised State Highway Access Code. The revised Code reevaluated the number of access categories and their respective naming convention, and established new guidelines for access along state highways. The revised access categories are defined in Table 4-1. The purpose of the Code is to “provide procedures and standards to aid in the management of the highway system” and to “protect the public health, safety and welfare, to maintain smooth traffic flow, ... and to protect the functional level of state highways while considering state, regional and local transportation needs and interests.”

**Table 4-1
Access Categories**

F-W Interstate System, Freeway Facilities	
E-X Expressway, Major Bypass	
Rural	Non-Rural
R-A Regional Highway	NR-A Regional Highway
R-B Rural Highway	NR-B Arterial
	NR-C Arterial
F-R Frontage Roads (both urban and rural)	

The access category that is assigned to Jefferson Street and Riverside Avenue is NR-B, Non-Rural Arterial. Some of the access category standards include:

Access Granting Criteria:	“...one access shall be granted per parcel, if it does not create safety or operational problems. The access will provide, as a minimum, for right turns only. The access may have left turns in (¾ movement) if the addition of left turns will improve operation at an adjacent full-movement intersection and meet appropriate design standards, unless significant operational or safety problems occur.”
Desirable Signal Spacing:	One-half mile with good signal progression of 30% efficiency or better, or existing signal progression is not degraded.
Restricted Movements:	“Additional right-turn-only access shall be allowed where required auxiliary lanes can be provided.”

The goal of the Access Control Plan is to provide adequate and reasonable access for all properties; however, adequate spacing and access points should be introduced to relieve congestion and reduce the number of conflict points along the corridor.

Railroad Crossings

There are no at-grade railroad crossings of either Jefferson Street or Riverside Avenue. The railroad does play an important role, however, regarding its location to Riverside Avenue. Union Pacific tracks exist only 15' from the northeast flowline of Riverside Avenue, thereby hindering any roadway widening along the street. Only near the Mountain Avenue/Lincoln Avenue and Mulberry Street intersections do the tracks move away from Riverside Avenue, where additional left turn lanes have been provided.

Posted Speeds

Two separate speed limits exist along this corridor with the speed limit change occurring where the street designation changes from Jefferson Street to Riverside Avenue (at the Mountain Avenue/Lincoln Avenue intersection). Jefferson Street is posted for 30 mph along its entire length, while Riverside Avenue is posted at 35 mph.

4.2 Inventory of Access Points

There are several types of access within the corridor. Several public streets along both streets serve as access to the Fort Collins downtown business area, the more industrial parcels along the northeast side of Jefferson Street, and the Old Town Neighborhood residential community. In addition, some private driveways exist for local businesses or private residences, while alley access points also exist. At a few locations, access for local businesses are not clearly defined. An “open” access exists along some property frontage allowing for inbound and outbound movements at any point along the frontage. Following is a summary of the significant access types along the corridor:

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- Public Road Signalized Intersection (PRS) - Public road signalized intersections are at-grade, full movement public road intersections with a traffic signal. The PRS accesses along Jefferson Street and Riverside Avenue, from northwest to southeast, are:
 - US 287 (North College Avenue)
 - Linden Street
 - Mountain Avenue/Lincoln Avenue
 - SH 14 (Mulberry Street)

 - Public Road Unsignalized Intersection (PRU) - This type of highway access is a full movement, at-grade, stop-controlled intersection. The PRU accesses along Jefferson Street and Riverside Avenue, from northwest to southeast, are:
 - Pine Street
 - Chestnut Street
 - Whedbee Street
 - Oak Street
 - Smith Street
 - Olive Street
 - Stover Street
 - Magnolia Street
 - Cowan Street

Six public alleys also exist along the corridor.

- Driveway Access (DA) - Driveway accesses are full or partial movement highway accesses serving numerous types of private properties. None have acceleration/ deceleration lanes and are generally used multiple times daily. A driveway access can be a drop curb or other highway access that serves a business such as a gas station, liquor store, or a retail area; or an access serving a single family home along the highway. There are 40 driveway accesses along Jefferson Street and Riverside Avenue.

Based on the above classifications of access points, accesses along the corridor are approximately distributed as follows:

- 4 public road intersections with signals (6.8%)
- 15 unsignalized public road intersections (25.4%)
- 40 driveway accesses (67.8%)

A detailed listing of each access point along Jefferson Street and Riverside Avenue between North College Avenue and Mulberry Street is included in Appendix B.

4.3 Existing Traffic Conditions

Traffic Volumes

Traffic volume data, including vehicle turning movements and Average Daily Traffic (ADT) was provided by the City of Fort Collins. The vehicle turning movements were typically from 1997, while the ADT information was from 1999. Figure 4-3 illustrates the ADT and the AM and PM peak hour turning movement volumes at the signalized intersections along the corridor.

