Town of Apex
Standard Specifications & Standard Details
Summary of Revisions
April 9, 2024

❖ Standard Specifications

Section 200 – General Provisions

- 219 Retaining Walls
  - ➢ First paragraph, revised last sentence to "*Private retaining walls, including supports, foundations, reinforcement, geogrid, and any other wall appurtenances are not allowed within public right-of-way or easements.*"
  - ➢ Add "*Where private retaining walls are intended to retain public roadway infrastructure, the walls shall be laterally offset at a 1H:1V rate from the right-of-way to the top of concrete footer. Walls shall be designed for a typical highway live traffic surcharge load of 250 pounds per square foot (psf). A vehicle accessible maintenance easement of at least 10 feet in width with 6H:1V slopes shall be provided behind the wall for walls that exceed 4 feet in height.*"

Section 300 – Streets

- 302 Design, General:
  - ➢ Add "*Design vehicles and minimum edge of pavement radii shall be based on street classification per the following table. Compound curves may be considered to accommodate turning movements.*

Street Classification	*Design Vehicle*	*Control Vehicle*	*Edge of Pavement Radius*
4 & 6 Lane Thoroughfares	*WB-40*	*WB-62*	*40 feet*
2 & 3 Lane Thoroughfares	*WB-40*	*WB-50*	*40 feet*
Major Collector	*SU-30*	*WB-40*	*30 feet*
Minor Collector	*DL-23[3]*	*FIRE[4]*	*25 feet*
Residential Street	*DL-23[3]*	*FIRE[4]*	*25 feet*
Alleys	*P[7]*	*DL-23[3,7]*	*10 feet[7]*

Notes:

1. *Design Vehicle shall not encroach on adjacent lanes for turning movements.*
2. *Control Vehicle may encroach on adjacent lanes for turning movements.*
3. *DL-23: 22.6' length Delivery Truck, 13' wheelbase, 23' inside turning radius, 29' outside turning radius (refer to Urban Street Design Guide published by the National Association of City Transportation Officials).*
4. *Fire Truck: 21.25' wheelbase, 33.33' outside turning radius w/ 5.34' overhang (Town of Apex).*
5. *All designated Truck Routes shall meet WB-50 design vehicle.*
6. *All designated Go Triangle Bus Routes shall meet BUS-40 control vehicle.*
7. *Alleys that serve solid waste collection and/or provide fire access must meet the same criteria as a Residential Street.*
8. *Where different street types intersect, the ENGINEER shall be allowed to use the lesser of the two radii.*"

  - ➢ Replace "Grades" heading with "Geometric Standards".
  - ➢ Delete "*Refer to the Street Geometric Standards Detail for maximum grades and vertical curve controls.*"
  - ➢ Add "*The following table outlines geometric standards for roadway design. Sound engineering judgement should be exercised when using minimum or maximum design standards for roads.*

Alternate designs shall be in accordance with the current edition of A Policy on Geometric Design of Highways and Streets as published by AASHTO.

CLASSIFICATION	DESIGN SPEED (MPH)	HORIZONTAL CURVE CONTROLS		MIN. TANGENT B/W REVERSE CURVES (FT)	MAX. GRADE (%)	MIN. VERTICAL CURVE LENGTH (FT)	VERTICAL CURVE CONTROLS	
		MAX. SUPER ELEV. (%)	MIN. CL RADIUS (FT)				MIN. LENGTH CREST (FT)	MIN. LENGTH SAG (FT)
THOROUGHFARE	50	4	926	400	7	150	84A	96A
MAJOR COLLECTOR	35	4	371	200	9	100	29A	49A
MINOR COLLECTOR	30	NC	333	150	10	100	19A	37A
RESIDENTIAL STREET	25	NC	198	0	10	50	12A	26A
ALLEY	--	RC	50	0	10	50	12A	26A

A = ALGEBRAIC DIFFERENCE IN GRADES

NC / RC = NORMAL CROWN / REVERSE CROWN"

