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Planning Commission 11/13/12

NEW BUSINESS: Initiate a Code Amendment: Discussion and possible action to initiate a code amendment amending Chapter 25 of the City Code to revise subdivision regulations.

Background

This is a code amendment to consider revising the City of Austin's subdivision regulations in an effort to make them more compact, connected, and pedestrian friendly.

This request was made by staff. The subdivision revision effort will be funded by a Healthy Communities grant, will use principles from the Imagine Austin comprehensive plan, and will dovetail with larger code revision efforts.

On October 16, 2012, the Codes and Ordinances Subcommittee recommended initiation of this code amendment, vote: 3-0.

Staff contact: Carol Haywood, carol.haywood@austintexas.gov, 974-7685

Robert Anderson, robert.anderson2@austintexas.gov, 974-6405

Pamela Larson, pamela.larson@austintexas.gov, 974-6404

Process to Revise Austin's Subdivision Regulations and TCM

Planning Commission Codes and Ordinances Committee
October 16, 2012

A priority program of **IMAGINEAUSTON**

Carol Haywood & George Adams
Planning and Development Review Department



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- Imagine Austin provides direction for code changes, including subdivision and TCM revisions

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- LDC re-write (2+years) too long to wait for subdivision regulations and TCM changes.
- LDC re-write budget will likely be insufficient.
- Grant funds for subdivision / TCM revisions can supplement.

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- Subdivision Regulations and TCM are:
 - Highly technical
 - Need focused attention
 - Stand-alone code sections/ documents

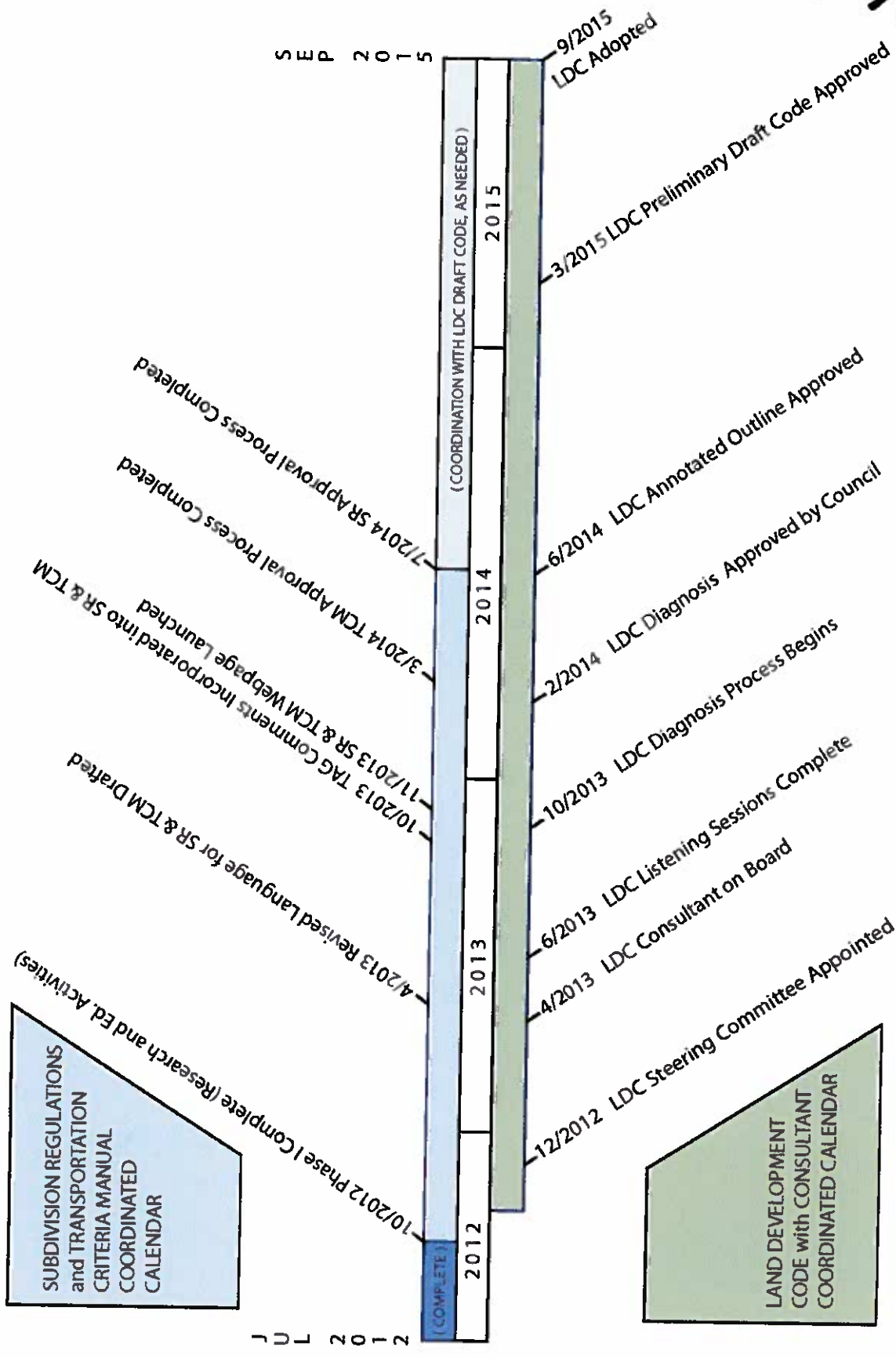
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- Need to align subdivision regulations with ongoing amendments, including watershed amendments.
- Opportunity to merge subdivision and TCM revisions with LDC re-write process, if needed.

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Dates are tentative and subject to change.

How Subdivision and LDC align

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MEMORANDUM

TO: Planning Commission

From: Robert Anderson, Planner
Planning and Development Review Department

Date: October 31, 2012

RE: State statutes informing revisions to City of Austin's subdivision regulations.

Staff is responding to a request for information on state requirements for municipal subdivision regulations that would impact or limit the types of revisions allowed to the City of Austin subdivision regulations. The request of staff was made at the October 16, 2012 Codes and Ordinances Subcommittee briefing regarding initiation of revisions to the subdivision regulations of the Land Development Code.