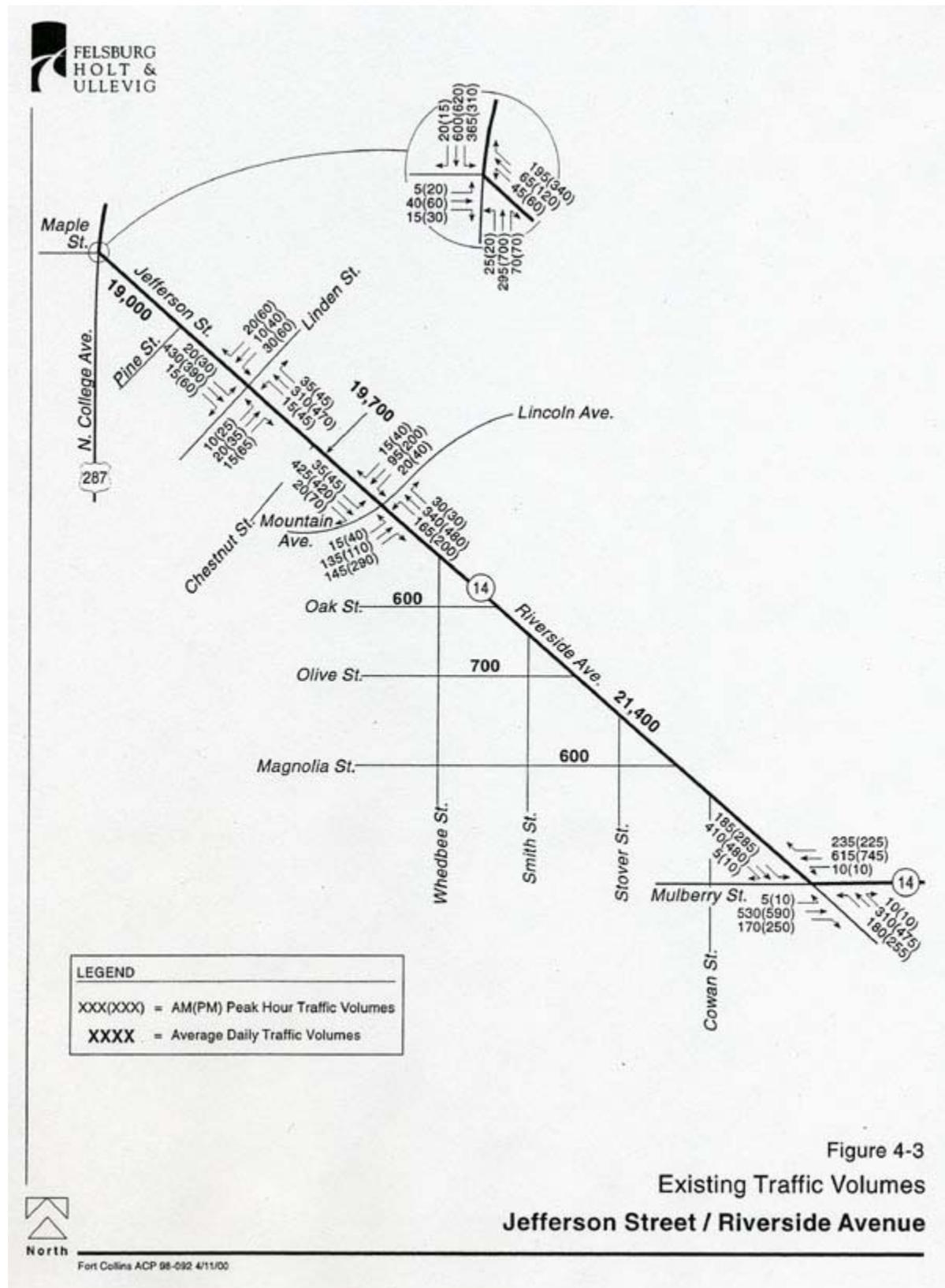
As can be seen on Figure 4-3, ADT volumes are the greatest along Riverside Avenue and average approximately 21,000 vehicles. Daily volumes along Jefferson Street are only slightly lower and are in the 19,000 to 20,000 ADT range.