- Delete "*Radii of Curvature"* section.
- Delete "*Tangents*" section.
- Revise "*Sight Triangle*" heading to "*Intersection Sight Distance*". Revise to "*All stop-controlled intersections shall meet minimum AASHTO sight distance requirements. A 10-foot x 70-foot sight triangle easement shall be provided at all intersections except where the ENGINEER is provided a plan illustrating such easements are not required or can be reduced in size based on AASHTO minimum sight line projections in cases where the typical 10-foot x 70-foot sight triangle easement would otherwise create a conflict with proposed structures. The 10-foot dimension shall be the setback from the right-of-way of the major street, and the 70-foot dimension shall be measured along the right-of-way of the major street. Sight triangle easements shall be increased if necessary to meet AASHTO minimum guidelines based on the projection of sight lines from the intersection. Sight triangle easements shall be shown on the final plat for the developed tract.*

  Plant materials placed within the sight triangle shall be limited to a mature height of 30 inches. Signs or other structures shall not be allowed."

- Add table "*Intersection Sight Distance for Left Turn from Stop (Passenger Cars)*

Design Speed (Major Road)	Posted Speed (Major Road)	2-lane Undivided		3-lane Undivided or 2-lane Divided w/ 12' median		4-lane Undivided		5-lane Undivided or 4 lane Divided w/ 12' median	
		Calculated	Design	Calculated	Design	Calculated	Design	Calculated	Design
25	20	275.6	280	294.0	300	312.4	315	330.8	335
30	25	330.8	335	352.8	355	374.9	375	396.9	400
35	30	385.9	390	411.6	415	437.3	440	463.1	465
40	35	441.0	445	470.4	475	499.8	500	529.2	530
45	40	496.1	500	529.2	530	562.3	565	595.4	600
50	45	551.3	555	588.0	590	624.8	625	661.5	665
55	50	606.4	610	646.8	650	687.2	690	727.7	730
60	55	661.5	665	705.6	710	749.7	750	793.8	795

Reference: Table derived from AASHTO Table 9.7 (Case B1) using the following parameters:

*ISD = 1.47*V*t_g where:*

ISD = Intersection sight distance (length of leg of sight triangle along major road)

V = design speed of major road (mph)

t_g = 7.5s time gap for 2-lane plus 0.5s for each additional lane

Method of measurement

1. Driver's eye height shall be a minimum of 3.5 feet above pavement.

2. Driver's eye shall be placed 15 feet from edge of pavement.

3. Object height (approaching vehicle) shall be 4.25 feet above center of traffic lane."

- Add table "*Minimum Intersection Sight Distance for Right Turn from Stop*

Design Speed (Major Road)	*Posted Speed (Major Road)*	*Calculated*	*Design*
25	*20*	*238.9*	*240*
30	*25*	*286.7*	*290*
35	*30*	*334.4*	*335*
40	*35*	*382.2*	*385*
45	*40*	*430.0*	*430*
50	*45*	*477.8*	*480*
55	*50*	*525.5*	*530*
60	*55*	*573.3*	*575*

Reference: Table derived from AASHTO Table 9.9 (Case B2) using the following parameters:
*ISD = 1.47*V*tg where:*
ISD = Intersection sight distance (length of leg of sight triangle along major road)
V = design speed of major road (mph)
tg = 6.5s time gap for 2-lane plus 0.5s for each additional lane
Method of measurement
1. Driver's eye height shall be a minimum of 3.5 feet above pavement.
2. Driver's eye shall be placed 15 feet from edge of pavement.
3. Object height (approaching vehicle) shall be 4.25 feet above center of traffic lane."

- Add table "*Stopping Sight Distance*

Minimum Stopping Sight Distance (feet), Street Grade (%)							
Design Speed	*Upgrades*			*Flat*	*Downgrades*		
	0.09	*0.1*	*0.03*	*-*	*-0.03*	*(0.1)*	*-0.09*
60	*495*	*515.0*	*540*	*570.0*	*600*	*640.0*	*690*
55	*435*	*450.0*	*470*	*495.0*	*520*	*555.0*	*595*
50	*375*	*390.0*	*405*	*425.0*	*450*	*475.0*	*510*
45	*320*	*335.0*	*345*	*360.0*	*380*	*400.0*	*430*
40	*270*	*280.0*	*290*	*305.0*	*315*	*335.0*	*355*
35	*225*	*230.0*	*240*	*250.0*	*260*	*275.0*	*290*
30	*180*	*185.0*	*200*	*200.0*	*205*	*215.0*	*230*
25	*140*	*145.0*	*150*	*155.0*	*160*	*165.0*	*175*

Reference: Table derived from AASHTO 2018 (Tables 3.1 and 3-2) and distances rounded to nearest 5 feet."