Several chapters of Texas Local Government Code address subdivision requirements for cities and counties:

- Municipal requirements are articulated within Local Government Code Chapter 212 Municipal Regulation of Subdivisions and Property Development;
- County subdivision requirements are contained within Local Government Code Chapter 232 County Regulation of Subdivisions (County subdivision requirements are beyond the scope of this memorandum and are not discussed herein);
- Territory within a city's Extraterritorial Jurisdiction (ETJ) is subject to requirements found within Local Government Code Chapter 242 Authority of Municipality and County to Regulate Subdivisions In and Outside Municipality's Extraterritorial Jurisdiction; and
- Lastly, Local Government Code Chapter 245 Issuance of Local Permits establishes grandfathering rights.

The above chapters of the Local Government Code provide the minimum legal requirements for subdivisions.

Municipal Requirements

Aside from a few statutory prohibitions constraining what municipalities may regulate (to be addressed later), the Local Government Code serves as a statutory 'floor', providing the minimum legal framework to which subdivisions must conform. The minimum statutory requirements are relatively few and involve certain platting requirements including the exact and relative location of the platted land, exact dimensions of lots, rights-of-way (Local Government Code 212.004), and certain sewer and groundwater requirements, if applicable (Local Government Code 212.0101, 212.01045). Amendments that may be proposed for the subdivision regulations shall not contradict these state mandated minimum approval and recordation standards.

Other than minimum legal standards, the State of Texas provides broad authority for municipalities to regulate subdivisions. "After a public hearing on the matter, the governing body of a municipality may adopt rules governing plats and subdivisions of land within the municipality's jurisdiction to promote the health, safety, morals, or general welfare of the municipality and the safe, orderly, and healthful development of the municipality" (Local Government Code 212.002).

The state does expressly require the approval of a plat if state and local requirements are satisfied (Local Government Code 212.005). (This includes the rules a municipality adopts as provided for within Local Government Code 212.002 Rules). The municipality must approve or disapprove a plat within 30 days after the date the plat is filed. Otherwise, the plat is considered approved (Local Government code 212.009, 212.010). These are procedural mandates, however. The process to revise City of Austin's subdivision regulations will focus on specific standards which are required for approval, not the procedure for approval. As such, this requirement for approval or denial will not influence any revisions to the standards themselves.

The lack of discretion in the approval process has caused confusion for members of the public that have been notified of a public hearing. While the Local Government Code requires public hearings for the various platting types, if the standards are met municipalities are obligated to approve the plat. David Wahlgren, Development Services Process Coordinator for the Planning and Development Review Department, has verified that all state minimum requirements of Code relating to notification requirements and public hearing requirements are exceeded by City of Austin Planning and Development Review Department practices (embodied within COA Code 25-4-55 Notice). Moreover, the process to revise the Subdivision Regulations will focus on the content and standards within the regulations. It is not anticipated that any modifications will be made to the *process* for accepting or approving new subdivisions. Those

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procedural elements, well-established and in conformance to State Code, are separate from the process to revise the standards themselves.

In general, any time an owner of a tract of land wishes to divide the tract into two or more parts, a plat is required (Local Government Code 212.004). However, two notable exceptions or exemptions are found within the Local Government Code and the Texas Property Code. First, a plat is not required if land is divided into tracts of greater than five acres, and if each tract has access to a public street and no public improvements are necessary (Local Government Code 212.004). Second, the Texas Property Code explicitly exempts condominium regimes from the requirements to subdivide (Texas Property Code 82.005). Once a tract has been legally subdivided or exempted from requirements to subdivide, individuals may utilize the condominium process to further divide property¹. Any changes to City of Austin Subdivision regulations impacting flag lots² and single family condominium development projects will be minimal and will comply with state law.

Finally, the process to adopt any proposed revisions to the subdivision regulations is also subject to public hearing requirements (Local Government Code Chapter 212.044). "After a public hearing on the matter, the municipality may adopt general plans, rules, or ordinances governing development plats of land within the limits and in the extraterritorial jurisdiction..."

Territory Within Austin's Extraterritorial Jurisdiction (ETJ)

Territory within Austin's extraterritorial jurisdiction is governed by Local Government Code Chapter 242 Authority of Municipality and County to Regulate Subdivisions In and Outside Municipality's Extraterritorial Jurisdiction. Section 242.001 provides that municipalities and counties shall enter into a written agreement specifying the governmental body responsible for regulation subdivision plats. Four approaches may be used:

- 1.) The municipality may be granted exclusive jurisdiction;
- 2.) The county may be granted exclusive jurisdiction;
- 3.) The municipality and the county may geographically divide the area and utilize their respective standards to regulate;
- 4.) The municipality and the county may enter into an interlocal agreement that establishes a set of subdivision standards and processes for regulation and approval;

¹ Schnier, Will. *Land Subdivision: A Practical Guide for Central Texas*. Presented at the 18th Annual Land Development Conference, Austin Bar Association (October 29, 2010), available at <http://www.bigreddog.com/wordpress-olddsite/publications/Will%20Schnier%20-%20Land%20Subdivision%20A%20Practical%20Guide%20for%20Central%20Texas%20-%20October%2029,%202010.pdf>

² A new ordinance addressing flat lots went into effect in Austin on June 4, 2012. These requirements are found in City of Austin Code 25-4-175.

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Williamson County, Bastrop County and Hays County have opted to grant Austin exclusive jurisdiction. This has the effect of extending Austin's specific standards into the ETJ.

Travis County opted to enter into an interlocal agreement with a separate set of subdivision regulations. These are codified as Title 30 Austin/Travis County Subdivision Regulations.

The impact on existing agreements – in particular Title 30 – of amendments to the subdivision regulations is still being determined. Suffice to say, the Planning and Development Review Department is interested in perpetuating new standards and will involve the counties throughout the input phase and revision process.

Grandfathered Status

The Local Government Code provides specific instruction on the establishment of vested rights. Projects requiring multiple permits are vested at the time the first permit in the series is filed, and approval or denial of all subsequent permits shall be considered according to ordinances and regulations in effect at the time³³ (Local Government Code 245.002 (2) (b)). If new subdivision standards were applied universally, there would likely be conflict with this state requirement. However, the Planning and Development Review Department has in place a system to recognize the grandfathered status of ongoing projects as well as the applicable regulations and standards to be applied. Importantly, though, it is not the plan to apply new subdivision standards retroactively. Amended subdivision regulations will not interfere with the vested rights of any owner or current project.