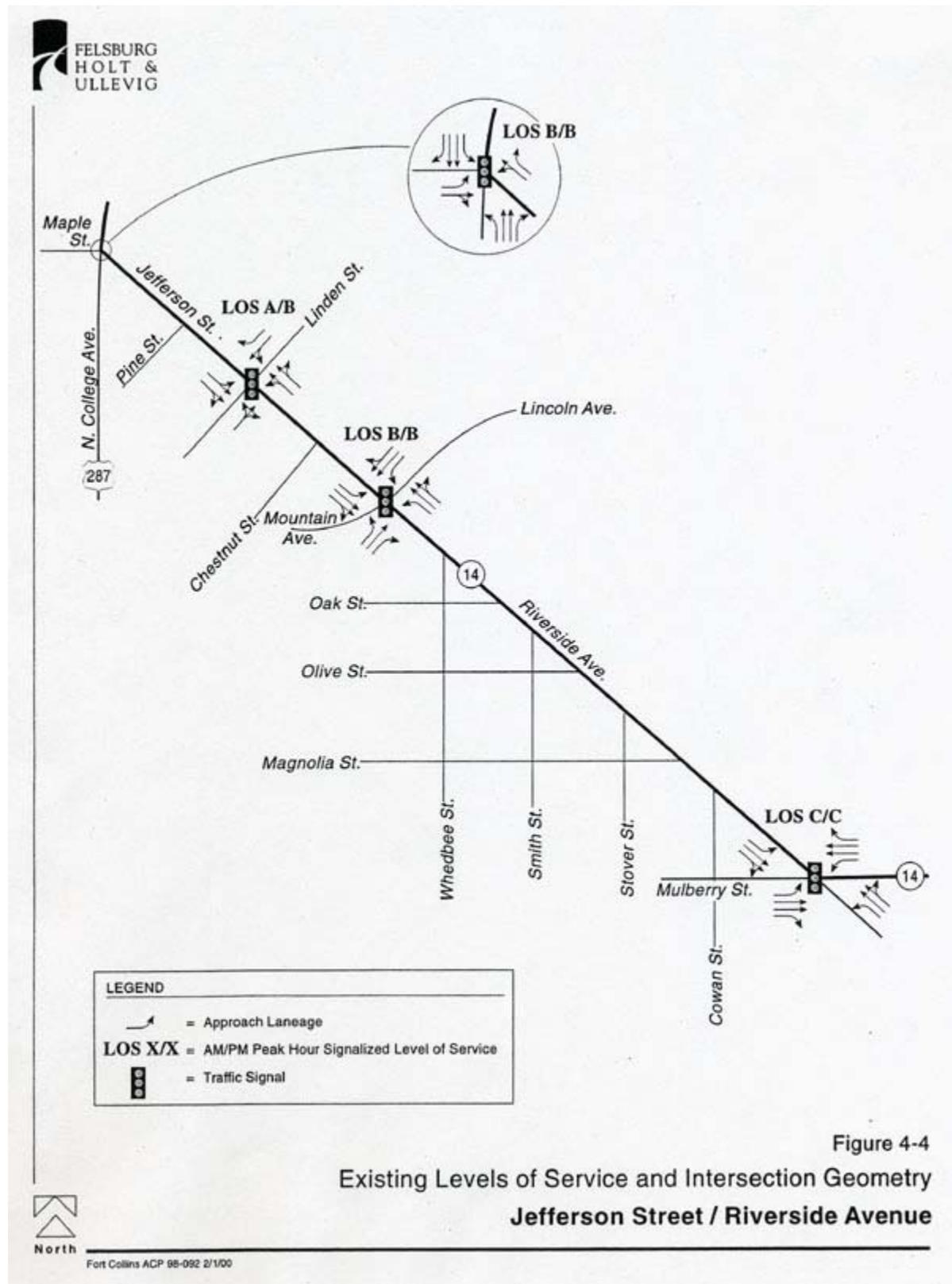
Vehicle movements vary by intersection with through volumes being below 500 vehicles per hour (vph) and left or right turns being below 300 vph. Of particular significance is the southeast-bound left turn movement at Mulberry Street where almost 300 left turns were recorded during the PM peak hour.

Operational Conditions

The detailed traffic analyses for this corridor is included in the US 287/SH 14 Access Management Traffic Analysis Technical Report by Balloffet & Associates, Inc. The AM and PM peak hour turning movement volumes were used to estimate the traffic flow characteristics of each intersection. Analysis methods documented in the 1994 Highway Capacity Manual (TRB Special Report No. 209), updated 1997, were used to establish a Level of Service (LOS) for each signalized and unsignalized intersection, a qualitative assessment of the traffic flow characteristics described by a letter designation ranging from LOS A (essentially uninterrupted flow) to LOS F (a breakdown of traffic flow with excessive congestion and delay). LOS D or better is generally considered to be acceptable for peak period conditions in urban areas and is used by the City of Fort Collins as an operational threshold for evaluating the operation of an intersection (City of Fort Collins Multimodal Level of Service Manual). LOS D is also the accepted guidepost for the CDOT.

Existing lane geometry and signal timing information was used to estimate peak hour LOS for each signalized public street intersection. The results of the analyses are shown on Figure 4-4 and include the existing intersection geometry. Capacity analyses indicate that the operation of existing traffic signals are at LOS C or better during both the AM and PM peak hours, thereby meeting the City's minimum level of service guideline.





Vehicle Classification

The CDOT publication, 1996 Traffic Volume Report, was examined to identify the level of single unit (RV's, delivery trucks) and semi-truck volume along the corridor. These data are divided into three segments and the average percent of each of these vehicle types is:

- Single Unit = 3.0%
- Semi-Truck = 5.5%

These data indicate that the percentage of semi-truck vehicles is almost twice that of single unit trucks. In addition, the information in this report shows that single unit trucks are slightly more prevalent along Riverside Avenue (3.2%) than Jefferson Street (2.9%), whereas, semi-trucks are slightly more prevalent along Jefferson Street (5.8%) than Riverside Avenue (5.0%).

Accidents

Accident data between January of 1996 and July of 1998 was compiled from three sources: the City of Fort Collins, the CDOT and the Colorado State Patrol (CSP). The 2½ year period represents the period where consistent data was available from all three sources. During this period, 68 accidents were reported along Jefferson Street and Riverside Avenue. Of the reported accidents, 8 (11.8%) had at least one injury and the remaining 60 accidents (88.2%) were property damage only. There were not any fatalities during this time period along these two streets. See Figure 4-5.

