CHAPTER 4

ROADWAY DESIGN AND TECHNICAL CRITERIA

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CHAPTER 4
ROADWAY DESIGN AND TECHNICAL CRITERIA

4.1 GENERAL

This section sets forth the minimum design and technical criteria and specifications to be used in the preparation of all roadway plans.

Within this chapter on Roadway Design and Technical Criteria, AASHTO "Green Book" refers to "A policy on Geometric Design of Highways and Streets--1984" as published by the American Association of State Highway and Transportation Officials.

4.2 ROADWAY DESIGN AND TECHNICAL CRITERIA

4.2.1 Roadway Specifications

Table 4.1 summarizes the minimum roadway construction requirements.

4.2.2 Partially Developed Right-of-Way

Half streets are prohibited. When a proposed half street in one subdivision is adjacent to another property, the approval of the adjacent owner shall be obtained and the entire right-of-way shall be platted and dedicated by the owners. The responsibility for acquiring the additional right-of-way shall be with the subdivider.

4.2.3 Ingress and Egress

Subdivision road system shall be designed with two or more dedicated access roads for separate, multiple ingress and egress, where practical.

4.2.4 Street Names

Names of new streets shall not duplicate names of existing streets. New streets which are extensions of or which are in alignment with existing streets shall bear the names of the existing streets (Ord. 59, Series of 1981).

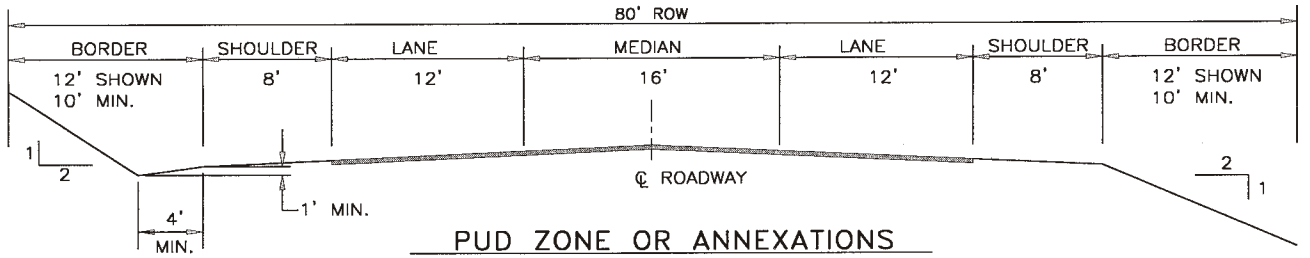
TABLE 4.1
ROADWAY CONFIGURATIONS

Roadway Classification	Local	Collector			Minor Arterial		
		Minor	Major	Major			
Zone Districts	R1-R2-RC	DC and CI	R1-R2-RC	DC and CI	DC	DC	PUD
Design Speed	25 – 35	40 – 45	40 – 45	40 – 45	40 – 45	40 – 45	
Driving lanes	2	2	2	2	4	2	2
Parking width[2]	N/A	9 ft both sides	N/A	10 ft both sides	N/A	10 ft both sides	N/A
Median width	N/A	N/A	N/A	N/A	N/A	16 ft	16 ft
Minimum right-of-	60	65	60	65	80	80	80
Road bed width	36	62	36	64	80	80	56
Pavement width	24	38	24 [(3)]	40	48	56	40
Curb type	None	Type 1	None	Type 1	Type 1	Type 1	None
Sidewalk Width	Not req'd See Note 1	10	Not req'd See Note 1	10	10	10	Not req'd See Note 1
Curb radius Intersection w/arterial Intersection w/collector Intersection w/local	 25 25 25	 30 25 25					
Minimum horizontal centerline radius	100 - 250	250 – 425					
Minimum tangent between reverse curves	0	50					
Minimum grade	1.0%	1.0%					
Maximum grade	7.0%	7.0%					

