

3.0 ACCESS CONTROL PLAN - US 287(NORTH COLLEGE AVENUE)

3.1 Existing Conditions

Roadway Physical Characteristics

Typical Section

The existing typical cross-section for US 287, hereinafter referred to by its local street designation, North College Avenue, is shown on Figure 3-1 and is comprised of four travel lanes, a center turn lane, and , typically, two paved outside shoulders. Shoulder width and condition vary along the corridor. In some areas there is curb and gutter along the outside of the shoulder, however. The dimensions are relatively constant throughout the corridor with the most common dimensions being:

- Travel Lanes: 12 feet - 13 feet
- Outside Shoulder: 8 feet - 10 feet
- Center Turn Lane: 13 feet
- Right-of-Way: 80 feet - 130 feet

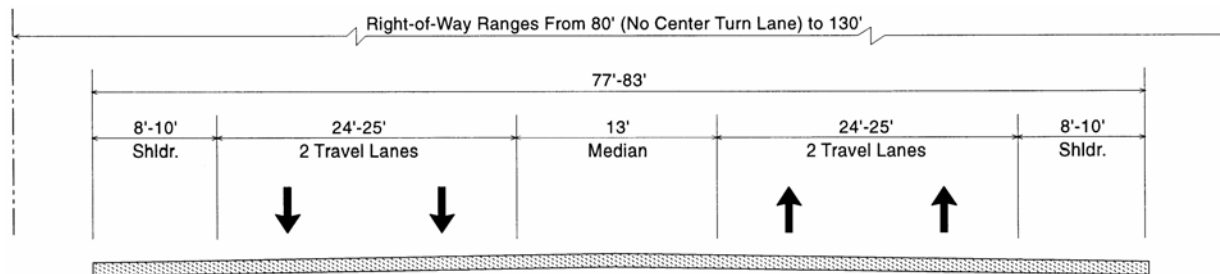


Figure 3-1
Existing Typical North College Avenue Cross-Section

A center continuous left turn lane is provided along almost the entire length of North College Avenue. At major intersections, the center lane is converted to an exclusive left turn lane with a storage area specifically designated. A few exceptions exist, however. Between SH 1 and Willox Lane, the width of the bridge across the Larimer and Weld Canal precludes having a continuous left turn lane and, therefore, only two through lanes in each direction are provided. Between Vine Drive and Jefferson Street there exists a raised median at a few locations and only exclusive left turn lanes are provided. Exclusive right turn deceleration lanes exist only at Cherry Street (southbound) and Willow Street (northbound), Vine Drive (northbound), Willox Lane (northbound and southbound) and SH 1 (northbound).

Functional Classification

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 North College Avenue as an Arterial Street. As adjoining parcels re-develop, they will be required to provide sufficient right-of-way to construct the Arterial Street cross-section. The cross-section features include:

- 2 - 12 foot travel lanes in each direction
- 1 - 8 foot bike lane in each direction
- A 19 foot raised, landscaped median (7 foot median with a 12 foot left turn lane at major intersections)
- A six foot sidewalk and a 10 foot parkway on both sides
- 115 feet of right-of-way (minimum)

The Transportation Commission of Colorado classifies North College Avenue as a Principal Arterial. This roadway has 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 3-1. 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 3-1
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 North College 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 of access points should be introduced to relieve congestion and reduce the number of conflict points along the corridor.

Railroad Crossings

Currently, there are two at-grade railroad crossings of North College Avenue at the following locations:

- Between Jefferson and Willow Streets, owned by Union Pacific Railroad
- Between Willow Street and the Cache La Poudre River, owned by Burlington Northern Santa Fe Railroad

Posted Speeds

North College Avenue has two separate speed limit regulations along the Jefferson Street to SH 1 corridor. From Jefferson Street to Vine Street, the posted speed limit is 35 mph, while between Vine Street and SH 1, the posted speed is 40 mph.

3.2 Inventory of Access Points

The access points within the corridor are quite diverse. At one extreme are lightly traveled private driveways, while at the opposite end are access points serving a shopping center with several business establishments. Most of the access points along the corridor are public streets or private access for the myriad of businesses. A few private driveways exist serving only a single family dwelling intermixed with the more abundant commercial activity. Some access points are not clearly defined, however. Numerous properties have an “open” access along the 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.

- Public Road Signalized Intersection (PRS) - Public road signalized intersections are at-grade, full movement public road intersections with a traffic signal. Signalized public roads include SH 14, SH 1 and several city streets. The PRS accesses along North College Avenue, from south to north, are:
 - SH 14 (Jefferson Street/Maple Street)
 - Cherry Street/Willow Street
 - Vine Drive
 - Conifer Street
 - Hickory Street
 - Willox Lane
 - SH 1

- Public Road Unsignalized Intersection (PRU) - This type of highway access is a full movement, at-grade, stop-controlled intersection. The PRU accesses along North College Avenue, from south to north, are:
 - Woodlawn Drive
 - Alpine Street
 - Pinon Street
 - Hemlock Street
 - Hibdon Court
 - Bristlecone Drive
 - Grape Street

- 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, restaurant, or a retail area; or an access serving a single family home along the highway. There are a total of 116 driveway accesses along North College Avenue.

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

- 7 public road intersections with signals (5.4%)
- 7 unsignalized public road intersections (5.4%)
- 116 driveway accesses (89.2%)

A detailed listing of each access point along North College Avenue between Jefferson Street and SH 1 is included in Appendix A.

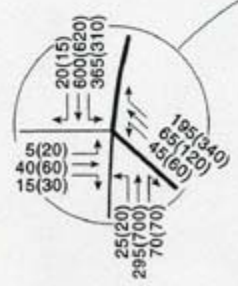
3.3 Existing Traffic Conditions

Traffic Volumes

Traffic volume data, including vehicle turning movements and Average Daily Traffic (ADT), were provided by the City of Fort Collins. The turning movement traffic volumes were from 1997 and were recorded by the City as part of their continuing traffic counting program. These data are consistent with the traffic volumes recently used in the city-wide traffic signal timing project conducted in 1998. The ADT volumes were recorded in 1999. Figures 3-2 and 3-3 illustrate the ADT and the AM and PM peak hour turning movement volumes along the corridor.