Questions/Clarification

Clarification on the subdivision revision process and applicable state statutes may be addressed to Robert Anderson, 974-6405 or robert.anderson2@austintexas.gov.

³³ Austin has expiration dates for approved preliminary plans (found in City of Austin Code 13-1, 13-3, 25-4, and 30-2).

INTERLOCAL COOPERATION CONTRACT

THE STATE OF TEXAS
COUNTY OF TRAVIS

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This Interlocal Cooperation Contract (this "Contract") is entered into by and between the Contracting Parties shown below pursuant to authority granted in and in compliance with the *Interlocal Cooperation Act, Chapter 791, Texas Government Code*.

I. Contracting Parties:

The Receiving Party: City of Austin, a local government of the State of Texas
Contact: Nadia M. Barrera, Public Works Dept., City of Austin, 512-974-7142

The Performing Party: The Center for Transportation Research
The University of Texas at Austin
Contact: John Brigrance, Contracts Manager, 512-232-3123

II. Statement of Services to be Performed

Performing Party will perform the following service(s):

The Center for Transportation Research scope of work is:

Research of best practices on the implementation of policies and codes that support sustainable, healthy lifestyles, and active transportation, and recommendations for how Austin may incorporate these best practices into the TCM and Subdivision Regulations of the Austin Land Development Code as necessary.

LOCATIONS

The scope of work covers all portions of the City of Austin within the current city limits, as well as areas contained within the extra-territorial jurisdiction (ETJ) of the City of Austin, as appropriate.

SCHEDULE

- August-September 2012: PHASE 1 –Recommendations for amendments

ANTICIPATED DELIVERABLES:

CTR will present their recommendations and justifications to the TAG to assure that recommendations are consistent with state law and any other regulations outside of local control.

Possible revisions to draft - ultimately resulting in the final draft.

The information compiled in each of the tasks above will be combined into a high quality printed and digital report, suitable for review and approval by the City Staff, policymakers, and the citizens of Austin. The CTR team may be asked to assist with the Code Amendment Process, which includes, but is not limited to:

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- Presentation to the appropriate Boards and Commissions for review, comment and recommendations.
- Revisions based on comments received.

Draft report to be presented to City staff, policymakers, and citizens for approval as necessary.

III. Basis for Calculating Reimbursable Costs

Services of Personnel (<i>salaries, wages, fringe benefits, travel & consultant fees</i>):	\$19,184
Services of Supplies & Material (<i>supplies, materials, telephone and duplication</i>):	\$ 200
TOTAL DIRECT COSTS:	\$19,384
Indirect costs (15%)	\$ 2,908
TOTAL AMOUNT DUE	\$22,292

IV. Contract Amount

The total amount of this Contract shall not exceed \$22,292.

V. Payment of Services

Receiving Party will remit payments to Performing Party for services satisfactorily performed under this Contract in accordance with the *Texas Prompt Payment Act, Chapter 2251, Texas Government Code*.

Payments made under this Contract will (1) fairly compensate Performing Party for the services performed under this Contract, and (2) be made from current revenues available to Receiving Party.

VI. Warranties

Performing Party warrants that (1) it has authority to perform the services under authority granted in Section 65.31, *Texas Education Code* and Chapter 791, *Texas Government Code*; (2) it has all necessary power and has received all necessary approvals to execute and deliver this Contract; and (3) the representative signing this Contract on its behalf is authorized by its governing body to sign this Contract.

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VII. Term of the Agreement

This Agreement is effective as of the later of 7/1/12 or date fully executed by both parties ("Effective Date") and shall terminate on 9/29/12.

VIII. Termination

Performing Party may terminate this Contract without cause upon thirty (30) days' advance written notice of termination to the Receiving Party.

Executed effective as of the Effective Date by the following duly authorized representatives of the Contracting Parties:

Receiving Party
City of Austin

By: 

Name: HOWARD S. LAZARUS

Title: DIRECTOR, PUBLIC WORKS DEPT

Date: 8-15-12

Performing Party
The University of Texas at Austin

By: 

Name: David Hawkins

Title: Associate Director - OSP

Date: 6.13.2012



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**CONNECTIVITY, COMPLETE STREETS, AND
HEALTHY LIVING POLICY: LITERATURE AND
CASE STUDY REVIEW AND
RECOMMENDATIONS FOR CHANGES TO
AUSTIN'S SUBDIVISION CODE AND THE
TRANSPORTATION CRITERIA MANUAL**

DR. RANDY MACHEMEHL

LISA LOFTUS-OTWAY

BRIDGET BIENKOWSKI

CENTER FOR TRANSPORTATION RESEARCH

**COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN**

October 2012

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Chapter 1. Project Overview Recommendations

1.1 Project Requirements and Scope of Services

The city is currently in the process of revising the existing Transportation Criteria Manual (TCM) and Land Development Code (LDC) of the subdivision regulations to incorporate present-day best practices in street design and connectivity, to facilitate improvements to the built environment that remove barriers to active living, and to streamline and modernize this document for the digital age.

The City of Austin tasked CTR with two major objectives for Phase I of the project:

1. Research of best practices on the implementation of policies and codes that support sustainable, healthy lifestyles, and active transportation, and
2. Recommendations for how Austin may incorporate these best practices into the TCM and Subdivision Regulations of the Austin Land Development Code as necessary.

This report provides a matrix and written list of Subdivision regulations and TCM current language and goals along with recommendations on code amendments to achieve complete streets in chapters 2 through 4. Chapter 5 provides some best practice recommendations from various cities across the United States to provide language for policy and technical changes to the LDC and TCM.