1 Walks may be required by Walkway Master Plan
2 Parking may be restricted near intersections
3 No on-street parking

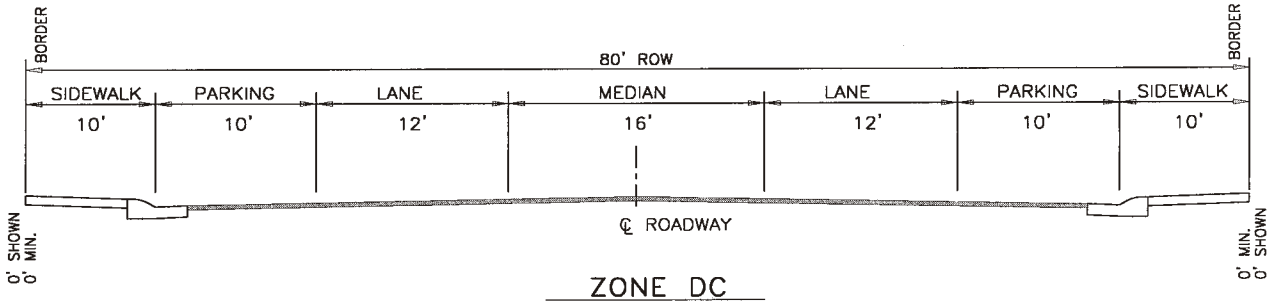
FIGURE 4.1

ROAD TEMPLATES - MINOR ARTERIAL



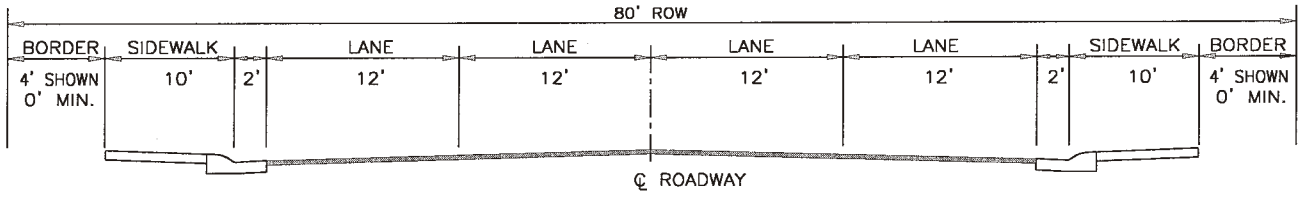
PUD ZONE OR ANNEXATIONS

WITHOUT PARKING



ZONE DC

WITH PARKING

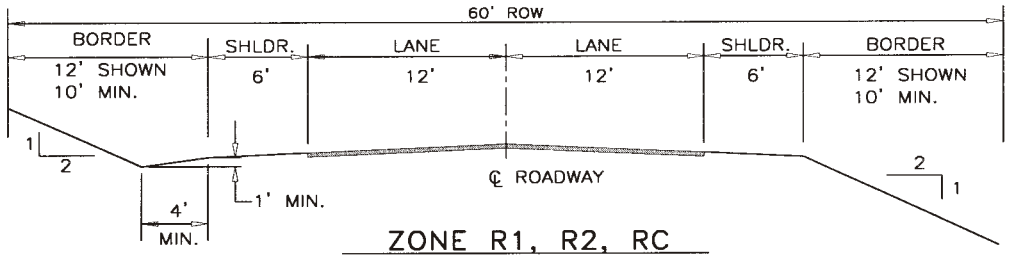


ZONE DC

WITHOUT PARKING

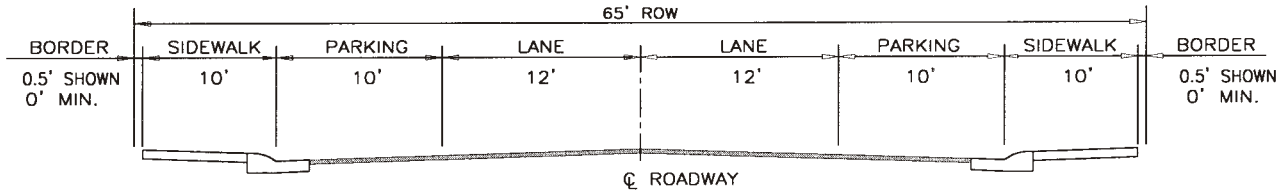
ROAD TEMPLATES - MAJOR COLLECTOR

FIGURE 4-2



ZONE R1, R2, RC

WITHOUT PARKING

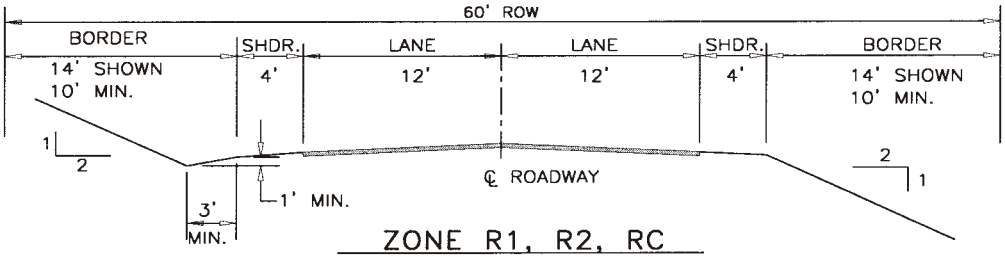


ZONE DC & C1

WITH PARKING

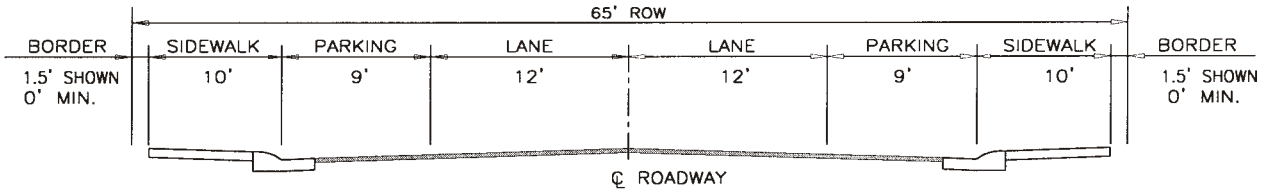
ROAD TEMPLATES - MINOR COLLECTOR/ LOCAL STREET