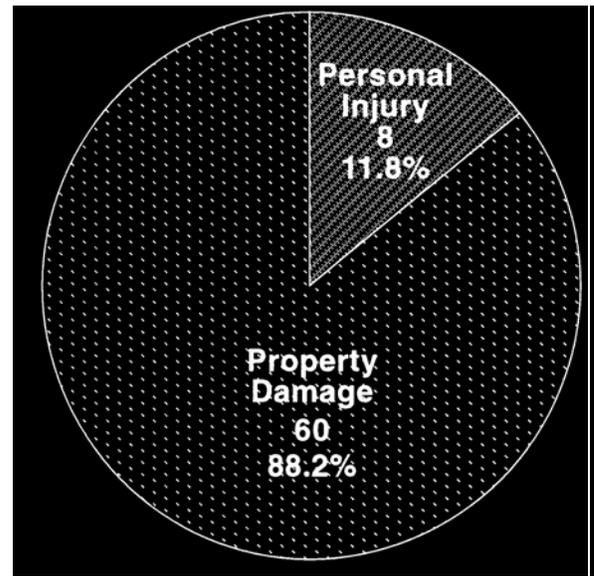


Figure 4-5
Corridor Accidents by Severity
(January 1996 to July 1998)

Table 4-2 presents a summary of accident types along Jefferson Street and Riverside Avenue during this period. The predominant types of accidents were rear-end (47.0%), 90° angle (32.4%) collisions and side-swipes (11.8%). There were only two head-on accidents (2.9%) and only one accident with a bicyclist. Diagrams of the accident history of the corridor can be found in Appendix G.

Table 4-2
Corridor Accidents by Type (1/96 - 7/98)

Accident Type	Number of Accidents	Percent Per Type
Rear-End	32	47.0%
90 Angle	22	32.4%
Side-Swipe	8	11.8%
Head-on	2	2.9%
Bicycle	1	1.5%
Other	3	4.4%
Total	68	100.0%

The accident data also indicated that approximately 79 percent of all corridor accidents between January 1996 and July 1998 were access related. Most of the access-related accidents occurred at the signalized intersections along the corridor; however, two unsignalized intersections also showed a higher level of accident frequency than at other unsignalized locations. These include:

- The Olive Street intersection with Riverside Avenue (one injury accident).
- The Stover Street intersection with Riverside Avenue. Each of the accidents at this location involved injuries.

All of the accidents at these locations were rear-end accidents.

The accident frequency along Jefferson Street and Riverside Avenue was compared to the average accident rates for all state highways of the same highway classification. Jefferson Street and Riverside Avenue are classified as Federal-Aid Primary (Urban) highways. These data were examined for a ten year period and it was found that along Jefferson Street, accidents occur at the same rate as the statewide average. Along Riverside Avenue, accidents occur at a 48% higher rate than the statewide average. Table 4-3 documents the average accident rates for Jefferson Street and Riverside Avenue versus the statewide average.

**Table 4-3
Accident Rate¹ Comparison - Jefferson Street and Riverside Avenue versus Statewide Average**

Year	Total Number of Accidents-Statewide	Statewide Accident Rate	Accident Rate	
			Jefferson Street	Riverside Avenue
1997	16,337	3.16	3.51	4.20
1996	16,024	3.16	3.34	4.57
1993	13,871	3.09	3.36	3.45
1992	12,966	3.00	2.49	6.55
1991	11,950	3.04	3.13	4.77
1990	12,009	3.17	4.26	7.06
1989	12,301	3.46	4.70	6.48
1988	13,862	4.03	4.61	5.99
1987	14,293	4.16	3.81	4.76
1986	14,910	4.41	1.62	3.60
Average Accident Rates		3.47	3.48	5.14

¹ The accident rate is calculated by dividing the number of accidents by the vehicle miles of travel occurring along a particular highway section. The rate represents the average anticipated number of accidents per million miles of vehicle travel.

4.4 Projected Conditions

Neighborhood Plan Recognition

There are areas along Jefferson Street where changes in land use and, therefore, re-development of a parcel, may occur. Since this area is immediately adjacent the central downtown business district and some buildings have historical significance, re-development on a large scale is not anticipated. In addition, the presence of historical buildings will preclude any widening of Jefferson Street.

Along Riverside Avenue, most of the adjacent property to the southwest is residential or directly abuts residential parcels. Several businesses exist in the triangular land parcels between intersecting streets. To the northeast of Riverside Avenue, existing railroad tracks preclude development in this area; however, consolidation of the railroad tracks is anticipated and, therefore, Riverside Avenue could be widened to some extent. The East Side Neighborhood Plan, prepared by the City of Fort Collins in March of 1986, was consulted to evaluate street improvements along Riverside Avenue in the East Side Neighborhood (now referred to as the Old Town Neighborhood).

Typical Sections

The City of Fort Collins has designated Jefferson Street and Riverside Avenue as Arterial Streets in their Master Street Plan. The standard Arterial Street section consists of four through lanes (two for each direction), bike lanes, sidewalk, a raised center median and a 10' parkway buffer. As noted in the previous section, however, the Arterial Street section cannot be accommodated along these streets due to historical and physical constraints. The anticipated consolidation of railroad tracks along Riverside Avenue will likely provide some additional area to widen the roadway, however, thereby allowing for a modified Arterial section to be provided. A bike path is also recommended along the northeast side of the railroad tracks adjacent to Riverside Avenue.