LEGEND
 XXX(XXX) = AM(PM) Peak Hour Traffic Volumes
 XXXX = Average Daily Traffic Volumes



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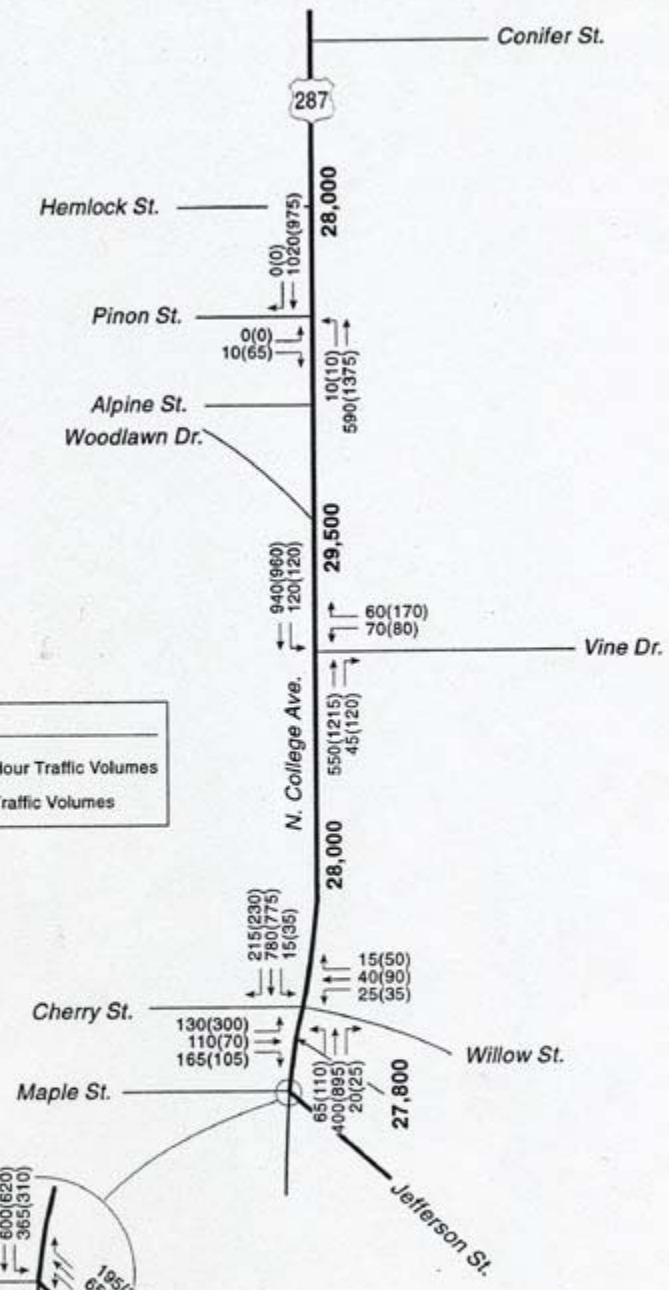
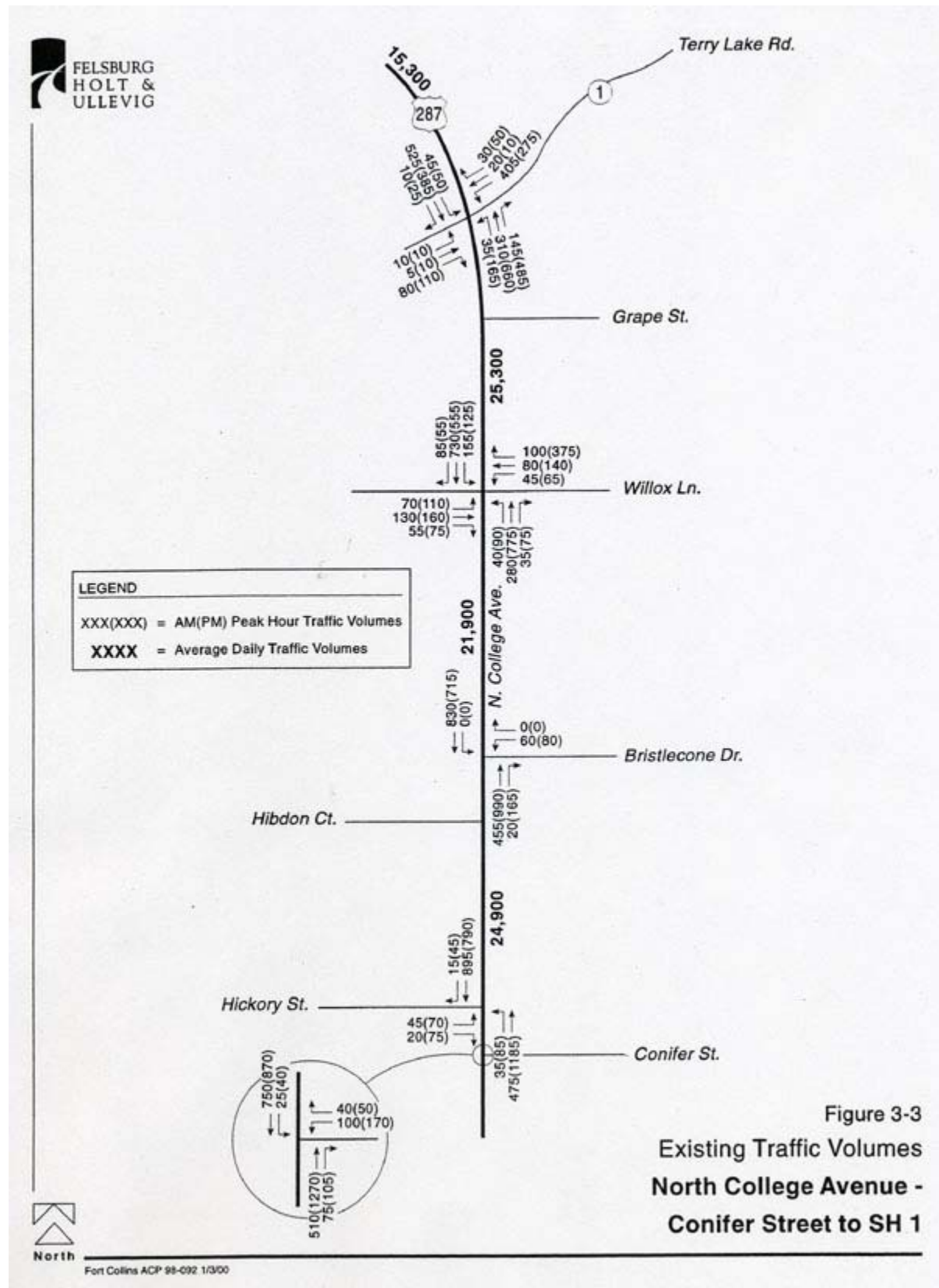