FIGURE 4.3



ZONE R1, R2, RC

WITHOUT PARKING



ZONE DC & C1

WITH PARKING

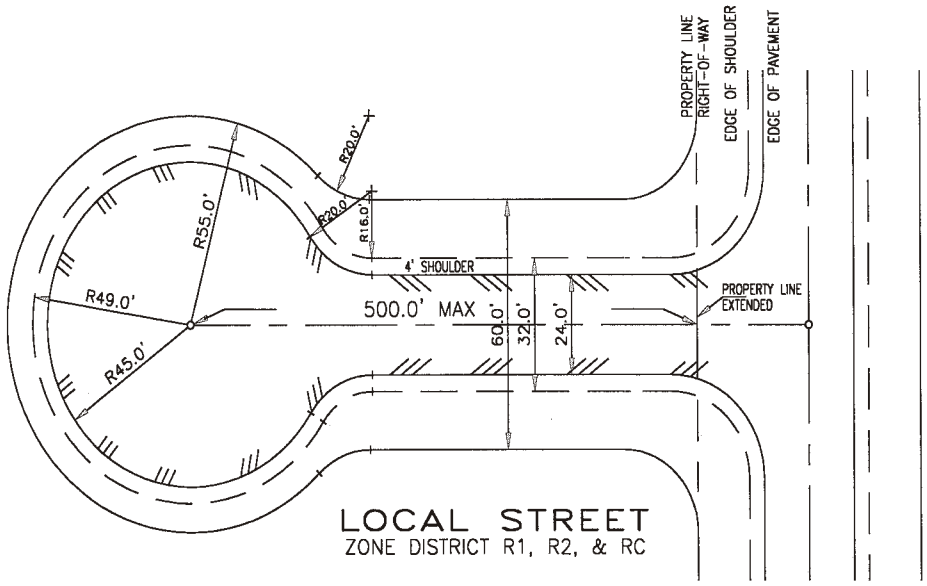
4.3 SIDEWALKS, CURBS AND GUTTER, AND DRIVEWAYS

4.3.1 Sidewalks, pedestrian, and bicycle paths shall be constructed in accordance with the roadway templates and/or the Town's master trail concepts. See Figures 4.1, 4.2, 4.3, and 4.9.

4.3.2 Handicap ramps shall be shown at all curb returns and must be shown (located) at all "T" intersections. Whenever referencing a handicap ramp, call out the specific Town of Winter Park Standard Detail to be used to construct that ramp. See Figure 4.7.

4.4 CUL-DE-SAC CRITERIA

See Figure 4.4 for cul-de-sac configuration. If topography dictates the use of a longer cul-de-sac, the approval of the Town Engineer shall be obtained. Drainage should be toward the intersecting street or a drainage easement shall be required between the cul-de-sac and the rear lot line of the lowest lot.



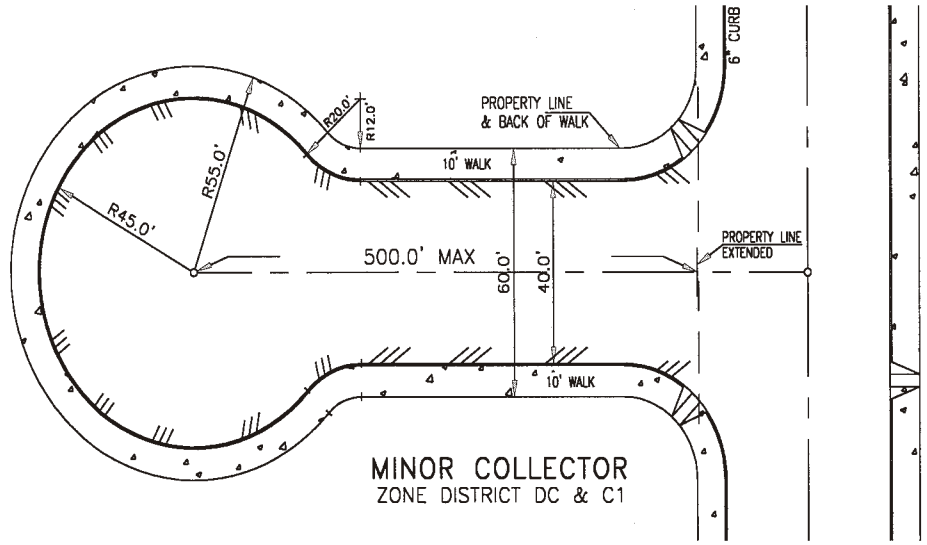


FIGURE 4.4

CUL-DE-SAC CONFIGURATION

4.5 HORIZONTAL ALIGNMENT

4.5.1 Horizontal Curves

See Table 4.2 below.

HORIZONTAL CURVES
TABLE 4.2

Design Speed (mph)	Average Speed Running Speed (mph)	Maximum Degrees of Curvature	Minimum Curve Radius* (Ft.)
20	20	57.3	100
25	24	32.7	175
30	28	22.9	250
35	32	14.3	400
40	36	8.8	650

* AASHTO Figure 111-17

4.5.4 Stopping Sight Distance

The minimum stopping sight distance is the distance required by the driver of a vehicle traveling at the design speed to bring the vehicle to a stop after an object on the road becomes visible. Stopping sight distance is calculated in accordance with the AASHTO "Green Book," page 243 ff. Object height is six inches above road surface and viewers height is 3.50 feet above road surface.