The proposed typical sections for these streets are represented on Figures 4-6 and 4-7. An estimated flowline to flowline width of 71' for Riverside Avenue would provide sufficient area for a raised, landscaped median and for four through lanes. Depending upon the final location of the railroad track consolidation, these dimensions may need to be revised.

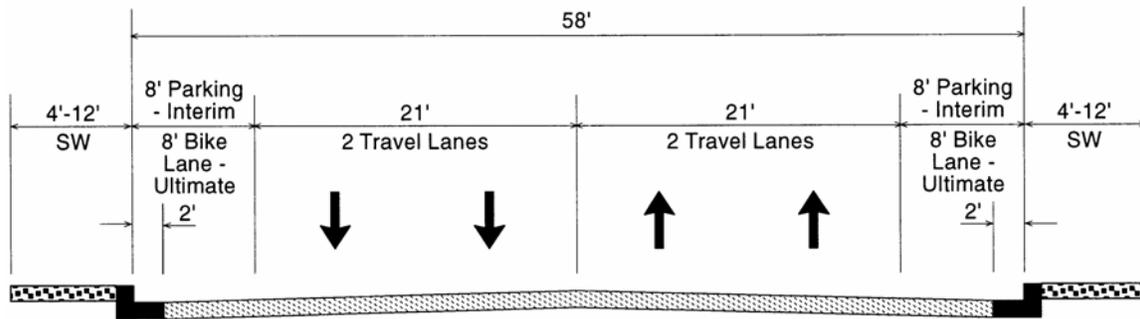


Figure 4-6
Proposed Jefferson Street Cross-Section

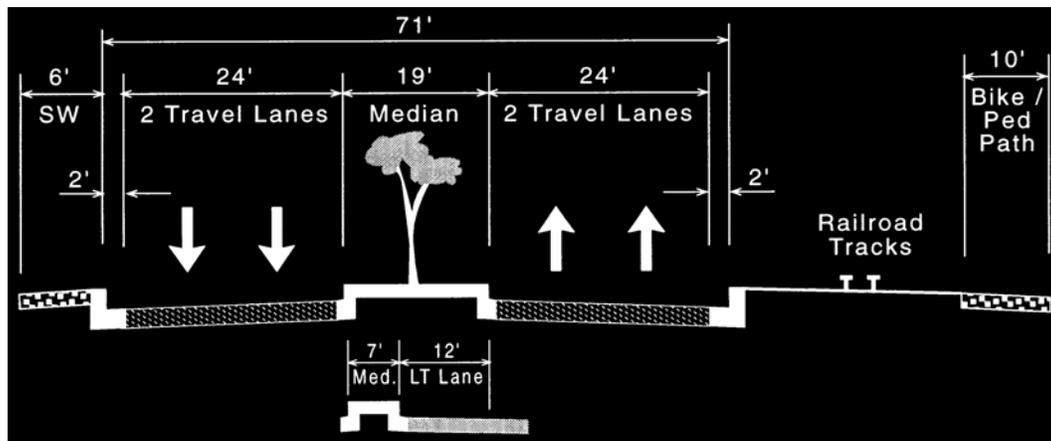
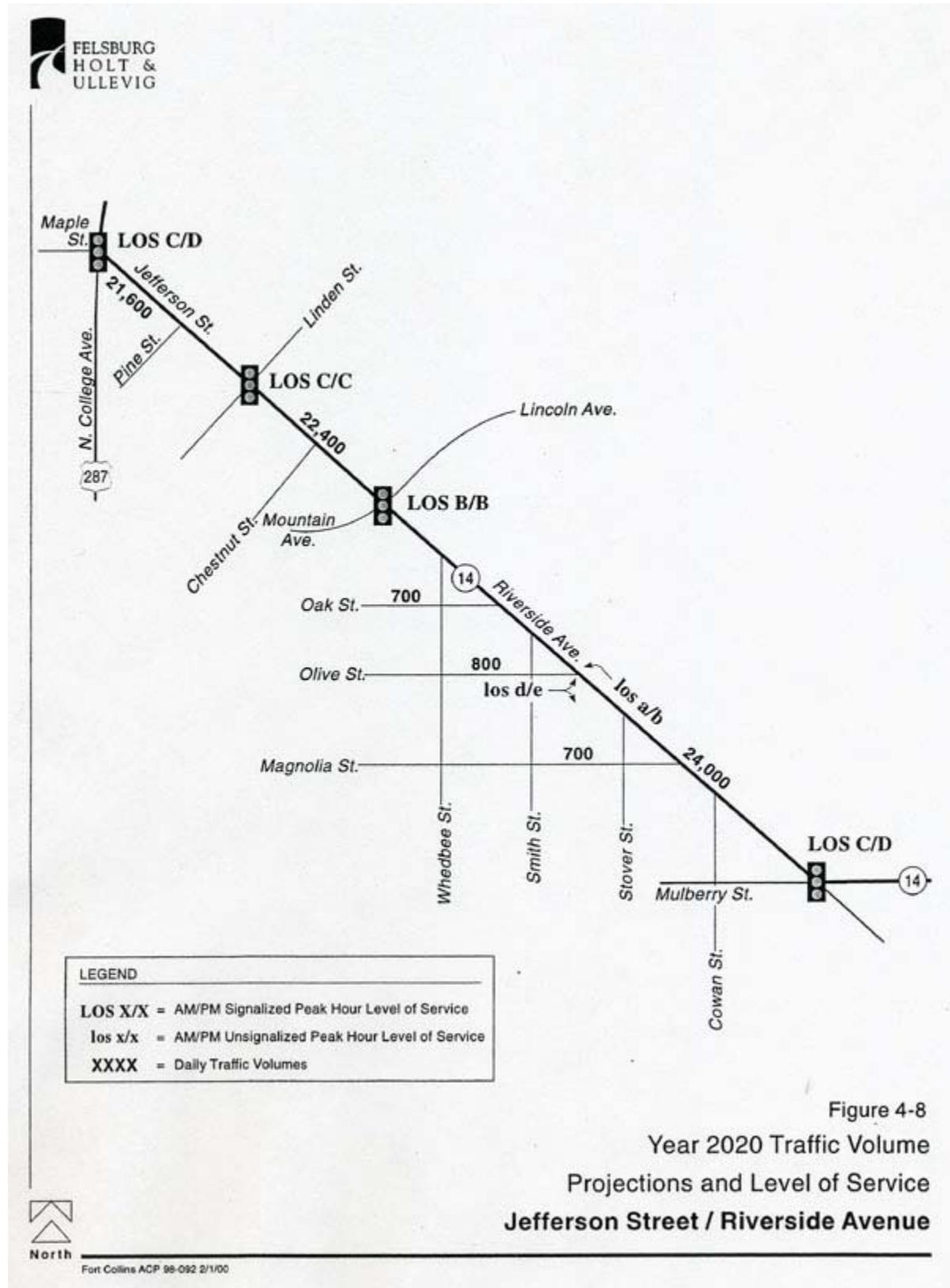