1.1.1 Task Approach

The team for the tasks undertook a literature review to gather information on cities that had reworked their code, implemented complete street and other connectivity components and had developed any performance metrics to measure success. The following terms were utilized in the literature review searches:

- Complete streets
- Complete streets + design
- Connectivity + subdivision regulations
- Healthy living
- Active living
- Subdivision regulation audit
- Context sensitive solution
- Road Diets
- Complete streets + traffic calming
- Walkability index scoring

The literature review led to multiple documents revealing how cities were implementing new ordinances, codes, and subdivision regulations to achieve the more holistic community goals of connectivity, complete streets, accessibility, and healthy living. The literature also revealed that groups such as the American Planning Association, Smart Growth America, and the Complete Streets Coalition had also developed examples of subdivision code (often based from a

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city) that can be used by cities to enhance and improve their subdivision code. The American Planning Association, for example, produced guidance in 2006 on model subdivision codes. The team also reviewed policy documents that cities had developed to guide the design of streets within subdivisions where the city had developed an active complete streets policy/ordinance as another reference point.

A series of short case studies was also conducted to review how cities had constructed these new elements of their policies and procedures and to gather information on the timelines involved in constructing such activities and in making subdivision and zoning code changes. Finally, the literature review identified multiple cities as potential candidates whose subdivision codes should be reviewed as examples that Austin might consider utilizing. Slightly over twenty cities subdivision codes were reviewed to ascertain what components had been included to enhance connectivity, encourage healthier living, and improve access to alternative modes of transportation. The subdivision codes were then placed into a matrix for comparison to Austin's code and to assist in making recommendations. The full unabridged matrix of pure subdivisions code examples can be found in Appendix A.

The recommendations for Austin's subdivision code were then amalgamated with specific goals from the city's comprehensive plan "Imagine Austin" and the deficiencies were highlighted, along with recommendations for improvements, and suggestions on potential language that could be used, or resources from other jurisdictions that the team considers could be utilized by Austin.

A similar process was utilized for the TCM recommendations.

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Chapter 2. Major Recommendations to Subdivision Code

The current subdivision code Section 25-4 within Austin's LDC requires a major overhaul to bring it up to date for the city's desired needs to enhance connectivity between and within subdivisions and existing neighborhoods, enhance healthy and active living, and develop the goals that Imagine Austin has set out. All revisions to Subdivision Codes and applicable Criteria Manuals will follow the City's Rules Posting Process, including being review by Austin's Watershed Protection Agency.

Recommendation: The city's current complete street resolution is not robust enough to deliver a complete streets policy. A major deficiency is that the term "complete streets" is not included anywhere within the text of the ordinance. We would also recommend that this term is made into an ordinance so it becomes part of code. Other complete street resolutions and ordinances also include descriptive language outlining the philosophical components of complete streets and many require a specific city department to take charge of implementation and review of plans to ensure their adherence to the ordinance's goals.

Recommendation: Current subdivision code is disjointed, and requires multiple cross-references to other sections. It also makes no reference to other policy documents that are required for specific design elements within a subdivision. The subdivision code, for a lay reader, is also a hard read. Other cities, as they have amended their codes, have also chosen to put the code into a PDF-accessible document that can be accessed from the City's website, rather than the traditional municode. Las Vegas, for example, created a unified development code in 2011: a clickable PDF that is extremely easy to access and has an entire section within the subdivision regulations sub-section on complete streets. The current subdivision code is a searchable document, though, and any updates or changes to the code should also be searchable.

Recommendation: Current subdivision code makes no reference to other city policy documents, e.g., comprehensive plan, bicycle master plan, sidewalk plan etc. The subdivision code should refer to these documents, and incorporate them by reference. A more sophisticated approach to the subdivision update would require the city to consider developing a unified development code (UDC) that would incorporate both subdivision regulations and zoning code into one document. This would facilitate better connectivity between the various policy documents and the zoning and subdivision requirements and it would allow the city to include design specifications, schematics, and a policy preamble. The City could also develop a complete streets and connectivity section within a UDC that would be applicable across the entire range of development types.

Recommendation: Current subdivision code has no policy preamble that provides context for the city's goals and aspirations, nor does it include relevant components from Imagine Austin and other plans and policies that have been developed. The city should develop a policy preamble/purpose section for the subdivision regulations that sets out the purpose for the subdivision regulations and includes references to any/all other policies, ordinances, and plans that should be considered by a developer, including complete streets.

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Recommendation: Current subdivision code has no visual aids to guide/assist the developer as they sub-divide the land and make plans for new developments. Any new code should include visual aids—especially to show how connectivity can be achieved without the use of cul-de-sacs and dead-end streets.

Recommendation: Current subdivision code does not utilize any type of metrics to measure connectivity. Recommend using at minimum a connectivity index that requires measures of connectivity for vehicular circulation, sets out minimum standards for bicycle facilities, parking, sidewalks, and standards for public transit access. As an example the city should use the connectivity index and set a minimum that must be achieved (the average is between 1.2 and 1.65). Connectivity index is the ratio of the number of street links (road sections between intersections and cul-de-sacs) divided by the number of street nodes (intersections and cul-de-sac heads). This section should also include a purpose and scope and set out consistency with other city documents and design standards.

Recommendation: The current subdivision code does not explicitly provide for stub-streets to connect to adjacent communities, both existing and planned, although this is a requirement within the zoning regulations of the city under vehicular and pedestrian connections between sites in Section 2.3 on connectivity and have requirements included in the Transportation Criteria Manual. The Subdivision code should explicitly mandate that new subdivisions have at least one stub to adjoining communities.

Recommendation: Current subdivision code does not restrict block lengths to the lengths that other cities are utilizing to achieve complete street/connectivity. As a rule of thumb, cities that are starting to address the issue of connectivity within their subdivision codes cap block lengths in the range of 500–660 feet, with longer blocks requiring mid-block crossings. The restriction in block lengths has also been noted as a way to reduce the use of cul-de-sacs and encourage the use of design that encourages connectivity.

The major recommendations for changes that we suggest are incorporated into the subdivision code can be seen in Table 1.