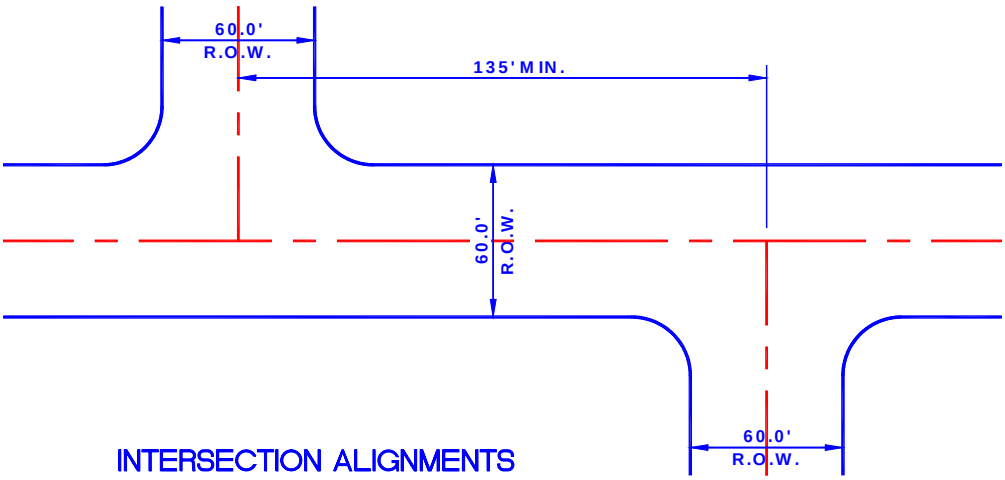
TABLE 4.3
STOPPING SIGHT DISTANCE

Design Speed (mph)	Stopping Sight Distance
15	100
20	125
25	150
30	200
35	250
40	275
45	325

From AASHTO "Green," Table III-1 and Table III-5

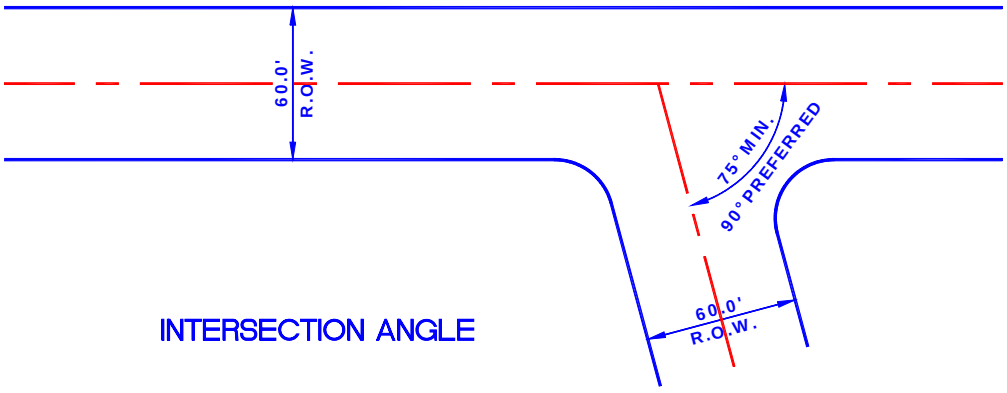
4.5.3 Intersection Alignments

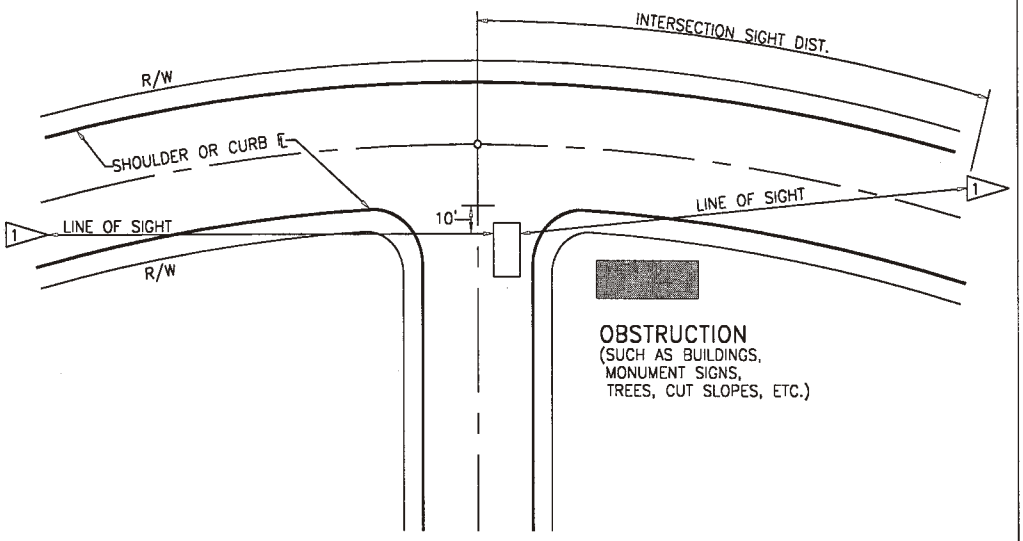
Whenever intersections do not align, offset the intersection a minimum of 135 feet.



4.5.4 Intersection Angle

Intersecting streets shall be at approximately 90°. If necessary due to special constraints such as topography, existing intersection, existing buildings, etc, the intersection angle may be reduced to 75° with approval of the Town Engineer.





DESIGN SPEED (MPH)	POSTED SPEED LIMIT (MPH)	INT. SIGHT DIST. (FT.)
20	15	210
25	20	230
30	25	280
35	30	363
40	35	465
45	40	515

NOTES:

ANY OBJECT WITHIN THE SIGHT TRIANGLE BETWEEN THREE FEET AND EIGHT FEET ABOVE THE ELEVATION OF THE ADJACENT ROADWAY SHALL CONSTITUTE A SIGHT OBSTRUCTION AND SHALL BE REMOVED, LOWERED OR REVISED AS APPROPRIATE. SUCH OBJECTS INCLUDE BUILDINGS, CUT SLOPES, HEDGES, TREES, BUSHES, UTILITY CABINETS, AND TALL CROPS. THIS DESIGN CRITERIA ALSO REQUIRES THE ELIMINATION OF PARKING WITHIN THE SIGHT TRIANGLE AND APPLIES WHETHER THE INTERSECTING ROADS ARE LEVEL OR ON GRADES. TREES MAY BE TRIMMED TO A HEIGHT OF EIGHT FEET AND THINNED TO ALLOW FOR CLEAR VISIBILITY.

