



**AGENDA  
PLANNING AND ZONING MEETING  
Norwalk City Hall, 705 North Ave  
Monday, May 23, 2016  
5:45 P.M.**

1. Call meeting to order at 5:45 P.M.
2. Approval of Agenda
3. Approval of Minutes – May 9, 2016
4. Chairperson – Welcome of Guests
5. Public Comment – 3-minute limit for items not on the agenda (No action taken)
6. New Business
  - a. Request from Cort Landing, LLC to approve the Preliminary Plat of the Cort Landing Plat 1
  - b. Discussion on Subdivision Regulations update focusing on street design
7. Staff Development Update
8. Future Business Items
  - a. Old School Plat 2 Final Plat
  - b. SubArea 1 Master Plan Draft
  - c. Future Land Use Chapter Draft
  - d. R-F District Rezoning
9. Next Meeting Date: June 13, 2016
10. Adjournment

## REGULAR NORWALK PLANNING AND ZONING MEETING 5-9-2016

### Call to order

The Regular Meeting of the Norwalk Planning and Zoning Commission was held at the Norwalk City Hall, 705 North Avenue, Monday, May 9, 2016. The meeting was called to order at 5:49 p.m. by Chairperson Chad Ross. Those present at roll call were, Judy McConnell, Jim Huse, Donna Grant, Elizabeth Thompson, Brandon Foldes, and Chad Ross. Absent: John Fraser.

Present was City Council liaison Stephanie Riva.

Staff present included: Luke Parris, City Planner; Wade Wagoner, Planning and Economic Development Director; Tim Hoskins, Public Works Superintendent.

### Approval of Agenda – 16-23

*Motion by Thompson and seconded by Huse to approve the agenda as presented. Approved 6-0.*

### Approval of Minutes – 16-24

*Motion by McConnell and seconded by Huse to approve the minutes from the March 28, 2016 meeting. Approved 6-0.*

### Approval of Minutes – 16-25

*Motion by McConnell and seconded by Thompson to approve the minutes from the April 25, 2016 meeting. Approved 6-0.*

### Welcome of Guests

Chairperson Ross welcomed guests present. With no guests wishing to speak, the business portion of the meeting was opened.

### New Business

#### **Request from Locust Center LTD to approve the Preliminary Plat of Twin Lakes Plat 4 (a subdivision outside of City limits within 2 miles) – 16-26**

Parris gave the staff report and explained that it had been awhile since the Commission dealt with a similar request. The City has a 28E agreement with the County to allow City review of plats within two miles. If you recall, we waived one south of town on the old Rolling Hills golf course because it's outside of our planned growth area. This plat however is within a likely annexation area. It does not have City Zoning, but if brought into the City it would likely be RE-1, which allows rural cross sections.

Bob Veenstra spoke on behalf of the applicant. Veenstra was asked many questions about the 18 foot wide street. Wagoner indicated that if this were a City development, the minimum private street width would be 24' wide.

Veenstra was asked if the 28E agreement the City has with the county would allow the City to impose our standard or if this is just a suggestion. Veenstra thought the City could impose, but said there is already a portion of the street out there that is developed at 18' wide and that widening to 24' on the last phase of the development would be of little value. McConnell expressed concerns about the street width not meeting our minimums. She and Grant were also specifically concerned about public safety vehicles being able to navigate the streets since it would be very narrow for fire trucks, has steep slopes, only one way in - one way out on a long cul-de-sac.

McConnell asked about draining indicating that the Commission has been burned on drainage matters far too often. Veenstra responded to McConnell that there wouldn't be a problem given the size of the lots and a house would add relatively little impervious surface and plenty of ground left to handle runoff. Also variable topography would make it hard to have onsite detention.

*Motion by Grant, seconded by McConnell to approve the plat as submitted, but to offer the suggestion (not mandate) that the streets be 24' wide. Approved 6-0.*

**Planning and Zoning Commission Member Representation on the Economic Development Subcommittee – 16-27**

Wagoner explained the role of the subcommittee. There are no quorums and no formal votes taken; it's an advisory role to him as an Economic Development Director, but also used as a forum for developers to "dip their toe in the water" on new projects. The Commissioner's role would be to offer P&Z perspective and to communicate the often still-confidential projects to the other Commissioners.

McConnell volunteered for the role. Hearing no objections,, Chairperson Ross appointed McConnell to the Economic Development Subcommittee.

**Discussion on Subdivision Regulations and Sign Ordinance memos.**

Parris briefly discussed both memos. He was instructed to proceed with updates and to provide examples of other community's regulations, especially those staff thought were successful. Parris acknowledged that now would be the time to address any lingering concerns with the Subdivision Ordinance and that any thought on areas to include in the update should be forwarded to staff.

**Staff Development Update**

Wagoner presented the update. He spoke about the final portion of Cherry Parkway being planted with flowering trees by Tony Stravers, Chris Campbell and members of the Norwalk football team. He encouraged everyone to look at the final product and to come up with ideas for next year's Trees Please! program.

**Future Business Items**

With time being of the essence, staff asked if there were questions on future business items. With none, staff did not go through items.

**Adjournment – 16-28**

Motion by Huse and seconded by McConnell to adjourn the meeting at 6:48 P.M. Approved 6-0.

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Chad Ross, Chairperson

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Luke Parris, City Planner

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<b>CITY OF NORWALK</b> <b>REPORT TO THE NORWALK PLANNING COMMISSION</b>
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**REQUEST:** Request from Cort Landing, LLC to approve the Preliminary Plat of the ***Cort Landing Plat 1***

**MEETING DATE:** May 23, 2016

**STAFF CONTACT:** Luke Parris, AICP  
City Planner

**APPLICANT(S):** Cort Landing, LLC                      Civil Engineering Consultants, Inc.  
340 Wright Rd, Suite E                      2400 86<sup>th</sup> St. Unit 12  
Norwalk, Iowa 50211                      Des Moines, Iowa 50322

**GENERAL DESCRIPTION:** This request would create 38 lots along Iowa Highway 28 that are proposed to be zoned R-1 as part of the Dobson PUD. The City approved a past preliminary plat for the area on November 5, 2015. This replat includes 7 single family lots where a C-2 lot was previously platted.

**IMPACT ON NEIGHBORHOOD:** The properties surrounding the new seven lots are all single family lots.

**VEHICULAR & PEDESTRIAN TRAFFIC:** The plat shows the construction of two (2) new streets, Pine Avenue, and Cortland Drive. Pine Avenue is a 28' wide north/south road that intersects with Elm Avenue on the north side, intersects with Cortland Drive going south and narrows into a 26' wide street turning into a cul-de-sac on its southern end. Cortland Drive is a 28' wide east/west road that narrows west into a 26' wide cul-de-sac.

**TRAIL PLAN:** N/A

**ZONING HISTORY FOR SITE AND IMMEDIATE VICINITY:** This site was recently re-zoned from C-2 to R-1(60) on May 9, 2016 (Ordinance No. 16-05). This site is zoned as Parcel D and Parcel E of the Dobson Planned Unit Development with a classification of "R-1(60)" Residential. This area was zoned as C-2 since the July 15, 2004 adoption of the Dobson PUD (Ordinance No. 04-08) and the amendment to the Dobson PUD (Ordinance No. 15-05) on June 4, 2015.

**BUFFERS REQUIRED/ NEEDED:** Lots 26- 36 and 38 are double frontage lots since they back up to a major throughway, Highway 28. There will need to be buffers (excluding fences) adjoining the rear street frontage and building setback shall be measured from the boundary of landscape buffer zone (35').

**DRAINAGE:** Drainage for the residential lots is identified in two detention areas located east of lots 32-36 and west of lot 22. Drainage is collected in a storm sewer system and discharged via a pipeline to the detention area east of lots 32-36 and overland to the detention area west of lot 22. A drainage pipe will be installed to help relieve a resident’s lot who has seen persistent wet conditions and has come to numerous Council meetings to address the issue to Council.

Details of the design of the storm sewer system will be reviewed with the Construction Plans to ensure that detention areas are sized correctly.

**DEVELOPMENT HISTORY:** The area was planned as a PUD on July 15, 2004 and amended on June 4, 2015 and May 9, 2016.

**FLOODPLAIN:** None of the proposed lots are located within a floodplain.

**PARKLAND:** The subdivision ordinance requires 783 square feet of parkland per single family dwelling unit. The development has 38 lots and is required to provide 0.68 acres of parkland, or the equivalent per Subdivision Regulations, to the City. No park is shown on site. Parkland dedication requirements will be finalized during final platting.

- UTILITIES: WATER, SANITARY SEWER, STORM SEWER.**
- An 8’ water main is provided on the west side of Pine Avenue, the north side of Cortland Drive and the west side of the Cortland Drive cul-de-sac.
  - Hydrants are shown along Pine Avenue and Cortland Drive.
  - Sanitary sewer on the north end of the development runs in an 8’ sewer on the north side of servicing lots 32-38.
  - An 8’ sewer is along the east side of Pine Avenue and south/east side of Cortland Drive.

**RELATIONSHIP TO COMPREHENSIVE LAND USE PLAN:** The future land use plan designates this location medium density residential.

**STAFF ANALYSIS – ZONING ORDINANCE:** The Preliminary Plat consists of 38 residential lots. The plat consists of 14.399 acres of land west of Iowa Highway 28 and north of Wright Road. The residential lots vary in size measuring from 7,979 SF to 34,655 SF.

Streets shown will be dedicated to the City for street use upon approval of the Final Plat. The designated street right-of-way is 60 feet with a 28’ wide road on Pine Avenue and Cortland

Drive with 26' wide road on the cul-de-sacs.

The proposed preliminary plat would be for any residential lots to be in the R-1 district with the following bulk regulations:

- Minimum lot area – 7,500 SF
- Minimum lot width – 60'
- Front Setback – 30'
- Side setback – 15' total (min. 7' one side)
- Rear setback – 35'
- Height – 35'

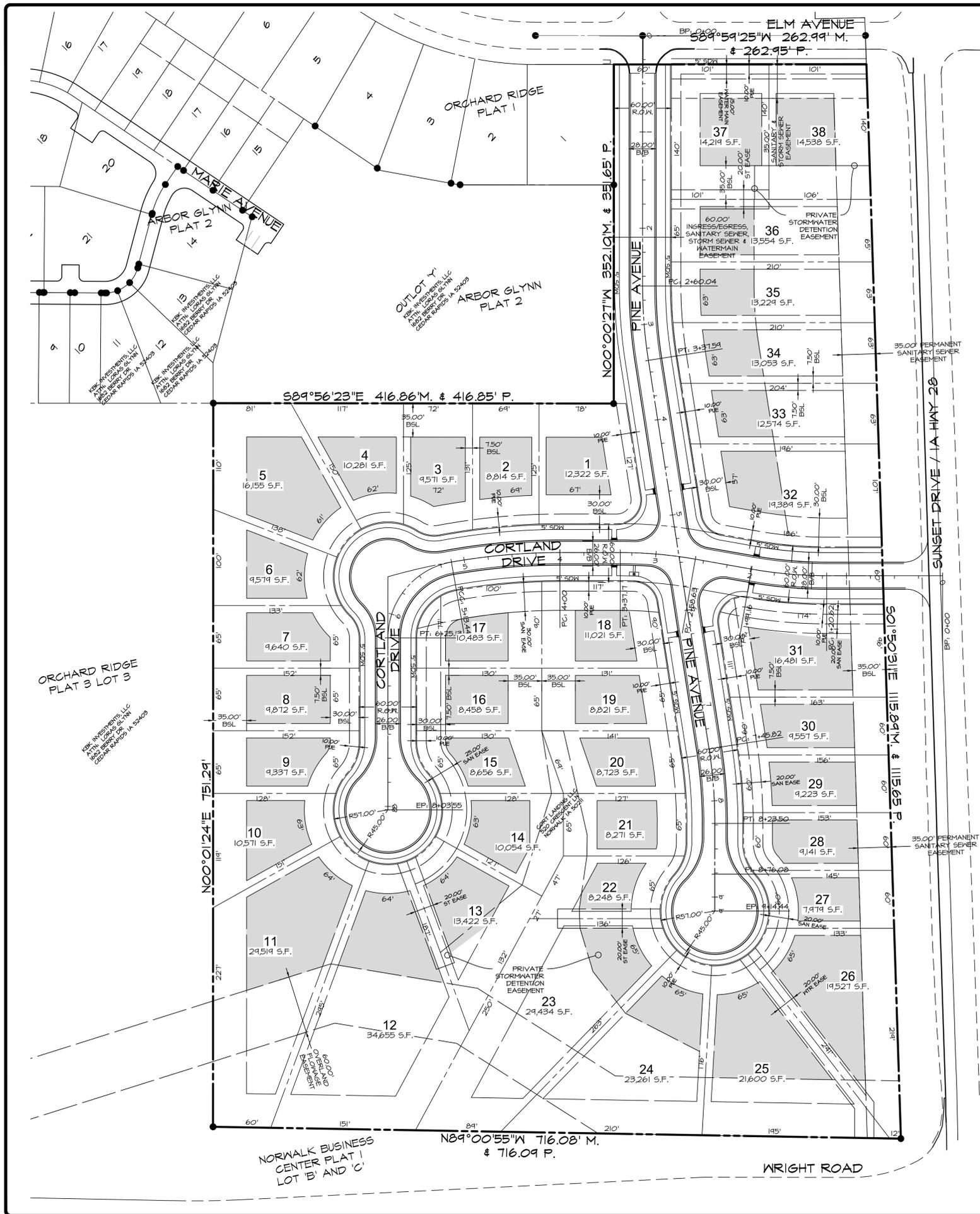
**STAFF ANALYSIS –  
SUBDIVISION  
ORDINANCE:**

The Subdivision Ordinance requires that Preliminary Plat submissions details on lot design, street layout, sanitary sewer layout, water main layout, grading, and storm water management. All information has been submitted by the applicant.

**STAFF  
RECOMMENDATION:**

Therefore, staff recommends that the request for the Preliminary Plat of Cort Landing Plat 1 be approved for the following conditions:

- That the applicant provides all supporting documentation required within the Norwalk Subdivision Regulations.
- That any significant modifications to the final plat be reviewed and approved by the Planning & Zoning Commission and City Council.



**PRELIMINARY PLAT**  
**CORT LANDING**  
**PLAT 1**  
 NORMALK, IOWA  
 SHEET 1 OF 2

**PROPERTY OWNER / APPLICANT:**  
 CORT LANDING, LLC  
 340 WRIGHT ROAD, SUITE E  
 NORMALK, IOWA 50211

**LEGAL DESCRIPTION**  
 LOT 1, ORCHARD RIDGE PLAT 3, AN OFFICIAL PLAT, CITY OF NORMALK, WARREN COUNTY, IOWA, RECORDED IN BOOK 2006, PAGE 92394 AT THE WARREN COUNTY RECORDER'S OFFICE, AND CONTAINS 14.349 ACRES MORE OR LESS.

**ZONING**  
 DOBSON PLANNED UNIT DEVELOPMENT  
 LOTS 1-38: R-1 (60)

**BULK REGULATIONS**  
 R-1 (60)  
 MINIMUM LOT AREA - 7,500 SF  
 MINIMUM LOT WIDTH - 60'  
 FRONT YARD SETBACK - 30'  
 REAR YARD SETBACK - 35'  
 SIDE YARD SETBACK - 15' TOTAL (MIN. 1' ONE SIDE)  
 HEIGHT LIMIT - 35'

**UTILITIES**  
 CITY OF NORMALK WATER WORKS  
 CITY OF NORMALK SANITARY SEWER SYSTEM  
 CITY OF NORMALK STORM SEWER SYSTEM

**FLOOD ZONE**  
 ZONE 'X'  
 FEMA FIRM FLOOD INSURANCE RATE MAP NUMBER 19181C0131E, REVISED MARCH 2, 2004.  
 &  
 ZONE 'X'  
 FEMA FIRM FLOOD INSURANCE RATE MAP NUMBER 19181C0133F, REVISED OCTOBER 16, 2014.

- NOTES**
1. ALL STORM SEWER EASEMENTS ARE TO BE 20 FEET WIDE OR TWO TIMES THE DEPTH, WHICHEVER IS GREATER.
  2. ALL SANITARY SEWER EASEMENTS ARE TO BE 30 FEET WIDE OR TWO TIMES THE DEPTH, WHICHEVER IS GREATER.
  3. THE USE OF PUBLIC UTILITY EASEMENTS IS SUBORDINATE TO THE CITY'S USE OF ITS DESIGNATED EASEMENT.
  4. SOME LOTS ACCEPT DRAINAGE FROM ADJACENT PROPERTY. BUILDING ON THESE LOTS MUST TAKE INTO ACCOUNT UPSTREAM DRAINAGE.
  5. LOTS 'A', 'B', 'C', AND 'D' ARE TO BE DEEDED TO THE CITY OF NORMALK FOR STREET PURPOSES.
  6. STRUCTURES AND FENCES ARE PRECLUDED WITHIN EASEMENTS.
  7. FENCES ARE NOT ALLOWED IN THE DETENTION AREA.
  8. ALL DRAINAGE AND DETENTION EASEMENTS ARE PRIVATE.
  9. STORMWATER DRAINAGE AND DETENTION FOR LOT 38 WILL BE REQUIRED DURING THE SITE PLAN DEVELOPMENT PHASE.

**CERTIFICATIONS**

HEREBY CERTIFY THAT THIS LAND SURVEYING DOCUMENT WAS PREPARED AND THE RELATED SURVEY WORK WAS PERFORMED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF IOWA.

JERRY F. OLIVER, IOWA REG. NO. 7844  
 DATE MY LICENSE RENEWAL DATE IS DECEMBER 31, 2026  
 PAGES OR SHEETS COVERED BY THIS SEAL: \_\_\_\_\_

HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.