Table 2.1: Major Recommendations for Updating Subdivision Code

Elements	Current Deficiencies	Recommendations	Examples
Complete Streets Ordinance	Currently reads like a bicycle and sidewalk retrofit document—nowhere in the text is the terminology complete streets used.	Suggest develop a new “complete streets” ordinance that uses this terminology and that would lead to a complete streets policy/plan.	Kentucky Transportation Cabinet’s zoning and subdivision model ordinance. San Francisco Complete Streets Ordinance, which also requires coordination of department actions. Denver’s Complete Streets policy passed in May 2011 sets procedure used by public works to incorporate complete streets into the routine planning design and implementation of transportation infrastructure. Louisville KY also has a well-structured ordinance.
Code Organization	Current subdivision code is disjointed, not easy to read as it requires the reader to cross-reference many areas.	Consider a single unified development code that includes procedures and administration, along with development and design standards and zoning district provisions.	Examples of UDC include Nashville-Davidson County TN, Cary NC, San Antonio TX
Use of Visual Aids	Current code has no visual aids and illustrations to show good and bad design	When code is updated illustrations on connectivity, streetscape design, lighting, utility placement, and complete street design specs should be included.	Nashville Davidson TN has excellent illustration in its subdivision regulations, as does Las Vegas in its recently issued UDC.
Policy Preamble	No policy preamble in the beginning	Inserting a policy preamble into the subdivision code that sets out the	Nashville-Davidson TN, Franklin TN, Cary NC, all have excellent

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Elements	Current Deficiencies	Recommendations	Examples
		purpose and goals to be achieved, ideally it would include goals of connectivity, complete streets, healthy living, and sustainable development.	purpose and scope policy preambles in subdivision codes.
Complete Streets	Current code does not have this	Consider inserting into subdivision code a section on connectivity/complete streets that at minimum have a connectivity index to be achieved.	Cary NC has a whole section on connectivity in subdivision code at Section 7.10. Las Vegas NV in 2011 issued a brand new UDC which has an entire section on complete streets with specifications on minimum connectivity (1.3) and transportation and land use matrix and street widths and design specs for street section and dimensions for collectors (major and minor and residential and narrow residential streets they also include utility and landscaping features including sidewalks and bicycle paths
Adopt a 'walkable' subdivision section	Current code does not have this	Consider adopting a walkable subdivision segment of code to encourage other modal use and seamlessly integrate transit, pedestrian, bicycle, and urban trail requirements into the subdivision code	Nashville-Davidson TN has done this—allows for greater density and leads to the development of complete streets.
Insert a Healthy Living Component in subdivision code	Current code does not have this	City could also consider inserting a section surrounding healthy living—with metrics on current obesity and setting out policies to encourage	Review Knoxville TN "Toward Healthier Living: Strategies to Make Healthier Living and Healthy Eating Part of Life in Knoxville and Knox

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Elements	Current Deficiencies	Recommendations	Examples
		active living and healthy eating.	County" completed in 2011 and which reviewed how their subdivision code creates barriers to achieving this. New York City developed the Active Design Guidelines in January 2010 to create a healthier and more physically active city. The ADG is a manual of evidence-based and best-practice strategies for increasing physical activity in the design and construction of neighborhoods, streets, and buildings.
Block size, width and depth	Current code has extremely large block length and sizes	Block width should be sufficient to provide for two tiers of lots of appropriate depths. Communities who are implementing complete streets are setting block length in the 600 ft range.	Grand Rapids MI, Franklin TN, Spokane WA, Tacoma WA all set block lengths at 600 or 660 ft. Bishop CA sets block lengths at 500 ft.
Reduced use of cul-de-sacs	Current code allows	Insert language that restricts the use of cul-de-sacs and requires exceptions to be for one of two reasons, topography, or an existing or planned street is blocked by a permanent structure. Alternatively, allow cul-de-sacs only if the connectivity index metric can be obtained	Nashville TN in its walkable subdivision code prohibits cul-de-sacs. Franklin TN allows cul-de-sacs if connectivity index minimum score is maintained.
Stub—streets should be noted with signs	Not in current code	Insert language that notes that stub streets are not cul-de-sacs and will be	Grand Rapids MI requires all locations where streets terminate with

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Elements	Current Deficiencies	Recommendations	Examples
Parkland/Green space requirements	Dedication required in current code	No requirements for its location at center of subdivision and connected to sidewalks and trails. Other cities require that any dedicated parkland is within the center of the subdivision, connected via sidewalks, provides bicycle racks and ties into any existing or proposed trail network	no street connection, but a future connection is planned or accommodated, a sign to be installed that notes that street will be extended. Most ordinances reviewed included recommendation for parkland and green space, including recommendations that these be in the center of the development. Bloomington IN also provides Sustainable Development Incentives to encourage better landscaping, and allows developers to place all slopes 12% and greater into a conservancy easement which counts towards the sustainable development incentive.

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2.1.2 Imagine Austin Actions for Subdivision Regulations Strategic Direction Recommendations

The following elements from the Imagine Austin Comprehensive Plan Action Matrix (page 228) relate to land development, compact and connected growth, and transportation, and generally provide for the type of development set forth within the Comprehensive Plan. The purpose of this matrix is to identify gaps within the subdivision code section 25-4 with regard to Imagine Austin's goals and objectives, along with the city's stated aim to amend the subdivision regulations to encourage sustainable communities, complete streets, and active and healthy living. The table is organized by the identified elements from the Imagine Austin Comprehensive Plan Action Matrix supplied by the city. The second through fourth column identify specific code issues, the related areas of the subdivision code and comments, and action items, including items that should be considered in the update process. The final column provides some suggestions from subdivision codes, unified development codes, and zoning codes from the project's review of multiple cities identified as exemplifying best practices that have undertaken code revisions in recent years.

