CHAPTER 7 – STREET DESIGN AND TECHNICAL CRITERIA
TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Figures are Located at End of Chapter

CHAPTER 7 – STREET DESIGN AND TECHNICAL CRITERIA

7.1 GENERAL

This chapter defines layout criteria and other design criteria that shall be followed for locating and designing all streets. The chapter provides the following information:

- How streets are to be located (layout criteria);
- Street classifications and purposes; and
- Minimum design criteria that must be met.

7.1.1 Conforming to Standards and Master Plans

The Project's street design and layout shall conform to these Standards and with the Local Entity's Transportation Master Plan (TMP) and other applicable plan documents such as Master Plans, Corridor Plans, Area Plans, codes and standards adopted by the Local Entity.

7.1.2 Construction Drawings Relating to Chapter 7

Appendix A includes Construction Drawings that are a part of these Standards. Note that "F" and "L" denote Fort Collins or Loveland on drawings that are specific to just one Entity and its related Growth Management Area. Please refer to the Construction Drawing List at the beginning of **Appendix A**.

7.2 STREET LAYOUT REQUIREMENTS

The locations of Major streets shall be in accordance with the TMP. Other streets shall be located in accordance with all other applicable street layout requirements.

7.2.1 Logical Placement and Extension

All streets shall have a logical relationship to the existing topography and to the location of existing or platted streets within adjacent properties. Certain streets within the Project may need to be extended to the Project boundary to provide for the future logical extension of the street through adjacent properties. Signs shall be placed at the end of roads planned for future road extensions (see Drawing 1412L).

In the City of Fort Collins, street layout shall conform to the Connectivity and Block Size Standards in the *City of Fort Collins Land Use Code*.

To ensure connectivity, enhance general circulation and to provide secondary points for access, the street layout for all subdivisions should include the following connecting street spacing:

A. Fort Collins (city limits only)

At least one connecting street to neighboring vacant land for every 660 feet in Fort Collins (city limits only).

B. All Other Urban Areas

At least one connecting street to neighboring vacant land for every 1320 feet in all other areas.

7.2.2 Master Planned Arterial and Major Collector Streets

The TMP for each Local Entity shows the approximate locations of all Arterial streets and some Collector streets for the Local Entity and its Growth Management Area (GMA). The TMP shall be used for establishing approximate locations of Major streets. The Local Entity Engineer shall hold approval authority for specific locations for all Arterial and Collector streets.

A. Transportation Master Plan (TMP) Documents

The relevant TMP documents for each Local Entity are as follows:

1. City of Fort Collins current Master Street Plan.
2. City of Loveland current Transportation Plan
3. Larimer County Transportation Plan.

B. Larimer County will use each Local Entity's current Master Street Plan to identify a road's classification and determine a road's right-of-way and typical sections within their respective Growth Management Areas. However, Larimer County reserves the right to use the classification shown on the Larimer County Road Functional Classification Map.

C. New Streets

New Arterial streets are unlimited in continuity. The maximum permitted length between 90 degree turns and sign-controlled or roundabout intersections is 2 miles on Major Collector streets.

7.2.3 Local and Minor Collector Streets

Layout of new Local streets and Collector streets not covered by the Local Entity's TMP shall meet the needs of the specific development and satisfy all other specific requirements of this chapter. The Local Entity retains the authority to designate Collector streets and to approve the overall street layout.

A. Neighborhood Traffic Safety and Traffic Calming

A major component in street layout is neighborhood traffic safety. This is an essential transportation issue in the Larimer County urban areas. Traffic calming is the implementation of physical and perceptual techniques intended to slow or divert traffic on existing or planned roadways. It is often a reactive approach to minimize high speeds and volumes of vehicular traffic. Significant efforts in traffic calming have been put forward on existing Roadways and in the development of new Roadways to limit traffic speeds and traffic volumes in neighborhoods and to provide for safer travel for all modes of transportation including pedestrian, bicycle, and vehicular. In addition, new streets shall be laid out to minimize opportunities for cut-through traffic. See **Chapter 18, Neighborhood Traffic Safety**.

B. Roadway Use

The necessity or desire for traffic safety and calming stems from the perception that at times Local roadways, particularly in residential areas, do not function as they are intended. Local Roadways are intended as a low volume roadways used for direct access to residences fronting on the street and as a multi-modal system that is shared by vehicular, bicycle, and pedestrian traffic equally in a manner that minimally impact residents who reside in these areas.

C. Commercial

Commercial Local streets have less multi-modal conflicts and are permitted to have longer continuity and less restrictive traffic calming requirements.

D. Maximum Length

New Minor Collectors and Local streets are limited in continuity. The maximum permitted length between 90 degree turns and controlled intersections is 660 feet on local streets. The maximum continuous length for a Minor Collector is 2640 feet.

7.3 STREET CLASSIFICATIONS

All streets are classified as Arterial, Collector, Local streets, Lanes, or Alleys. These classifications relate to the function of the streets. Lower order streets function primarily as access to individual lots, and higher order streets function primarily for the purpose of mobility (expeditious movement of people and goods). Each Local Entity has adopted an expanded classifications system that is to be used within their respective jurisdictions.

Each classification used must conform with the Local Entity TMP, when applicable, and meet all of the criteria for the specific classification. The primary test for the new streets not shown on the Local Entity's TMP shall be the anticipated traffic volumes for the desired classification (refer to **Chapter 4, Transportation Impact Study,** for traffic study requirements).

7.3.1 Street Classifications for Each Local Entity

A. City of Fort Collins Classifications

Figures 7-1F through **7-13F**, located at the end of this chapter, show street classifications and specific requirements for Fort Collins (city limits and GMA). provides a summary of the classification requirements. In Fort Collins (city limits and GMA), variations of these classifications may be approved with the adoption of subarea plans and other specific plans of the Local Entity. Classifications and related figure numbers are as follows:

Figure No.	Street Classification
Figure 7-1F	6-Lane Arterial Street
Figure 7-2F	4-Lane Arterial Street
Figure 7-3F	2-Lane Arterial Street
Figure 7-4F	Major Collector Street
Figure 7-5F	Minor Collector Street
Figure 7-6F	Commercial Local Street
Figure 7-7F	Industrial Local Street
Figure 7-8F	Connector Local Street

Figure 7-9F	Residential Local Street
Figure 7-11F	Alley (A) (Drainage to Center)
Figure 7-12F	Alley (B) (Drainage to One Side)
Figure 7-13F	Rural Residential Local Street

B. City of Loveland Classifications

Figures 7-1L through **7-11L**, located at the end of this chapter, show street classifications and specific requirements for Loveland (GMA and city limits). **Table 7-2** provides a summary of the classification requirements. Classifications and related figure numbers are as follows:

Figure No.	Street Classification
Figure 7-1L	6-Lane Arterial Street
Figure 7-2L	4-Lane Arterial Street
Figure 7-3L	2-Lane Arterial Street
Figure 7-4L	Major Collector Street/Commercial Collector Street
Figure 7-5L	Minor Collector Street
Figure 7-6L	Commercial/Industrial Local Street
Figure 7-7L	Residential Local Street
Figure 7-8L	Lane
Figure 7-9L	Alley (A) (Drainage to Center)
Figure 7-10L	Alley (B) (Drainage to One Side)
Figure 7-11L	Rural Road

7.4 GENERAL DESIGN ELEMENTS

All streets shall be designed in accordance with design speeds specified for each street classification in the above-referenced figures and **Table 7-3** or **Table 7-4**.