JERRY F. OLIVER, IOWA REG. NO. 7844  
 DATE MY LICENSE RENEWAL DATE IS DECEMBER 31, 2026  
 PAGES OR SHEETS COVERED BY THIS SEAL: \_\_\_\_\_  
 THIS SHEET ONLY



**LEGEND**

	FLAT BOUNDARY
	STORM SEWER # SIZE
	SANITARY SEWER # SIZE
	WATER MAIN # SIZE
	MANHOLE
	STORM INTAKE
	FIRE HYDRANT
	VALVE
	F.E.S.
	EXISTING CONTOURS
	PROPOSED CONTOURS
	SILT FENCE
	EXISTING TREE LINE
	P.O.B.
	B.S.L.
	MAIL BOX CLUSTER
	STREET LIGHT POLE

SCALE: 1" = 60'

**Civil Engineering Consultants, Inc.**  
 2400 86th Street, Unit 12, Des Moines, Iowa, 50322  
 515.276.4884 · Fax: 515.276.7084 · mail@cecinc.com

**CEC**

DATE:	REVISIONS	COMMENTS
AUGUST 04, 2015	1	2015-04-17
	2	2015-10-02
	3	2016-05-12
	4	2016-05-18
	5	JFO
	6	PC

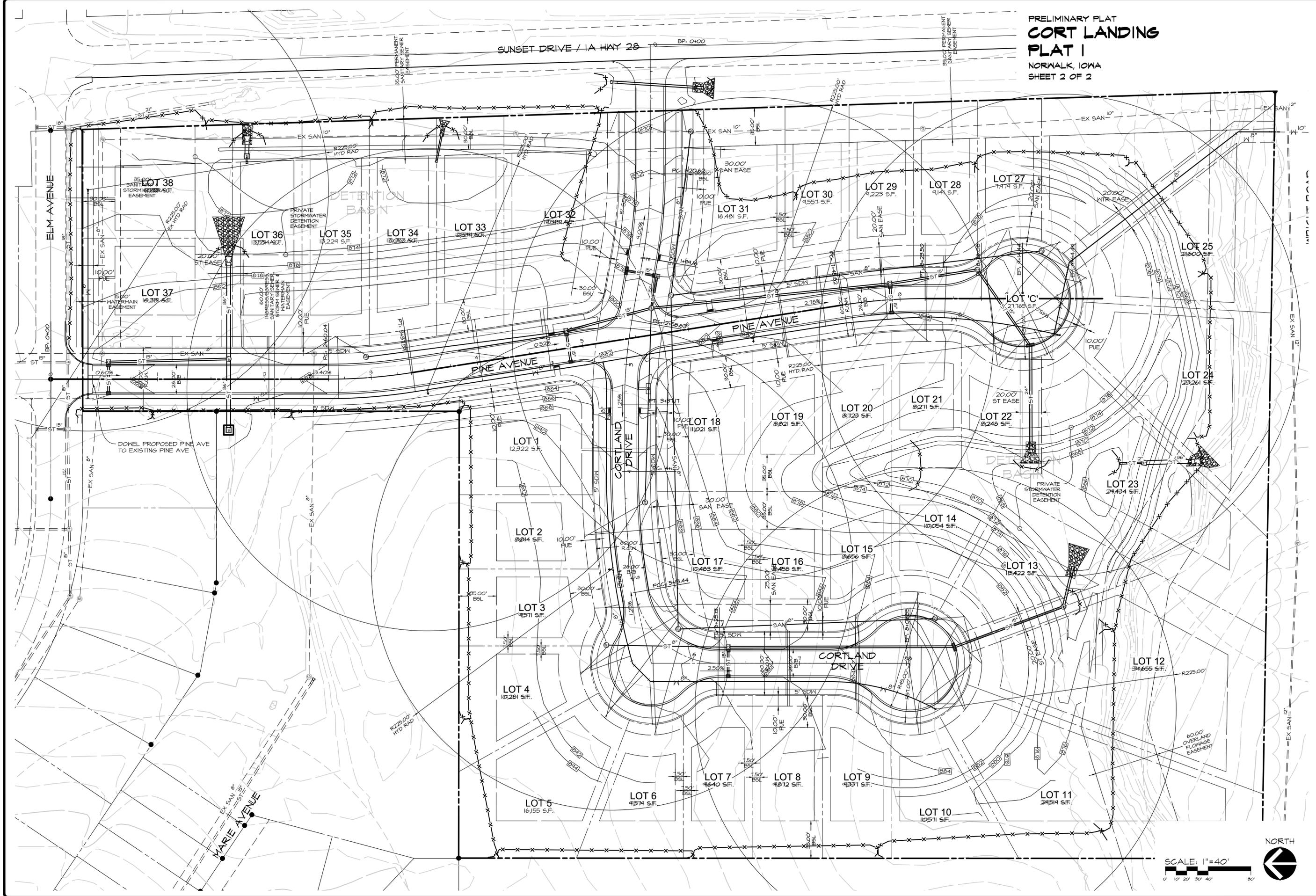
**CORT LANDING PLAT 1**  
 NORMALK, IOWA

**PRELIMINARY PLAT - DIMENSIONS**

SHEET  
**01**  
 OF 02

E-1222

PRELIMINARY PLAT  
**CORT LANDING**  
**PLAT 1**  
 NORMALK, IOWA  
 SHEET 2 OF 2



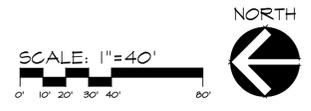
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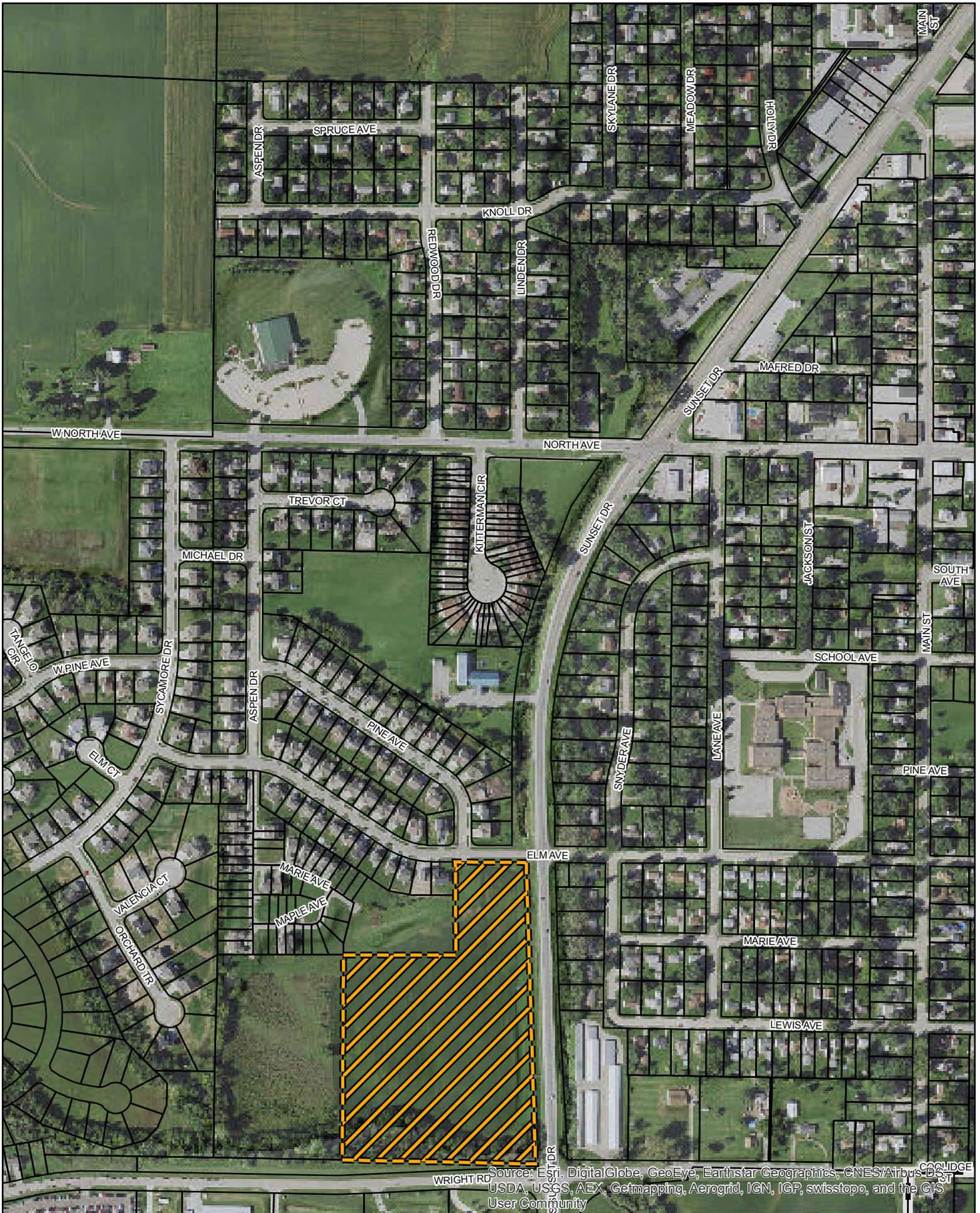
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AUGUST 04, 2015	1	2015-04-17
	2	2015-10-02
	3	2016-05-12
	4	2016-05-18
	5	JFO
	6	PC

DATE OF SURVEY: JFO  
 DESIGNED BY: JFO  
 DRAWN BY: PC

**CORT LANDING PLAT 1**  
 NORMALK, IOWA  
**PRELIMINARY PLAT - GRADING & UTILITIES**



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**CITY OF NORWALK  
REPORT TO THE NORWALK PLANNING COMMISSION**

**ITEM:** Subdivision Ordinance Update Discussion

**MEETING DATE:** May 23, 2016

**STAFF CONTACT:** Luke Parris, AICP  
City Planner  
Wade Wagoner, AICP  
Planning & Economic Development Director

**GENERAL DISCUSSION:** City staff prepared a memo that was shared with the Planning & Zoning Commission related to updating the City's Subdivision Ordinance. That memo identified the following areas as focus points for the update:

- Review and Approval Procedures for Final Plats
- Complete Streets Policy
- Street Design Standards
- Lot Design Standards
- Drainage
- Parkland Dedication
- Fees

To continue discussion on these topics, staff will be providing additional information and giving presentations relevant to the focal points for the update. The first presentation and set of information will be related to street design.

**ATTACHMENTS & ADDITIONAL INFORMATION:** Attachment A: Subdivision Memo  
Attachment B: Norwalk Subdivision – Street Design Standards  
Attachment C: SUDAS – Roadway Design Standards  
Attachment D: 10-Foot Traffic Lanes Are Safer  
Attachment E: SmartCode V2 Summary  
Attachment F: SmartCode Street Design

Online Resources:  
SUDAS Design Standards -  
<http://www.iowasudas.org/manuals/manual.cfm?manual=design>  
NACTO Design Standards –  
<http://nacto.org/publication/urban-street-design-guide/streets/>

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Attachment A

# MEMO

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TO: Planning and Zoning Commission Members  
FROM: Luke Parris, City Planner  
DATE: April 12, 2016  
RE: Subdivision Regulations

The City's Subdivision Regulations are a key piece of city code that guides the type of development in the City. Whereas the Zoning Ordinance specifically deals with allowable uses, the subdivision regulations deal with how land is divided and the criteria to do so. As with all regulations, it is important to revisit the language frequently to ensure that the code is in line with the goals of the City. The current Subdivision Regulations were adopted in October 2006. After recently updating the City's Zoning Ordinance, and with the current work updating the Land Use chapter of the Comprehensive Plan, staff feels it is important to look at the Subdivision Regulations to determine which areas might need updating. Below are a list of sections and some background on why we feel an update may be needed.

## Review and Approval Procedures for Final Plats

Review and approval of a final plat is the last stage of the development process before building permits can be pulled. Smooth transition from the platting process to the building permit process is important to land developers. Often times at this stage the land developer has commitments for lots and has a desire to record the final plat so that abstracts can be created and land can be transacted upon. For the City, the final plat is a key step to ensuring that all public infrastructure is built in an acceptable manner. At times the City's interest and the developer interest come into conflict. Having a clear approval process can reduce the conflicts and provide a clear set of expectations to the developer.

The approval process as identified in the Subdivision Regulations is as follows:

1. Developer submits final plat to the City for review
2. Staff coordinates review and provides comments to the developer
3. Planning & Zoning Commission review and referral to Council with a recommendation
4. City Council consideration and approval
  - a. The Council shall not give final approval of the plat until all improvements serving the area of the final plat have been constructed and accepted by the Council.
  - b. The Council can give tentative approval of a final plat to approve the plat's street and lot layout prior to construction of required improvement with the condition the improvements will be completed prior to releasing the plat for recording at the county.
  - c. Approval of the final plat and final acceptance of improvements shall be given by resolution of the Council.
  - d. The Council directs the Mayor and City Clerk to certify the resolution and the plat as approved.

The process as described above has not been precisely followed during the current staff's administration of the code, nor has it been precisely followed when reviewing records of plat approval going back to 2006. The approval process used in practice has been as follows:

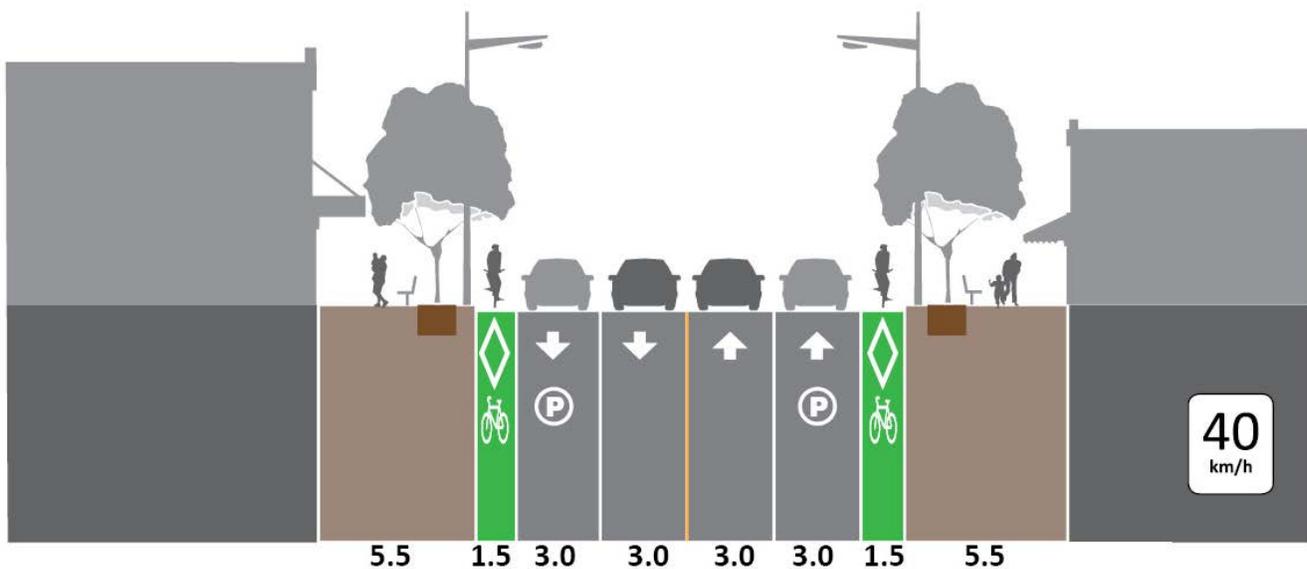
1. Developer submits final plat to the City for review
2. Staff coordinates review and provides comments to the developer
3. Planning & Zoning Commission review and referral to Council with a recommendation

4. City Council consideration and approval
  - a. The Council resolution includes a condition that the developer adheres to all provisions in the Subdivision Regulations. This has allowed staff to obtain Council approval and hold the final plat for recording until the City accepts the public infrastructure.
  - b. The Public Works Department takes the acceptance of the public infrastructure to Council, usually on a separate timeline at a separate meeting.
  - c. The Council resolution includes language allowing for the Planning & Economic Development Director, or his designee, to stamp, sign and release the final plat once all conditions of the Subdivision Ordinance are released.

Recent discussions with local developers have called to issue a concern with the need to wait for the City Council to formally approve the public infrastructure at a separate meeting. The development community contends that approval by Council is a formality as long as the Public Works Department has inspected the infrastructure and is recommending acceptance to the Council. A potential solution would be to allow City staff to release a plat for recording once the Public Works Department has inspected and decided to recommend acceptance to the Council.

### **Complete Streets Policy**

The City of Norwalk was one of the first metro communities to adopt a complete streets policy into its subdivision regulations. The idea of Complete Streets is that a street should be designed to accommodate all users of the public right-of-way, such as bicyclists, pedestrians, automobiles, and transit use. Norwalk’s Complete Streets Policy was adopted 10 years ago and large amount of additional research has gone into how Complete Streets should be designed. This section could be bolstered by looking at current examples of Complete Street policies and implementing some of the best practices.



*Example cross section of a complete street*

### **Street Design Standards**

The Subdivision Regulations includes a long section describing the criteria for the design of streets in the City of Norwalk. The design of our streets has just as much impact on the aesthetic of the community as the Zoning Codes Architectural Standards. The section provides standards for:

- Compatibility with the Comprehensive Plan
- Continuity of Existing Streets or Planned Streets
- Traffic Circulation
- Street Intersection Design
- Block Length
- Cul-de-sac use and length
- Street Names

- Topographic Features
- Alleys
- Access to Major Thoroughfares
- Traffic Impact Studies
- Dedication to the City
- Street Widths
- Rural Cross Section Streets
- Street Grade
- Temporary Turnarounds

This section should be looked at in conjunction with the Complete Streets policy to ensure that the design standards are compatible with Complete Streets. Additionally, the City has adopted the Statewide Urban Designs and Standards (SUDAS) guidelines for public infrastructure. SUDAS is a great resource for general practices on design throughout the state of Iowa; however, with the current street design standards and the adoption of SUDAS, there are many cases of inconsistency between the two.

### **Lot Design Standards**

This section will need a brief review to ensure that any changes made in the Zoning Ordinance update are incorporated into the lot design standards.

### **Drainage**

This section provides details on how the City requires property to be drained. The City has recently started requiring that drainage easement be label as private when they are not leading into a public facility. This language should be formalized in the code. Further review of best practices in storm water management will be reviewed and considered for incorporation.

### **Parkland Dedication**

This section provides details the requirement for dedicating parkland to the city. Developers currently have three options to meet the dedication requirement if they don't provide the parkland space in their development. Those options are:

1. Dedicate land owned elsewhere in the City for use as parks or trails.
2. Construct or install park improvements equal to the fair market value of the park land required.
3. Pay a cash deposit as a performance surety in an amount equal to the fair market value of the park land required.

These three options need to be reviewed to ensure they are still allowed under state law. If the options continue to be used, a definition of the fair market value of the land should be developed.

### **Fees**

This section details the fees for the various development review activities conducted by the City. The fee structure should be reviewed in relation to the fees charged by other communities to determine if any adjustment is needed.

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2. **Street Design Standards.** The standards for the design of streets, street rights of way, and improvements affecting the design and use of streets and street rights of way are as follows:

- A. Comprehensive Plan and Land Use Plan: All proposed plats and subdivisions shall be compatible with the Land Use Plan of the City's Comprehensive Plan as it relates to the proposed location of arterial and major collector streets. All proposed plats and subdivisions shall also be compatible with the street layout plan of any neighborhood plan or master plan approved by the Council.
- B. Continuity of Existing Streets or Planned Streets: All proposed streets shall provide for continuity in alignment, continuation or completion of any existing streets (constructed or recorded) or any streets that are part of an approved preliminary plat, neighborhood plan or master plan of an adjoining or neighboring property. Streets shall be extended at equal or greater width based on the street's classification, unless variations are approved by the Council.
- C. Circulation: The street pattern shall provide ease of circulation within the subdivision as well as convenient access to adjoining streets, thoroughfares, or undeveloped land as may be required by the Council. In a case where a street will eventually be extended beyond the plat, but is temporarily dead-ended, a temporary turnaround shall be required for temporary dead-end streets of over 300 feet of length.
- D. Street Intersections: Streets shall intersect other street across from each other and intersections shall be as nearly at right angles as possible, and not less than at a 70-degree angle. The radii at the intersections of street roadway pavements and right of way at intersections shall conform to City standards and shall not be less than 25 feet.  
  
Intersecting streets shall not be offset more than six (6) feet or less than 125 feet at the centerlines. No driveway shall be permitted to access a minor collector or local street closer than 15 feet from the end of the corner radius of an intersecting street or as required by the City to limit the congestion and hazard for traffic traveling through the intersection.
- E. Blocks: No block shall be longer than 1,320 feet from street centerline to street centerline.
- F. Cul-de-sac: The use of a cul-de-sac street shall be discouraged because cul-de-sacs can adversely affect the desired flow of traffic through the community and are more difficult and inefficient to serve with public services including garbage collection, snow removal, emergency services and fire protection. Cul-de-sacs shall be permitted only when a sites topography and shape do not allow for the use of a through street alternative, use of a cul-de-sac provides a more efficient use of the land, or the use of a through street is not cost efficient.

When a cul-de-sac is permitted, such street shall be no longer than 600 feet in length for office, commercial, industrial and

multiple-family residential land uses, and no longer than 800 feet within residential subdivisions with lots for detached single-family dwellings. The Council may allow cul-de-sacs exceeding the maximum permitted length if the incorporation of innovative design measures such as boulevards, additional roadway width, additional turning radius or alternative vehicle access that suitably addresses the intent to maintain adequate fire protection and emergency vehicle access and satisfies all other City standards and specifications, or the terminated roadway cannot be extended further due to the following: a.) the areas unique topography or environmental attributes; b.) the configuration of land ownership, or; c.) the existence of public land or environmentally sensitive land that is planned to be left undisturbed.

Land uses generating a maximum of 300 ADT of traffic or 30 single-family detached dwelling units will be permitted access to a cul-de-sac street without a second means of access. Traffic generation will be based on actual traffic counts or upon traffic generation surveys of the Institute of Traffic Engineers.

The closed end of a cul-de-sac shall have a circular turnaround having a diameter of 104 feet of right of way and paved roadway diameter of 80 feet in residential subdivisions. The circular turnaround of a cul-de-sac in a commercial or industrial subdivision shall have a diameter of 110 feet of right of way and 90 feet of roadway pavement. The right of way width of the street leading to the cul-de-sac turnaround in all subdivisions shall have a minimum of 60 feet in width and the lead-in portion of the street to the circular turnaround shall be rounded at a radius of not less than 50 feet.

- G. “Eyebrow cul-de-sac”: A cul-de-sac bulb used at a “L” intersection shall be discouraged, and only permitted to improve access to lots at the intersection if a through street cannot be used to create at least a “T” intersection due to the following: a.) the adjoining areas unique topography or environmental attributes; b.) the configuration of land ownership, c.) previously developed land adjoining the subdivision will not allow for a through street or; d.) the existence of public land or environmentally sensitive land that is planned to be left undisturbed. The “eyebrow cul-de-sac” at an intersection shall be designed with dimensions, radii and curve standards as used for cul-de-sacs with the center of the cul-de-sac bulb located at the intersection of the street centerlines and a minimum 50 feet radius at the inside intersection of the intersecting right of way and pavement.
- H. Street Names: All newly platted streets shall be named and in a manner conforming to the City’s street naming system. A proposed street that is in alignment with other existing streets, shall bear the same name. Names of new streets shall be subject to the approval of the Council.
- I. Topographic Features: In general, streets shall be designed with consideration for topography, creeks, drainage ways, flood hazard areas, wooded areas, slopes and other natural features

which can be an asset for the development and may improve the attractiveness of the subdivision.