Table 2.2: Major Recommendations for Subdivision Regulation Changes Based off Imagine Austin Goals

Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
Land Use and Transportation				
LUT A3 Establish land use and street design regulations to create sustainable neighborhoods that are child-friendly, support walking and bicycling, are in proximity to daily needs, and provide a range of housing-type options such as duplexes, townhouses, row houses, small-scale apartments, and houses on smaller lots to meet the needs of people	Subdivision code's ability to establish sustainable neighborhoods, Complete Streets and Connectivity.	25-5-171 – lots 25-5-172 through single lots allowed if access to an abutting street is prohibited, however if a street abutting is arterial, access is prohibited unless topography or property size justify 25-4-174 – minimum lot area 5750 square feet or 6900 for corner lot. For subdivision with onsite sewage lot width is 50 ft interior lot, 60 ft corner lot 33 ft, cul-de-sac/curved street. Flag lots are allowed and frontage is 20 ft.	Very little flexibility in the current code because of the minimum lot requirements, and the use of flag lots and cul-de-sacs. Suggest utilizing wording such as “Blocks shall have sufficient width to provide for two tiers of lots of appropriate depths.” Suggest also creating a set of design standards for a new type of subdivision standard—the walkable subdivision. Subdivision code at a minimum needs to reference the city’s bicycle master plan, sidewalk master plan and complete street resolution along with the comprehensive plan and ideally subdivision regulations should include requirements for sidewalks and bicycle requirements, along with parking	Nashville TN through its 3-pronged approach to subdivisions aims to achieve this. “Past Subdivision Regulations have contained a uniform set of standards that were applied without regard to the diverse environmental and developed character ... regulations tended to result in conventional suburban patterns. It is useful to have alternative development standards to implement varied development patterns in a variety of physical contexts. These Regulations provide a Conservation Subdivision and a Walkable Subdivision. Bloomington IN also has multiple types of subdivisions—their equivalent to the walkable

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
				subdivision is called the Traditional Subdivision. Bloomington's layout is also excellent with great use of diagrams and pictures.
LUT A11: Develop land use and transportation policies and regulations that promote the development of projects that promote more active and healthy lifestyles, such as community gardens, tree-shaded sidewalks and trails, bicycle parking, showers within office buildings, and having daily needs within proximity to home and work.	Complete Streets	Nothing in current code	Require a policy preamble to the subdivision code that would set out the cities priorities regarding sustainable neighborhoods, complete streets, and connectivity.	Franklin TN has an extremely expansive preamble to their subdivision code that effectively sets out the cities goals and policies. Hailey ID values non-vehicular traffic in the subdivision ordinance and it requires connections to other public facilities.
LUT A12: Create an integrated transportation plan that encompasses driving, transit, bicycling, walking, and roadway and rail freight.	Connectivity	Nothing in current code	Insert into the subdivision preamble section discussion of how the section will establish mobility and circulation standards that give equal treatment to alternative modes of travel. Also recommend that the streets section in land use code at 25-4, Article 3, Division 2utilizes the	Grand Rapids MI in Section 5.10.07. Mobility and Circulation notes that the purpose of this section is to establish mobility and circulation standards that give equal treatment to alternative modes of travel; allow reasonable access to properties; create a continuous network of non-motorized

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
			<p>wording transportation. Also recommend inserting new sections that require transit, walking and bike and trail infrastructure to be developed to ensure all parts of the community have access to an integrated transportation system</p>	<p>pathways within and between developments; maintain the capacity of existing public infrastructure as land development occurs; ensure safe access to and from streets by emergency vehicles.</p>
<p>LUT A14: Increase public transit ridership.</p> <ul style="list-style-type: none"> - Expand service to compact centers and activity corridors - Increase the number of people who use transit by choice - Create inviting public spaces at stops and transfer centers - Provide real-time schedule information - Add more covered bus shelters - Make stops more convenient - Add park and ride facilities - Make routes more convenient and the system more intuitive - Create street design standards (bus turnouts, 	<p>Transit Connections and connectivity</p>	<p>Nothing in current code</p>	<p>Insert into subdivision regulations requirements for transit access and connectivity. This could include sidewalk connectivity requirements to transit activity centers and bus stops, dedication at the juncture of connector streets to arterials and a requirement for developer to provide bulbs for bus stops, and other metrics to measure access to transit. The city could also consider adding a requirement for developer to provide transit infrastructure e.g. benches and shelters that are at a level appropriate to the size of the development. Another suggestion would</p>	<p>Tacoma WA requires in its subdivision regulations at 13.04.100 Plat procedures. 7. A transit access checklist, including a table showing the location and walking distance in feet to the nearest bus stop(s), the routes served by that stop, and the potential transit patronage calculated according to a formula and generation rates shown on the checklist, unless this information has already been provided in the checklist submitted pursuant to the State Environmental Policy Act (SEPA). Grand Rapids MI in its subdivision</p>

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
sidewalk width, benches, shelter) - Give transit priority (queue jumpers, signal priority, managed lanes, and dedicated lanes) - Launch an informative and enticing public relations campaign - Implement first and last mile solutions such as carpooling, vanpools, and bicycle and car sharing - Add more bicycle carrying capacity to buses and trains			be to add requirements for developer to construct urban rails and cycle routes that conform to the adopted bicycle and urban trail plans that would intersect with transit hub areas. These types of recommendations would also require the city to create a partnership with CapMetro to develop goals for types of infrastructure to be provided so that if any requirements are made of developers to provide this infrastructure they are provided with explicit instructions. A final suggestion that could also be considered is a requirement of any new development that negatively impacts level of service on surrounding streets to provide capital funding for transit improvements to improve LOS.	regulation requires 5.2.20.A. - Where public transit is available or planned, convenient access to transit stops shall be provided. (B) where transit shelters are provided, they shall be placed in highly visible locations. (*C) landscape and or plaza areas are encouraged at stops
LUT A19: Develop complete streets design guidelines for all new road construction and	Complete Streets, provisions to encourage walking and biking	25-4-152 cul-de-sacs allowed. 25-4-153 block length not	The average block length for complete streets is 600 ft. Amend code to reflect	Need to review Charlotte, NYC, San Francisco, Roanoke, complete street

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
reconstruction: - Pedestrian and bicycle facilities and amenities - Green street techniques - Green Street Techniques/Green Infrastructure Best Management Practices - Interconnected, navigable, grid-like streets and blocks - Flexibility in design and regulations - Create pedestrian-activated crosswalks at mid-block intersections on arterials to improve pedestrian safety - Traffic calming measures - Transit accommodations - Use of native landscaping		to exceed 1200 ft. Residential block more than 900 ft. must be transected by pedestrian path within 300 ft of block ends. Sidewalk must be 5 ft wide (or more) 25-4-154 – street design in compliance with TCM 25-4-157 two access street's are required in new subdivision but exception can be made to only have one	this. Restrict use of cul-de-sacs i.e. only have very stringent exemptions. Recommend that all subdivisions fulfill a minimum connectivity index in the range of 1.2 to 1.6. Develop language regarding stub streets including notification languages i.e. future expectations i.e. street will be connected in future. Some communities have completely ruled out the use of private streets. If TCM stays as reference it must be updated to include complete streets and other design components. If a UDC is adopted complete streets and other streetscapes and zoning requirements can be inserted into a UDC. Reduce the exceptions for	(better street) design guidelines and policy documents. These are all excellent templates to work from. Bloomington IN has great visuals that it uses within its different types of subdivisions. Las Vegas NV also has great use of visuals and a good document layout.