Section 500 – Storm Drainage

- 505 Inlets and Outlets, A. Headwalls, Endwalls, and Flared End Sections:
  - Revise last paragraph to "*For non-jurisdictional channels, The the slope from pipe invert to top of berm shall not exceed 2:1 to the top of pipe (preferably flatter). For jurisdictional stream and/or riparian buffer crossings, the slope from top of berm shall not exceed 2:1 to the top of pipe or top of roof slab or box (not headwall). Any deviation from NCDOT standard drawings requires pre-approval of the Transportation & Infrastructure Development Director.*"
- 508 Inspection Prior to Acceptance, Video Assessment and Cleaning, a):
  - Second sentence add *", including panning at each joint.*"

Section 700 – Wastewater Collection Systems

- 704 Testing and Inspections, B. Sewer Main and Service Connection Testing, 5. Video Assessment and Cleaning:
  - Fourth sentence add *", including panning at each joint."*

❖ Standard Details

Section 200 – General Provisions

- 200.07 EV CHARGING SPACE (new)

Section 300 – Streets

- 300.01 STREET TYPICAL SECTIONS (all): Revised sidewalk cross slope; added/**revised** note "ROADSIDE / STREETSCAPE TREATMENTS ARE CONTEXT SENSITIVE. REFER TO ADVANCE APEX: THE 2045 TRANSPORTATION PLAN FOR APPROPRIATE CONTEXT, AND THE BICYCLE AND PEDESTRIAN SYSTEM PLAN MAP **FOR APPROPRIATE FACILITY TYPE**.
- 300.01 STREET TYPICAL SECTIONS – MAJOR COLLECTOR: Added bike lane markings.
- 300.07 (1 OF 2) DRIVEWAY APRON (CURB & GUTTER): Added expansion joint where apron connects to curb and gutter.
- 300.14 STREET GEOMETRIC STANDARDS: Deleted; standards added to specification section.
- 300.15 BARRICADE FOR DEAD END ROADS: Changed color of *future road extension* sign to *white on green*.
- 300.17 SPEED HUMP: Revised profile geometry.
- 300.18 SPEED HUMP - ELEVATED CROSSWALK: Revised profile geometry.
- 300.23 NEIGHBORHOOD TRAFFIC MINI-CIRCLE: Added *roundabout circulation* sign.
- 300.26 (2 OF 4) STREET SIGNS - PLACEMENT & INSTALLATION: Added note "IN AREAS OF WEAK SOILS A BREAKAWAY ANCHOR UNIT SHALL BE USED AND BACKFILLED WITH CONCRETE, IF DETERMINED BY THE INSPECTOR."
- 300.26 (4 OF 4) STREET SIGNS - BREAKAWAY SIGN INSTALLATION: Added note "IN AREAS OF WEAK SOILS A BREAKAWAY ANCHOR UNIT SHALL BE USED AND BACKFILLED WITH CONCRETE, IF DETERMINED BY THE INSPECTOR."
- 300.32 (2 OF 3) BUS STOP - AMENITY PAD: Revised note "A MINIMUM **10** FEET WIDE PEDESTRIAN PATH IS TO BE RETAINED BETWEEN THE BACK OF CURB AND ANY AMENITIES WHERE SIDE PATH OR STREET-SIDE GREENWAY IS PLANNED."

Section 900 – Greenway Trails

- 900.06 BOLLARD: Revised note "FIXED BOLLARDS SHALL BE TRAFFICGUARD **MODEL RFP4560R**; REMOVABLE BOLLARDS SHALL BE TRAFFICGUARD **MODEL TL1004RL**, OR APPROVED EQUAL.