Figure 4-7
Proposed Riverside Avenue Cross-Section

4.5 Projected Traffic Conditions

Traffic Forecasts

The Year 2020 traffic projections (see Figure 4-8) indicate that daily traffic volumes will increase to approximately 21,600 vpd between North College Avenue and Linden Street, to about 22,400 vpd between Linden Street and Mountain Avenue/Lincoln Avenue, and to approximately 24,000 vpd along Riverside Avenue. These projections are consistent with the current City transportation model. The method used for calculating the Year 2020 traffic projections include a factoring process which compares the existing and Year 2020 traffic models and applies anticipated vehicle trip increases to the existing traffic count information.



Operational Conditions

It is not anticipated that any new traffic signals will be installed along Jefferson Street or Riverside Avenue by the Year 2020. Therefore, only the North College Avenue, Linden Street, Mountain Avenue/Lincoln Avenue and Mulberry Street intersections will be signalized. Capacity analyses indicate that LOS D or better can be achieved at each of these locations during both peak hours. Achieving LOS D will require that a left turn signal phase be provided for northwest-bound traffic at the Mountain Avenue/Lincoln Avenue intersection along Jefferson Street and that one additional left turn lane be constructed for both the northwest-bound and southeast-bound directions of travel on Riverside Avenue at the Mulberry Street intersection.

Progression Analyses

As traffic volumes increase along the corridor, it may become more difficult to traverse the entire length of the corridor without excessive stops and greater vehicle delay. The measure of the speed and relative congestion of vehicles proceeding along the entire corridor was evaluated by using the computer software program Progression Analysis and Signal System Evaluation Routine (PASSER). This program provides measures of efficiency that evaluates the relative effect of adding or removing traffic signals, the changing of signal timing or phasing patterns, or the increase or decrease in traffic volumes.

Using the projected traffic volume forecasts, anticipated roadway improvements and by optimizing signal timing, it is projected that good vehicle progression can be achieved along Jefferson Street and Riverside Avenue (see US 287/SH 14 Access Management Plan Traffic Analysis Technical Report).

Arterial Street Analysis

While the qualitative analyses of signalized intersections offer insight to the operation of specific locations along the corridor, it is important to quantify the effectiveness of an access control plan for the corridor as a whole. The Highway Capacity Manual documents a procedure that can evaluate operational conditions of sections of an arterial street, thereby providing indices of relative operational changes if access points are added or removed. The results of the analyses are provided in a level of service assessment similar to that of a signalized intersection. The analyses of Jefferson Street and Riverside Avenue indicate that LOS B or better can be achieved between the signalized intersections along the corridor.