- J. Half Streets: Dedication of half streets will not be permitted. Where there exists a dedicated or platted half street or alley adjacent to the property to be subdivided, the other half shall be platted if deemed necessary by the Council.
- K. Alleys: Alleys may be allowed in business areas and industrial districts for adequate access to block interiors and for off-street loading and parking purposes. Except where justified by unusual conditions, alleys will not be approved in residential districts, unless the alleys are privately owned and maintained by a property owner(s) or property owners association. Dead-end alleys shall be provided with a means of turning around at the dead end.
- L. Neighborhood Street Circulation: If a neighborhood plan or master plan has been approved by the Council for the neighborhood in which the proposed subdivision is located, the street circulation plan for the subdivision shall be compatible with the street circulation plans for the neighborhood and shall conform to the planned access locations for the subdivision site.
- M. Land Not Platted: A plat that includes only part of a parcel or tract owned by the developer, or adjoins other properties that are not developed, the developer shall submit a neighborhood plan including general topography and a sketch of a conceptual future street system for the neighboring undeveloped properties.
- N. Access to Major Thoroughfares: Where a new subdivision has frontage on a major thoroughfare (arterial or major collector street), direct access to the arterial or major collector street shall be restricted and access shall be by means of the following, except where justified by limiting conditions:
  - i. The backing or backward movement of vehicles from off-street parking or loading areas shall be prohibited on all streets. The backing or backward movement of vehicles from a driveway of a residence onto a major thoroughfare designated as arterial or major collector streets on the City's Land Use Plan.
  - ii. Parking lot, loading area and street accesses to major thoroughfares shall be approved by the Council and located to limit vehicular conflicts, provide acceptable location of driveway approaches, preserve traffic safety, and as possible, not impair movement of vehicular traffic on public streets. Parking lot, loading area, and street accesses to major arterial streets shall be limited to a minimum spacing of 600 feet from access centerline to access centerline. Parking lot, loading area and street accesses to minor arterial streets shall be limited to a minimum of 300 feet from centerline to centerline. Driveway approaches from single-family residential lots to arterial streets shall be discouraged and not permitted if access to a collector or local street is available. Single-

family lots with frontage and permitted direct access to an arterial street shall have a minimum frontage of 120 feet, or have a common access for two adjoining lots.

- iii. Direct access shall be restricted to a local street that is parallel to the major thoroughfare with lots backing up to the major thoroughfare.
- iv. Direct access shall be restricted to cul-de-sacs or short loop streets entered from and planned at right angles to the major thoroughfare.
- v. Direct access shall be restricted to an access frontage street separated from the major thoroughfare by a landscaped strip.
- vi. Direct access shall be through a service drive or alley at the rear of lots with frontage on the major thoroughfare.

Where anyone of the above stated provisions restricts access to a major thoroughfare, covenants, plat restrictions or other permitted means shall be used to make access restrictions of record and communicate to property owners any access restrictions to prevent any private driveways from having direct access to the major thoroughfare.

- O. Traffic Impact Study: If there is no existing traffic study or acceptable street design solution to address forecasted traffic flow congestion with alternative street widths, traffic lanes, lane configurations at intersections, driveway access locations and driveway access lane, a traffic impact study may be required for office, commercial, industrial, or residential developments that will increase traffic volumes more than 1,000 ADT. Such study will determine design measures that may be required to mitigate congestion and improve safety. Level of Service "C", as defined by the Transportation Research Board Highway Capacity Manual-Current Edition, shall be the standard for conduct of such study.

At a minimum, the study shall address the right of way widths pavement widths, traffic circulation, turn lanes, acceleration or deceleration lanes, and traffic control devices required. Developers will be responsible for the dedication of right of way and installation of those improvements necessary to provide access to each lot or unit and accommodate new trips generated by the development onto existing roadways. If such study is required, it shall be submitted with the Preliminary Plat, or Master Plan if no Preliminary Plat is required.

- P. Dedication: A warranty deed to the City shall be provided for all streets to be dedicated to the City.
- Q. Street Widths: The developer shall dedicate rights of way and construct paved roadways as part of the subdivision and platting of land within the jurisdiction of this Title. The minimum width by street classification for street rights of way to be dedicated and roadway paving to be planned shall be as follows:

- i. Major Arterial Streets:  
 Right of way.....120 feet  
 Roadway (Divided).....65 feet  
 Roadway (Undivided).....49 feet
- ii. Minor Arterial Streets:  
 Right of way.....100 feet  
 Roadway (Undivided).....49 feet
- iii. Major Collector Streets:  
 Right of way (Commercial/Industrial).....80 feet  
 Right of way (Residential).....70 feet  
 Roadway (Three Lanes).....37 feet  
 Roadway (Two Lanes).....31 feet
- iv. Minor Collector Streets:  
 Right of way .....60 feet  
 Roadway .....31 feet
- v. Local Streets:  
 Right of way.....60 feet  
 Roadway.....28 feet
- vi. Cul-de-sac:  
 Right of way.....60 feet  
 Roadway.....26 feet  
 Bulb Right of Way Radius(Residential).....52 feet  
 Bulb Right of Way Radius(Commercial/Industrial)..55 feet  
 Bulb Roadway Radius (Residential).....40 feet  
 Bulb Roadway Radius (Commercial/Industrial).....45 feet
- vii. Rural Cross Section (Local or Minor Collector Streets):  
 Right of way (Minimum with Sidewalks).....80 feet  
 Right of way (Minimum without Sidewalks).....70 feet  
 Roadway (Two Lanes).....24 feet  
 Shoulder Area (Each Side).....8 feet  
 Roadside Drainage Ditch (Each Side)..Minimum of 15 feet

The developer shall be responsible to pave up to 37 feet of roadway width as part of the improvements for a new subdivision, except as further provided herein. The above listed roadway widths for local and collector Streets are pavement widths required to be constructed by the developer as part of the improvements for a new subdivision. Additional roadway lanes and widths for major collector and arterial streets may be required by the Council to accommodate the traffic movements generated by large subdivisions and high traffic volume generating land uses.

- R. Rural Cross Section Streets: Streets classified as local or minor collector streets within areas planned or zoned as RE-1, Single-Family Rural Estates district may be designed with a rural cross section in accordance with City standards and this Title. Rural cross section streets are streets that are designed without curbing and use roadside ditches to control road surface drainage, convey storm water run-off and for snow storage. Parking shall not be permitted on minor collector streets with a rural cross section unless a thirty (30) feet wide roadway is provided.

All rural cross section streets shall have an eight (8) feet wide shoulder area provided on each side of the roadway to establish a seven (7) feet wide clear zone and space to place signage and fire hydrants. A minimum fifteen (15) feet wide area to accommodate a drainage ditch with side slopes shall be placed outside of the shoulder area on both sides of the roadway. Fire hydrants should generally be placed at an accessible location on the outer side slope of the drainage ditch a minimum of one foot from the right of way line. A greater right of way width may be needed if additional space is needed to provide a large enough drainage ditch to convey storm water flows. If a sidewalk is planned to be installed, an additional five (5) feet of right of way outside of the drainage ditch and back slope shall be provided to accommodate a four feet wide sidewalk.

- S. Street Grades. Streets and alleys shall be completed to grades approved by the City Engineer and conform to City standards. All streets shall be graded to the full width of the right of way. Streets with urban cross sections (versus rural cross sections) shall be graded with four percent (4%) rise from the curb level to the right of way line or sidewalk and adjacent side slopes graded to blend with the natural ground level. The maximum grade along the longitudinal alignment of a street shall not exceed six percent (6%) for major and minor arterial streets, seven percent (7%) for major collector streets, and eight percent (8%) for minor collector or local streets. All changes in grades along the alignment of all streets shall be connected by vertical curves designed in accordance with design standards adopted by the City.
- T. Temporary Turnaround: Streets that are over 300 feet in length and dead end at the plat or subdivision boundary shall be provided with a paved temporary hammerhead turnaround or a circular turnaround with a minimum diameter of 90 feet. Temporary turnarounds will not be considered to be cul-de-sacs for the purposes of this Title and will require the installation of an approved barricade at the end of the street. Residential streets that result in only one means of ingress/egress for a temporary period of time until a later phase of development occurs or an abutting property extends the roadway, shall not exceed 500 ADT until a second access has been provided.

3. **Lot Design Standards:** The standards for the design of lots, street rights of way, and improvements affecting the design and use of streets and street rights of way are as follows:

- A. Minimum Lot Requirements: The minimum bulk requirements for developments within the City shall comply with the bulk regulations set forth for the zoning district as shown on the Zoning Map or Land Use Plan for the City and Land Use Plan for outside of the City in which the subdivision or plat is located. Except for townhouse lots, mobile home park and factory built home park lots and cemetery plot, each lot shall be at least 100 feet in depth and not have a depth greater than four (4) times the width at the minimum front yard setback. Each lot, except for

# Geometric Design Tables

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## A. General

The following sections present two sets of design criteria tables - Preferred Roadway Elements (Table 5C-1.01) and Acceptable Roadway Elements (Table 5C-1.02). In general, the “Preferred” table summarizes design values taken from the AASHTO’s “Green Book” that may be considered “preferred” while the “Acceptable” table represents AASHTO minimums or practical minimums not covered in AASHTO.

Designers should strive to provide a design that meets or exceeds the criteria established in the “Preferred” table. For designs where this is not practical, values between the “Preferred” and “Acceptable” tables may be utilized, with approval of the Engineer.

## B. Design Controls and Criteria

The selection of various values for roadway design elements is dependent upon three general design criteria: functional classification, design speed, and adjacent land use.

- 1. Functional Classification:** The first step in establishing design criteria for a roadway is to define the function that the roadway will serve (refer to Section 5B-1 for street classifications). The functional classification of the roadway is the basis for the cross-sectional design criteria shown in Tables 5C-1.01 and 5C-1.02. It also serves as the basis for the ultimate selection of design speed and geometric criteria.

Under a functional classification system, design criteria and level of service vary according to the intended function of the roadway system. Arterials are expected to provide a high level of mobility for longer trip length; therefore, they should provide a higher design speed and level of service. Since access to abutting property is not their main function, some degree of access control is desirable to enhance mobility. Collectors serve the dual function of accommodating shorter trips and providing access to abutting property. Thus, an intermediate design speed and level of service is important. Local streets serve relatively short trip lengths and function primarily for property access; therefore, there is little need for mobility or high operating speeds. This function is reflected by use of lower design speeds and an intermediate level of service.

- 2. Design Speed:** Design speed is the selected speed used to determine various geometric features of the roadway, including horizontal and vertical alignment. The design speed selected should be as high as practical to attain the desired degree of safety, mobility, and efficiency. It is preferred to select a design speed that is at least 5 mph greater than the anticipated posted speed limit of the roadway. Selecting a design speed equal to the posted speed limit may also be acceptable and should be evaluated on a project by project basis, subject to approval of the Engineer. Once the design speed is selected, all pertinent roadway features should be related to it to obtain a balanced design.

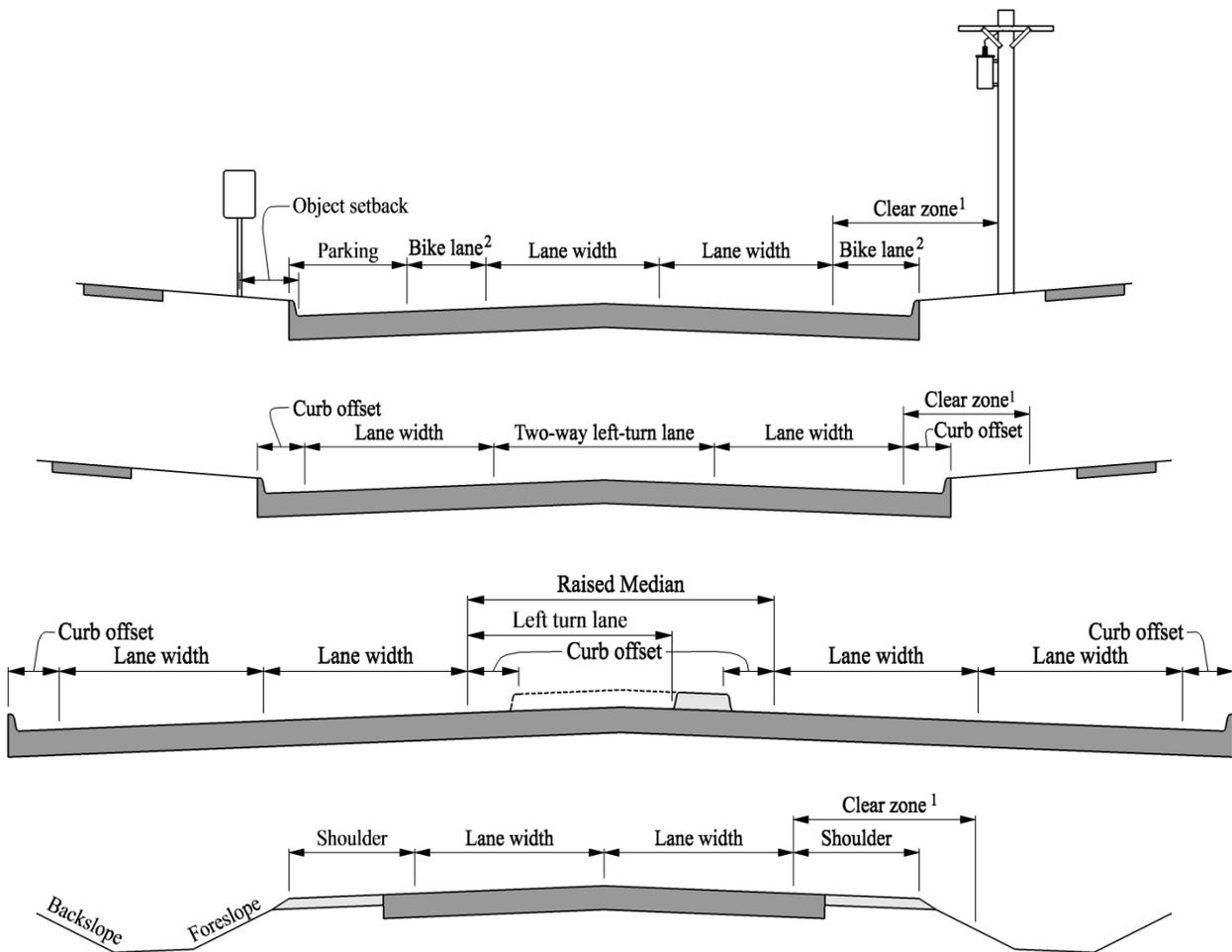
In some situations, it may be impractical to conform with the desired design speed for all elements of the roadway (e.g. horizontal radius or clear zone). In these situations, warning signs or additional safety treatments may be required (e.g. warning signs or guard rail).

- 3. Adjacent Land Use:** In addition to functional classification and design speed, the surrounding land use can impact the design elements of the roadway corridor as well. Land use can be categorized into three groups: residential, commercial, and industrial.
- a. Residential areas are regions defined by residential or multi-family zoning districts where single-family houses, apartment buildings, condominium complexes and townhome developments are located. Because these facilities typically have lower overall traffic volumes, low truck volumes, and are utilized primarily by drivers who are familiar with the roadway, some design values can be set at a lower level than for commercial or industrial areas.
  - b. Commercial and industrial areas are highly developed regions generally defined by commercial and industrial zoning districts where factories, office buildings, strip malls, and shopping centers are or will be located. The areas typically require higher level design values due to increased traffic volumes, increased truck volumes, and decreased driver familiarity.

## C. Roadway Design Tables

The following figures illustrate the location of various design elements of the roadway cross-section as specified in Tables 5C-1.01 and 5C-1.02.

**Figure 5C-1.01: Roadway Design Elements**



<sup>1</sup> Clear zone is measured from the edge of the traveled way.

<sup>2</sup> See Chapter 12 for bike lane requirements.

**Table 5C-1.01: Preferred Roadway Elements**  
Elements Related to Functional Classification

Design Element	Local		Collector		Arterial	
	Res.	C/I	Res.	C/I	Res.	C/I
<b>General</b>						
Design level of service <sup>1</sup>	D	D	C/D	C/D	C/D	C/D
Lane width (single lane) (ft) <sup>2</sup>	10.5	12	12	12	12	12
Two-way left-turn lanes (TWLTL) (ft)	N/A	N/A	14	14	14	14
Width of new bridges (ft) <sup>3</sup>	See Footnote 3					
Width of bridges to remain in place (ft) <sup>4</sup>	-----	-----	-----	-----	-----	-----
Vertical clearance (ft) <sup>5</sup>	14.5	14.5	14.5	14.5	16.5	16.5
Object setback (ft) <sup>6</sup>	3	3	3	3	3	3
Clear zone (ft)	Refer to Tables 5C-1.03, 5C-1.04, and 5C-1.05					
<b>Urban</b>						
Curb offset (ft) <sup>7</sup>	2	2	2	3	3	3
Parking lane width (ft)	8	8	8	10	N/A	N/A
Roadway width with parking on one side <sup>8</sup>	26/31 <sup>9</sup>	34	34	37	N/A	N/A
Roadway width without parking <sup>10</sup>	26	31	31	31	31	31
Raised median with left-turn lane (ft) <sup>11</sup>	N/A	N/A	19.5	20.5	20.5	20.5
Cul-de-sac radius (ft)	45	45	N/A	N/A	N/A	N/A
<b>Rural Sections in Urban Areas</b>						
Shoulder width (ft)						
ADT: under 400	4	4	6	6	10	10
ADT: 400 to 1,500	6	6	6	6	10	10
ADT: 1,500 to 2000	8	8	8	8	10	10
ADT: above 2,000	8	8	8	8	10	10
Foreslope (H:V)	4:1	4:1	4:1	4:1	6:1	6:1
Backslope (H:V)	4:1	4:1	4:1	4:1	4:1	4:1

Res. = Residential, C/I = Commercial/Industrial

Elements Related to Design Speed

Design Element	Design Speed, mph <sup>12</sup>							
	25	30	35	40	45	50	55	60
Stopping sight distance (ft)	155	200	250	305	360	425	495	570
Passing sight distance (ft)	900	1090	1,280	1,470	1,625	1,835	1,985	2,135
Min. horizontal curve radius (ft) <sup>13</sup>	198	333	510	762	1,039	926	1,190	1,500
Min. vertical curve length (ft)	50	75	105	120	135	150	165	180
Min. rate of vertical curvature, Crest (K) <sup>14</sup>	18	30	47	71	98	136	185	245
Min. rate of vertical curvature, Sag (K)	26	37	49	64	79	96	115	136
Minimum gradient (percent)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Maximum gradient (percent)	5	5	5	5	5	5	5	5

Note: For federal-aid projects, documentation must be provided to explain why the preferred values are not being met. For non-federal aid projects, the designer must contact the Jurisdiction to determine what level of documentation, if any, is required prior to utilizing design values between the “Preferred” and “Acceptable” tables.