¹ An access street is a street generally limited to providing access to abutting property and tributary to major and secondary thoroughfares.

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
LUT A20: Develop roadway and rights-of-way design standards that accommodate the needs of street trees and above and below ground utilities and infrastructure.	Streetscape measures	25-4-232 – small lot subdivisions requires underground utility service	<p>access streets as current regulations would erode any connectivity gains.</p> <p>Recommend adding language and requirements to add street trees to all cross sections. Need to ensure that landscaping requirements do not conflict with private utility requirements – recommend meeting with utility providers to develop standards that can be inserted into these requirements.</p>	<p>San Francisco's Better Streets Policy does an excellent job of detailing the design specifications for street trees and utilities. Cary NC also sets standards in Section 7.2 for landscaping buffering, screening and tree protection. They also require that upper story trees are placed at least 10 feet from light poles and electrical transformers. They also require all utility corridors to be designated on the subdivision plan to reduce the impact on existing vegetation and to ensure coordination for future utility installation. In Section 8 of Cary's LDC (which is their subdivision section) it requires streets to have a minimum width of 20 feet to accommodate driveways, drainage and</p>

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
LUT A21: Create a network of on- and off-street physically separated bicycle and walking routes or trails linking all parts of Austin and the region.	Provisions to encourage walking and biking	Nothing in code, although the bike plan is adopted as an ordinance and does have some connectivity requirements.	Develop within subdivision ordinance requirements that sidewalks and trails are connected to current and planned trails and greenways. A secondary recommendation would be that should be constructed concurrently to the development – i.e. not constructed afterwards, or not at all, or placing the burden on the city.	utilities in general. Grand Rapids MI requires that where trails exist or are planned, paths or sidewalks shall connect building entries to the trail system. (5.2.19C) Cary NC requires that adequate private paved trail connections to existing or planned greenways shall be constructed every 900 linear ft and connects will be determined by staff during subdivision plan review. Hailey ID also requires that the developer provide paths for all trails and paths identified in the master plan.
LUT A23: Develop standards to connect all new neighborhoods to adjacent neighborhoods and commercial areas by streets, sidewalks, and bicycle lanes and/or paths.	Connectivity	25-5-151 requires connectivity to existing streets on adjoining property. LUC can exempt. No language regarding bicycles or sidewalks and connectivity nor provision for connectivity to planned projects.	Sub-streets and notification language that this street will be connected in the future should be developed. Should also have a requirement that all streets are connected. Should include language that allows for bike and pedestrian connections and these types	Virginia's Administrative Code requires any street proposed for VDOT acceptance should accommodate the anticipated pedestrian and bicycle traffic. When separate pedestrian and bicycle facilities are deemed appropriate, they

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
			<p>of connections if some streets cannot be easily connected.</p> <p>Also suggest adding in language on connectivity within the transportation section of subdivision standards to ensure that this is taken into consideration as design of a development is being created.</p>	<p>should be included in the initial construction of the street, prior to VDOT acceptance. Las Vegas in its 2011 UDC requires this and has an entire section on complete streets and connectivity.</p>
LUT A26: Set targets for vehicle miles traveled per capita and incorporate those targets into traffic impact studies for new development.	Transportation Metrics	Nothing in code	<p>Need to develop this—within TCM—based off current data available and new modeling techniques being developed by CAMPO's network modeling project.</p>	<p>No examples found in codes reviewed.</p> <p>Knoxville in its Towards Healthy Living Subdivision Review recommended for performance measures from the 5th edition of the highway capacity manual which came out in 2010, which better measures the quality of the travel experience. Charlotte and San Francisco are also developing their own performance measure metrics. Roanoke VA also sets width of streets to expected ADT measures and within this applies</p>

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
				streetscape design, paved way minimums, and sidewalk width provisions.
Housing and Neighborhoods				
HN A21: Align future development with the Growth Concept Map through adoption of small-area plans (e.g., neighborhood, corridor, and station area plans) that contain provisions set forth in Imagine Austin, including: <ul style="list-style-type: none"> - Areas experiencing change - Infill Development - Activity centers and corridors - Increased density - Open space and open space connectivity - Historic preservation - Neighborhood preservation - Transitioning between land uses - A variety of housing types - Affordable housing - Brownfield and greyfield redevelopment - Public Transportation 	Housing choice	Nothing in code	Need to change the subdivision code to include these elements and to link to the various elements within Imagine Austin and other city plans/policies. One way to create this is to consider the use of Walkable Subdivision code (or another title that may fit better for Austin) to generate housing choice through opportunities to develop denser subdivisions that have some mixed use and activity center elements either within or adjacent to the subdivision.	Nashville TN walkable subdivision code. Charlotte NC also has an excellent mobility and circulation description which encapsulates these aspirations. Louisville KY requires that buildable lots 'shall' be designed and located to ensure compatibility with adjacent development.