7.4.1 Alignment

Horizontal and vertical street alignments should conform to existing land layout plus the following criteria:

A. Horizontal Alignment

On Arterial and Major Collector roadways, curve radii and tangents shall be as large as possible using the minimums only where necessary. However, minimum radius curves shall be used on Local Residential, Minor Collector, and Connector Local streets unless otherwise required. Angle point direction changes are not allowed. All changes in direction shall be made using standard curves.

1. Horizontal Curve Radii. The minimum allowable centerline radii for horizontal curves shall be as designated in **Table 7-3** or **Table 7-4**. Reverse and compound curves should be used only when a single radius curve will not work. For driver safety, compound curves shall have a ratio no greater than 1.5 where the value of the larger radius is divided by the smaller radius.
2. Minimum Tangent Length
   a. Intersection. Whenever a street intersects a street of higher or equal classification, a tangent length (as measured in a straight line from the nearest gutter flowline of the intersected street to the point on the centerline of the

intersecting street) shall be provided for safe sight distance and safe traffic operation. The minimum required tangent lengths indicated in **Table 7-3** and **Table 7-4** apply to the, the leg(s) for which the crown is not carried through the intersection. The angle of departure shall not exceed 10 degrees for the length of tangent. Alternatively, in constrained re-development areas, with approval of the local entity engineer, all or a portion of the minimum tangent length may be measured within a curve so long as the there is no more than a 10-degree departure from the point where the curve centerline intersects the gutter flowline of the intersected street.

b. Reverse Curves. The tangent between reverse curves shall be no less than the length shown in **Table 7-3** and **Table 7-4**.

Table 7-1
Fort Collins (GMA and City Limits)Street Standards - General Parameters

Street Classification:	6-Lane Arterial	4-lane Arterial	Modified 4-lane Arterial *n	2-lane Arterial	Major Collector (without parking)	Minor Collector (with parking)	Commercial Local	Industrial Local	Connector Local	Residential Local	Alley *a	Rural Residential Local
Right-of-Way (ROW) Width	141'	115'	102'	84'	69'	81'	77'	71'	63'	57' *m	12'- 20'	46'
Roadway Width	107'	83'	74'	52'	42'	54'	50'	44'	36'	30'	12'-20'	28'
Median Width	19'&7' *b	19'&7' *b	Optional *c	None	Optional *c	Optional *c	Optional *c	Optional *c	Optional *c	None	None	Optional *c
No. of Travel Lanes	6	4	4	2	2	2	2	2	2	1	1	2
Travel Lane Width *p	11'-12'	11'-12'	11'	11'	11'-12' *d	11'	10'	11'12'	10'	16'	12'-20'	0
Designated Bike Lanes?	Y	Y	Y	Y	Y	Y	Y	N *e	N *e	N *e	N *e	N *e
Bike Lane - width (P)rotected, (B)uffered	7' P	6' B	6.5' *o B	7' B	7' B	5' w/parking 6' w/lt turn' B	7' or 8' *h B	0'	0' or 6' *f B	0' *i	0'	0'
Parking Lane Width	None	None	None	None	None	8' or None *j	7' or None *j	10'	8' or None *j	7'	None	Not Defined
Lane Striping Req'd (T)ravel, (B)ike, (P)arking	T,B	T,B	T,B	T,B	T,B	T,B,P	T,B/P or T,B	None	T,P or None	None	None	None
Min. Parkway Width	10'	10'	8'	10'	8'	8'	8'	8'	8'	8' *m	NA	9'
Min. Sidewalk width * k	7'	6'	6'	6'	5'	5'	5'	5'	5'	5'	None	None
Left Turn Lanes Req'd?	Y	Y	Y	Y	N or Y *d	N or Y *j	N or Y *j	N	N or Y *j	N	NA	N
Left Turn Lane Width	12'	12'	11'	11'	0' or 12'	0' or 12'	0' or 12'	0'	0' or 10'	0'	NA	0'
Speed Limit, mph	40 - 45	35 - 45	35 - 45	30-45	30 – 35	25 - 30	25	25	25	25	15	25
Fence minimum setbacks, feet from parkway edge of sidewalk	10'	8'	8'	8'	7'	7'	7'	6.5'	6.5'	6.5'	3' or 8' *l	9' *d
Driveway & Street Access	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Unlimited	Unlimited	Unlimited	Unlimited
Curb & Gutter Vertical or Driveover	V	V	V	V	V	V	V	V	V	V or D	V or D	V or D

*a The maximum length of an Alley shall be 600 feet.
*b Medians shall be 19' wide standard width or 7'wide where a 12' left turn lane is needed.
*c Additional street width shall be required for development requested medians.
*d To provide left turn lanes at intersections, 8' additional roadway width is required to provide an 12' wide left turn lane with 5' buffered bike lanes and 11' travel lanes.
*e Bikes share travel lanes with motor vehicles.
*f If bike lanes are required, additional street width will be required to provide 6' wide bike lanes.
*g An 11' lane for shared parking and bikes is provided.
*h A 7' wide bike lane is provided when parking is removed for a left turn lane.
*i Additional street width up to 4' wider may be required in the travel lane to accommodate higher volumes of bike traffic within and leading to activity areas.
*j To provide left turn lanes at intersections, parking shall be removed.
*k Additional sidewalk width may be required to accommodate anticipated higher pedestrian traffic volumes within or leading to activity areas.
*l An 8' fence setback is required for a garage door setback of 8' from the alley ROW. With a garage door setback at 20' or greater, the minimum fence setback is 3' from the alley ROW.
*m To use driveover curb and gutter the parkway width must be widened by 1 foot, thereby increasing street ROW width by 2 feet to provide 53 feet.
*n The Modified 4-Lane Arterial is to be applied in constrained right-of-way situations and after review and approval of the City Engineer.
*o 6-ft bike lane is acceptable if built using a continuously poured concrete gutter pan
*p 11 foot lanes may be considered in constrained situations and upon review and approval by the City Traffic Engineer