BOTH THE HORIZONTAL AND VERTICAL SIGHT DISTANCES SHOULD BE CHECKED TO ENSURE THAT THE SIGHT DISTANCE ALONG THE MAJOR HIGHWAY IS SUFFICIENT TO ALLOW A VEHICLE TO CROSS OR TURN LEFT, WHICHEVER IS REQUIRED. CONSIDERATION FOR ICE CONDITIONS SHOULD BE USED.

FIGURE 4.5

INTERSECTION SIGHT TRIANGLE

1 MIDDLE OF DRIVING LANES

4.5.5 Continuation of Roadways and Trails

Streets, bike pathways, walkways, and easements shall be aligned to join with the planned or existing public ways adjacent to the subdivision. The Planning and Zoning Commission may require public ways to provide direct, continuous routes to all adjacent lands, whether such adjacent lands have been subdivided or not. The location of public ways providing access to adjacent lands shall be selected by the subdivision planner provided such location shall be reasonably calculated to provide usable access to the adjacent lands. The cost of such public ways leading to and within a subdivision shall be borne by the subdivider.

4.5.5.1 Streets shall be extended to boundaries of the property, except where such extension is prevented by topography or other physical conditions, or where the connection of streets with existing or probable future streets is deemed unnecessary for the advantageous development of adjacent properties.

4.5.5.2 Where future extension of a street is anticipated, a temporary turn-around, meeting Town Cul-de-sac standards, may be required. See Figure 4.4.

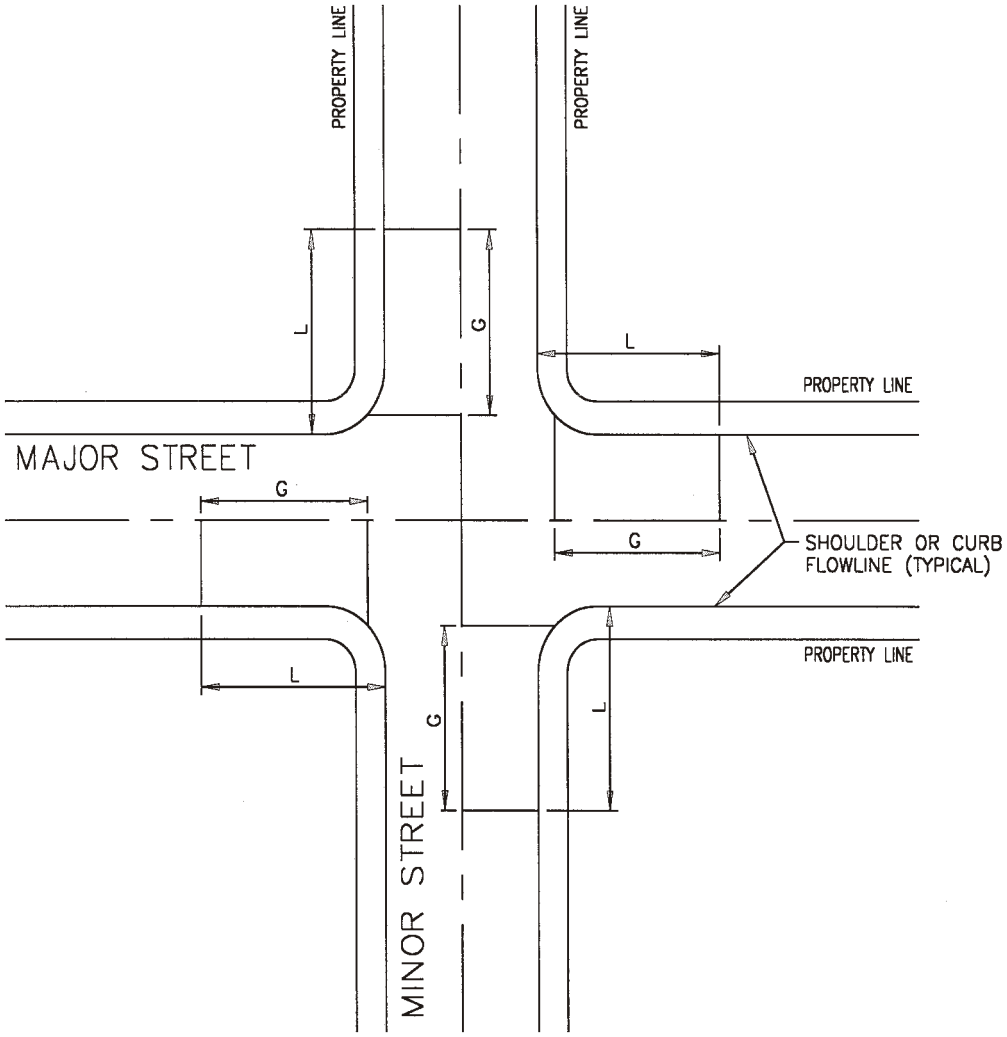
4.6 VERTICAL ALIGNMENT

Design controls for vertical alignment are shown on Table 4.4 below.