Table 5C-1.01 Footnotes:

- <sup>1</sup> Number of traffic lanes, turn lanes, intersection configuration, etc. should be designed to provide the overall specified LOS at the design year ADT. Two LOS values are shown for collectors and arterials. The first indicates the minimum overall LOS for the roadway as a whole; the second is the minimum LOS for individual movements at intersections.
- <sup>2</sup> Width shown is for through lanes and turn lanes.
- <sup>3</sup> Bridge width is measured as the clear width between curbs or railings. Minimum bridge width is based upon the width of the traveled way (lane widths) plus 4 feet clearance on each side; but no less than the curb-face to curb-face width of the approaching roadway. Minimum bridge widths do not include medians, turn lanes, parking, or sidewalks. At least one sidewalk should be extended across the bridge.
- <sup>4</sup> See Table 5C-1.02, for acceptable values for width of bridges to remain in place.
- <sup>5</sup> Vertical clearance includes a 0.5 foot allowance for future resurfacing.
- <sup>6</sup> Object setback does not apply to mailboxes constructed and installed according to US Postal Service regulations, including breakaway supports.
- <sup>7</sup> Values shown are measured from the edge of the traveled way to the back of curb. Curb offset is not required for turn lanes. On roadways with an anticipated posted speed of 45 mph or greater, mountable curbs are required. For pavements with gutterline jointing, the curb offset should be equal to or greater than the distance between the back of curb and longitudinal gutterline joint.
- <sup>8</sup> Parking is allowed along one side of local or collector streets unless restricted by the Jurisdiction. Some jurisdictions allow parking on both sides of the street. When this occurs, each jurisdiction will set their own standards to allow for proper clearances, including passage of large emergency vehicles. Parking is normally not allowed along arterial roadways.
- <sup>9</sup> For local, low volume residential streets, two free flowing lanes are not required and a 26 foot or 31 foot (back to back) roadway may be used where parking is allowed on one side or both sides respectively. For higher volume residential streets, which require two continuously free flowing traffic lanes, a 31 foot or 37 foot roadway should be used for one sided or two sided parking respectively.
- <sup>10</sup> Some minimum roadway widths have been increased to match standard roadway widths. Unless approved by the Jurisdiction, all two lane roadways must comply with standard widths of 26, 31, 34, or 37 feet.
- <sup>11</sup> Median width is measured between the edges of the traveled way of the inside lanes and includes the curb offset on each side of the median. Values include a left turn lane with a 6 foot raised median as required to accommodate a pedestrian access route (refer to Chapter 12) through the median (crosswalk cut through). At locations where a crosswalk does not cut through the median, the widths shown can be reduced by 2 feet to provide a 4 foot raised median.
- <sup>12</sup> It is preferred to select a design speed that is at least 5 mph greater than the anticipated posted speed limit of the roadway. Selecting a design speed equal to the posted speed limit may also be acceptable and should be evaluated on a project by project basis, subject to approval of the Engineer.
- <sup>13</sup> Values for low design speed (<50 mph) assume no removal of crown (i.e. negative 2% superelevation on outside of curve). Radii for design speeds of 50 mph or greater are based upon a superelevation rate of 4%. For radii corresponding to other superelevation rates, refer to the AASHTO's "Green Book."
- <sup>14</sup> Assumes stopping sight distance with 6 inch object.

**Table 5C-1.02: Acceptable Roadway Elements**

Elements Related to Functional Classification

Design Element	Local		Collector		Arterial	
	Res.	C/I	Res.	C/I	Res.	C/I
<b>General</b>						
Design Level-of-Service <sup>1</sup>	D	D	D/E	D/E	D/E	D/E
Lane width (single lane) (ft) <sup>2</sup>	10	11	11	11	11	11
Two-Way Left-Turn Lanes (TWLTL) (ft)	N/A	N/A	12	12	12	12
Width of new bridges, (ft) <sup>3</sup>	See Footnote 3					
Width of bridges to remain in place (ft) <sup>4</sup>	20	22	24	24	26	26
Vertical clearance (ft) <sup>5</sup>	14.5	14.5	14.5	14.5	14.5	14.5
Object setback (ft) <sup>6</sup>	1.5	1.5	1.5	1.5	1.5	1.5
Clear zone (ft)	Refer to Tables 5C-1.03, 5C-1.04, and 5C-1.05					
<b>Urban</b>						
Curb offset (ft) <sup>7</sup>	1.5 <sup>8</sup>	1.5 <sup>8</sup>	1.5 <sup>8</sup>	1.5 <sup>8</sup>	2	2
Parking lane width (ft)	7.5	7.5	7.5	9	10	10
Roadway width with parking <sup>9, 11</sup>	26/31 <sup>10</sup>	31	31	34 <sup>11</sup>	34	34
Roadway width without parking <sup>11</sup>	26 <sup>10</sup>	26	26	26	26	26
Raised median with left-turn lane (ft) <sup>12</sup>	N/A	N/A	18	18	18.5	18.5
Cul-de-sac radius (ft)	45	45	N/A	N/A	N/A	N/A
<b>Rural Sections in Urban Areas</b>						
Shoulder width (ft)						
ADT: under 400	2	2	2	2	8	8
ADT: 400 to 1,500	5	5	5	5	8	8
ADT: 1,500 to 2,000	6	6	6	6	8	8
ADT: over 2,000	8	8	8	8	8	8
Foreslope (H:V) <sup>13</sup>	3:1	3:1	3:1	3:1	4:1	4:1
Backslope (H:V)	3:1	3:1	3:1	3:1	3:1	3:1

Res. = Residential, C/I = Commercial/Industrial

Elements Related to Design Speed

Design Element	Design Speed, mph <sup>14</sup>															
	25		30		35		40		45		50		55		60	
Stopping sight distance (ft)	155		200		250		305		360		425		495		570	
Passing sight distance (ft)	900		1,090		1,280		1,470		1,625		1,835		1,985		2,135	
Min. horizontal curve radius (ft) <sup>15</sup>	198		333		510		762		1,039		833		1,060		1,330	
Min. vertical curve length (ft)	50		75		105		120		135		150		165		180	
Min. rate of vert. curve, Crest (K) <sup>16</sup>	12		19		29		44		61		84		114		151	
Min. rate of vert. curve, Sag (K)	26		37		49		64		79		96		115		136	
Min. rate of vert. curve, Sag (K) based on driver comfort/overhead lighting <sup>17</sup>	14		20		27		35		44		54		66		78	
Minimum gradient (percent) <sup>18</sup>	0.5		0.5		0.5		0.5		0.5		0.5		0.5		0.5	
Maximum gradient (percent) <sup>19</sup>	R	C/I	R	C/I	R	C/I	R	C/I	R	C/I	R	C/I	R	C/I	R	C/I
Local	12	10	12	9	11	9	11	9	10	8	9	8	N/A	N/A	N/A	N/A
Collector	12	9	11	9	10	9	10	9	9	8	8	7	N/A	N/A	N/A	N/A
Arterial	N/A	N/A	9	9	8	8	8	8	N/A	7	N/A	7	N/A	6	N/A	6

R = Residential, C/I = Commercial/Industrial

Note: For federal-aid projects, proposed design values that do not meet the “Acceptable” table may require design exceptions. Design exceptions will be considered on a project-by-project basis and must have concurrence of the Iowa DOT when applicable. For non-federal aid projects, the designer should contact the Jurisdiction to determine what level of documentation, if any, is required prior to utilizing design values that do not meet the “Acceptable” table.

Table 5C-1.02 Footnotes:

- <sup>1</sup> Number of traffic lanes, turn lanes, intersection configuration, etc. should be designed to provide the specified LOS at the design year ADT.
- <sup>2</sup> Width shown is for through lanes and turn lanes.
- <sup>3</sup> Bridge width is measured as the clear width between curbs or railings. Minimum bridge width is based upon the width of the traveled way (lane widths) plus 3 feet clearance on each side; but no less than the curb-face to curb-face width of the approaching roadway. Minimum bridge widths do not include medians, turn lanes, parking, or sidewalks. At least one sidewalk should be extended across the bridge.
- <sup>4</sup> The values shown are the clear width across the bridge between curbs or railings. Values are based upon the width of the traveled way (lane width) and include a 1 foot and 2 foot offset on each side for collectors and arterials respectively. Values do not include medians, turn lanes, parking, or sidewalks. In no case should the minimum clear width across the bridge be less than the width of the traveled way of the approach road.
- <sup>5</sup> Vertical clearance includes a 0.5 foot allowance for future resurfacing. Vertical clearance of 14.5 feet on arterials is allowed only if an alternate route with 16 feet of clearance is available.
- <sup>6</sup> Object setback does not apply to mailboxes constructed and installed according to US Postal Service regulations, including breakaway supports.
- <sup>7</sup> Values shown are measured from the edge of the traveled way to the back of curb. Curb offset is not required for turn lanes. On roadways with an anticipated posted speed of 45 mph or greater, mountable curbs are required. For pavements with gutterline jointing, the curb offset should be equal to or greater than the distance between the back of curb and longitudinal gutterline joint.
- <sup>8</sup> At locations where a 1.5 foot curb offset is used, an alternative intake boxout, with the intake set back a minimum of 6 inches from the curb line, must be used to prevent intake grates from encroaching into the traveled way.
- <sup>9</sup> Some jurisdictions allow parking on both sides of the street. When this occurs, each jurisdiction will set their own standards to allow for proper clearances, including passage of large emergency vehicles.
- <sup>10</sup> For low volume residential streets, two free flowing lanes are not required and a 26 foot roadway may be used where parking is allowed on one side only. For higher volume residential streets, which require two continuously free flowing traffic lanes, a 31foot roadway should be used.
- <sup>11</sup> Some minimum roadway widths have been increased to match standard roadway widths. Unless approved by Jurisdiction, all two lane roadways must comply with standard widths of 26, 31, 34, or 37 feet.
- <sup>12</sup> Median width is measured between the edges of the traveled way of the inside lanes and includes the curb offset on each side of the median. Values include a left turn lane with a 6 foot raised median as required to accommodate a pedestrian access route (refer to Chapter 12) through the median (crosswalk cut through). At locations where a crosswalk does not cut through the median, the widths shown can be reduced by 2 feet to provide a 4 foot raised median.
- <sup>13</sup> The use of 3:1 foreslopes is allowed, as shown, but may require a wider clear zone as slopes steeper than 4:1 are not considered recoverable by errant vehicles.
- <sup>14</sup> It is preferred to select a design speed that is at least 5 mph greater than the anticipated posted speed limit of the roadway. Selecting a design speed equal to the posted speed limit may also be acceptable and should be evaluated on a project by project basis, subject to approval of the Engineer
- <sup>15</sup> Values for low design speed (<50 mph) assume no removal of crown (i.e. negative 2% superelevation on outside of curve). Radii for design speeds of 50 mph or greater are based upon a superelevation rate of 6%. For radii corresponding to other superelevation rates, refer to the AASHTO’s “Green Book.”
- <sup>16</sup> Assumes stopping sight distance with 2 foot high object.
- <sup>17</sup> Use only if roadway has continuous overhead lighting.
- <sup>18</sup> A typical minimum grade is 0.5%, but a grade of 0.4% may be used in isolated areas where the pavement is accurately crowned and supported on firm subgrade.
- <sup>19</sup> Maximum gradient may be steepened by 2% for short distances and for one way downgrades.

**Table 5C-1.03:** Preferred Clear Zone Distances for Rural and Urban Roadways

Design Speed mph	Design Traffic ADT	Foreslope			Backslope or Parking		
		6:1 or flatter	5:1 to 4:1	3:1	6:1 or flatter	5:1 to 4:1	3:1
In feet from edge of traveled way							
Urban 40 or less	All	For low-speed urban roadways, refer to Table 5C-1.05.					
Rural 40 or less	Under 750	10	10	*	10	10	10
	750 to 1,500	12	14	*	12	12	12
	1,500 to 6,000	14	16	*	14	14	14
	Over 6,000	16	18	*	16	16	16
Rural and Urban 45 to 50	Under 750	12	14	*	12	10	10
	750 to 1,500	16	20	*	16	14	12
	1,500 to 6,000	18	26	*	18	16	14
	Over 6,000	22	28	*	22	20	16
Rural and Urban 55	Under 750	14	18	*	12	12	10
	750 to 1,500	18	24	*	18	16	12
	1,500 to 6,000	22	30	*	22	18	16
	Over 6,000	24	32	*	24	22	18
Rural and Urban 60	Under 750	18	24	*	16	14	12
	750 to 1,500	24	32	*	22	18	14
	1,500 to 6,000	30	40	*	26	22	18
	Over 6,000	32	44	*	28	26	22

Source: Adapted from the *Roadside Design Guide*, 2006

**Table 5C-1.04:** Acceptable Clear Zone Distances for Rural and Urban Roadways

Design Speed mph	Design Traffic ADT	Foreslope			Backslope or Parking		
		6:1 or flatter	5:1 to 4:1	3:1	6:1 or flatter	5:1 to 4:1	3:1
In feet from edge of traveled way							
Urban 40 or less	All	For low-speed urban roadways, refer to Table 5C-1.05.					
Rural 40 or less	Under 750	7	7	*	7	7	7
	750 to 1,500	10	12	*	10	10	10
	1,500 to 6,000	12	14	*	12	12	12
	Over 6,000	14	16	*	14	14	14
Rural and Urban 45 to 50	Under 750	10	12	*	10	8	8
	750 to 1,500	14	16	*	14	12	10
	1,500 to 6,000	16	20	*	16	14	12
	Over 6,000	20	24	*	20	18	14
Rural and Urban 55	Under 750	12	14	*	10	10	8
	750 to 1,500	16	20	*	16	14	10
	1,500 to 6,000	20	24	*	20	16	14
	Over 6,000	22	26	*	22	20	16
Rural and Urban 60	Under 750	16	20	*	14	12	10
	750 to 1,500	20	26	*	20	16	12
	1,500 to 6,000	26	32	*	24	18	14
	Over 6,000	30	36	*	26	24	20

Source: Adapted from the *Roadside Design Guide*, 2006

\* Foreslopes steeper than 4:1 are considered traversable, but not recoverable. An errant vehicle can safely travel across a 3:1 slope, but it is unlikely the driver would recover control of the vehicle before reaching the bottom of the slope; therefore, fixed objects should not be present on these slopes or at the toe of these slopes.

**Table 5C-1.05:** Clear Zone for Low-speed (40 mph or less Design Speed) Urban Roadways

Roadway Classification	Distance from the Edge of the Traveled Way, feet <sup>1</sup>	
	<i>Preferred</i>	<i>Acceptable</i>
Arterial	10	7
Collector	8	5.5
Local	8	5.5

<sup>1</sup> Values in the table are measured from the edge of the traveled way. Parking lane, bike lane, and curb offset widths may be included as part of the clear zone; however, a minimum clear zone behind the back of curb of 6 feet (preferred) or 4 feet (acceptable) should be provided regardless of roadway classification. Clear zone requirements also apply along medians of divided roadways.

Source: Maze et al, 2008

## D. References

American Association of State Highway and Transportation Officials (AASHTO) *Roadside Design Guide*. 3rd ed. Washington, DC. 2006.

Maze T. Hawkins N. et al. Clear Zone - A Synthesis of Practice and an Evaluation of the Benefits of Meeting the 10ft Clear Zone Goal on Urban Streets. Center For Transportation Research and Education. Iowa State University. 2008.

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## CITYFIXER

# 10-Foot Traffic Lanes Are Safer—and Still Move Plenty of Cars

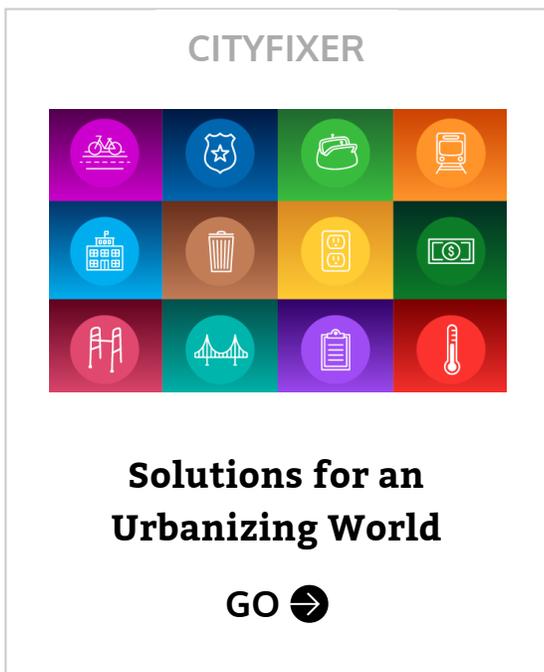
The case against 12-foot lanes in cities, in 3 charts.

ERIC JAFFE | [@e\\_jaffe](#) | Jul 28, 2015 | [43 Comments](#)



Raphael Desrosiers / Flickr

At first glance, it makes sense that wider traffic lanes could be safer traffic lanes. Drivers are prone to bad decisions and sleepiness and text messages and fits of rage. Providing some buffer room seems a reasonable way to keep them from veering into anything else sharing the road.



But as Jeff Speck [persuasively argued](#) during our Future of Transportation series, the conventional engineering wisdom that favors 12-foot traffic lanes to 10-foot lanes is deadly wrong—especially for city streets. The problem largely comes down to speed: when drivers have more room, cars go faster; when cars go faster, collisions do more harm. The evidence cited by Speck on the safety hazards of wider lanes is powerful, though to date it remains pretty scarce.

That body of work just got a bit thicker, thanks to a new study by civil engineer Dewan Masud Karim ([spotted by](#) Chris McCahill at the State Smart Transportation Initiative). Evaluating dozens of intersections in Toronto and Tokyo, Karim linked lower crash rates to narrower lanes—those closer to 10- or 10.5-feet wide than to 12-feet. Sure enough, wider lanes meant speedier cars, and yet narrower lanes were perfectly capable of moving high volumes of traffic.

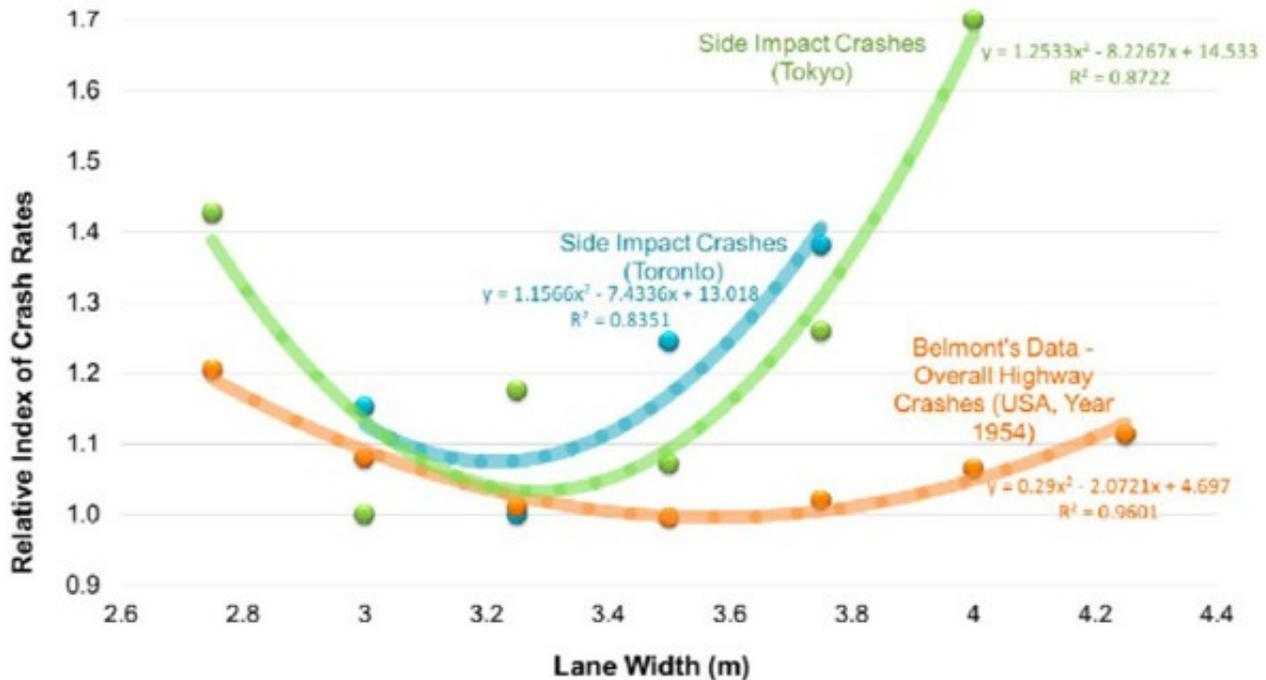
He [concludes](#):

Given the empirical evidence that favours ‘narrower is safer’, the ‘wider is safer’ approach based on intuition should be discarded once and for all. Narrower lane width, combined with other livable streets elements in urban areas, result in less aggressive driving and the ability to slow or stop a vehicle over shorter distances to avoid a collision.

Let’s take a closer, chart-filled look at the details.