Table 7-2
Loveland (GMA and City Limits) Street Standards - General Parameters

Street Classification:		Major Arterial (4-6 Lanes)	Minor Arterial (2 Lanes)	Major Collector	Minor Collector	Local Com/Ind	Local Resid	Lane	Alley
Functional Parameters	**No. of Dwelling Units Served**	NA	NA	>300	101-300	NA	21-100	<50	–
	Average Daily Traffic At Build-out	16,001-48,000	7,001-16,000	3,001-7,000	1,001-3,000	201-1,000	201-1,000	Max. 200	Max. 200
	Access	See Table 7-4	See Table 7-4	1 forward access per lot (if access cannot be provided from a lower classification	Max. 2 per Street Frontage	No limit	No limit	No limit	No limit
	Continuity (see definitions)	Unlimited	Unlimited	2 miles	2640' Max	660' Max	660' Max	660' Max	660' Max
Land Use Requirements	**Min. right-of-way**	120' or 140' [5,11]	100'	80'	60'	60'	58'	50'	16'-20'
	Min. Utility (Each Easement Side)	14'	14'	14'	14'	14'	14'	14'	10'
Geometric Parameters	**Minimum Street Width (Flowline to flowline)**	80'-116' [4,12]	40'-56' [4]	48' (w/parking) 38' (no parking)	38' (w/parking) 36' (no parking)	38' (w/parking)	34' (w/parking)	34' (w/parking) 28' (restricted parking[7])	16'-20' (in 16'-20' ROW[8])
	Min. Lane Width[9]	12'	12'	12'	11'	–	-	–	–
	Turn Lanes	Required[3]	Required[3]	Not Req.	Not Req.	Not Req.	Not Req.	Not Req.	Not Req.
	Bicycles	5'-7' lane	5'-7' lane[2]	5'-7' lane[2]	5'-7' lane[2]	Share Street	Share Street	Share Street	Share Surface
	Sidewalk Width[1]	6' min.	6' min.	6' min.	6' min.	5' min.	5' min.	5' min.	NA
	Sidewalk Location	Detached by 10' min.	Detached by 10' min.	Detached by 6' min.	Detached by 6' min. [6]	Detached by 6' min.	Detached by 6' min.	Detached by 5' min.	NA
	Curb Type	Vertical	Vertical	Vertical	Vertical, Drive over or Rollover	Vertical, Drive over or Rollover	Vertical, Drive over or Rollover	Vertical, Drive over or Rollover	

1 Sidewalk may not be required in industrial zones with initial development
2 5' width exclusive of gutter
3 Left turn lanes always required, right turn lanes required if TIS indicates need.
4 Minimum widths must be increased to provide auxiliary turn lanes where needed
5 Required on Taft Ave., Wilson Ave., Eisenhower Blvd., Hwy 287, and 14th St. SW
6 Sidewalks may only be attached when adjacent to single family residential homes through a formal variance per LCUASS Section 1.9.4.
7 One side only
8 May be reduced to 16' when necessary due to existing obstructions (power poles, etc.)
9 Lane width is measured from lip of gutter to center of lane stripe.
10 Commercial / Industrial area
11 This width includes turn lanes and minimum right-of-way at the intersection
12 This width includes turn lanes and double lefts at the intersection

Table 7-3
Fort Collins (GMA and City Limits) Street Standards - Technical Design Criteria

Design Element		Arterial				Collector		Local		Alley
		4 or 6 lane		2 lane		Major	Minor	Comm/Industrial	Residential	
Overall Design Parameters										
Design Speed / Posted Speed		50/40-45 (6) 50/35-45 (4)		50/30-45		40/30-35	40/25-30	30/25	30/25 connector 25/25	15
Stopping Sight Distance		425		425		305	305	200’	200’	80
Horizontal Alignment										
Minimum centerline radius (with no super-elevation)		1075’		1075’		600’	600’	275’	275’ connector 165’	50’
Maximum super-elevation		0.04 ft/ft		0.04 ft/ft		0.04 ft/ft	NA	NA	NA	NA
Minimum tangent between curves or at intersections [1]		200’		200’		150’	100’	100’	100’	20’
Vertical Alignment										
Maximum Centerline Grade		5%		5%		6%	8%	8%	8%	8%
Minimum Gutter Flowline Grade		0.5%		0.5%		0.5%	0.5%	0.5%	0.5%	0.5%
Minimum K-values for Vertical Curves	Crest	84		84		44	44	19	19 connector 12 all others	3
	Sag	96		96		64	64	37	37 connector 26 all others	10
Intersection Design										
Minimum sight distance at driveways and intersections		1030’		1030’		660’	660’	310’	260’	210’
Access Management		Without Raised Median	With Raised Median	Without Raised Median	With Raised Median					
Distance between intersections[2]	Signalized	2640’[5] Min.		2640’[5] Min.		NA	NA	NA	NA	NA
	Unsignalized	460’ – 660’ [5] 1320’[6] Min.	460’ – 660’ [5] 660’[6] Min.	460’ – 660’ [5] 1320’[6] Min.	460’ – 660’ [5] 660’[6] Min.	330’ Min.	250’ Min.	200’ Min.	200’ Min.	NA
Distance between high volume driveways and intersections[2]		460’ – 660’ [5] 1320’[6] Min.	460’ – 660’ [5] 660’[6] Min.	460’ – 660’ [5] 1320’[6] Min.	330’ Min.	200’ Min.	175’ Min.	175’ Min.	150’ Min.	NA
Distance between driveway edges		460’ – 660’ [5] 660’[6] Min.	460’ – 660’ [5] 660’[6] Min.	460’ – 660’ [5] 660’[6] Min.	330’ Min.	75’ Min.	30’ Min.	30’ Min.	12’ Min.	No limit
Corner clearance between driveways/alleys & street intersections[2]		460’ – 660’ [5]		460’ – 660’ [5]		175’ Min.	100’ Min.	175’ Min.	50’ Min.	40’ Min.
Driveway approach street config. [3]		Radial curb return		Radial curb return		Curb cut [4]	Curb cut [4]	Curb cut [4]	Curb cut [4]	Curb cut [4]

1 Intersection tangents are measured from flowline of the intersected street at intersections. Note: Two curves in the same direction must be separated by a tangent at least two times the minimum tangent lengths shown in Table 7-3 and Table 7-4.
2 These distances are measured as shown in Figure 9-1.
3 Table indicates residential driveways. All commercial driveways shall be constructed with radial curb returns (see Section 9.3.2).
4 Radial curb returns are also allowed where traffic volumes meet the requirements for a High Volume Driveway.
5 For a distance less than 460’ an administrative variance must be approved by the Local Entity Engineer; for a distance greater than 660’ a modification in accordance with the Land Use Code will be required.
6 Minimum spacing for full movement and/or potentially signalized intersections