Table 4.4
VERTICAL ALIGNMENT CONTROLS

Description	Design Speed*	K Value Ranges Crest	Sag
Local	20	25--30	25--30
	25	25--30	25--30
	30	25--30	25--30
Collectors	35	35--50	40--50
Minor arterials	40	55--65	55--65
	45	70--105	65--85

* The design speed is a minimum of five mph over the posted speed for each classification
* The use of grade breaks in lieu of vertical curves is discouraged. However, if a grade break is necessary, the algebraic difference shall not exceed 0.80% (.008 ft/ft).
* The maximum permissible grade at intersections will be as shown in Figure 4.6.



* MAJOR STREET / MINOR STREET	LOCAL	MINOR COLLECTOR	MAJOR COLLECTOR
LOCAL	L – 40' G – 4%	L – 40' G – 4%	L – 100' G – 4%
MINOR COLLECTOR	– –	L – 100' G – 4%	L – 120' G – 3%
MAJOR COLLECTOR	– –	– –	L – 120' G – 3%

* – REQUIRED FOR STOPPING CONDITION ONLY

FIGURE 4.6

PERMISSIBLE INTERSECTION GRADES

4.7 OFFSITE DESIGN

The design grade, and existing ground at that design grade, of all roadways that dead-end due to project phasing, subdivision boundaries, etc., shall be continued in the same plan and profile as the proposed design for at least five hundred feet (500') or to its intersection with an arterial roadway.

4.7.1 If the offsite roadway adjacent to the proposed development is not fully improved, the developer is responsible for the design and construction of a transition for the safe conveyance of traffic from his improved section to the existing roadway. The following formula shall be applied to the taper of lane change necessary for this transition:

$$L = WS\ 2/60$$

where:

L = Length of transition in feet
W = Width of offset in feet
S = Speed limit

4.8 CONSTRUCTION TRAFFIC CONTROL

Construction work zone traffic shall be controlled by signs, barricades, detours, etc. which are designed and installed in accordance with the *Manual on Uniform Traffic Control Devices*, most recent edition, and applicable Town of Winter Park standards. A traffic control plan shall be submitted and approved by the Town of Winter Park prior to the start of any construction.

4.9 CONSTRUCTION SPECIFICATIONS

Construction shall conform to the latest edition of the Colorado Department of Transportation *Standard Specifications for Road and Bridge Construction.*

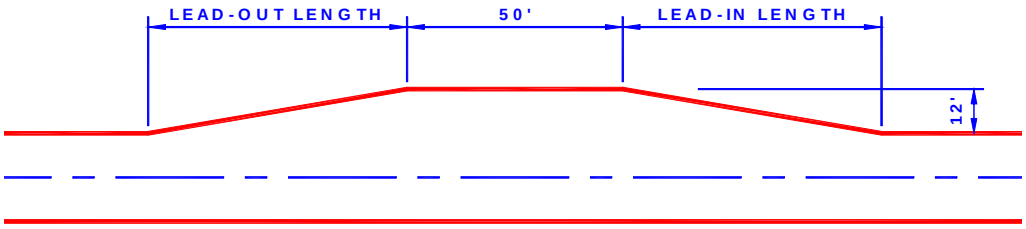
4.10 SIGNAGE AND STRIPING PLAN

A signage and striping plan may be required at the request of the Town Engineer.

4.11 BUS PULLOUT LANES

If recommended by the Town Manager or Town Council, bus pullout lanes shall be designed and constructed by the adjacent subdivider. The design of the pullout lanes will be governed by dimensions shown below.