Figure 3-2
 Existing Traffic Volumes
 North College Avenue -
 Jefferson Street to Conifer Street



As can be seen on Figures 3-2 and 3-3, ADT volumes are the greatest near Vine Drive, and Willow and Jefferson Streets with levels approaching 30,000 vehicles per day. Traffic volumes during the AM and PM peak hours are relatively evenly distributed. Through traffic volumes at individual intersections range from 280 to 1,375 vehicles per hour (vph) depending upon location and time of day with the higher through volumes being closer to downtown Fort Collins. Left and right turn movements vary considerably. The highest level of left turn vehicles is from SH 1 onto North College Avenue during the AM peak hour and from North College Avenue onto Jefferson Street during the PM peak hour. The highest level of right turn vehicles is from Jefferson Street onto North College Avenue during the AM peak hour and from North College Avenue onto SH 1 during the PM peak hour.

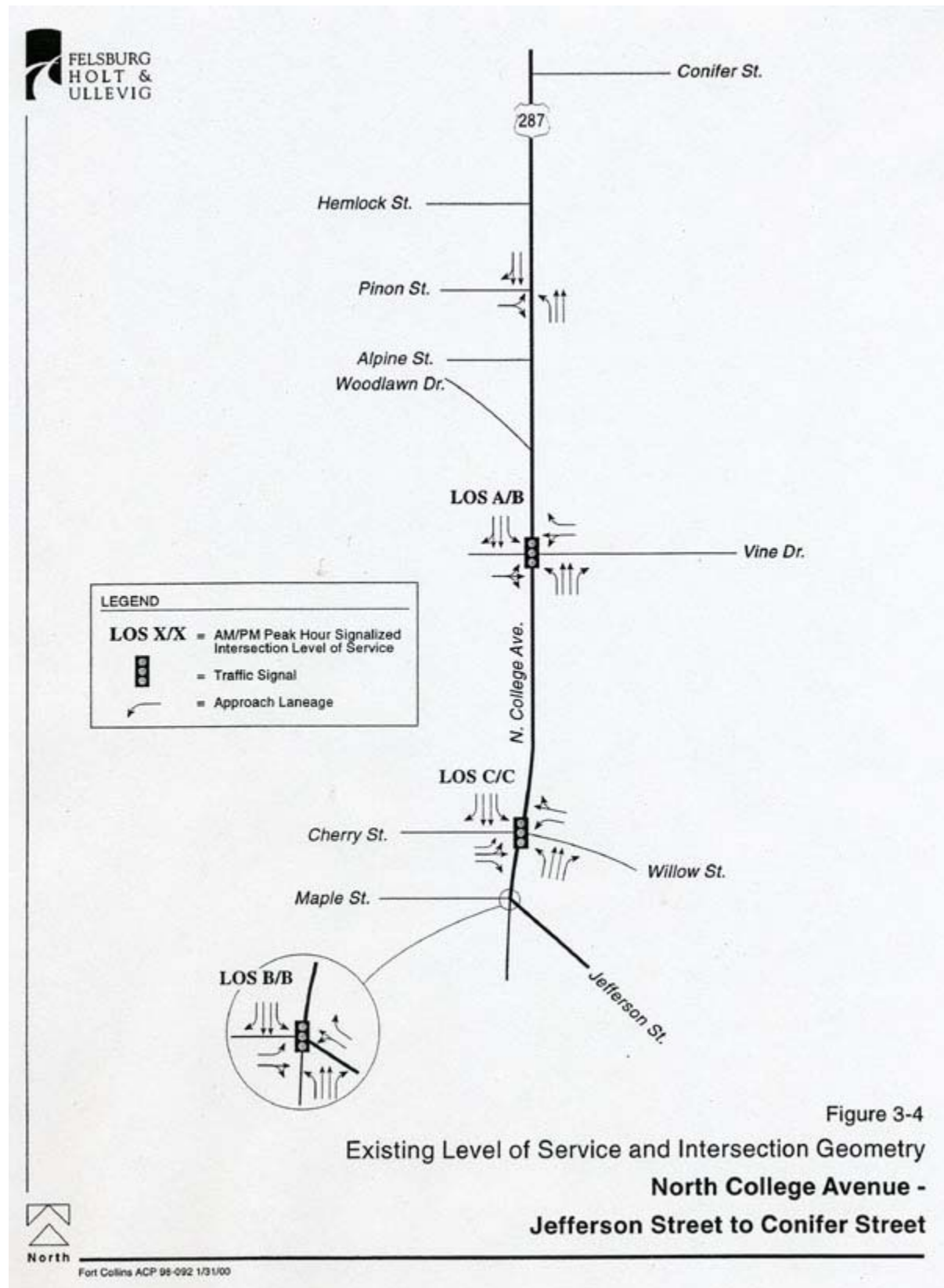
Operational Conditions

The detailed traffic analyses for this corridor is included in the US 287/SH 14 Access Management Plan Traffic Analysis Technical Report by Balloffet & Associates, Inc. North College Avenue has numerous access points between Jefferson Street and SH 1. There are currently 130 accesses along North College Avenue, including the public street intersections. Two of the direct results of having a significant number of access points are excessive stop and go driving conditions in the right through lane, with numerous left turn ingress and egress movements at existing streets and businesses.

The AM and PM peak hour turning movement volumes were used to estimate the traffic flow characteristics of each signalized 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 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 a guidepost for evaluating the operation of an intersection (City of Fort Collins Multimodal Level of Service Manual). LOS D is also the accepted guidepost for Larimer County and the CDOT.

At stop-controlled intersections, LOS F results when more than 50 seconds of average stopped delay occurs. Due to high levels of through traffic on North College Avenue, it is not uncommon for left turn movements from the stop-controlled approach to operate at LOS F even if left turns are low and do not meet MUTCD criteria for signalization.

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 Figures 3-4 and 3-5, and include the existing intersection geometry. As can be seen on these figures, LOS C or better is achieved at each signalized intersection during both peak hours.