Table 7-4
Loveland (GMA and City Limits) Street Standards - Technical Design Criteria

Design Element		Arterial				Collector		Local		Lane	Alley
		4 or 6 lane		2-lane		Major	Minor	Comm/Industrial	Residential		
Overall Design Parameters											
Design Speed / Posted Speed		50/45		45/40		35/35	30/25	30/25	25/25	20/20	NA
Stopping Sight Distance		400'		325'		275'	200'	200'	150'	125'	100'
Horizontal Alignment											
Minimum centerline radius (with no super-elevation)		1075'		825'		600'	275'	275'	165'	90'	50'
Maximum super-elevation		0.04 ft/ft		0.04 ft/ft		0.04 ft/ft	NA	NA	NA	NA	NA
Minimum tangent between curves or at intersections [1]		200'		200'		150'	100'	100'	50'	0	0
Vertical Alignment											
Maximum Centerline Grade		5%		5%		6%	8%	8%	8%	8%	8%
Minimum Gutter Flowline Grade		0.5%		0.5%		0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Minimum K-values for Vertical Curves	**Crest**	84		84		44	44[6]	19[6]	19[6]	19[6]	12[6]
	Sag	96		96		64	64	37	37	26	26
Intersection Design											
Minimum sight distance at driveways and intersections		1030'		830'		660'	310'	310'	260'	210'	210'
Access Management		Without Raised Median	With Raised Median	Without Raised Median	With Raised Median						
Minimum distance between intersections[2]	**Signalized**	2640'		2640'		NA	NA	NA	NA	NA	NA
	Unsignalized	1320'[3]	660'	1320'[3]	660'	330'	250'	200'	200'	200'	NA
Minimum distance between high volume driveways and corner clearance between high volume driveways and intersections[2]		1320'[3]	660'	1320'[3]	660'	200'	175'	175'	150'	NA	NA
Minimum distance between driveway edges		660'	660'	660'	330'	75'	30'	30'	12'	12'	No limit
Minimum corner clearance between driveways or alleys and intersections[2]		1320' [3,4]		660'		175'	100'	100'	80'	60'	50'
Driveway approach configuration		Radial curb return		Radial curb return		Curb cut [5]	Curb cut [5]	Curb cut [5]	Curb cut [5]	Curb cut [5]	Curb cut [5]

[1] Tangents are measured from flowline of intersecting street at intersections. See Section 7.4.1, A, .2. for more information.
[2] These distances are measured as shown in Figure 9-1.
[3] Only allowed if shown to comply with ACF ordinances.
[4] 600' for speeds ≤ 45 mph subject to Traffic Impact Study findings.
[5] Radial curb returns are also allowed.
[6] AASHTO values may be used within 100' of controlled intersections, or other locations where speeds are reduced.

c. Broken Back Curves. Two curves in the same direction (broken back curves) shall be separated by a tangent with a length of at least 2 times the minimum length shown in **Table 7-3** and **Table 7-4**.

3. Consistent Radii. All curves along a street shall be designed with radii that are approximately equal. The purpose of this limitation is to provide consistency and minimize unexpected difficult or quick maneuvers for the driver.

4. Curves with Small Deflection Angles (10° or less). To reduce the appearance of kinks in the street, minimum lengths of curve shall be designed with minimum arc lengths as shown in **Table 7-5**.

Table 7-5
Centerline Arc Lengths

Street Classification	Minimum Centerline Arc Length (ft.)
Arterial	400
Collector	300
Local, Commercial & Industrial	200
Local, Residential	100

5. Horizontal Curves on Vertical Curves. For driver safety, horizontal curves shall not begin near the top of a crest vertical curve nor near the bottom of a sag vertical curve.

6. Transitions for Roadway Shifts or Lane Drops. Refer to requirements for redirect /approach and bay taper, **Figures 8-2 and 8-3**.

7. Coefficient of Friction. The coefficient of friction shall conform to the values in Figure III-1 of the **AASHTO "Green Book."**

8. Off-Site Design Centerline, Flowlines and Cross Sections. To assure that future street improvements will meet these Standards, the centerline, flowline, and cross sections of all streets, except cul-de-sacs, shall be continued for 500 feet beyond the proposed construction. The grade and ground lines of all Arterials shall be continued an additional 500 feet for a total of 1000 feet beyond the end of the proposed construction.

9. Joining Existing Improvements. Connection with existing streets shall be made to match the existing alignment grade of the existing improvements, in accordance with horizontal alignment criteria.

10. Street Widening at Turns. See **Section 7.6.3**

B. Vertical Alignment

1. Maximum and Minimum Grades for Streets. The maximum and minimum grades for specific street classifications are shown in to **Table 7-3** and **Table 7-4**. The

centerline grade in the bulb of a cul-de-sac shall not exceed 3 percent. For Fort Collins (city limits only), the flowline grade in the bulb of a cul-de-sac shall be a minimum of 1 percent. Where sidewalks and/ or ramps cross the flowline ADA requirements shall be met for the flowline grades.

2. Minimum Flowline Grades. Minimum flowline grades for gutters shall be 0.50 percent, except the bulb of cul-de-sacs where the minimum shall be 1.0 percent.
3. Grade Breaks. No single point grade break shall exceed 0.50 percent, except for the flow line in sag curves where the maximum grade break is 1.0%. In curb returns, a grade break may be as great as 3.0% for extreme circumstances. Grade breaks, except for those located within curb returns shall be spaced at least 25 feet apart.
4. Requirements for Using Vertical Curves. Vertical curves are required for grade changes that exceed 1.0 percent. Both centerlines and the curb and gutter flowlines shall be designed with vertical curves to meet the requirements of **Figures 7-17** and **7-18.** A series of grade breaks may be used in lieu of a specified vertical curve as long as the series of breaks meet the vertical curve criteria in these Standards for the design speed. K-values for design shall conform to **Table 7-3** or **Table 7-4.** No grade changes are allowed at the beginning or end of a vertical curve; the curve information shall be based on the curve going into or out of the vertical curve. In sag curves on flow line, the minimum grade requirement shall override the slope within the vertical curve.
    a. Minimum Length Crest and Sag. **Figures 7-17** and **7-18** give minimum length of crest and sag vertical curves for various algebraic differences in grade. Street designs shall meet or exceed these minimums. Within the intersection transition of stop-controlled intersections, shorter vertical curves may be considered on a case-by-case basis.
    b. Crest Curves. For crest curves, the street centerline, curb, and gutter shall be designed with vertical curves in accordance with minimum requirements shown on **Figure 7-17**. K-values for design shall conform to **Table 7-3** and **Table 7-4**.
    c. Sump Sag Curves. For sag curves the street centerline shall be designed with a vertical curve with minimum length as shown on **Figure 7-18**. The minimum flowline grade on a sag curve shall be 0.5 percent. Curb and gutter shall be constructed with no vertical curve in these areas. The grade into an inlet located in a sump shall have a .5 percent grade into and out of the inlet. The inlet(s) themselves in these situations do not need to meet the minimum flowline grades.
5. Joining Existing Improvements. Connection with existing streets shall be made to match the existing grade of the existing improvements, in accordance with vertical alignment criteria. (Grade breaks shall not exceed allowable.)
6. Vertical Clearance. Vertical clearance above a roadway is a minimum of 16.5 feet.
7. Intersection Approach Grades. Intersection approach grades are discussed in **Chapter 8, Intersections**.
8. Off-Site Continuance of Grade and Ground Lines. To assure that future street improvements will meet these Standards the centerline and flowline profiles, the