4.6 Access Control Plan

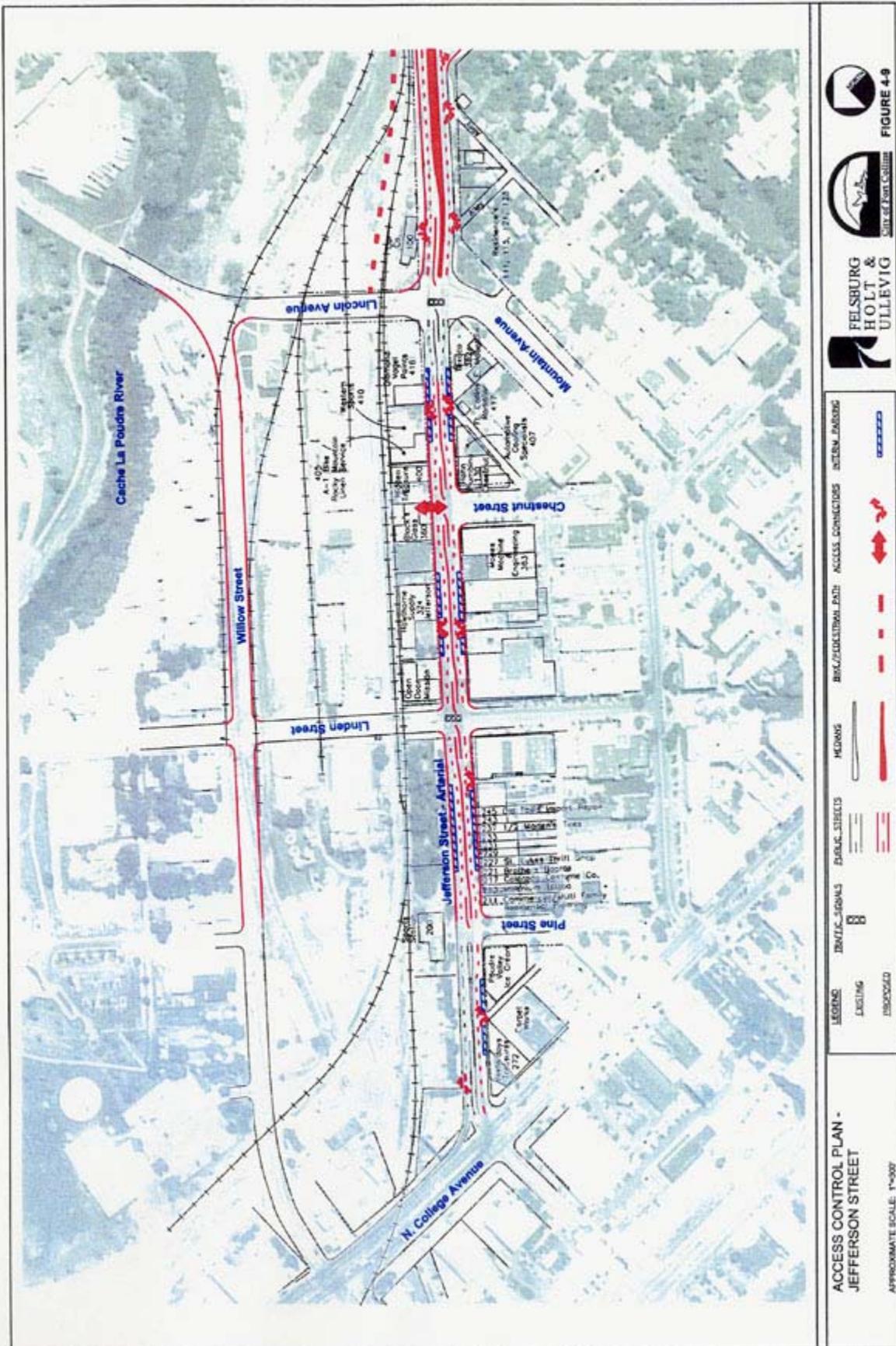
This section presents the Access Control Plan which has been formulated through the considerable input of the governing agencies, organized homeowner groups, and the public. After considering both existing and future conditions in the corridor, the plan defines how access for future development should be planned.

Conceptual level cost estimates for the recommended access improvements have been prepared, and the relative priority for each improvement along the corridor is documented. The narratives included in this chapter are meant to serve as a summary of the key features of the plan. A detailed explanation of every access in the corridor is presented in the Intergovernmental Agreement. The Access Control Plan is also illustrated on aerial photographs (Figures 4-9 and 4-10).

Jefferson Street

Major access changes to Jefferson Street are not foreseen. The recommended improvements, however, represent changes that should provide a safer traveling environment while also increasing the capacity of the street. It is recognized that significant portions of the adjoining land uses will not change given the historical nature of the area. There are some properties that are anticipated to re-develop and these are located mostly on the northeast side of the street between Linden Street and Lincoln Avenue. Following is a list of improvements that should be undertaken as soon as funds become available:

- Develop exclusive left turn lanes at public street intersections where none currently exist. These locations include both directions of travel at the Linden Street and Chestnut Street intersections, and the westbound direction of travel at the Pine Street intersection. The addition of these lanes can be accomplished by eliminating parking near the intersections.
- Upgrade Willow Street to Collector Street standards so that this street becomes a more attractive route for local access northeast of Jefferson Street. By improving Willow Street, some traffic will relocate to this street, thereby relieving some of the anticipated congestion along Jefferson Street. As part of the upgrade of Willow Street, the northwest and southeast portions of the street on either side of Linden Street should be aligned. Currently, these streets are offset by approximate 50 feet. In addition, upgrading Linden Street and Lincoln Avenue should be pursued. The addition of curb and gutter and other street amenities common to a Collector Street and Arterial Street cross-sections will attract more vehicles along these routes.
- Remove on-street parking along Jefferson Street when additional off-street parking is provided. The existing parking width would be used for new bike lanes.
- Modify the existing intersection at North College Avenue to improve the northwest-bound right turn movement from Jefferson Street onto North College Avenue. The objective would be to eliminate vehicle weaving between the right turn movement and the northbound left turn lane at Cherry Street on North College Avenue.