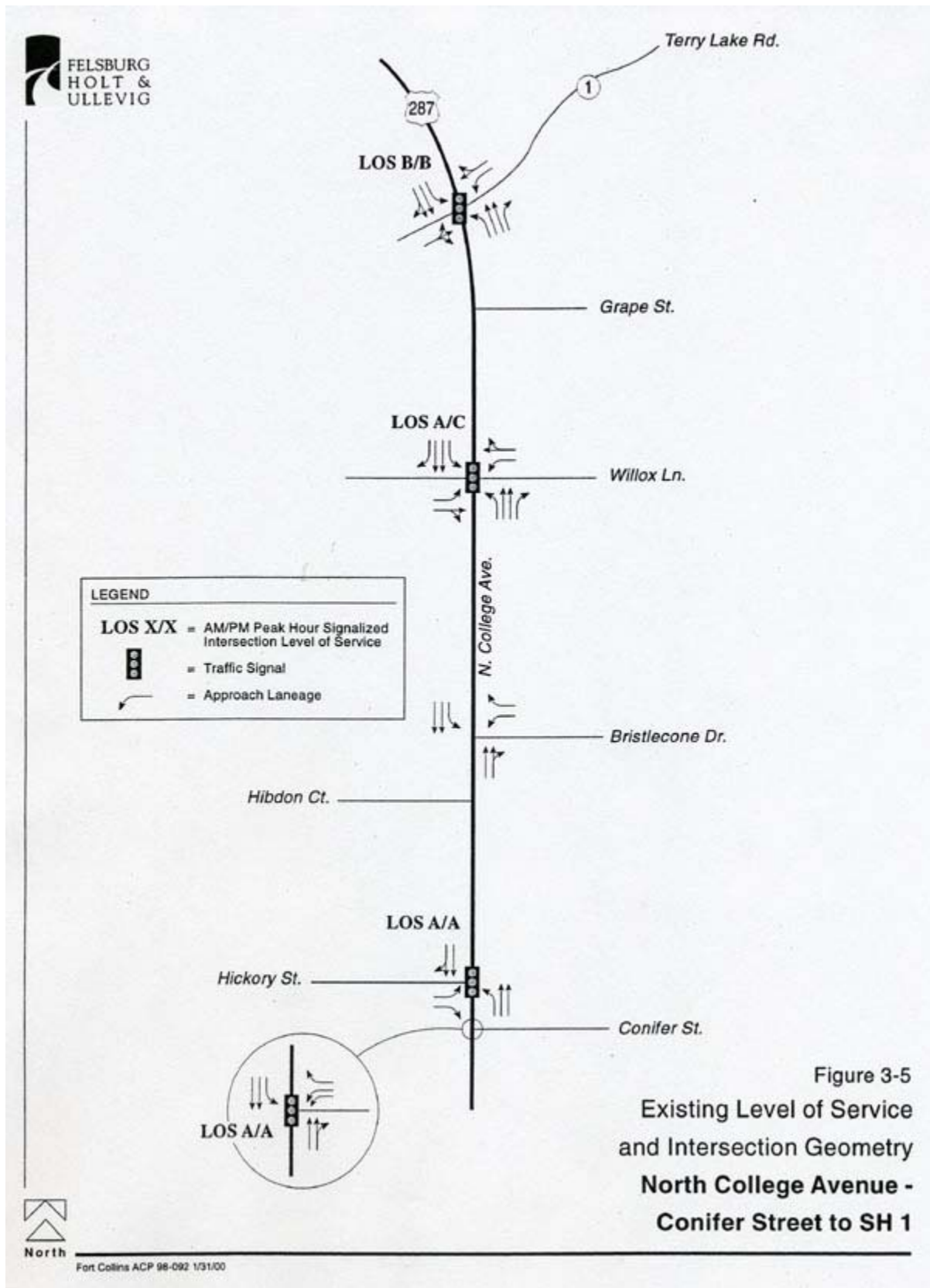


Figure 3-5
Existing Level of Service
and Intersection Geometry
North College Avenue -
Conifer Street to SH 1

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 indicate that the percent of single unit and semi-trucks along North College Avenue is:

- Single Unit = 3.9%
- Semi-Truck = 5.2%

These data indicate that the percentage of semi-truck vehicles is slightly larger than the percentage of single unit trucks. In addition, the percentage of each vehicle type by segment increases in the more northern sections of the corridor.

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, 179 accidents were reported along North College Avenue. Of the reported accidents, 22 (12.3%) had at least one injury, there were 2 (1.1 percent) fatalities, and the remaining 155 accidents (86.6 percent) had property damage only. See Figure 3-6.

Table 3-2 presents a summary of accident types along North College Avenue during this period. The predominant types of accidents were rear-end (38.0%) and 90° angle (33.5%) collisions. Other common accident types were side-swipes (10.6%) and fixed objects (10.1%). There were only two head-on accidents (1.1%); however, accidents with pedestrians or bicyclists accounted for six (3.4%) of the total number of accidents. Diagrams of the accident history of the corridor can be found in Appendix G.

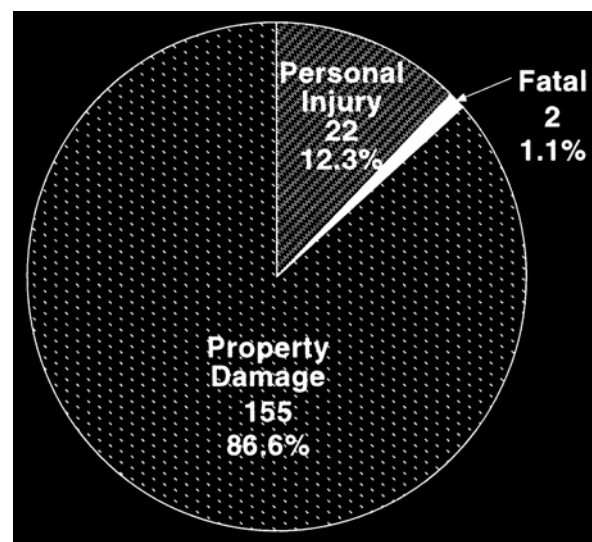


Figure 3-6
Corridor Accidents by Severity
(January 1996 to July 1998)

Table 3-2
Corridor Accidents by Type (1/96 - 7/98)

Accident Type	Number of Accidents	Percent Per Type
Rear-End	68	38.0%
90 Angle	60	33.5%
Side-Swipe	19	10.6%
Fixed Object	18	10.1%
Pedestrian	4	2.2%
Bicycle	2	1.1%
Head-on	2	1.1%
Other	6	3.4%
Total	179	100.0%

The accident data also indicated that approximately 70 percent of all corridor accidents between January 1996 and July 1998 were access related. Most of the access-related accidents occurred at the major intersections along the corridor; however, several mid-block locations also showed a higher level of accident frequency than at other mid-block locations. These include:

- The 1800 block - just north of Willox Lane
- The 1600-1700 block - adjacent to a private residence and the North College Car Wash
- Adjacent to the Plainsman Motel
- Adjacent to the JAX Mercantile Company
- The 400 block - adjacent to Rapid Lube and the BNRR tracks

The accident frequency along North College Avenue was compared to the average accident rates for all state highways of the same highway classification. North College Avenue is classified as a Federal-Aid Primary (Urban) highway. North College Avenue is divided into four analysis sections, one between Jefferson and Conifer Streets, one between Conifer and Willox Streets, one between Willox Street and the Eaton Ditch, and one between the Eaton Ditch and SH 1. These data were examined for a ten-year period and it was found that only in the Jefferson Street to Conifer Street area were accidents occurring at a rate higher than the statewide average (about 10% higher).