grade and ground lines of all local and collector streets, except cul-de-sacs, shall be continued for 500 feet beyond the proposed construction. The centerline and flowline profiles, the grade and ground lines of all Arterials shall be continued 1000 feet beyond the end of the proposed construction.

C. Sight Distance

Sight distance is the distance necessary for a vehicle operator to perform expected functions and be able to do so without causing a hazard for the driver or other vehicle operators for the specific design speed of the street. Vehicles shall perform moves without causing other vehicles to slow from the average running speed. In no case shall the distance be less than the stopping sight distance. This includes visibility at intersections and driveways as well as around curves and roadside encroachments.

1. Stopping Sight Distance for Vehicle Crest Curves. Stopping sight distance is calculated as follows:

   Object height is 2.00 feet above road surface and viewer's height is 3.50 feet above road surface. Stopping Sight Distance on Horizontal Curves. Where an object off the pavement restricts sight distance, the minimum radius of curvature is determined by the stopping sight distance (see **Figures 7-15.1**and **7-15.2**). In no case shall the stopping sight distance be less than as specified in **Table 7-3** or **Table 7-4.** The sight distance design procedure shall assume a 6-foot high fence (as measured from actual finished grade) exists at all property lines except in the sight-distance easements that may be required to preserve the needed sight distance.

   Stopping sight distance on horizontal curves is based upon lateral clearance from the inner edge of pavement to sight obstruction, for various radii of inner edge of pavement and design speeds. The position of the driver's eye and the object sighted shall be assumed to be 6 ft. from the inner edge of pavement, with the sight distance being measured along this arc. Stopping sight distances are given in **Table 7-6**.

Table 7-6
Stopping and Passing Sight Distance

Design Speed (Mph)	Stopping Sight Distance (feet)	Passing Sight Distance (feet)
20	115	400
25	155	450
30	200	500
35	250	550
40	305	600
45	360	700
50	425	800
From latest edition of the AASHTO **"Green Book" Table 3-1 and Table 3-5** (For Intersection and Driveway Sight- Distance, see **Figure 7-16.**)		

2. Passing Sight Distance (Rural Applications Only). Two-lane roads shall provide adequate passing zones. Required passing sight distance for given design speeds is

given in **Table 7-6**. Passing zones are to be provided on 2 lane roads, which may be classified as 4 and 6 lane Arterials and occasionally on 2-lane Arterials and Major Collectors.

3. Corner Sight Distance. The corner sight distance provides for vehicles to enter traffic and accelerate to the average running speed. Corner sight distance shall be measured as shown in **Figure 7-16**.
4. Sight Distance Triangles and Easements. All sight-distance easements must be shown on the street plan/profile plans. All sight distances must be within the public right-of-way or a sight distance easement. If the line of sight crosses onto private property, a "Sight Distance Easement" shall be dedicated to provide the required sight distance. The easement or right-of-way shall be dedicated to the Local Entity, however, maintenance shall be noted on the final plat as the responsibility of a private entity such as the property owner or the home owners association.
5. Sight Obstructions. Any object within the sight distance easement more than 30 inches above the flowline elevation of the adjacent street shall constitute a sight obstruction, and shall be removed or lowered. Such objects include but are not limited to berms, buildings, parked vehicles on private property, cut slopes, hedges, trees, bushes, utility cabinets or tall crops.

   Mailbox clusters must be installed a minimum of 2 feet from back of walk and not cause any sight obstruction. Mailboxes must not pose a fixed object hazard for vehicles and pedestrians. Since parked vehicles are under the control of the Local Entity, parked vehicles shall not be considered an obstruction for design purposes. The city may limit parking to protect visibility. The sight distance shall be measured to the centerline of the closest through-lane in both directions.

   In no case shall any permanent object encroach into the line-of-sight of any part of the sight-distance triangle. Street trees required by the Local Entity are excepted from this requirement. Trees are permitted if pruned up to 8 feet.
6. Sight Distance (City of Loveland and Loveland GMA only). In addition to the sight distance triangle requirements, a clear space zone is required within all curb returns (measured from point of curb return to point of curb return) where no trees, shrubs, aesthetic structures/features, monument signs, or objects that have the potential to hinder driver visibility, and/or pedestrian and bicycle safety, are allowed. See Figure 7-34L.

D. Interim Pavement Edge

In situations where curb and gutter are not installed along the roadway edge and/or in situations where the full street widening in accordance with the Street Classification is not being constructed, an asphalt shoulder shall be provided that is the same width as existed prior to construction or 4 feet, whichever is greater. A minimum 2-foot gravel shoulder shall be provided beyond the edge of asphalt.

7.4.2 Cross Slope

Cross slope on a pavement is provided to drain water from the street surface. The design of cross slope shall consider driver comfort and safety.

A. Minimum Cross Slope

A minimum cross slope on all streets shall be 2.0 percent. Minimum cross slope on reconstruction or overlays is 1.5 percent.

B. Maximum Allowable Cross Slope

Maximum allowable cross slope on all new construction shall be 3 percent. Maximum allowable Cross Slope on any reconstruction or overlays of existing roadways shall be 4 percent.

C. Cross Slope for Street Modifications

When widening an existing street or adding turn lanes to an existing street, the resulting cross slope of the widened portion shall be within the limits stated above and the new Cross Slope shall be no less than the existing cross slope.

However, if the cross slope of the existing street exceeds the Standards then new curb and gutter shall be designed such that the existing pavement, when overlaid, will result in a straight line cross slope grade that meets these Standards. Alternatively, the existing pavement may be removed and reprofiled to comply with these Standards.