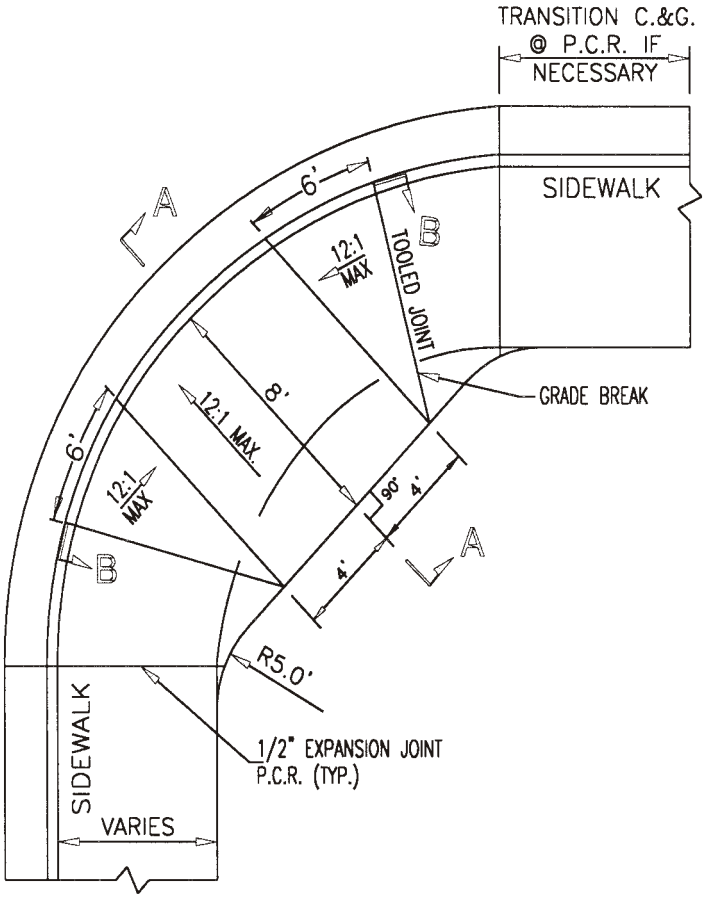
BUS PULLOUT LANES



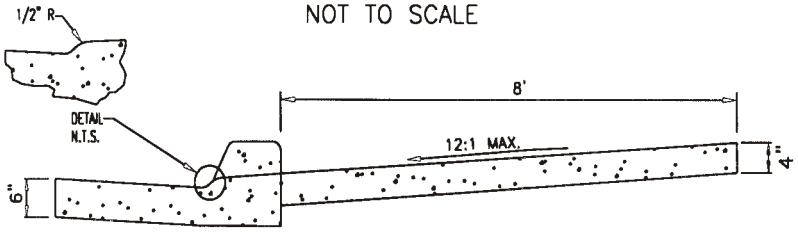
Design Speed	Lead-in Length	Lead-out Length
35 mph and under	60 feet	60 feet
40 mph	100 feet	70 feet
45 mph	150 feet	80 feet

4.12 Trails and Bike Paths

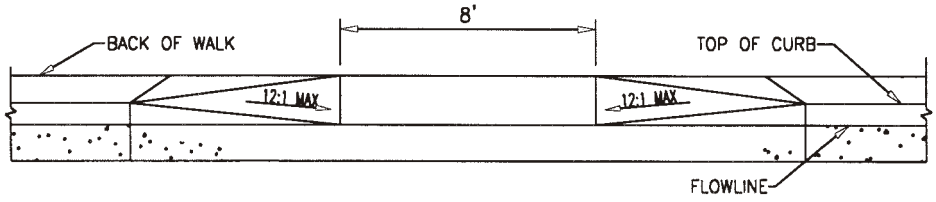
Trails and/or bike paths shall be within an easement or right-of-way granted to the town. If the trail or bike path is to be a condition of a development plan, the location shall be shown on the plat or site plan for the development. The width of the easement or right-of-way shall be a minimum of 20 feet. The trail or bike path shall be a minimum of 10 feet in width. The town engineer shall determine if the trail will be paved with asphalt or concrete. See figure 4.9.



ATTACHED SIDEWALK
NOT TO SCALE



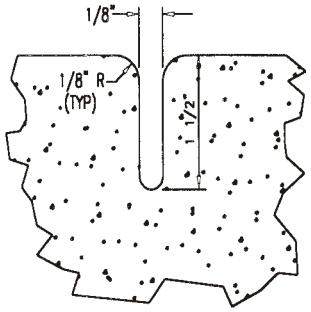
SECTION A–A
NOT TO SCALE



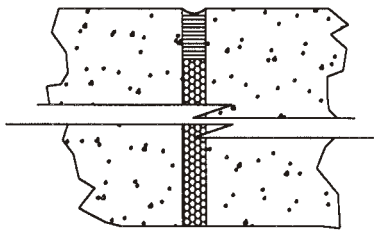
SECTION B–B
NOT TO SCALE

FIGURE 4.7

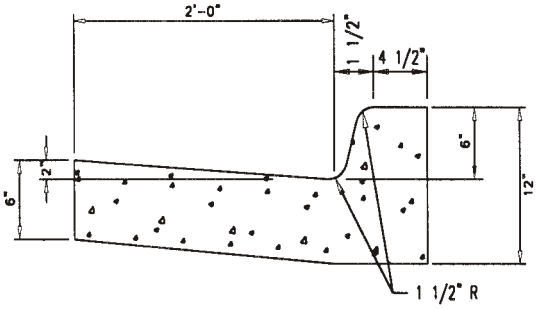
CURB RAMPS FOR PHYSICALLY HANDICAPPED



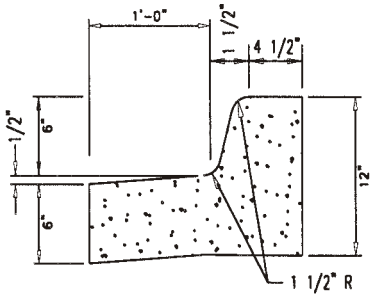
CONTRACTION OR
WEAKEN PLANE JOINT



EXPANSION JOINT

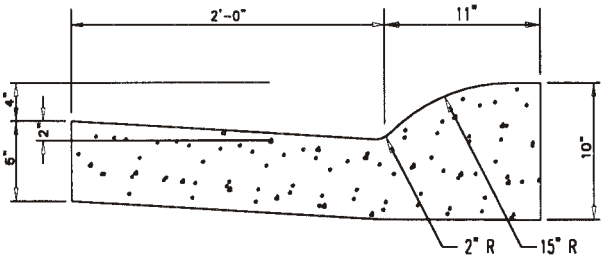


TYPE 1 CURB & GUTTER
(CATCH GUTTER)



TYPE 2 CURB & GUTTER
(SPILL GUTTER)

PREFFERED CURB & GUTTER (TYPE 1 & 2)



TYPE 3 CURB & GUTTER
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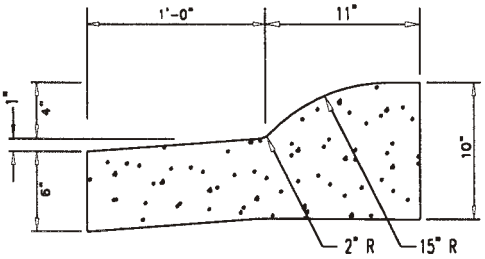