**Table 3-3
Accident Rate¹ Comparison - North College Avenue versus Statewide Average**

Year	Total Number of Accidents - Statewide	Statewide Accident Rate	Jefferson to Conifer	Conifer to Willox	Willox to Eaton Ditch	Eaton Ditch to SH 1
1997	16,337	3.16	3.80	2.86	1.12	0.42
1996	16,024	3.17	3.13	2.50	0.90	0.15
1993	13,871	3.09	3.15	1.39	0.17	0.68
1992	12,966	3.00	3.36	3.08	0.82	0.00
1991	11,950	3.04	3.93	1.69	0.51	0.00
1990	12,009	3.17	4.10	1.92	1.07	0.15
1989	12,301	3.46	4.17	2.81	0.93	0.00
1988	13,862	4.03	4.68	1.86	0.80	0.00
1987	14,293	4.16	3.65	2.74	0.29	0.00
1986	14,910	4.41	4.65	6.22	0.68	0.68
Average Accident Rates		3.47	3.86	2.71	0.73	0.21

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.

3.4 Projected Conditions

Development Plan Recognition

The recommendations of the Access Control Plan were influenced by known development that is likely to occur in the immediate future and also on long-range land use plans for the corridor. Short-term plans could include the re-development of a parcel to a different land use or simply making improvements to a property frontage. The City of Fort Collins is aware of the more immediate development plans and the recommendations of the Access Control Plan reflect that knowledge.

Long-range planning relied to some extent on the North College Avenue Corridor Plan which was prepared by the City in April of 1995. Zoning and land use information in this document was used to develop long-range traffic forecasts that ultimately influence the transportation planning needs and operational constraints and opportunities. Street system improvements identified in the North College Avenue Corridor Plan were reflected in the development of the Access Control Plan, but were also expanded upon.

North College Avenue Typical Section

The City of Fort Collins has designated North College Avenue as an Arterial Street in their Master Street Plan. The Arterial Street section consists of four through lanes (two for each direction), a center raised median, bike lanes, sidewalk, and a 10' parkway buffer. Analyses of projected traffic conditions and all of the access control plan decisions reflect this section. The typical section is represented on Figure 3-7.