## **Narrow lanes are safer**

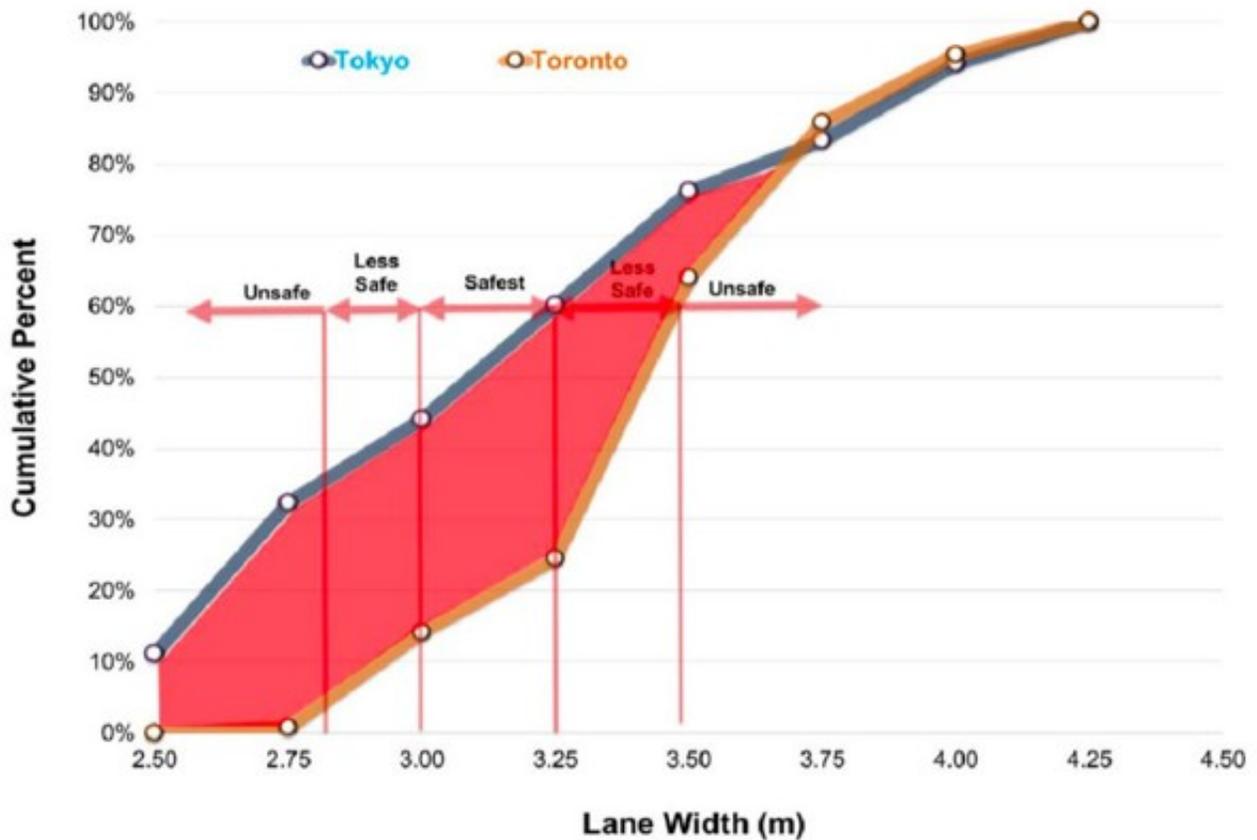
An analysis of several years of crash data in both cities showed a clear sweet spot for lane width around 10.2 feet in Tokyo (3.1 meters) and 10.5 feet in Toronto (3.2 meters). Crash rates increased as lanes got too slim and drivers ran out of space; they also rose as lanes got wider. Karim writes that these results “clearly demonstrate why ‘conventional wisdom of lane width’ does not hold up to scientific scrutiny.”



Crash rates in Toronto (blue) and Tokyo (green) were lowest in lanes between 10 and 10.5 feet wide.

## Cars in wider lanes tend to go faster

Generally speaking, traffic lanes in Tokyo are narrower than those in Toronto, with a much greater percentage falling into what Karim calls the “safest” width range. He believes wider lanes, and the faster traffic that comes with them, explains why Tokyo’s collision rates were lower than those in Toronto, despite the fact that Tokyo is a much more populous city with a greater traffic volume. At the time of a collision, the average speed of a car in Toronto was 34 percent higher than it was in Tokyo, according to Karim’s figures.

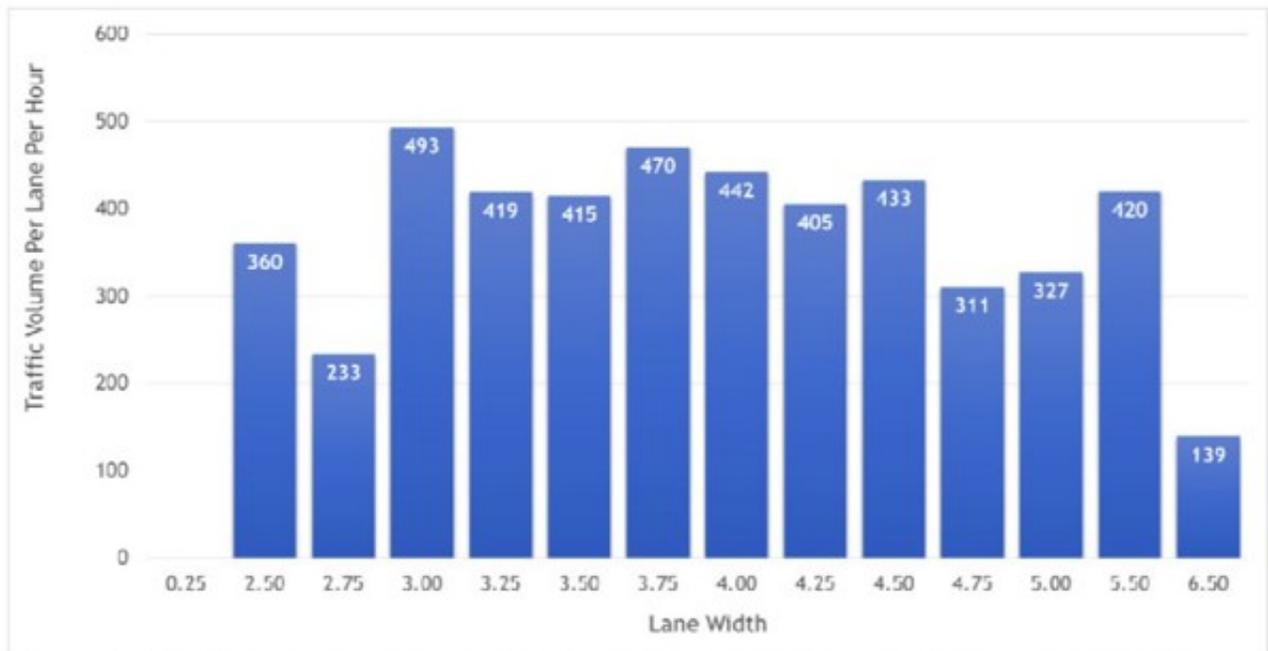


Tokyo (blue) tends to have narrower travel lanes than Toronto (orange), which might explain why collisions occur there at slower speeds.

## Narrow lanes still carry lots of traffic

A common rebuttal to reducing lanes from 12 to 10 feet is that doing so will produce congestion. But smart design can accommodate slim lanes and traffic alike—something New York City recently [discovered](#) when it narrowed car lanes to make way for bike lanes. Karim found that traffic capacity in Toronto was actually highest for lanes right around 10-feet wide.

“Traffic delays on urban roads are principally determined by junctions, not by midblock free flow speeds,” he writes. “Reducing lane width to 3.0 m [~10 feet] in urban environments should therefore, not lead to congestion.”



**Figure 6: Distribution of traffic capacity (per lane per hour) demand and lane width (Toronto)**

Plenty of cars still moved through lanes that were roughly 10-feet wide.

## About the Author

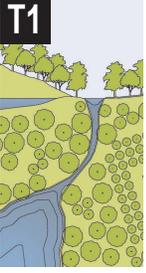
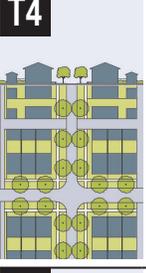
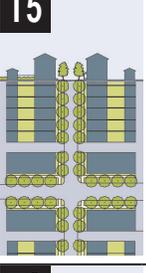
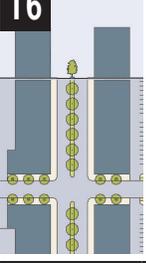


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TABLE 1: Transect Zone Descriptions. This table provides descriptions of the character of each T-zone.

 <p><b>T1</b></p>	<p><b>T-1 NATURAL</b> T-1 Natural Zone consists of lands approximating or reverting to a wilderness condition, including lands unsuitable for settlement due to topography, hydrology or vegetation.</p>	<p><b>General Character:</b> Natural landscape with some agricultural use  <b>Building Placement:</b> Not applicable  <b>Frontage Types:</b> Not applicable  <b>Typical Building Height:</b> Not applicable  <b>Type of Civic Space:</b> Parks, Greenways</p>
 <p><b>T2</b></p>	<p><b>T-2 RURAL</b> T-2 Rural Zone consists of sparsely settled lands in open or cultivated states. These include woodland, agricultural land, grassland, and irrigable desert. Typical buildings are farmhouses, agricultural buildings, cabins, and villas.</p>	<p><b>General Character:</b> Primarily agricultural with woodland &amp; wetland and scattered buildings  <b>Building Placement:</b> Variable Setbacks  <b>Frontage Types:</b> Not applicable  <b>Typical Building Height:</b> 1- to 2-Story  <b>Type of Civic Space:</b> Parks, Greenways</p>
 <p><b>T3</b></p>	<p><b>T-3 SUB-URBAN</b> T-3 Sub-Urban Zone consists of low density residential areas, adjacent to higher zones that some mixed use. Home occupations and outbuildings are allowed. Planting is naturalistic and setbacks are relatively deep. Blocks may be large and the roads irregular to accommodate natural conditions.</p>	<p><b>General Character:</b> Lawns, and landscaped yards surrounding detached single-family houses; pedestrians occasionally  <b>Building Placement:</b> Large and variable front and side yard Setbacks  <b>Frontage Types:</b> Porches, fences, naturalistic tree planting  <b>Typical Building Height:</b> 1- to 2-Story with some 3-Story  <b>Type of Civic Space:</b> Parks, Greenways</p>
 <p><b>T4</b></p>	<p><b>T-4 GENERAL URBAN</b> T-4 General Urban Zone consists of a mixed use but primarily residential urban fabric. It may have a wide range of building types: single, sideyard, and rowhouses. Setbacks and landscaping are variable. Streets with curbs and sidewalks define medium-sized blocks.</p>	<p><b>General Character:</b> Mix of Houses, Townhouses &amp; small Apartment buildings, with scattered Commercial activity; balance between landscape and buildings; presence of pedestrians  <b>Building Placement:</b> Shallow to medium front and side yard Setbacks  <b>Frontage Types:</b> Porches, fences, Dooryards  <b>Typical Building Height:</b> 2- to 3-Story with a few taller Mixed Use buildings  <b>Type of Civic Space:</b> Squares, Greens</p>
 <p><b>T5</b></p>	<p><b>T-5 URBAN CENTER</b> T-5 Urban Center Zone consists of higher density mixed use building that accommodate retail, offices, rowhouses and apartments. It has a tight network of streets, with wide sidewalks, steady street tree planting and buildings set close to the sidewalks.</p>	<p><b>General Character:</b> Shops mixed with Townhouses, larger Apartment houses, Offices, workplace, and Civic buildings; predominantly attached buildings; trees within the public right-of-way; substantial pedestrian activity  <b>Building Placement:</b> Shallow Setbacks or none; buildings oriented to street defining a street wall  <b>Frontage Types:</b> Stoops, Shopfronts, Galleries  <b>Typical Building Height:</b> 3- to 5-Story with some variation  <b>Type of Civic Space:</b> Parks, Plazas and Squares, median landscaping</p>
 <p><b>T6</b></p>	<p><b>T-6 URBAN CORE</b> T-6 Urban Core Zone consists of the highest density and height, with the greatest variety of uses, and civic buildings of regional importance. It may have larger blocks; streets have steady street tree planting and buildings are set close to wide sidewalks. Typically only large towns and cities have an Urban Core Zone.</p>	<p><b>General Character:</b> Medium to high-Density Mixed Use buildings, entertainment, Civic and cultural uses. Attached buildings forming a continuous street wall; trees within the public right-of-way; highest pedestrian and transit activity  <b>Building Placement:</b> Shallow Setbacks or none; buildings oriented to street, defining a street wall  <b>Frontage Types:</b> Stoops, Dooryards, Forecourts, Shopfronts, Galleries, and Arcades  <b>Typical Building Height:</b> 4-plus Story with a few shorter buildings  <b>Type of Civic Space:</b> Parks, Plazas and Squares; median landscaping</p>

**TABLE 2: Sector/Community Allocation.** Table 2 defines the geography, including both natural and infrastructure elements, determining areas that are or are not suitable for development. Specific Community types of various intensities are allowable in specific Sectors. This table also allocates the proportions of Transect Zones within each Community Type.

	ALREADY DEVELOPED AREAS								
	PROXIMITY TO MAJOR THOROUGHFARES AND TRANSIT								
	PROXIMITY TO THOROUGHFARES								
	MEDIUM SLOPES WOODLANDS								
	FLOOD PLAIN OPEN SPACE TO BE ACQUIRED CORRIDORS TO BE ACQUIRED BUFFERS TO BE ACQUIRED LEGACY WOODLAND LEGACY FARMLAND LEGACY VIEWSHEDS CLD RESIDUAL OPEN SPACE								
	SURFACE WATERBODIES PROTECTED WETLANDS PROTECTED HABITAT RIPARIAN CORRIDORS PURCHASED OPEN SPACE CONSERV. EASEMENTS LAND TRUST TRANSPORT. CORRIDORS CLD OPEN SPACE								
	RURAL GROWTH BOUNDARY		URBAN GROWTH BOUNDARY						
	(PRIMARILY OPEN SPACE)		(PRIMARILY NEW COMMUNITIES)		(SUCCESSIONAL COMMUNITIES)				
	<b>01</b> PRESERVED OPEN SECTOR	<b>02</b> RESERVED OPEN SECTOR	<b>G1</b> RESTRICTED GROWTH SECTOR	<b>G2</b> CONTROLLED GROWTH SECTOR	<b>G3</b> INTENDED GROWTH SECTOR	<b>G4</b> INFILL GROWTH SECTOR			
	CLD		CLD	TND	TND	RCD	TND	RCD	
<b>T1</b>	NO MINIMUM	NO MINIMUM	50% MIN	50% MIN	NO MIN	NO MIN			
<b>T2</b>	NO MINIMUM	NO MINIMUM							
<b>T3</b>			10 - 30%	10 - 30%	10 - 30%	10 - 30%	VARIABLE		
<b>T4</b>			20 - 40%	20 - 40%	30 - 60%	30 - 60%	10 - 30%	VARIABLE	VARIABLE
<b>T5</b>				10 - 30%	10 - 30%	10 - 30%	VARIABLE	VARIABLE	
<b>T6</b>						40 - 80%		VARIABLE	

**TABLE 3A: Vehicular Lane Dimensions.** This table assigns lane widths to Transect Zones. The Design ADT (Average Daily Traffic) is the determinant for each of these sections. The most typical assemblies are shown in Table 3B. Specific requirements for truck and transit bus routes and truck loading shall be decided by Warrant.

DESIGN SPEED	TRAVEL LANE WIDTH	T1	T2	T3	T4	T5	T6
Below 20 mph	8 feet	▪	▪	▪	□		
20-25 mph	9 feet	▪	▪	▪	▪	□	□
25-35 mph	10 feet	▪	▪	▪	▪	▪	▪
25-35 mph	11 feet	▪	▪			▪	▪
Above 35 mph	12 feet	▪	▪			▪	▪

- BY RIGHT
- BY WARRANT

DESIGN SPEED	PARKING LANE WIDTH	T1	T2	T3	T4	T5	T6
20-25 mph	(Angle ) 18 feet					▪	▪
20-25 mph	(Parallel) 7 feet				▪		
25-35 mph	(Parallel) 8 feet			▪	▪	▪	▪
Above 35 mph	(Parallel) 9 feet					▪	▪

DESIGN SPEED	EFFECTIVE TURNING RADIUS	T1	T2	T3	T4	T5	T6
Below 20 mph	5-10 feet			▪	▪	▪	▪
20-25 mph	10-15 feet	▪	▪	▪	▪	▪	▪
25-35 mph	15-20 feet	▪	▪	▪	▪	▪	▪
Above 35 mph	20-30 feet	▪	▪			□	□

(See Table 17b)

TABLE 3B: Vehicular Lane/Parking Assemblies. The projected design speeds determine the dimensions of the vehicular lanes and Turning Radii assembled for Thoroughfares.

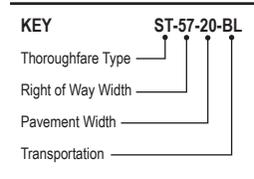
	ONE WAY MOVEMENT			TWO WAY MOVEMENT		
a. NO PARKING	T1	T2	T3	T1	T2	T3
	T1	T2	T3	T1	T2	T1
Design ADT	300 VPD	600 VPD	600 VPD	2,500 VPD	22,000 VPD	36,000 VPD
Pedestrian Crossing	3 Seconds	5 Seconds	5 Seconds	5 Seconds	9 Seconds	13 Seconds
Design Speed	20 - 30 MPH	Below 20 MPH	Below 20 MPH	20-25 MPH	35 MPH and above	35 MPH and above
b. YIELD PARKING	T3	T4		T3	T4	
Design ADT	1,000 VPD	1,000 VPD		1,000 VPD	1,000 VPD	
Pedestrian Crossing	5 Seconds	5 Seconds		7 Seconds	7 Seconds	
Design Speed	20-30 MPH	20-30 MPH		25-30 MPH	25-30 MPH	
c. PARKING ONE SIDE PARALLEL	T3	T4	T3	T4	T5	T4
	T3	T4	T3	T4	T5	T4
Design ADT	5,000 VPD	18,000 VPD	16,000 VPD	15,000 VPD	15,000 VPD	32,000 VPD
Pedestrian Crossing	5 Seconds	8 Seconds	8 Seconds	11 Seconds	11 Seconds	13 Seconds
Design Speed	20-30 MPH	25-30 MPH	25-30 MPH	25-30 MPH	25-30 MPH	35 MPH and above
d. PARKING BOTH SIDES PARALLEL	T4	T4	T5	T6	T4	T5
	T4	T5	T6	T5	T6	T5
Design ADT	8,000 VPD	20,000 VPD	15,000 VPD	22,000 VPD	22,000 VPD	32,000 VPD
Pedestrian Crossing	7 Seconds	10 Seconds	10 Seconds	13 Seconds	13 Seconds	15 Seconds
Design Speed	Below 20 MPH	25-30 MPH	25-30 MPH	25-30 MPH	25-30 MPH	35 MPH and above
e. PARKING BOTH SIDES DIAGONAL	T5	T6	T5	T6	T5	T6
	T5	T6	T5	T6	T5	T6
Design ADT	18,000 VPD	20,000 VPD	15,000 VPD	22,000 VPD	22,000 VPD	31,000 VPD
Pedestrian Crossing	15 Seconds	17 Seconds	17 Seconds	20 Seconds	20 Seconds	23 Seconds
Design Speed	Below 20 MPH	20-25 MPH	20-25 MPH	25-30 MPH	25-30 MPH	25-30 MPH
f. PARKING ACCESS			T3	T4	T5	T6
Design ADT						
Pedestrian Crossing			3 Seconds	6 Seconds	6 Seconds	6 Seconds
Design Speed						

**TABLE 4A: Public Frontages - General.** The Public Frontage is the area between the private Lot line and the edge of the vehicular lanes. Dimensions are given in Table 4B.