D. Cross Slope for Cul-de-Sacs

Refer to **Figure 7-19** for cul-de-sac bulb cross slopes.

7.4.3 Superelevation on Horizontal Curves

The purpose of superelevating a roadway is to maintain the riding comfort on smaller than standard curves. Superelevation may only be used when other means of design will not work. If superelevation is necessary, the following criteria shall be followed:

A. Where Superelevation Is Permitted

Superelevation may be allowed for curves on Arterial and Major Collector streets in order to reduce the minimum centerline radius. In no case shall superelevation exceed 4.0 percent cross slope. As specified in **Table 7-3** or **Table 7-4**, superelevation shall not be used to reduce minimum radii on Local or Minor Collector Streets.

B. Run-Out

When superelevation is used, a minimum 100-foot run-out shall be used entering and exiting the superelevated portion.

C. Drainage

Where the superelevation is used, the gutter shall always be an inflow type. The water must enter a storm sewer system or other acceptable outlet from the street rather than crossing the street in sheet flow or in crosspans.

7.4.4 Design Speed

Each roadway classification has a specific design speed. See **Table 7-3** or **Table 7-4**.

7.4.5 Curb Return Radii

The required curb return radii are defined in **Table 8-1** or **Table 8-2,** unless otherwise approved or required by the Local Entity Engineer.

7.4.6 Streetscape Design

For all street landscaping standards, including median and parkway sections within the Fort Collins (city limits only), see **Appendix C,** ***City of Fort Collins Streetscape Design Standards and Guidelines.***

7.5 MEDIANS

7.5.1 Medians

A. General Requirements

General criteria for medians are specified on **Figures 7-1 through 7-13.** In Loveland (GMA and city limits) painted or raised medians are required on all Arterial Streets. In Fort Collins (GMA and city limits) raised medians are required on all 4-Lane and 6-Lane Arterial Streets. Other medians may be required by the Local Entity Engineer for specific circumstances to control traffic. Medians requested by Developers may be approved as long as additional right-of-way are dedicated and all maintenance shall be done by viable private parties.

1. Refer to **Construction Drawings 704, 705, 801** for design and construction details on medians.
2. The minimum width of any raised median shall be 4 feet wide. See **Construction Drawing 801**.
3. Raised center medians shall have an 8-inch-high curb measured from the pavement surface (Loveland City Limits and Loveland GMA only).

B. Turn Lane and Access

The design of medians shall include the evaluation for needed turn lanes and accesses. For the minimum requirements of turn lanes, refer to **Chapter 8, Intersections**.

C. Drainage

Landscaped medians shall be provided with drainage facilities to handle sprinkler runoff and nuisance flows. Sprinklers shall be designed to prevent spray onto the pavement surface. Refer to Local Entity requirements for specific median landscape design in **Appendix C**. A properly designed drain system shall be required.

D. Curb and Gutter

If gutters are not needed to handle drainage referenced above, medians may be constructed with barrier curb. All barrier curb shall be full depth and not glue down unless otherwise approved by the Local Entity Engineer

E. Nose

Use vehicle turning templates to determine the position of the median nose so that vehicles do not track onto the median. Refer to **Construction Drawing 703**.

The minimum radius for nose curbs shall be 2 feet to flowline. See **Construction Drawing 801**.

F. Paving

All non-landscaped areas of medians shall be paved with stamped concrete, brick pavers, concrete, or exposed aggregate concrete in accordance with streetscape standards of the Local Entity. Standard width medians shall be designed in accordance with streetscape standards for the Local Entity.

G. Transitions

The ends of medians shall transition into turn lanes with a minimum radius of 100 feet. A change of directions must be accomplished with the use of radii. Angle points shall not be allowed.

H. Objects

No permanent structures, including light poles, fire hydrants, trees, etc., shall be placed within 5 feet of the travel lane or in any location that would obstruct sight distance except for structures as approved in these Standards. If a median streetlight is placed within 5 feet of the travel lane, the light pole standard must be a breakaway model.

7.6 NON-CONNECTIVE STREET ALIGNMENTS

7.6.1 Cul-de-Sacs

Cul-de-sacs shall be used only where necessary.

A. Permitted Locations

Cul-de-sacs are permitted only on Local Streets in conformance with **Figures 7-19** and **7-21**. In Loveland (GMA and city limits) cul-de-sacs may conform to Figure 7-22L**.**

B. Maximum Length

The cul-de-sac shall have a maximum length of 660 feet, (400 feet in Loveland (city limits only)). If commercial sites or residences install fire sprinkler systems, the Local Entity may increase this length to 1,000 feet, or to 1,320 in Fort Collins (city limits only) in accordance with Local Entity Fire Standards.

C. Secondary Access in Loveland (GMA and City Limits)

Any cul-de-sac that does not meet the requirements of **Section 7.6.1 B** shall be provided with a secondary access road per **Section 7.8**.

D. Minimum Radius

The cul-de-sac shall have a minimum flowline radius per **Figures 7-21**.

E. Minimum Parking

A minimum of one parking space must be provided for each residence. All parking areas outside of the right-of-way shall have the appropriate easements and shall be maintained by private entities. Refer to **Chapter 19, Parking**.

7.6.2 Eyebrows

A. Permitted Locations

Eyebrows shall be permitted only on Local Streets that intersect Local Streets in conformance with **Figure 7-23**.

B. Spacing Requirements

The location of the Eyebrow shall be in conformance with spacing requirements in **Chapter 9, Access Requirements and Criteria**.

C. Permitted Lengths

Eyebrows shall be a minimum of 25 feet in length and a maximum of 100 feet measured along the flowline.

7.6.3 Turns

When a roadway width is less than 36 feet wide and the centerline radius is less than requirements of **Table 7-3** or **Table 7-4**, the requirements of Figure 7-24 shall be met for turns. No other widening (Knuckles) are permitted.

7.6.4 Dead-End Streets.

A. Permanent Dead-End Streets

New permanent dead-end streets are prohibited.

B. Temporary Dead-End Streets

Temporary dead-end streets will be permitted only on streets that have no direct access from adjoining property. Additionally, a temporary dead-end street shall be planned to extend into neighboring property during a later development phase or project. The road must be fully constructed to the property line, except in Loveland (GMA and city limits) where the length must exceed 150' before the temporary turnaround would be required).

1. Signage. Signage for temporary, dead-end Roadways shall be in accordance with **Chapter 14, Traffic Control Devices.**

C. Temporary Turnarounds

At locations where a street will be temporarily terminated with access provided from the street and the street is planned to be extended with future development, a temporary turnaround shall be constructed. The turnaround shall have a minimum radius of 50 feet to the edge of the completed dead-end street. Refer to **Figure 7-26** No curb and gutter is required on temporary turnarounds. Surface requirements of temporary turnarounds must be approved by the Local Entity Engineer.