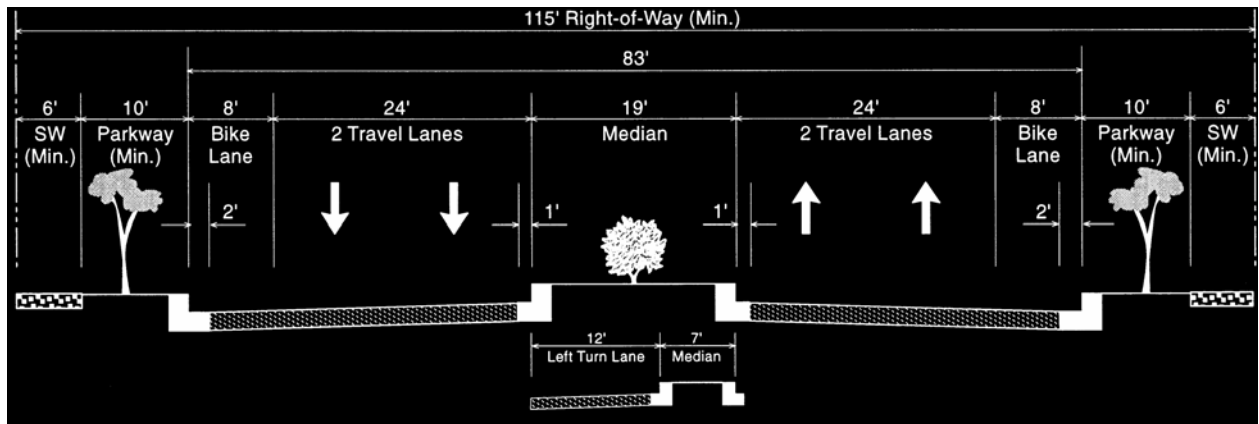


Figure 3-7
North College Avenue Arterial Street Cross-Section

3.5 Projected Traffic Conditions

Traffic Forecasts

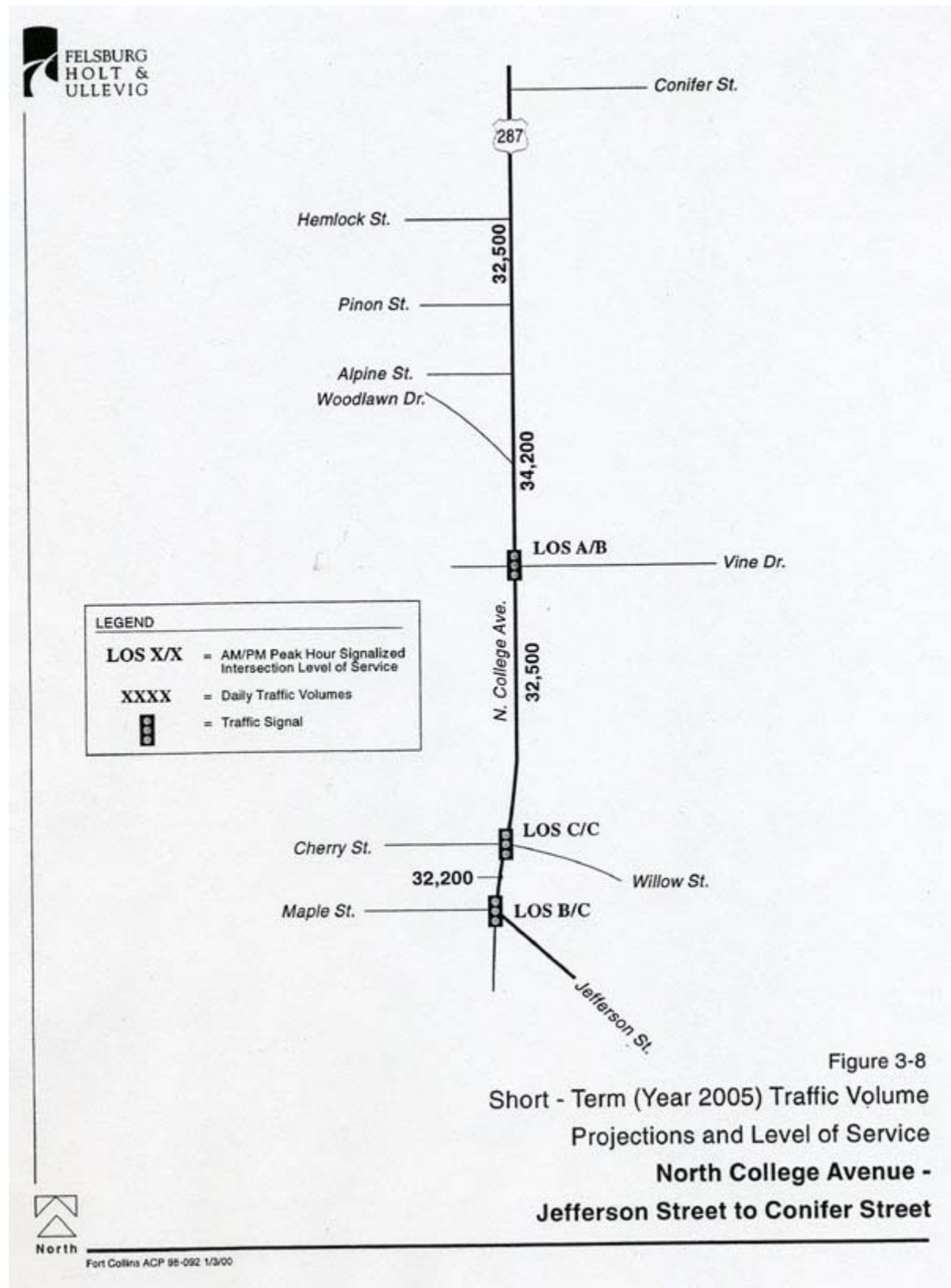
Two future scenarios were analyzed for traffic volume projections, a Short-Term scenario (with a five-year growth horizon) and a Long-Range scenario (an approximate 20-year growth horizon). Traffic forecasts for the Short-Term scenario were developed by estimating an annual growth rate of 3 percent for the five-year period. Average Daily Traffic volumes were increased at this rate and the resulting ADT's are shown on Figures 3-8 and 3-9. The daily traffic volume projections range between about 18,000 vehicles per day (vpd) (north of SH 1) to almost 35,000 vpd (north of Vine Drive).

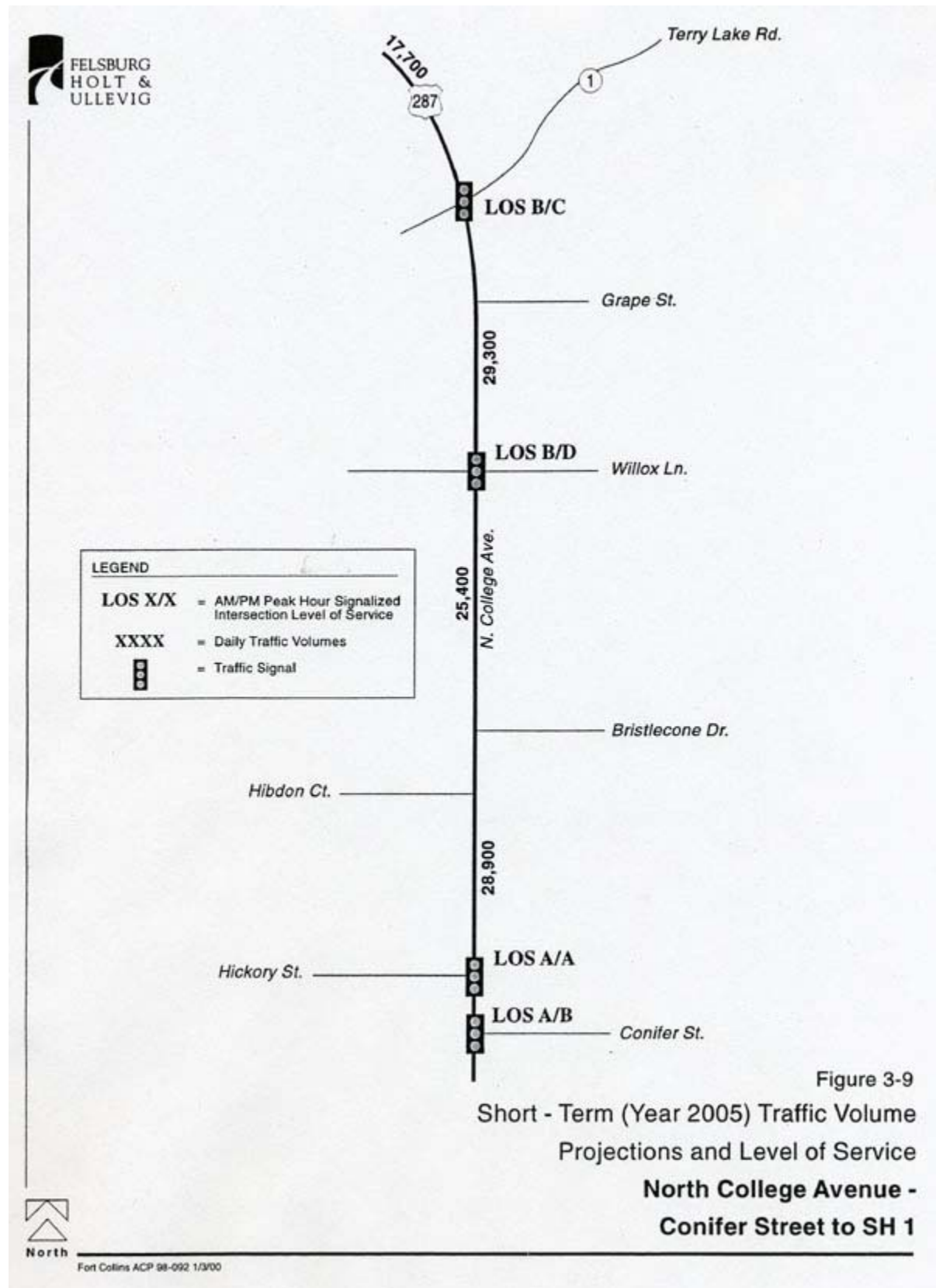
The traffic forecasts for the Long-Range scenario were calculated based on the Long-Range plan being implemented by the Year 2020. The Long-Range Plan estimates that re-development of many of the existing land uses along North College Avenue will occur. Land use assumptions for the Year 2020 are included in the City's North College Avenue Corridor Plan from April of 1995. Several development projections were evaluated. The Access Control Plan estimates that 50 percent of the anticipated growth identified in the North College Avenue Corridor Plan will occur by the Year 2020 and that North College Avenue will be re-developed with mostly retail uses, while office and light industrial uses would develop on a smaller scale. A 50 percent growth scenario is consistent with the City's traffic model projections. The Institute of Transportation Engineers' publication, Trip Generation, was used to develop the traffic projections for this period. As can be seen on Figures 3-10 and 3-11, daily traffic volumes are anticipated to increase to over 40,000 vpd by the Year 2020 in some locations, specifically, between Willow and Conifer Streets.