TYPE 4 CURB & GUTTER
(SPILL GUTTER)

NON-PREFFERED CURB & GUTTER (TYPE 3 & 4)

(ALLOWED ONLY IF ACCEPTED BY TOWN ENGINEER)

FIGURE 4.8

CURB and GUTTER DETAILS

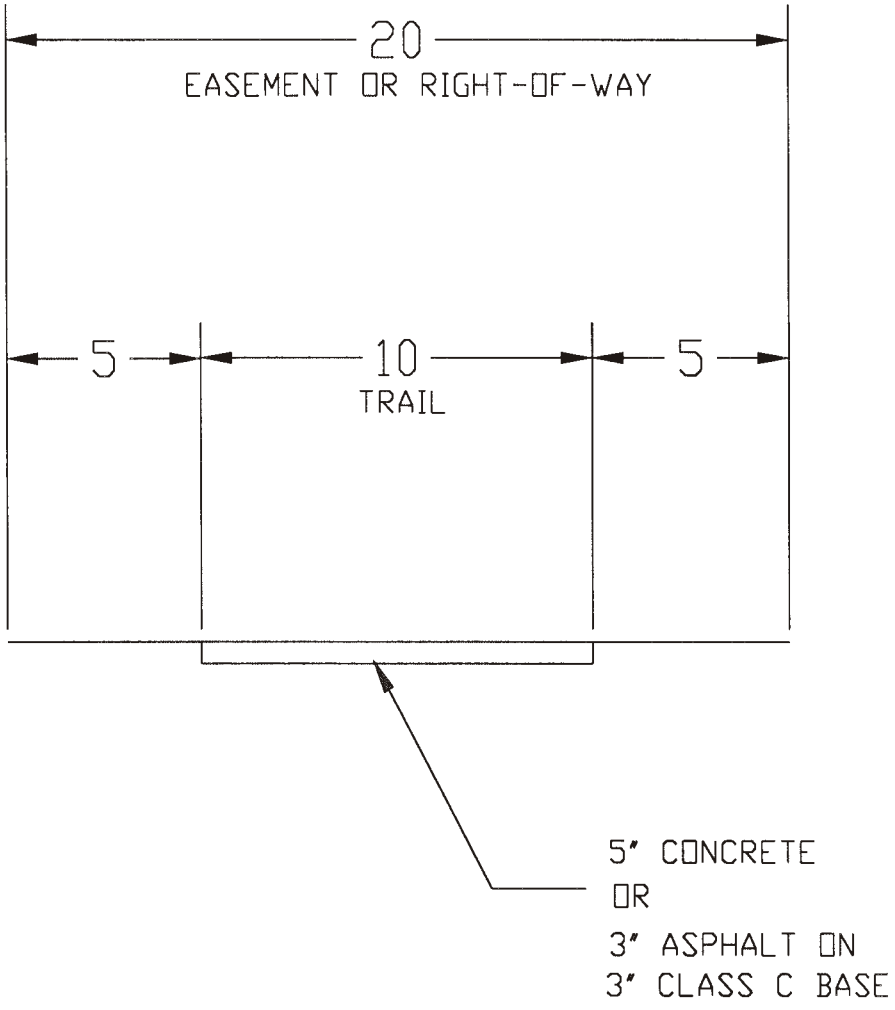
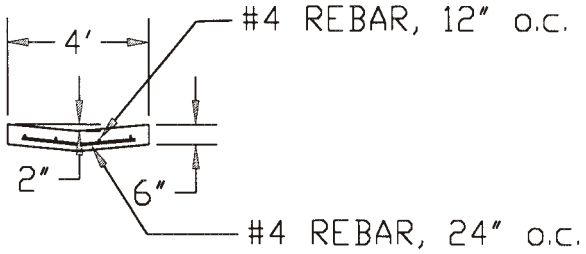
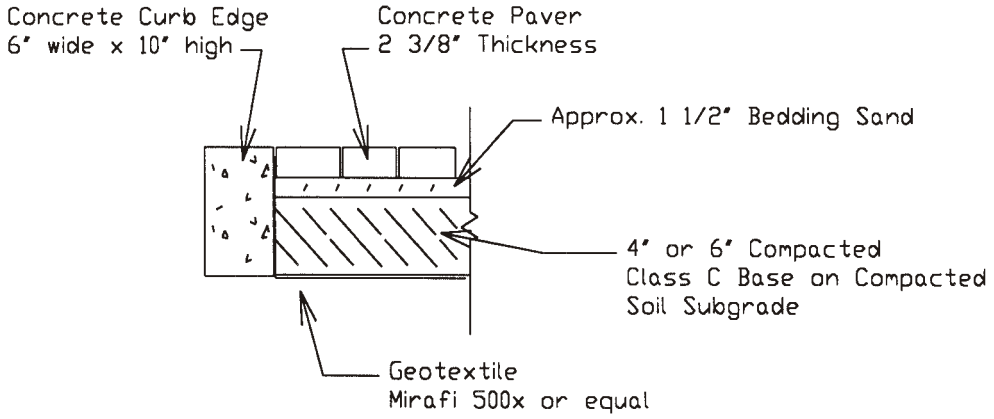


FIGURE 4.9

TRAIL / BIKEPATH DETAIL



CONCRETE PAN



CONCRETE SIDEWALK PAVER SECTION

FIGURE 4.10

SIDEWALK PAVER AND CONCRETE PAN DETAILS