D. Temporary Turnaround Easements

All temporary turnarounds shall be constructed within an access Easement. The Easement may be vacated by the Local Entity when the Easement is no longer necessary. Application for vacation of the easement must be initiated and paid for by the Developer or property owner.

7.7 DRAINAGE SYSTEMS

7.7.1 Drainage

Drainage system design shall be in accordance with current Local Entity storm drainage requirements.

7.7.2 Grading in Right-of-way

A. Slopes

The maximum slopes for all areas within the right-of-way or outside of the right-of-way that can affect the public improvements, shall be 4:1 unless designed with retaining walls. Any slopes proposed to exceed 4:1 must be proven to be stable and must be approved by the Local Entity Engineer. In general, retaining walls are discouraged and not allowed within the right-of-way. Refer to **Chapter 11, Structures** for design requirements. The minimum slopes in non-roadway areas shall be 2 percent unless otherwise allowed by the Local Entity Engineer. All areas shall be seeded or stabilized in accordance with these Standards or the requirements of the Local Entity Storm Water Utility, whichever is more conservative.

B. Off-site Fill Material

Any material from an off-site location to be used in right-of-way or areas within the influence area of the right-of-way must be tested and discussed within the Soils Investigation Studies. Refer to **Chapter 5, Soils Investigation** for specific requirements.

7.7.3 Subdrains

A. Controlling Groundwater

Subdrains used for the purpose of controlling groundwater on private property may be constructed within public right-of-way if certain criteria are met. The system shall be private and must be maintained by viable private parties and approved with an Encroachment Permit if applicable. Refer to **Chapter 12, Utility Locations,** for allowable locations within the right-of-way. Refer to **Chapter 5, Soils Investigations** for information on design criteria.

B. Protecting Right-of-way Improvements

Subdrains constructed for the purpose of protecting public right-of-way improvements may be installed only if other means are not possible. In Loveland (GMA and city limits) and Fort Collins (GMA only), subdrain systems must be owned and maintained by a private party other than the Local Entity.)

C. Design Criteria

1. All subdrains covered by these Standards shall be designed to meet the following criteria:

a. Positive Outfall: Demonstrate that subdrain has positive outfall for gravity drainage; prevent surcharging of subdrain.

b. Adequate Engineering: Demonstrate that the system has been designed in consideration of site-specific groundwater conditions, soil properties, topography, and layout of proposed development. Address maintenance aspects of recommended design.

c. Sanitary Sewer Kept Dry (minimize infiltration): Demonstrate that the subdrain system maintains adequate flow capacity under peak hydraulic loading rates to keep groundwater below the invert of the sanitary sewer.

d. No Offsite Transport: Show that the system will neither receive groundwater inflow from additional upstream developments, nor transfer collected groundwater to downstream developments.

e. Water Rights: The system shall be shown to create no injury to existing water rights or others on their property in the project vicinity.

f. One Year Monitoring After Construction: The system shall incorporate provisions to allow monitoring of groundwater levels to confirm that it is functioning as designed.

g. Design for Seasonal High Water: The system shall be designed in consideration of seasonal high groundwater levels anticipated at the project site.

h. Groundwater Barriers: The system shall be designed such that clay cutoff walls are provided at boundaries of the development to preclude hydraulic communication with offsite utility trenches either upstream or downstream.

i. Filter Fabric: The utility trench shall be lined with a filter fabric specifically selected in consideration of on-site soil conditions in order to minimize the invasion of fine soil particles into the bedding gravel.

j. Pipe Diameter: 8 inches minimum for mains; 3 inches minimum for laterals (pipe diameter shall be different from the sewer lateral).

k. Engineer and designer needs to show in the design how future tree roots will not negatively impact the subdrain (if applicable).

D. Subdrain Placement and Cleanouts

Construction Drawings 713.1F, 713.1L, 713.2F, and 713.2L show general requirements for subdrain placement, location of cleanouts and service.)

7.7.4 Sidewalk Culvert (Chases)

Storm water from concentrated points of discharge shall not be permitted to flow over sidewalks, but shall drain to the roadway by use of a sidewalk culvert or other methods approved by the Local Entity Engineer.

A sidewalk culvert shall not be located within a curb ramp, curb cut, or driveway. Sidewalk culverts shall only be allowed in special situations, on a case-by-case basis, as determined by the Local Entity Engineer. Sidewalk chase sections shall be constructed in accordance with **Construction Drawing 709.**

7.7.5 Crosspans

A. Basic Requirements

Crosspans for passing storm drainage flow across roadways shall be constructed in accordance with the **Construction Drawings 708 and 710**. The pans shall be a minimum of 6 feet wide with 7/8-inch typical catch. Mid-block crosspans shall be a minimum of 12 feet wide with 1-3/4 inches typical depth. Greater widths may be required by the Local Entity Engineer.

B. Dimensions and Depth

Crosspans shall be a minimum width of 6 feet and a 7/8-inch typical catch adjacent to residential streets. Crosspans adjacent to Collector streets shall be 8 feet wide with a typical depth of 1-1/8 inches and crosspans adjacent to an Arterial shall be 10 feet wide with a typical depth of 1-1/2 inches. Refer to **Construction Drawing 708**.

C. Prohibited on Arterial and Collector Streets

No crosspans are allowed to cross Arterial streets. No crosspans are allowed to cross Collector streets in Fort Collins (GMA and city limits).

D. Minimum Grade

Minimum grade on crosspans at flowline of pan shall be 0.5 percent.

E. Crosspan Transitions

The following criteria shall be followed for crosspan approaches:

1. Design Speeds. Pavement transition from standard crown to crosspan shall be designed using the appropriate design speeds as given in **Table 7-3** and **Table 7-4**.
2. Intersections. Transitions from standard crown to crosspan at intersections shall be designed in accordance with **Figures 7-27 and 7-28.** Details shall be prepared to show the elevations in the locations shown on **Figures 7-27 and 7-28**.
3. Pavement Material. In asphalt paved streets, approaches to crosspans shall be constructed with full depth asphalt wedges per **Construction Drawing 710.**

F. Monolithic Paving

If pavement is concrete, any drainage conveyance, such as crosspans, may be poured monolithically with the main line paving process.