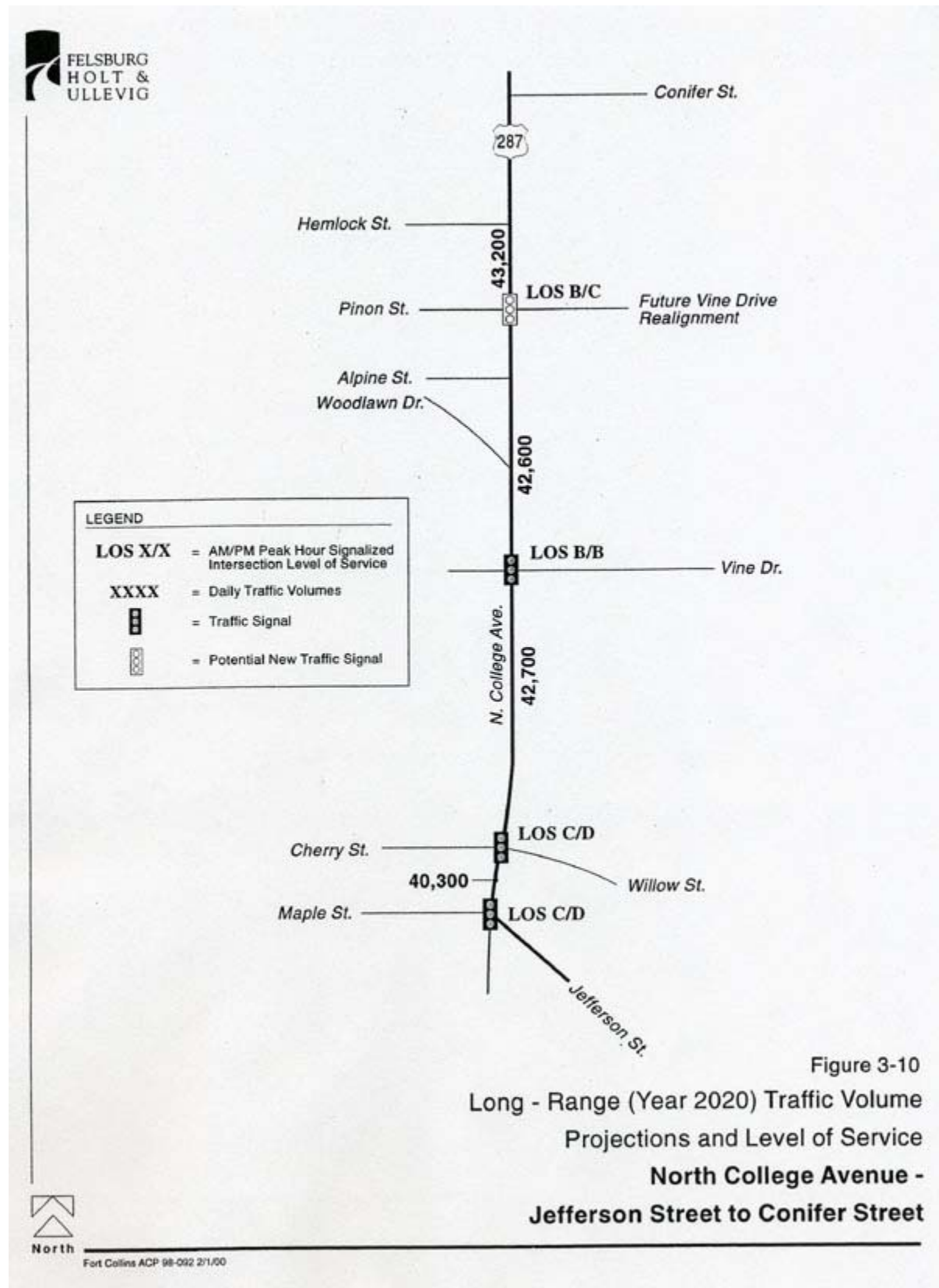
Operational Conditions

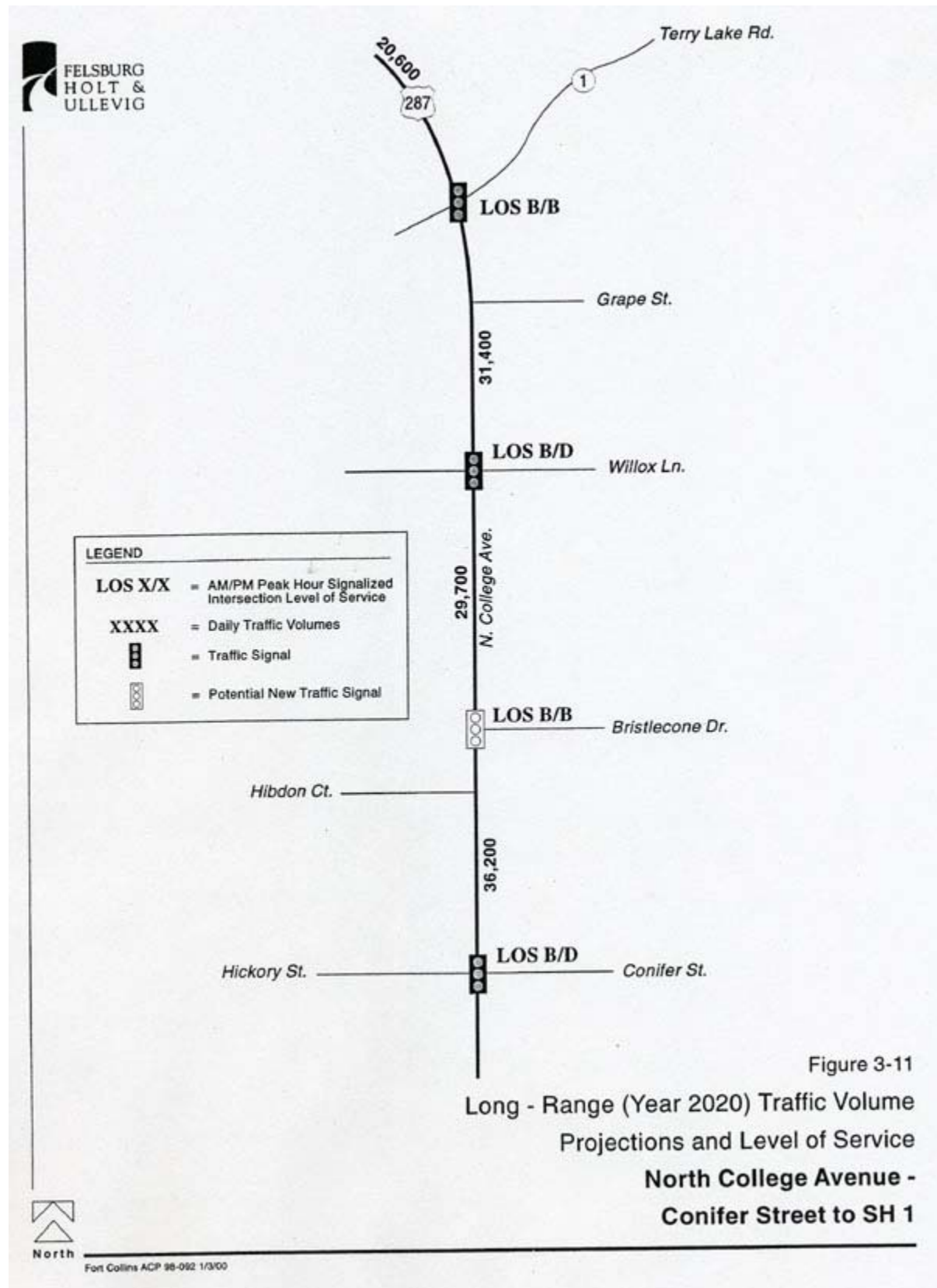
A level of service was calculated for each of the signalized intersections for both the Short-Term and Long-Range scenarios using peak hour turning movement projections. The City of Fort Collins and CDOT defines an acceptable peak hour LOS as being LOS D or better. Levels of service for each of the signalized intersections were calculated by optimizing traffic signal operations. The results of the level of service analyses follow.

Short-Term Access Control Plan - Projected levels of service indicate that LOS D or better can be achieved at each of the existing traffic signals along the corridor, thereby meeting the City's and CDOT's minimum evaluation criteria. A second southbound left turn lane should be provided at Jefferson Street to improve the capacity of this movement, however. It is also recommended to modify the existing intersection to include signalization and/or geometric improvements for the right turn movement from westbound Jefferson Street to northbound North College Avenue. The objective would be to eliminate an existing weaving pattern between Jefferson and Cherry Streets on northbound North College Avenue. Currently, motorists make right turns from Jefferson Street onto northbound North College Avenue, then weave across two through lanes of travel to access the left turn lane for movements onto Cherry Street. The weave occurs in approximately 375' or less if there are vehicles already in the left turn lane. As traffic volumes increase along North College Avenue, it is anticipated that the accident potential in this area will increase if the weaving movement remains.









Long-Range Access Control Plan - The long-range plan estimates that two new traffic signals will be in place by the Year 2020, at Bristlecone Drive and at Pinon Street. Projected levels of service indicate that LOS D can be achieved with some operational and physical improvements to intersection approach laneage, including:

- Remove the northbound left turn lane at Cherry Street to provide additional area for extending the southbound left turn lanes at Jefferson Street. Projected Long-Range traffic volumes indicate that additional storage capacity will be required by the Year 2020.
- Widen eastbound Cherry Street and westbound Willow Street so that an exclusive through lane can be provided on Cherry Street and change the traffic signal operating parameters.