PLAN	
LOT	R.O.W.
PRIVATE FRONTAGE	PUBLIC FRONTAGE
<p><b>a. (HW) For Highway:</b> This Frontage has open Swales drained by percolation, Bicycle Trails and no parking. The landscaping consists of the natural condition or multiple species arrayed in naturalistic clusters. Buildings are buffered by distance or berms.</p>	<p>T1 T2 T3</p>
<p><b>b. (RD) For Road:</b> This Frontage has open Swales drained by percolation and a walking Path or Bicycle Trail along one or both sides and Yield parking. The landscaping consists of multiple species arrayed in naturalistic clusters.</p>	<p>T1 T2 T3</p>
<p><b>c. (ST) For Street:</b> This Frontage has raised Curbs drained by inlets and Sidewalks separated from the vehicular lanes by individual or continuous Planters, with parking on one or both sides. The landscaping consists of street trees of a single or alternating species aligned in a regularly spaced Allee, with the exception that Streets with a right-of-way (R.O.W.) width of 40 feet or less are exempt from tree requirements.</p>	<p>T3 T4 T5</p>
<p><b>d. (DR) For Drive:</b> This Frontage has raised Curbs drained by inlets and a wide Sidewalk or paved Path along one side, related to a Greenway or waterfront. It is separated from the vehicular lanes by individual or continuous Planters. The landscaping consists of street trees of a single or alternating species aligned in a regularly spaced Allee.</p>	<p>T3 T4 T5 T6</p>
<p><b>e. (AV) For Avenue:</b> This Frontage has raised Curbs drained by inlets and wide Sidewalks separated from the vehicular lanes by a narrow continuous Planter with parking on both sides. The landscaping consists of a single tree species aligned in a regularly spaced Allee.</p>	<p>T3 T4 T5 T6</p>
<p><b>f. (CS) (AV) For Commercial Street or Avenue:</b> This Frontage has raised Curbs drained by inlets and very wide Sidewalks along both sides separated from the vehicular lanes by separate tree wells with grates and parking on both sides. The landscaping consists of a single tree species aligned with regular spacing where possible, but clears the storefront entrances.</p>	<p>T5 T6</p>
<p><b>g. (BV) For Boulevard:</b> This Frontage has Slip Roads on both sides. It consists of raised Curbs drained by inlets and Sidewalks along both sides, separated from the vehicular lanes by Planters. The landscaping consists of double rows of a single tree species aligned in a regularly spaced Allee.</p>	<p>T3 T4 T5 T6</p>

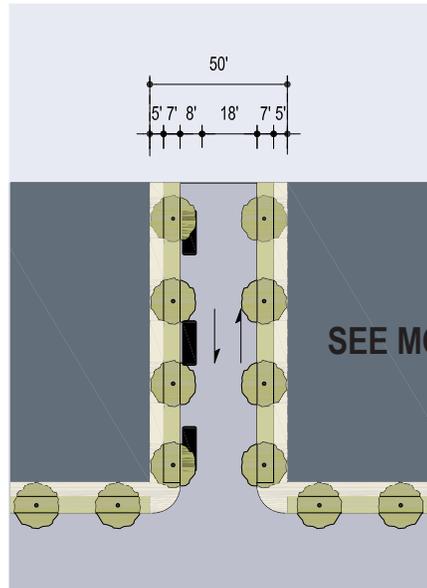


**TABLE 4C: Thoroughfare Assemblies.** These Thoroughfares are assembled from the elements that appear in Tables 3A and 3B and incorporate the Public Frontages of Table 4A. The key gives the Thoroughfare type followed by the right-of-way width, followed by the pavement width, and in some instances followed by specialized transportation capability.

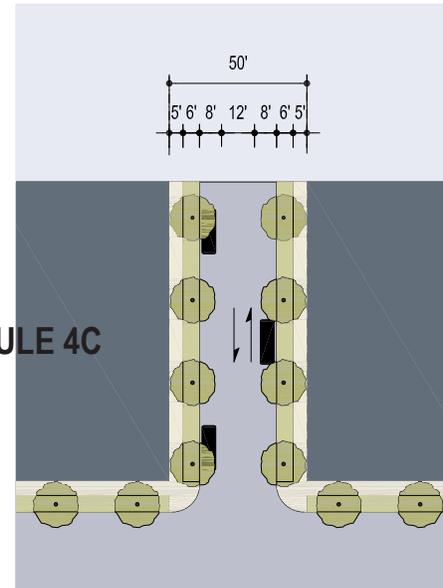


**THOROUGHFARE TYPES**

Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



<b>ST-50-26</b>	
Thoroughfare Type	Street
Transect Zone Assignment	T4, T5, T6
Right-of-Way Width	50 feet
Pavement Width	26 feet
Movement	Slow Movement
Design Speed	20 MPH
Pedestrian Crossing Time	7.4 seconds
Traffic Lanes	2 lanes
Parking Lanes	One side @ 8 feet marked
Curb Radius	10 feet
Walkway Type	5 foot Sidewalk
Planter Type	7 foot continuous Planter
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	BR

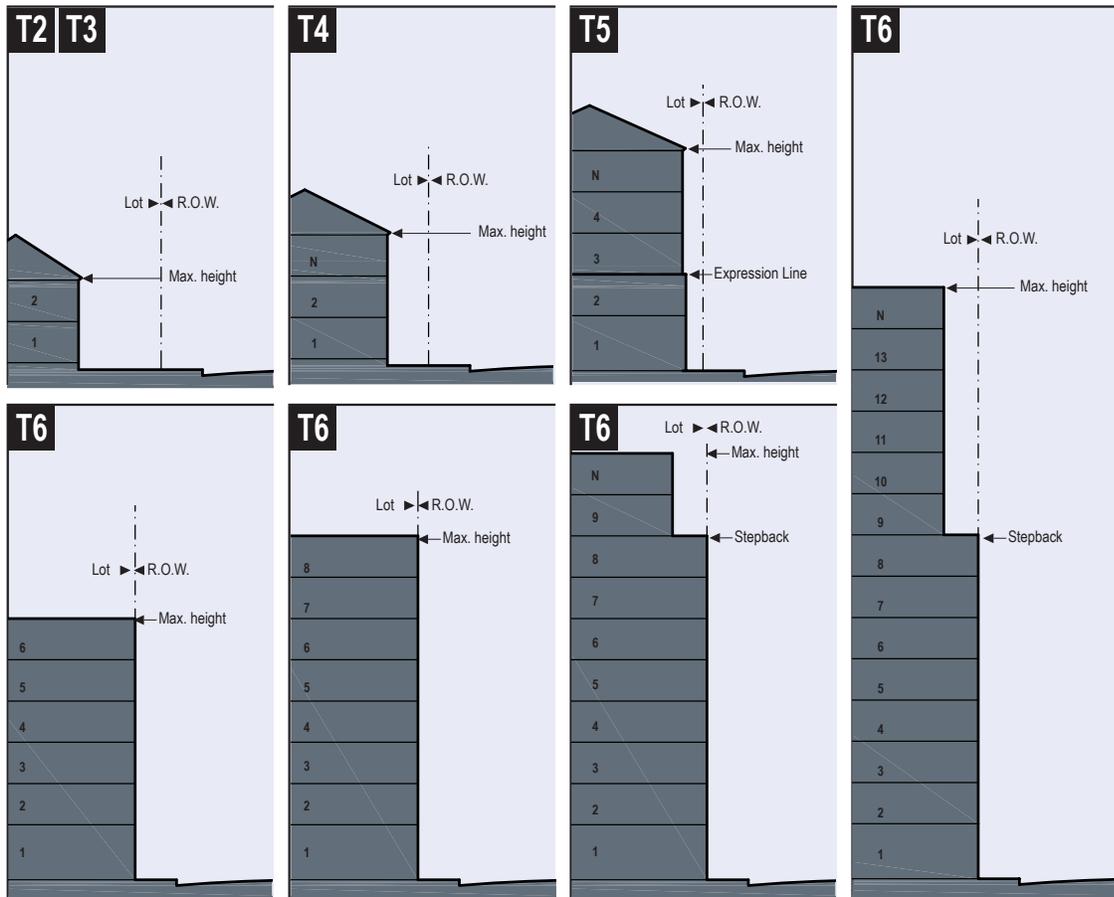


<b>ST-50-28</b>	
Thoroughfare Type	Street
Transect Zone Assignment	T4, T5, T6
Right-of-Way Width	50 feet
Pavement Width	28 feet
Movement	Yield Movement
Design Speed	20 MPH
Pedestrian Crossing Time	7.6 seconds
Traffic Lanes	2 lanes
Parking Lanes	Both sides @ 8 feet unmarked
Curb Radius	10 feet
Walkway Type	5 foot Sidewalk
Planter Type	6 foot continuous Planter
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	BR

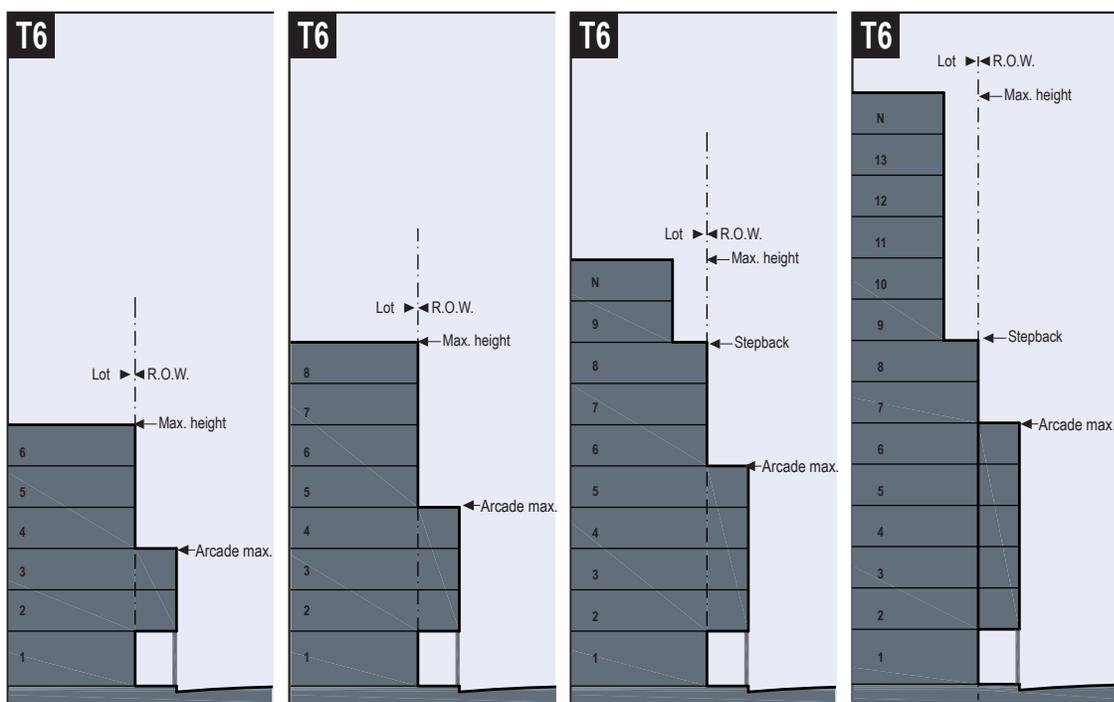
**TABLE 7: Private Frontages.** The Private Frontage is the area between the building Facades and the Lot lines.

	SECTION	PLAN
	LOT PRIVATE FRONTAGE   R.O.W. PUBLIC FRONTAGE	LOT PRIVATE FRONTAGE   R.O.W. PUBLIC FRONTAGE
<p><b>a. Common Yard:</b> a planted Frontage wherein the Facade is set back substantially from the Frontage Line. The front yard created remains unfenced and is visually continuous with adjacent yards, supporting a common landscape. The deep Setback provides a buffer from the higher speed Thoroughfares.</p>		 T2 T3
<p><b>b. Porch &amp; Fence:</b> a planted Frontage wherein the Facade is set back from the Frontage Line with an attached porch permitted to Encroach. A fence at the Frontage Line maintains street spatial definition. Porches shall be no less than 8 feet deep.</p>		 T3 T4
<p><b>c. Terrace or Lightwell:</b> a Frontage wherein the Facade is set back from the Frontage line by an elevated terrace or a sunken Lightwell. This type buffers Residential use from urban Sidewalks and removes the private yard from public Encroachment. Terraces are suitable for conversion to outdoor cafes. Syn: <b>Dooryard.</b></p>		 T4 T5
<p><b>d. Forecourt:</b> a Frontage wherein a portion of the Facade is close to the Frontage Line and the central portion is set back. The Forecourt created is suitable for vehicular drop-offs. This type should be allocated in conjunction with other Frontage types. Large trees within the Forecourts may overhang the Sidewalks.</p>		 T4 T5 T6
<p><b>e. Stoop:</b> a Frontage wherein the Facade is aligned close to the Frontage Line with the first Story elevated from the Sidewalk sufficiently to secure privacy for the windows. The entrance is usually an exterior stair and landing. This type is recommended for ground-floor Residential use.</p>		 T4 T5 T6
<p><b>f. Shopfront:</b> a Frontage wherein the Facade is aligned close to the Frontage Line with the building entrance at Sidewalk grade. This type is conventional for Retail use. It has a substantial glazing on the Sidewalk level and an awning that may overlap the Sidewalk to within 2 feet of the Curb. Syn: Retail Frontage.</p>		 T4 T5 T6
<p><b>g. Gallery:</b> a Frontage wherein the Facade is aligned close to the Frontage line with an attached cantilevered shed or a lightweight colonnade overlapping the Sidewalk. This type is conventional for Retail use. The Gallery shall be no less than 10 feet wide and should overlap the Sidewalk to within 2 feet of the Curb.</p>		 T4 T5 T6
<p><b>h. Arcade:</b> a colonnade supporting habitable space that overlaps the Sidewalk, while the Facade at Sidewalk level remains at or behind the Frontage Line. This type is conventional for Retail use. The Arcade shall be no less than 12 feet wide and should overlap the Sidewalk to within 2 feet of the Curb. See Table 8.</p>		 T5 T6

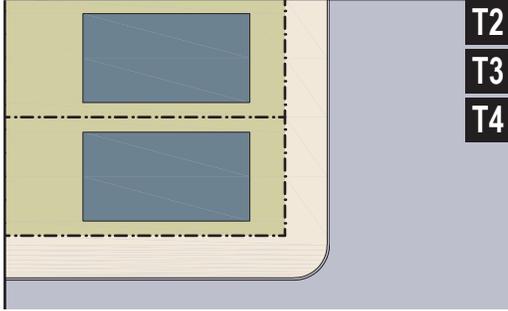
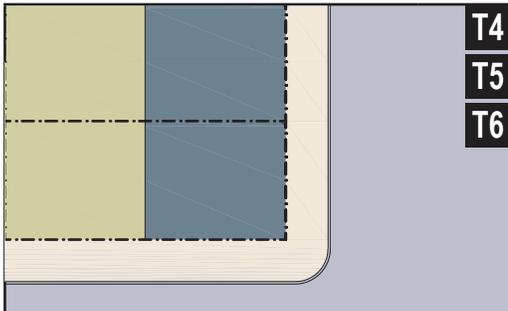
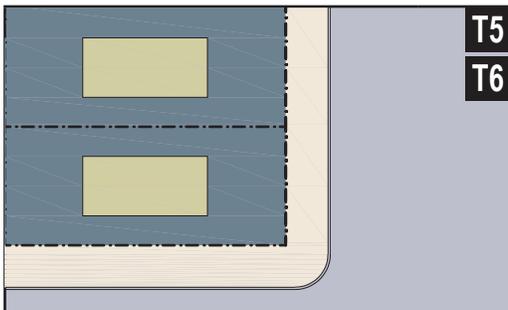
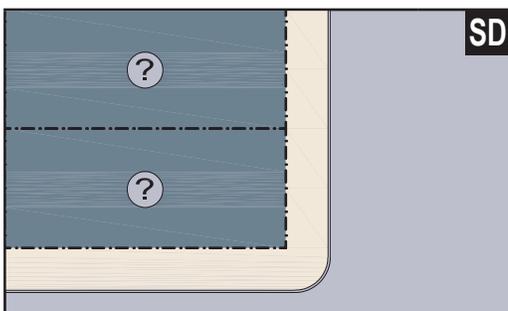
**TABLE 8: Building Configuration.** This table shows the Configurations for different building heights for each Transect Zone. It must be modified to show actual calibrated heights for local conditions. Recess Lines and Expression Lines shall occur on higher buildings as shown. N = maximum height as specified in Table 14k.



**Stepbacks/Arcade Heights.** The diagrams below show Arcade Frontages. Diagrams above apply to all other Frontages.



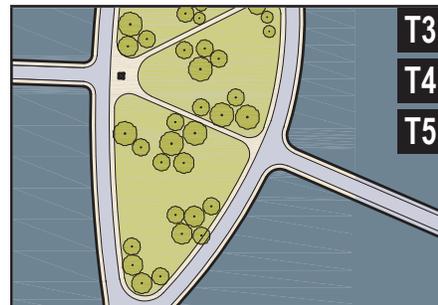
**TABLE 9: Building Disposition.** This table approximates the location of the structure relative to the boundaries of each individual Lot, establishing suitable basic building types for each Transect Zone.

<p><b>a. Edgeyard:</b> Specific Types - single family House, cottage, villa, estate house, urban villa. A building that occupies the center of its Lot with Setbacks on all sides. This is the least urban of types as the front yard sets it back from the Frontage, while the side yards weaken the spatial definition of the public Thoroughfare space. The front yard is intended to be visually continuous with the yards of adjacent buildings. The rear yard can be secured for privacy by fences and a well-placed Backbuilding and/or Outbuilding.</p>	 <p>T2 T3 T4</p>
<p><b>b. Sideyard:</b> Specific Types - Charleston single house, double house, zero lot line house, twin. A building that occupies one side of the Lot with the Setback to the other side. A shallow Frontage Setback defines a more urban condition. If the adjacent building is similar with a blank side wall, the yard can be quite private. This type permits systematic climatic orientation in response to the sun or the breeze. If a Sideyard House abuts a neighboring Sideyard House, the type is known as a twin or double House. Energy costs, and sometimes noise, are reduced by sharing a party wall in this Disposition.</p>	 <p>T4 T5</p>
<p><b>c. Rearyard:</b> Specific Types - Townhouse, Rowhouse, Live-Work unit, loft building, Apartment House, Mixed Use Block, Flex Building, perimeter Block. A building that occupies the full Frontage, leaving the rear of the Lot as the sole yard. This is a very urban type as the continuous Facade steadily defines the public Thoroughfare. The rear Elevations may be articulated for functional purposes. In its Residential form, this type is the Rowhouse. For its Commercial form, the rear yard can accommodate substantial parking.</p>	 <p>T4 T5 T6</p>
<p><b>d. Courtyard:</b> Specific Types - patio House. A building that occupies the boundaries of its Lot while internally defining one or more private patios. This is the most urban of types, as it is able to shield the private realm from all sides while strongly defining the public Thoroughfare. Because of its ability to accommodate incompatible activities, masking them from all sides, it is recommended for workshops, Lodging and schools. The high security provided by the continuous enclosure is useful for crime-prone areas.</p>	 <p>T5 T6</p>
<p><b>e. Specialized:</b> A building that is not subject to categorization. Buildings dedicated to manufacturing and transportation are often distorted by the trajectories of machinery. Civic buildings, which may express the aspirations of institutions, may be included.</p>	 <p>SD</p>

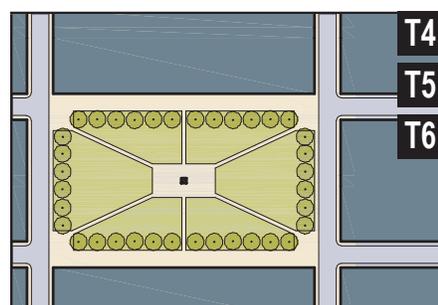
**a. Park:** A natural preserve available for unstructured recreation. A park may be independent of surrounding building Frontages. Its landscape shall consist of Paths and trails, meadows, waterbodies, woodland and open shelters, all naturalistically disposed. Parks may be lineal, following the trajectories of natural corridors. The minimum size shall be 8 acres. Larger parks may be approved by Warrant as Special Districts in all zones.



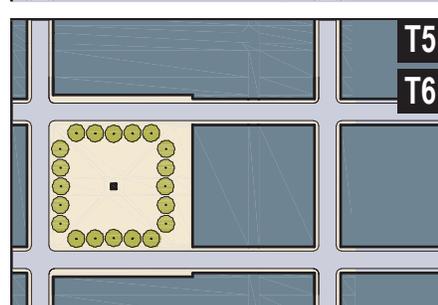
**b. Green:** An Open Space, available for unstructured recreation. A Green may be spatially defined by landscaping rather than building Frontages. Its landscape shall consist of lawn and trees, naturalistically disposed. The minimum size shall be 1/2 acre and the maximum shall be 8 acres.



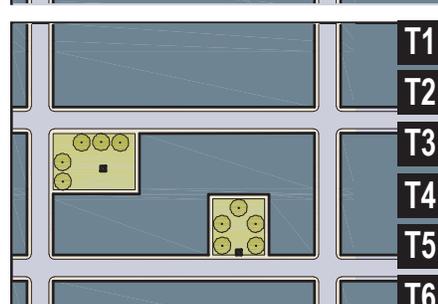
**c. Square:** An Open Space available for unstructured recreation and Civic purposes. A Square is spatially defined by building Frontages. Its landscape shall consist of paths, lawns and trees, formally disposed. Squares shall be located at the intersection of important Thoroughfares. The minimum size shall be 1/2 acre and the maximum shall be 5 acres.