- As existing parcels re-develop, a minimum access spacing of 200' should be required based on minimum sight distance standards of the Code.
- Restrict public and private access to RIRO by installing regulatory signing since adequate width is not available to provide a physical restriction.

Riverside Avenue

The recommended improvements for Riverside Avenue include a few major access changes. The recommended improvements represent changes that should provide a safer traveling environment while also increasing the capacity of the street. Some of the recommendations reflect information provided in the East Side Neighborhood Plan. It is not anticipated that significant portions of the adjoining land uses will change since most of these parcels are residential homes. Commercial activities with direct access to the highway should be discouraged. Following is a list of recommended improvements.

- Consolidate the railroad tracks along the northeast side of Riverside Avenue and provide the greatest spacing possible between the tracks and the street. Construct a raised, landscaped median (19' wide) along the entire length of Riverside Avenue between the Mountain Avenue/Lincoln Avenue and Mulberry Street intersections.
- Extend the northwest-bound left turn lane at the Mountain Avenue/Lincoln Avenue intersection and install a left turn signal phase to increase the left turn capacity.
- Add a second left turn lane for southeast and northwest-bound movements from Riverside Avenue onto Mulberry Street. Projected traffic volumes indicate that a second left turn lane will be required as traffic increases. Final design must investigate the impacts to right-of-way at this intersection.
- Eliminate access to the highway at Smith Street by constructing a cul-de-sac at the northern terminus of the street.
- The Olive Street intersection would remain with full vehicle movements. Left turns from Olive Street onto Riverside Avenue would be provided an acceleration lane/refuge area in the proposed median. A left turn deceleration lane for movements from Riverside Avenue onto Olive Street would also be provided.
- Restrict access at Oak and Magnolia Streets to $\frac{3}{4}$ movements (right-in, right-out, left-in). Left turn deceleration lanes would also be provided along Riverside Avenue at these locations.
- Restrict access at Whedbee and Stover Streets to inbound right turns only.
- Restrict access at the Cowan Street intersection to RIRO only.
- Restrict access to the public alleys and commercial properties to RIRO except at R&B Food and Gas, where movements would be restricted to right-in only.



- Construct a 10 foot wide, concrete bike path along the northeast side of the railroad tracks between Lincoln Avenue and Mulberry Street.

4.7 Cost Estimates

Conceptual opinions of probable costs (Year 2000 dollars) have been prepared for both the Jefferson Street and Riverside Avenue corridors. Since the improvement recommendations are conceptual in nature, detailed cost estimates were not prepared. The following basis was used to develop conceptual cost estimates, which includes design, construction and construction observation but does not include right-of-way acquisitions or displacements/ relocations:

- Median Construction - \$80 per lineal foot.
- Private Access Reconstruction - \$2,000 each
- Left Turn Lane Construction - \$200,000 each.
- Collector Street (Parallel Street System) - \$1,500,000 per mile.
- Striping for Left Turn Lanes - \$5,000 total.

Table 4-4 presents the estimated total cost (in Year 2000 dollars) of all recommended improvements in each section.

**Table 4-4
Conceptual Opinion of Probable Costs By Section**

Corridor Section	Total Cost Estimate ¹
Jefferson Street	\$1,119,000
Riverside Avenue	\$1,430,000
Entire Corridor	\$2,549,000
¹ Cost estimates do not include cost for right-of-way acquisitions or displacement/relocations. All cost estimates are Year 2000 dollars. These estimates do not include the cost to consolidate the railroad tracks.	

Although the cost information provided in Table 4-4 provides a **conceptual level estimate** for the project as a whole, estimates of cost for the improvements listed in Sections 4.6 were also developed. By estimating cost for specific improvements, the City will have a mechanism for allocating funds to these projects. These improvements have been prioritized by level of importance and a list of each project and associated cost is provided in Table 4-5. These cost estimates should be reviewed and updated as appropriate on an annual basis in order to reflect inflation. These improvements are also graphically summarized on Figure 4-11.

**Table 4-5
Conceptual Opinion of Probable Costs by Project**

Project Description	Conceptual Cost Estimates
Jefferson Street	
Medium Priority - Develop left turn lanes along Jefferson Street at public street intersections	\$36,500
- Re-construct Willow Street, Linden Street and Lincoln Avenue to Collector Street standards	\$1,082,500
TOTAL	\$1,119,000
Riverside Avenue	
High Priority - Construct one additional northwest-bound and one additional southeast-bound left turn lane at the Mulberry St. intersection	\$472,000
- Street modifications, driveway restrictions	\$70,000
- Construct modified arterial street cross-section	\$716,000
Medium Priority - Bike path construction	\$172,000
TOTAL	\$1,430,000