- Reconstruct the Hickory and Conifer Street “T” intersections to create one four-legged intersection. Two through lanes and two left turn lanes are recommended for the Hickory and Conifer Street approaches to the intersection.
- Construct an exclusive westbound right turn lane at the Willox Lane intersection.
- Install a protected left turn phase (green arrow) for the westbound approach at the SH 1 intersection.

Traffic Signal 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.

An evaluation of North College Avenue was conducted for both the Short-Term and Long-Range scenarios. The results of the evaluation conclude that vehicle progression does not currently, or in the Short-Term scenario, meet minimum CDOT Code requirements for good vehicle progression; however, the evaluation also concludes that the removal of one traffic signal (when Conifer and Hickory Streets are aligned) and the addition of two new traffic signals (at Bristlecone Drive and Pinon Street) as part of the Long-Range plan will not decrease the progression efficiency along the corridor (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 evaluates 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 a signalized intersection. The analyses indicate that LOS C or better can be achieved for the southbound direction, while LOS D or better can be achieved for the northbound direction of travel along North College Avenue between the signalized intersections of the corridor.

Functional Street Classification

The Year 2020 projected traffic volumes were used to develop a recommended plan for the classification of the new north/south parallel street system. The City uses the following traffic volume thresholds to classify new streets:

- Major Arterial: >35,000 vpd
- Arterial: 15,000 vpd to 35,000 vpd
- Minor Arterial: 3,500 vpd to 15,000 vpd
- Collector without Parking: 3,500 vpd to 5,000 vpd
- Collector with Parking: 2,500 vpd to 3,500 vpd
- Connector Local: 1,000 vpd to 2,500 vpd
- Local: <1,000 vpd

The projected traffic volumes would indicate that each of the north/south segments of the parallel street system could be classified as either a Connector Local, Collector with Parking or a Collector without Parking. To provide a level of consistency along the entire length of the north/south parallel street system, it is recommended to classify all of the street segments as Collector without Parking.