7.7.6 Sidewalks, Curb and Gutter

A. Sidewalks

1. Typical Cross-Sections. Roadway typical sections that include sidewalks shall be as specified in this chapter. The typical cross-sections are summarized in **Figures**

7-1F through **7-13F** and **7-1L** through **7-11L and Construction Drawing 1601 and 1602.**

2. Other Sidewalk Requirements. Refer to **Chapter 16, Pedestrian Facilities,** for specific sidewalk requirements.

B. Curb and Gutter

Tables 7-1 and 7-2 and Figures 7-1 through 7-13 or the type of curb and gutter to be used for the various street classifications.

1. Drive-Over Curbs. Drive-over combination curb, gutter, and walk is permitted as indicated on Tables 7-1 and 7-2 and as indicated in the referenced Figures, on Local Roadways only.
2. Median Islands. All median islands shall be designed with curb and gutter as shown in **Construction Drawing 703, 704 and 705**. For median island standards, see **Section 7.5**.
3. Vertical Curb and Gutter (Type II). The vertical curb or curb and gutter section shall be in accordance with **Construction Drawing 701**. In Fort Collins (GMA and city limits), all new streets shall be constructed using vertical curb and gutter except for the Residential Local Street and Alley where Drive-Over curb and gutter may be used.

7.7.7 Inlets

Inlets located in a sidewalk shall be integrated with sidewalks. The inlet access shall be flush with the sidewalk surface. No manholes, inlets, or other storm sewer facilities are allowed within curb ramps. Refer to the appropriate Local Entity requirements for sizing of inlets. Inlets are not allowed in the curb return, but shall be located at or behind the tangent points of the curb returns.

7.7.8 Waterway Crossings

All waterway crossings beneath and/or within the public right-of-way shall be designed to minimize maintenance requirements. For irrigation structures, the minimization of silting within the structure must be addressed. The design shall maintain or increase the water velocity through the structure to minimize silting or provide other design elements to address this issue.

7.7.9 Rural Roadside Ditches

Any rural or interim roadway sections developed without curbs (and with roadside drainage ditches) must complete the ditch construction with the installation of sod, erosion control blanket, hydro mulch, or approved equivalent within the ditch area. The profile grade of the ditch shall be maintained at a minimum slope of one (1) percent and a maximum slope of five (5) percent. The side slopes of the ditches outside of the right-of-way shall be a minimum of 4:1 and meet any specific criteria of the Local Entity Storm Water Utility. Flatter slopes may be considered when a paved invert is designed for the ditch bottom.

A. Slope

The slope and capacity of any roadside ditches shall be maintained in any areas that driveways cross the ditch. Each site is required to provide a HDPE or concrete pipe, a minimum of fifteen (15) inches in diameter, calculated to meet capacity and strength requirements of the Storm Water Utility. The pipe shall be designed to have no less than twelve (12) inches of cover over the pipe. All portions of the driveway within the right-of-way shall be paved with concrete or asphalt.

B. Maintenance

All driveway improvements within the right-of-way including piping, ditches, curb and gutter, and sidewalk are the responsibility of the adjoining property owner. The Local Entity will not provide maintenance of these items.

7.8 EMERGENCY ACCESS REQUIREMENTS

Any emergency access not on public streets shall be provided in accordance with the Emergency Access Section in the City of Fort Collins Land Use Code or in accordance with the requirements of the Loveland Fire Marshall.

7.8.1 Slope

The slope of the fire lanes shall be a minimum of 0.5 percent and a maximum of 8 percent.

7.8.2 Cross Slope

The Cross Slope of the fire lanes shall be minimum of 1.0 percent and a maximum of 4.0 percent.

7.8.3 Lane Width

The lane width shall be a minimum of 20 feet from the edge of the roadway to edge of the roadway and shall be in an access Easement. The access Easement shall have a minimum width of 20 feet. The lane widths may be required to be increased through horizontal curves to accommodate fire truck passage.

7.8.4 Vertical Clearance

There shall be a minimum of 14 feet of vertical clearance over the entire fire lane.

7.8.5 Barricade

The fire lane may have an approved barricade, but it must be approved by the Local Entity Fire Department.

7.8.6 Roadway Surface

The surface of the roadway must be a paved surface complying with Local Street pavement thickness requirements, unless approved otherwise by the Local Entity Engineer.

7.8.7 Maintenance

All access roadways shall be maintained and kept clear for emergency use at all times.

7.9 BUS STOPS

7.9.1 General

The following minimum design criteria for the construction of bus stops. The Local Entity Engineer may vary any of the following requirements as deemed appropriate for the site and its particular situation. The Designer shall propose and the Local Entity Engineer will approve the exact location of the bus stop in a proposed development. All bus bay locations shall be coordinated with the Local Entity Engineer.

7.9.2 Bus Lane Width

Bus bays should be at least 10 feet wide.

7.9.3 Bus Stops

All bus stop locations shall be constructed with concrete pavement in accordance with **Chapter 22, Construction Specifications and Bus Stop Design Standards and Guidelines**

A. Approach Leg (Near-side) Minimum Criteria

Bus stops on the approach leg of an intersection (near-side) should be at least 55 feet back from the pedestrian crosswalk at the intersection or at least 50 feet back from the intersection curb return (point of curvature, P.C.), plus 50 feet long for a single bus. If on-street parking is present, an additional 50 feet minimum shall be provided behind the bus stop for the bus to transition to the stop. See Figure 5 of the Bus Stop Design Standards and Guidelines for more information.

B. Departure Leg (Far-side) Minimum Criteria

Bus stops on the departure leg of an intersection (far-side) should provide at least a 50-foot long loading area for a single bus, measured at least 5 feet from the pedestrian crosswalk or measured from the intersection curb return (point of curvature, P.C.).. If on-street parking is present, an additional 50 feet minimum shall be provided behind the bus stop for the bus to transition back into traffic. See Figure 5 of the Bus Stop Design Standards and Guidelines for more information.

C. Mid-Block

Mid-block stops shall be designed with entrance and exit designed for the posted speed limit in accordance with the transition criteria in **Construction Drawing 711**. For example, impacted area for a single bus stop ranges from about 150 to 200 feet, yielding a minimum of a 400 to 600-foot block for application.

7.9.4 Bus Bays

All bus pullouts and bays shall be designed and constructed in accordance with the requirements in **Construction Drawing 711**.

7.9.5 Bus Shelters

For access and design guidelines for bus shelters, refer to **Chapter 16, Pedestrian Facilities**.

7.9.6 Bus Pullout Lanes

Bus pullouts shall be constructed with no less than 50 feet between an intersection curb return (point of curvature, P.C.) and the beginning of the lead in taper. Bus pullouts for higher speed limits shall be as shown in **Construction Drawing 711**.

7.10 IMPROVEMENT OF ANNEXED STREETS

For improvement of annexed streets in Fort Collins (city limits only), See **Appendix "H".**