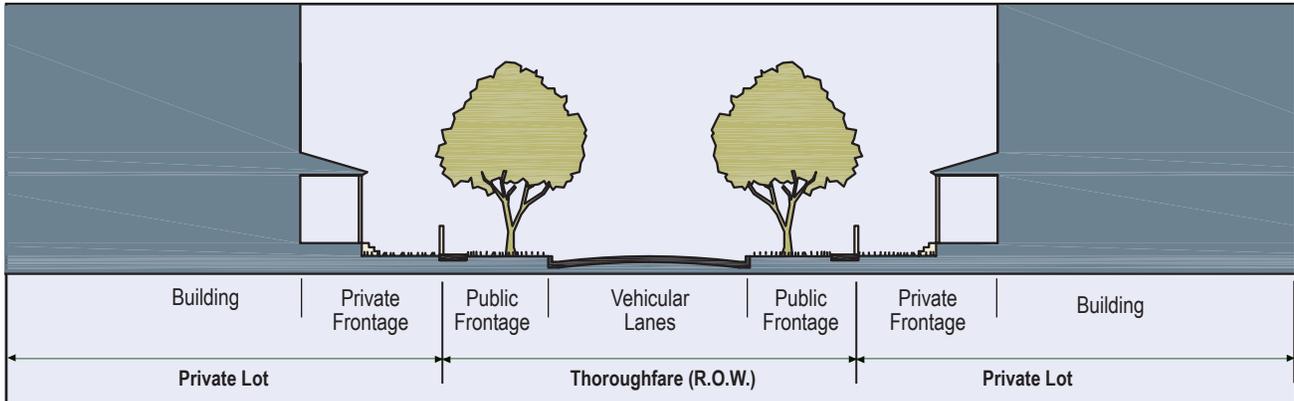
**d. Plaza:** An Open Space available for Civic purposes and Commercial activities. A Plaza shall be spatially defined by building Frontages. Its landscape shall consist primarily of pavement. Trees are optional. Plazas *should* be located at the intersection of important streets. The minimum size shall be 1/2 acre and the maximum shall be 2 acres.



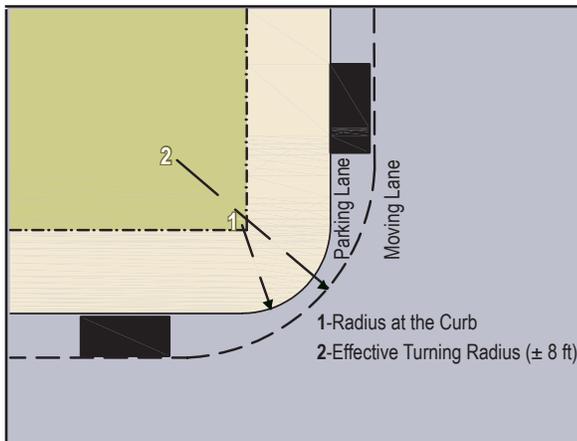
**e. Playground:** An Open Space designed and equipped for the recreation of children. A playground *should* be fenced and may include an open shelter. Playgrounds shall be interspersed within Residential areas and may be placed within a Block. Playgrounds may be included within parks and greens. There shall be no minimum or maximum size.



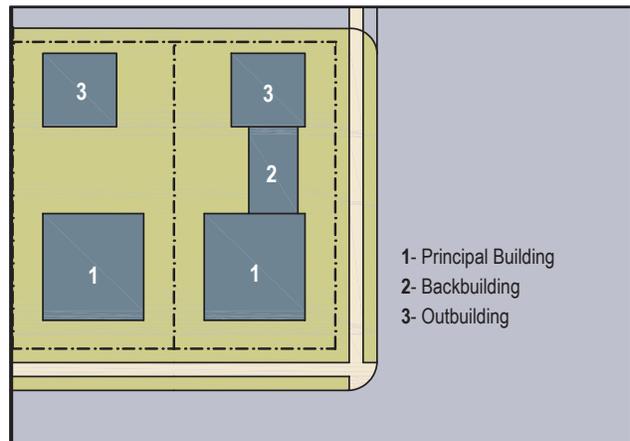
a. THOROUGHFARE & FRONTAGES



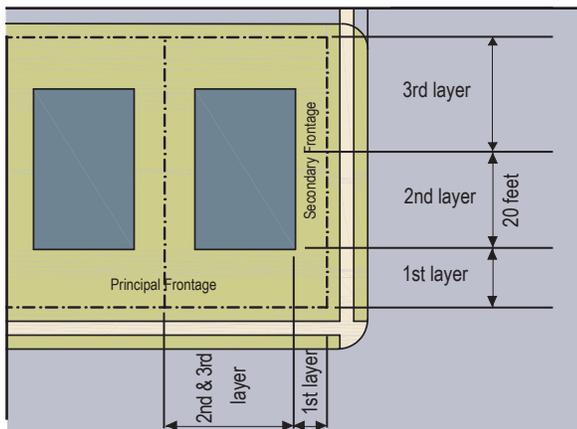
b. TURNING RADIUS



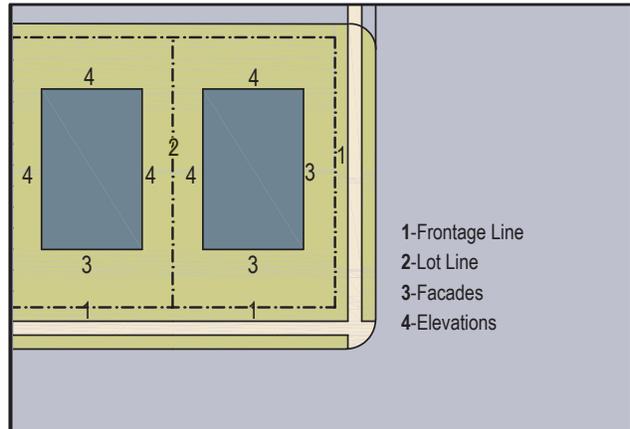
c. BUILDING DISPOSITION



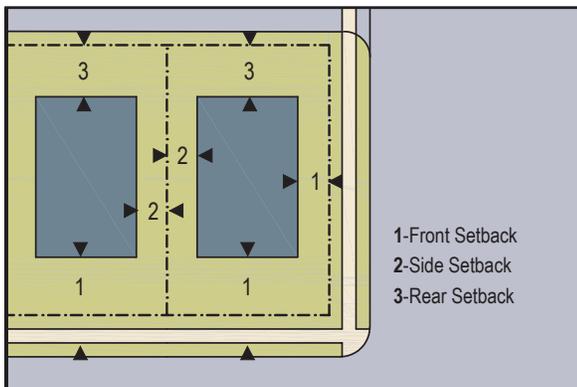
d. LOT LAYERS



e. FRONTAGE & LOT LINES



f. SETBACK DESIGNATIONS



g. NETWORK-BASED PEDESTRIAN SHED



*These annotations are advisory only. The SmartCode itself appears only on the right side of each spread.*

#### **TABLE 4C: COMPLETE STREETS THOROUGHFARE ASSEMBLIES**

Thoroughfares are assembled from the Vehicular Lane elements that appear in Table 3A and Table 3B and the Public Frontages of Table 4A and Table 4B. Twenty-two typical assemblies are presented here for convenience. These may be added to the base SmartCode for the local calibration, and others may be created as necessary using the same template. They replicate closely the thoroughfare standards of municipal public works manuals.

If Thoroughfare Assemblies are used, one or more of the Vehicular Lane or Public Frontage Tables may be removed. Calibrators should take care that provisions listed on the Table 4C Assemblies do not conflict with provisions on the remaining Vehicular Lane or Public Frontage Tables, or with Section 3.7.

The thoroughfares here are drawn to scale with the supporting information below them. The identification key gives the thoroughfare type followed by the right-of-way width, followed by the pavement width, and in some instances followed by specialized transportation capability. They are organized in the Module first by type, then by ROW width, then by Vehicular Lanes overall width.

If a regulating plan uses two thoroughfares with the same name, e.g., if the calibration has two street sections called ST-50-26 with different parking arrangements, they should be given different names to avoid confusion. If one of them is a yield street it could be called ST-50-26-Y.

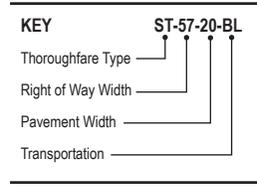
There are several one-way streets included in this Module. They should be used rarely, especially if blocks are long, as they are less connective than two-way streets. If low traffic volumes are expected, consider using the two-way yield movement instead. Specifying a one-way thoroughfare and later allowing it to become two-way with verified usage is a method for securing more appropriately narrow thoroughfares than some jurisdictions will allow initially.

Because walkability is so important to good urbanism, any paths or trails intended for runners and long-distance walkers should not be paved with concrete. Asphalt has less impact on the joints and feet.

For Bicycle Thoroughfares and facilities, please see the Bicycling Module at [www.transect.org](http://www.transect.org).

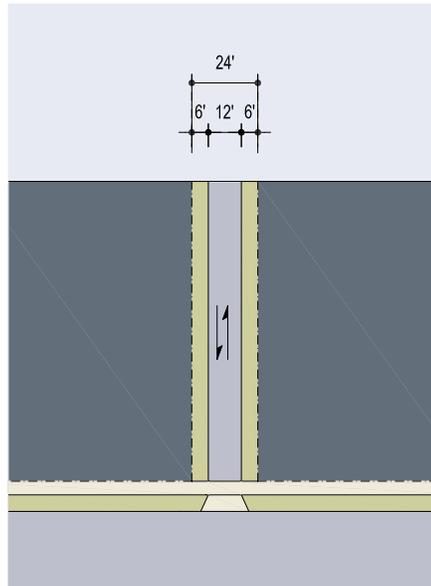
# SMARTCODE MODULETABLE 4C THOROUGHFARE ASSEMBLIES

Municipality



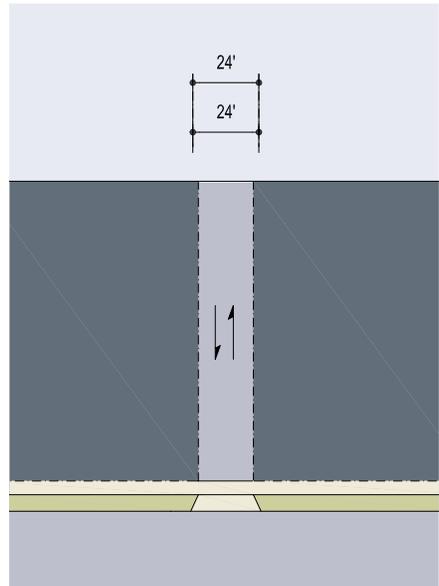
**THOROUGHFARE TYPES**

Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



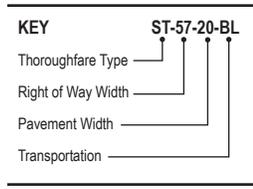
**RL-24-12**

Thoroughfare Type	Rear Lane
Transect Zone Assignment	T3
Right-of-Way Width	24 feet
Pavement Width	12 feet
Movement	Yield Movement
Design Speed	10 MPH
Pedestrian Crossing Time	3.5 seconds
Traffic Lanes	n/a
Parking Lanes	None
Curb Radius	Taper
Walkway Type	None
Planter Type	None
Curb Type	Inverted Crown
Landscape Type	None
Transportation Provision	None



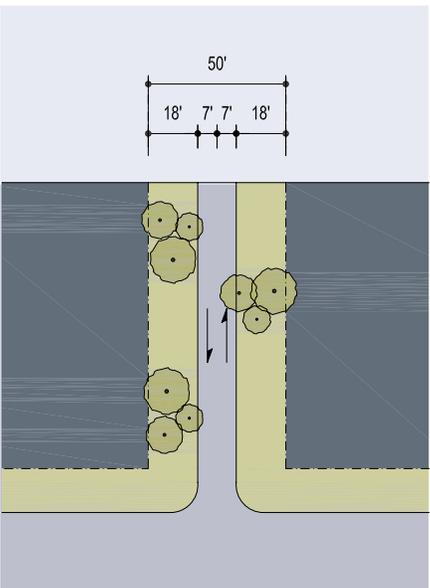
**RA-24-24**

Thoroughfare Type	Rear Alley
Transect Zone Assignment	T4, T5, T6
Right-of-Way Width	24 feet
Pavement Width	24 feet
Movement	Slow Movement
Design Speed	10 MPH
Pedestrian Crossing Time	7 seconds
Traffic Lanes	n/a
Parking Lanes	None
Curb Radius	Taper
Walkway Type	None
Planter Type	None
Curb Type	Inverted Crown
Landscape Type	None
Transportation Provision	None



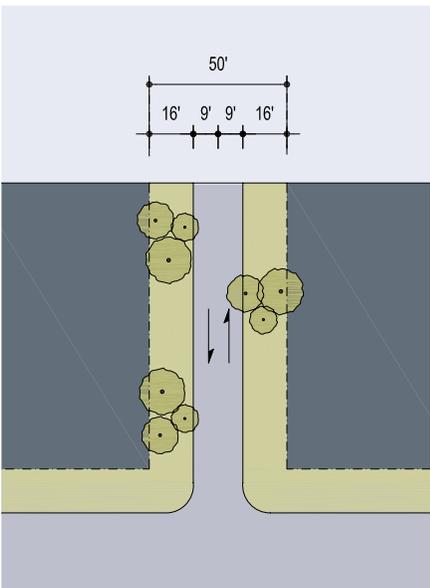
**THOROUGHFARE TYPES**

Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



**RD-50-14**

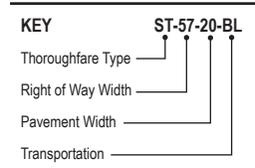
Thoroughfare Type	Road
Transect Zone Assignment	T1, T2, T3
Right-of-Way Width	50 feet
Pavement Width	14 feet
Movement	Yield Movement
Design Speed	15 MPH
Pedestrian Crossing Time	4 seconds
Traffic Lanes	2 lanes
Parking Lanes	None
Curb Radius	25 feet
Walkway Type	Path optional
Planter Type	Continuous Swale
Curb Type	Swale
Landscape Type	Trees clustered
Transportation Provision	see Bicycling Module



**RD-50-18**

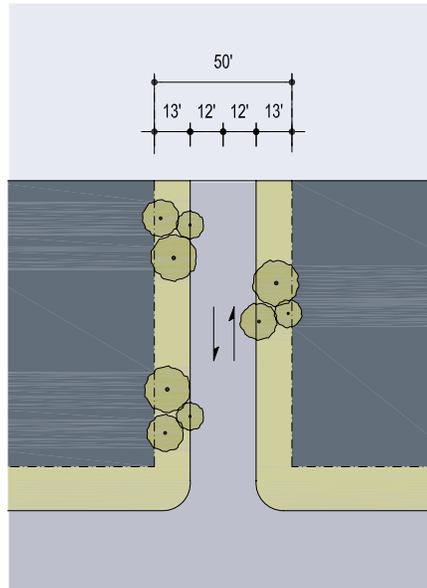
Thoroughfare Type	Road
Transect Zone Assignment	T1, T2, T3
Right-of-Way Width	50 feet
Pavement Width	18 feet
Movement	Slow Movement
Design Speed	15 MPH
Pedestrian Crossing Time	5.1 seconds
Traffic Lanes	2 lanes
Parking Lanes	None
Curb Radius	25 feet
Walkway Type	Path optional
Planter Type	Continuous Swale
Curb Type	Swale
Landscape Type	Trees clustered
Transportation Provision	see Bicycling Module

Thoroughfare Type	Road
Transect Zone Assignment	T1, T2, T3
Right-of-Way Width	50 feet
Pavement Width	14 feet
Movement	Yield Movement
Design Speed	15 MPH
Pedestrian Crossing Time	4 seconds
Traffic Lanes	2 lanes
Parking Lanes	None
Curb Radius	25 feet
Walkway Type	Path optional
Planter Type	Continuous Swale
Curb Type	Swale
Landscape Type	Trees clustered
Transportation Provision	see Bicycling Module



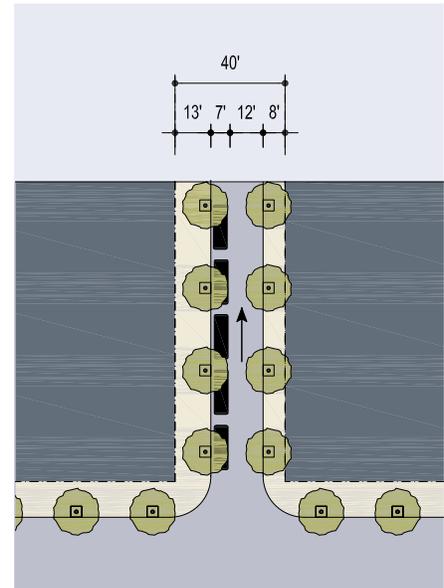
**THOROUGHFARE TYPES**

Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



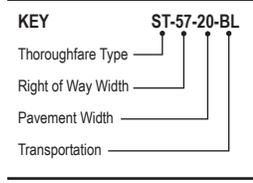
**RD-50-24**

Thoroughfare Type	Road
Transect Zone Assignment	T1, T2, T3
Right-of-Way Width	50 feet
Pavement Width	24 feet
Movement	Slow Movement
Design Speed	20 MPH
Pedestrian Crossing Time	6.8 seconds
Traffic Lanes	2 lanes
Parking Lanes	None
Curb Radius	25 feet
Walkway Type	Path optional
Planter Type	Continuous Swale
Curb Type	Swale
Landscape Type	Trees clustered
Transportation Provision	see Bicycling Module



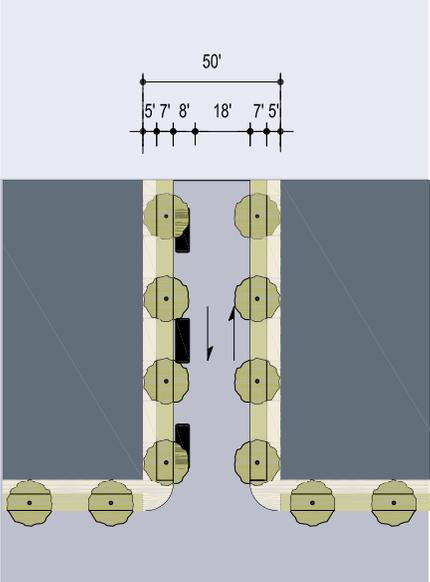
**ST-40-19**

Thoroughfare Type	Street
Transect Zone Assignment	T5, T6
Right-of-Way Width	40 feet
Pavement Width	19 feet
Movement	Slow Movement
Design Speed	20 MPH
Pedestrian Crossing Time	5.4 seconds
Traffic Lanes	1 lane
Parking Lanes	One side @ 7 feet marked
Curb Radius	15 feet
Walkway Type	13/8 foot Sidewalk
Planter Type	4x4" tree well
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Bicycling Module



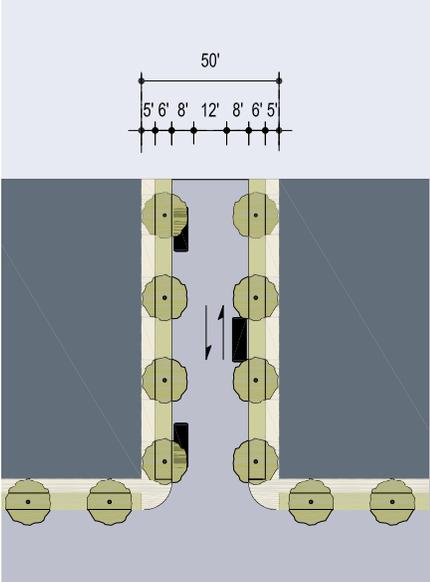
**THOROUGHFARE TYPES**

Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



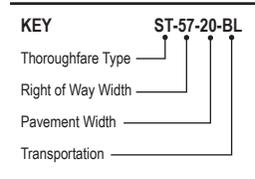
**ST-50-26**

Thoroughfare Type	Street
Transect Zone Assignment	T4, T5, T6
Right-of-Way Width	50 feet
Pavement Width	26 feet
Movement	Free Movement
Design Speed	20 MPH
Pedestrian Crossing Time	7.4 seconds
Traffic Lanes	2 lanes
Parking Lanes	One side @ 8 feet marked
Curb Radius	10 feet
Walkway Type	5 foot Sidewalk
Planter Type	7 foot continuous Planter
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Cycling Module



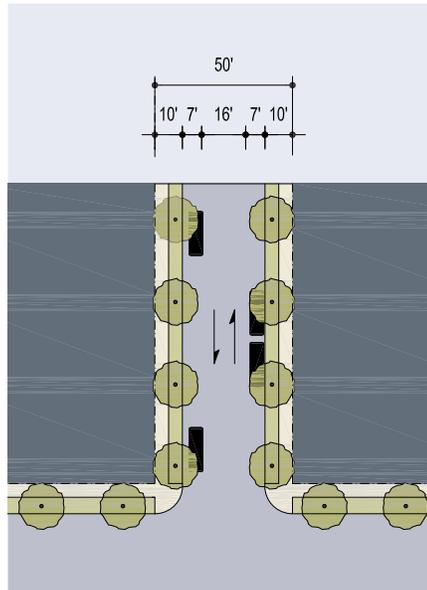
**ST-50-28**

Thoroughfare Type	Street
Transect Zone Assignment	T4, T5, T6
Right-of-Way Width	50 feet
Pavement Width	28 feet
Movement	Yield Movement
Design Speed	20 MPH
Pedestrian Crossing Time	7.6 seconds
Traffic Lanes	2 lane
Parking Lanes	Both sides @ 8 feet unmarked
Curb Radius	10 feet
Walkway Type	5 foot Sidewalk
Planter Type	6 foot continuous Planter
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Cycling Module

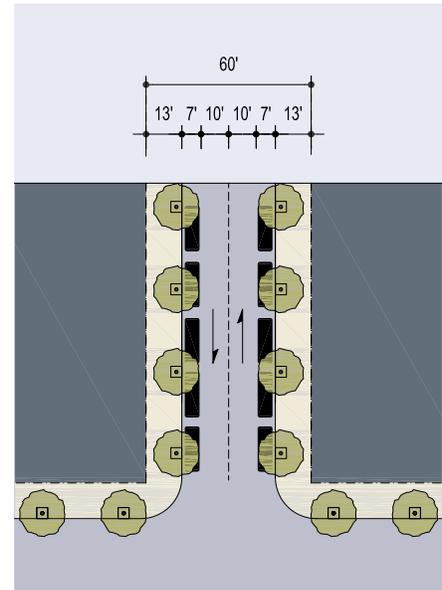


**THOROUGHFARE TYPES**

Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



**ST-50-30**

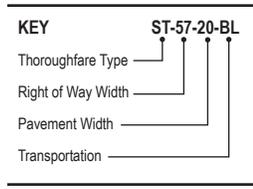


**ST-60-34**

Thoroughfare Type
Transect Zone Assignment
Right-of-Way Width
Pavement Width
Movement
Design Speed
Pedestrian Crossing Time
Traffic Lanes
Parking Lanes
Curb Radius
Walkway Type
Planter Type
Curb Type
Landscape Type
Transportation Provision

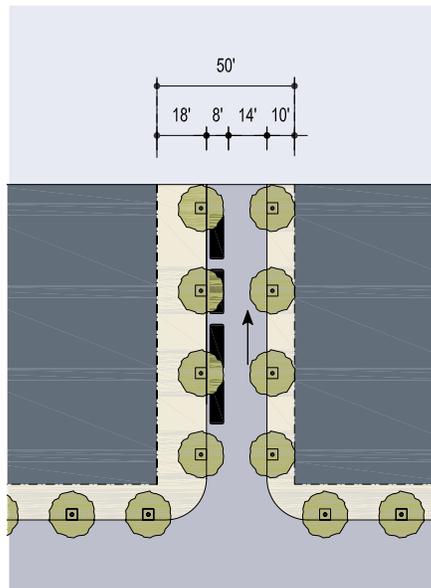
Street
T3, T4
50 feet
30 feet
Slow Movement
20 MPH
8.5 seconds
2 lanes
Both sides @ 7 feet unmarked
10 feet
5 foot Sidewalk
5 foot continuous Planter
Curb
Trees at 30' o.c. Avg.
see Cycling Module

Street
T3, T4, T5
60 feet
34 feet
Slow Movement
20 MPH
9.7 seconds
2 lanes
Both Sides @ 7 feet marked
15 feet
6 foot Sidewalk
7 foot continuous Planter
Curb
Trees at 30' o.c. Avg.
see Cycling Module

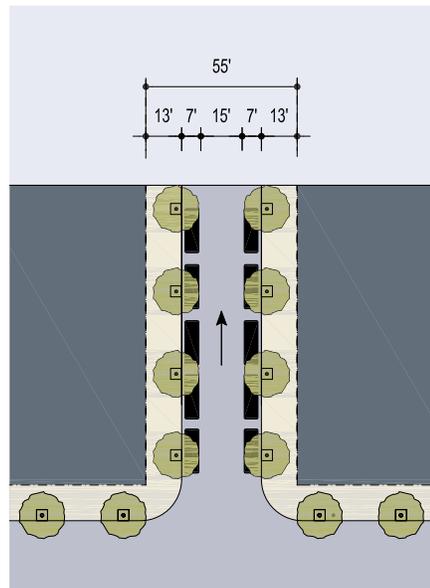


**THOROUGHFARE TYPES**

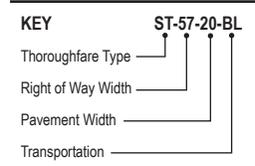
Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



<b>CS-50-22</b>	
Thoroughfare Type	Commercial Street
Transect Zone Assignment	T5, T6
Right-of-Way Width	50 feet
Pavement Width	22 feet
Movement	Slow Movement
Design Speed	20 MPH
Pedestrian Crossing Time	6.2 seconds
Traffic Lanes	1 lane
Parking Lanes	One side @ 8 feet marked
Curb Radius	15 feet
Walkway Type	18/10 foot Sidewalk
Planter Type	4x4" tree well
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Cycling Module



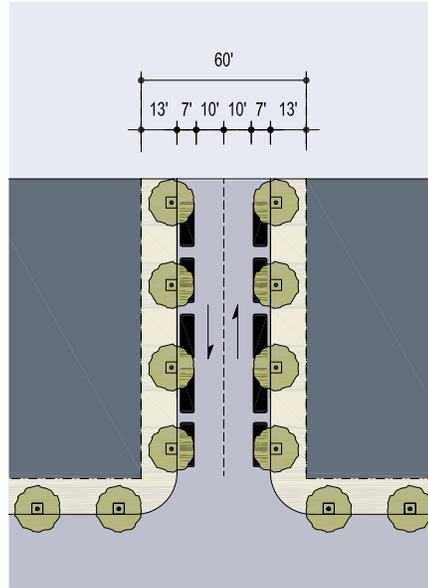
<b>CS-55-29</b>	
Thoroughfare Type	Commercial Street
Transect Zone Assignment	T5, T6
Right-of-Way Width	55 feet
Pavement Width	29 feet
Movement	Slow Movement
Design Speed	20 MPH
Pedestrian Crossing Time	8.2 seconds
Traffic Lanes	1 lane
Parking Lanes	Both sides @ 7 feet marked
Curb Radius	15 feet
Walkway Type	13 foot Sidewalk
Planter Type	4x4" tree well
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Cycling Module



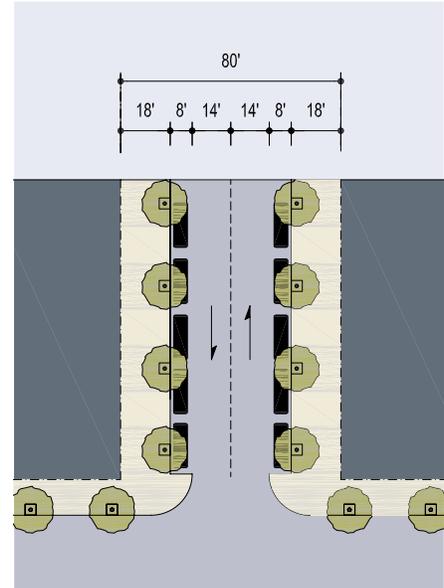
**THOROUGHFARE TYPES**

Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR

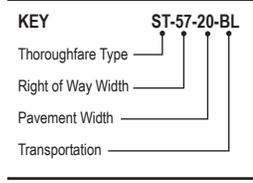
Thoroughfare Type
Transect Zone Assignment
Right-of-Way Width
Pavement Width
Movement
Design Speed
Pedestrian Crossing Time
Traffic Lanes
Parking Lanes
Curb Radius
Walkway Type
Planter Type
Curb Type
Landscape Type
Transportation Provision



<b>CS-60-34</b>
Commercial Street
T5, T6
60 feet
34 feet
Slow Movement
20 MPH
9.7 seconds
2 lanes
Both sides @ 7 feet marked
10 feet
13 foot Sidewalk
4x4" tree well
Curb
Trees at 30' o.c. Avg.
see Bicycling Module

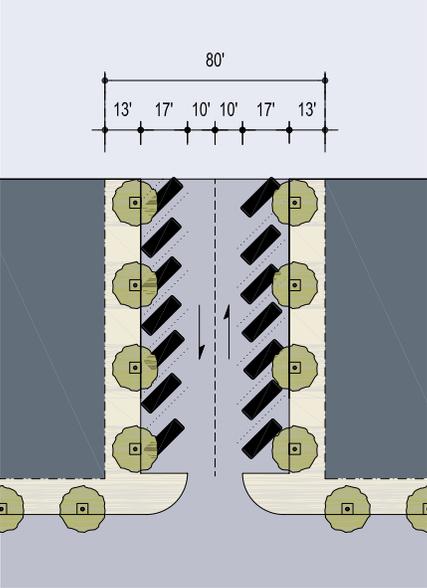


<b>CS-80-44</b>
Commercial Street
T5, T6
80 feet
44 feet
Free Movement
25 MPH
8 seconds at corners
2 lanes
Both sides @ 8 feet marked
10 feet
18 foot Sidewalk
4x4" tree well
Curb
Trees at 30' o.c. Avg.
see Bicycling Module

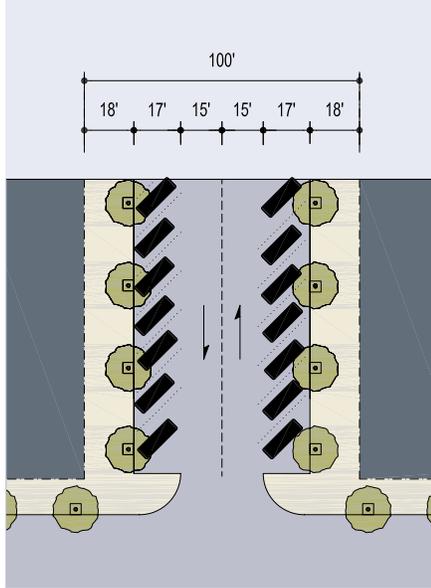


**THOROUGHFARE TYPES**

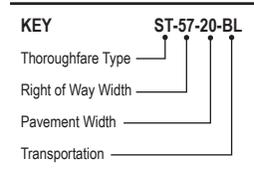
Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



<b>CS-80-54</b>	
Thoroughfare Type	Commercial Street
Transect Zone Assignment	T5, T6
Right-of-Way Width	80 feet
Pavement Width	54 feet
Movement	Slow Movement
Design Speed	25 MPH
Pedestrian Crossing Time	5.7 seconds at corners
Traffic Lanes	2 lanes
Parking Lanes	Both sides angled @ 17 feet marked
Curb Radius	10 feet
Walkway Type	13 foot Sidewalk
Planter Type	4X4' tree well
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Cycling Module

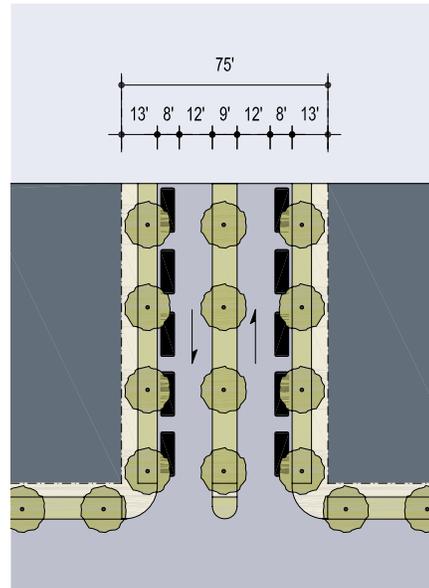


<b>CS-100-64</b>	
Thoroughfare Type	Commercial Street
Transect Zone Assignment	T5, T6
Right-of-Way Width	100 feet
Pavement Width	64 feet
Movement	Slow Movement
Design Speed	25 MPH
Pedestrian Crossing Time	8.5 seconds at corners
Traffic Lanes	2 lanes
Parking Lanes	Both sides angled @ 17 feet marked
Curb Radius	10 feet
Walkway Type	18 foot Sidewalk
Planter Type	4X4' tree well
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Cycling Module

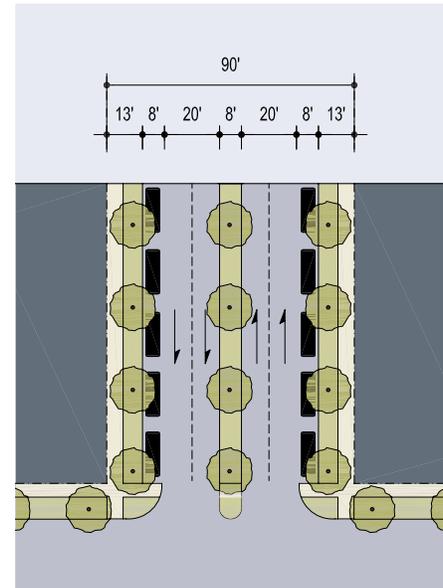


**THOROUGHFARE TYPES**

Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



**AV-75-40**

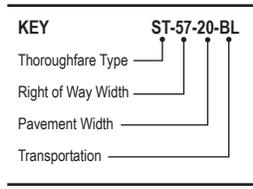


**AV-90-56**

Thoroughfare Type
Transect Zone Assignment
Right-of-Way Width
Pavement Width
Movement
Design Speed
Pedestrian Crossing Time
Traffic Lanes
Parking Lanes
Curb Radius
Walkway Type
Planter Type
Curb Type
Landscape Type
Transportation Provision

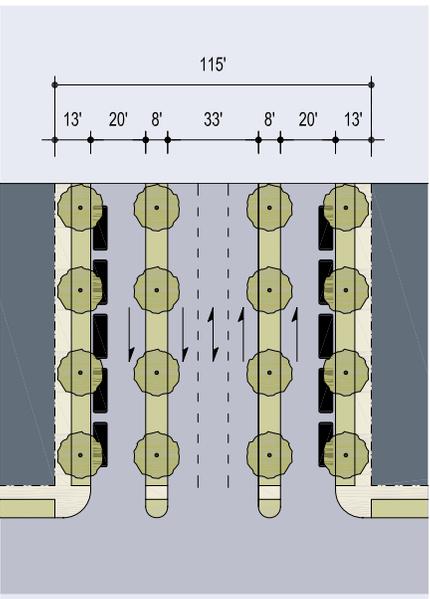
Avenue
T3, T4, T5
75 feet
40 feet total
Slow Movement
25 MPH
5.7 seconds - 5.7 seconds
2 lanes
Both sides @ 8 feet marked
10 feet
6 foot Sidewalk
7 foot continuous Planter
Curb or Swale
Trees at 30' o.c. Avg.
see Cycling Module

Avenue
T3, T4, T5
90 feet
56 feet total
Slow Movement
25 MPH
5.7 seconds - 5.7 seconds at corners
4 lanes
Both sides @ 8 feet marked
10 feet
6 foot Sidewalk
7 foot continuous Planter
Curb or Swale
Trees at 30' o.c. Avg.
see Cycling Module

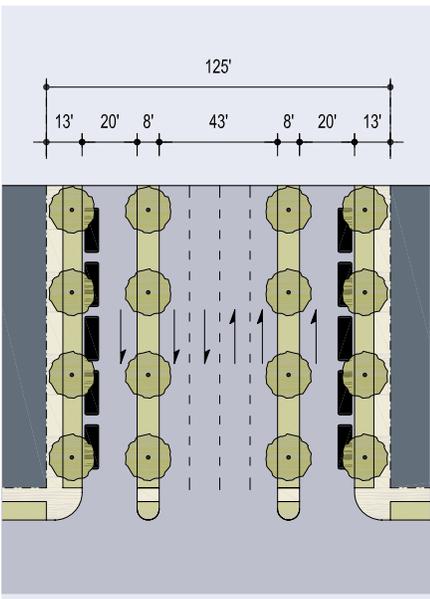


**THOROUGHFARE TYPES**

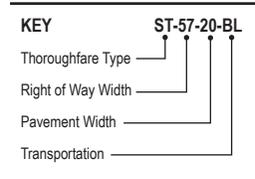
Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



<b>BV-115-33</b>	
Thoroughfare Type	Boulevard
Transect Zone Assignment	T5, T6
Right-of-Way Width	115 feet
Pavement Width	20 feet - 33 feet - 20 feet
Movement	Free Movement (inner lanes)
Design Speed	35 MPH
Pedestrian Crossing Time	5.7 seconds - 9.4 seconds - 5.7 seconds
Traffic Lanes	3 lanes, one turning lane & two one-way slip roads
Parking Lanes	8 feet
Curb Radius	10 feet
Walkway Type	6 foot Sidewalk
Planter Type	7 foot continuous Planter
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Bicycling Module

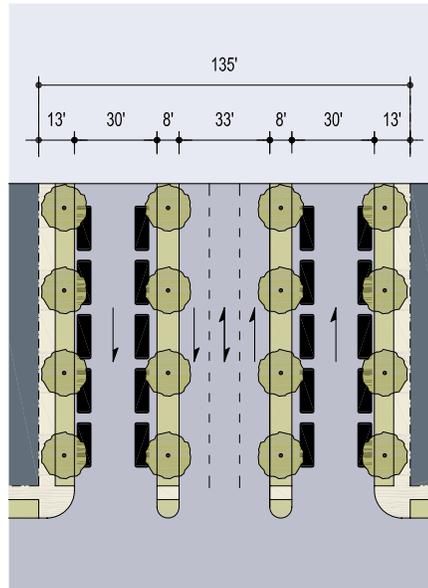


<b>BV-125-43</b>	
Thoroughfare Type	Boulevard
Transect Zone Assignment	T5, T6
Right-of-Way Width	125 feet
Pavement Width	20 feet - 43 feet - 20 feet
Movement	Free Movement (inner lanes)
Design Speed	35 MPH
Pedestrian Crossing Time	5.7 seconds - 12.2 seconds - 5.7 seconds
Traffic Lanes	4 lanes & two one-way slip roads
Parking Lanes	8 feet
Curb Radius	10 feet
Walkway Type	6 foot Sidewalk
Planter Type	7 foot continuous Planter
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Bicycling Module



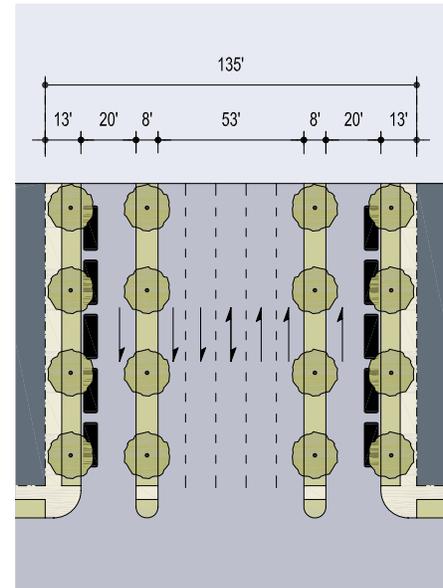
**THOROUGHFARE TYPES**

Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR



**BV-135-33**

Thoroughfare Type	Boulevard
Transect Zone Assignment	T5, T6
Right-of-Way Width	135 feet
Pavement Width	30 feet - 33 feet - 30 feet
Movement	Free Movement
Design Speed	35 MPH
Pedestrian Crossing Time	8.5 seconds - 9.4 seconds - 8.5 seconds
Traffic Lanes	3 lanes, one turning lane & two one-way slip roads
Parking Lanes	8 feet
Curb Radius	10 feet
Walkway Type	6 foot Sidewalk
Planter Type	7 foot continuous Planter
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Cycling Module



**BV-135-53**

Thoroughfare Type	Boulevard
Transect Zone Assignment	T5, T6
Right-of-Way Width	135 feet
Pavement Width	20 feet - 53 feet - 20 feet
Movement	Free Movement
Design Speed	35 MPH
Pedestrian Crossing Time	5.7 seconds - 15.1 seconds - 5.7 seconds
Traffic Lanes	5 Lanes, one turning lane & two one-way slip roads
Parking Lanes	8 feet
Curb Radius	10 feet
Walkway Type	6 foot Sidewalk
Planter Type	7 foot continuous Planter
Curb Type	Curb
Landscape Type	Trees at 30' o.c. Avg.
Transportation Provision	see Cycling Module