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
<p>HN A24: Establish a regulatory environment that creates communities across Austin that:</p> <ul style="list-style-type: none"> - support walking, bicycling, and transit - encourage live/work spaces - are in proximity to daily needs - include a variety of employment opportunities - provide a range of housing (duplexes, townhouses, row houses, small-scale apartments, etc.) integrating market-rate and affordable housing for people of all ages, abilities, and means - utilize sustainable building practices - are stable with low crime and safe buildings - provides a range of facilities and services such as schools, parks, community gardens, and other public gathering spaces 	<p>Transit compatible design, multi modal streets, and connectivity</p>	<p>Sections 25-4-231 25-4-232 and 25-4-233 – in subdivisions code details types of residential houses and prescribes lot dimensions.</p> <p>25-4-231 - townhouse lots.</p> <p>25-4-232 – small lot subdivision 3600 square ft. min lot area, 4500 square ft. corner lot. Lot widths are prescribed. No more than one dwelling unit allowed + 2 off-street parking spaces.</p> <p>25-4-233 single family attached residential subdivision permitted on un-platted land, or platted duplex lot that is vacant. Lot minimum site area is 7000 square ft, minimum lot area 3000 ft.</p> <p>Minimum lot width 25 ft, 20 ft on cul-de-sac. Not more than one dwelling unit.</p>	<p>Review lot size, width, and design components in zoning code. If a Walkable Subdivision segment of code is created this could also assist in achieving these goals.</p> <p>Develop design standards that should also be scaled to the 1/8, 1/4, and 1/2 mile radius segments because from most homes the walkable distance to services is on average a 1/4 mile.</p> <p>Also need to consider is the design aligned for 'people' i.e. access management standards, street width and calming measures, and easy access in walkable distance to schools, services, and other community amenities.</p> <p>Reviewing Austin's neighborhood plans (that are cited as a best practice) and find ways to integrate some of the vision components into the preamble and policy direction of a new subdivision code.</p>	<p>San Francisco's subdivision code has a relatively robust set of criteria to ensure a mix of housing, and to ensure that affordable housing fulfills a component of all development. Knoxville TN review of barriers to healthy living, actually noted cited Seattle W.A, Portland OR and Austin TX as model examples of neighborhood master plans that it considers are great 'visions'.</p> <p>Louisville Y requires the location of a transit shelter to be reserved for the village center, close to amenities, and within walking distance of residents. The shelters design should also consider personal safety and year-round weather conditions.</p>

Conservation and Environment

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
CE A6: Encourage designs and building practices that reduce the environmental impact of development and that result in accessible green space.	Parkland and trails	Nothing in code	Require safe and convenient urban trail access to all green space throughout new development	Louisville KY requires a 25-30% of the village to be open space. It also requires that a tree strip of 5ft is provided between the roadbed and sidewalk or pedestrian path. Bloomington IN also uses Sustainable Development Incentives to encourage the use of sustainable development practices throughout the planning jurisdiction
CE A7: Establish a comprehensive, predictable, consistent, and efficient process to evaluate the environmental effects of new development.	Environmental impacts	Currently environmental provisions within subdivision regulations are in various other sub-chapters of the planning code.	Needs to be developed	All codes reviewed have process - as each city is so different
CE A10: Identify existing areas with limited access to parks, open space, and trails, and create mechanisms to address these gaps.	Trails	Needs to tie into Imagine Austin's identified parks open space areas Within small lot subdivisions 25-4-232 requires the plat to show any restrictions running with the land on the use of the property for parks,	Needs to be developed	Most other codes reviewed required connection from subdivision to trails and open space through use of sidewalks and pathways.

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
		playgrounds, open space and common areas providing recreation amenities,		
CE A23: Strengthen regulations that protect creeks and floodplains from development by increasing buffer zones and reducing the amount and type of development allowed in these areas.	Floodplains and Watershed Impacts	25-7 does allow development within 100 year floodplains and requires the proposed plat, plan or site plan provide a sufficient waterway for design flood. This section does note that the proposed development 'to the greatest extent feasible' preserve the natural and traditional character of the land or waterway. 25-7-92 plans may not be approved if they encroach on the 25-year floodplain—although a variance can be approved under certain circumstances.	Buffers are delineated in Chapter 25-8 of the Code. The variance for the 25 year flood plain is tied to the development improving the drainage system, and that the development does not result in additional adverse flooding.	Bloomington IN—as noted uses Sustainable Development Incentives to encourage use of such practices. This includes landscape and site design to make an exceptional contribution to the quality of the natural environment.
City Facilities and Services				
CFS A8: Create a trails master plan to ensure connectivity and provide	Trails and connectivity requirements	Nothing in current code	Code needs to be amended to include the Trails Master Plan when it is developed.	San Diego County CA requires that if any part of a trail corridor is on

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Comprehensive Plan Direction	Code Component/Issue	Current Subdivision Code	Comments/Action items	Example of model code wording or policy prescriptions from other cities/states
consistency with regional, city, and neighborhood level trail and transportation goals to provide pedestrian and bicycle connections between neighborhoods and destinations; incorporate trails throughout the city and region; encourage developers to connect to or complete the trail system; and use protected land along creeks and floodplains in an environmentally sustainable way.				property the sub-divider shall prepare a study to determine specific location and pathway to be constructed. The developer is required to provide an easement ² and dedicate this to county.
CFS A17: Ensure that land development policies, regulations, and design standards take public safety issues like roadway connectivity, ingress/egress, and street design into consideration.	Street design and lot requirements including cul-de-sacs, private streets and street stubs	Current code does not have connectivity components.	Rename the "Streets" portion of Subdivision standards to "Transportation" and include all transportation issues under this heading	Louisville KY notes that streets in villages should be designed for pedestrian safety, and street width, pattern and design 'shall' be used to reduce vehicle travel speeds and encourage pedestrian activity. Streets are also allowed to vary in size and form to control traffic and give character to the development/village.

² The County then is responsible for any improvements to the land and liability; the developer still has the title to the property.

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Chapter 3. Imagine Austin Actions for Transportation Criteria Manual Update Recommendations

Austin's Transportation Criteria Manual (TCM) is one of the Development Criteria Manuals created to provide concise and comprehensive criteria for proper planning and design within the City of Austin. It has been updated periodically but hasn't been looked at as whole since 1995; so it consequently does need a major overhaul to bring it up to date with current standards and practices.

Many of the cities studied do not have a specific transportation manual for their city; many use AASHTO, ITE, and state regulations to govern their designs. Some cities have specific manuals for one transportation aspect (such as bicycles or street design). The current TCM uses many other documents and manuals to develop Austin specific standards such as Transit Facility Design Guide (CTR 1988), Guidelines for Urban Major Street Design (ITE 1983), Transportation and Traffic Engineering Handbook (ITE 1982), Access Management and Driveway Design (TTI 1986) and other documents.

The TCM should follow the ITE Context Sensitive Solutions tenets (ITE 2010):

- Balance safety, mobility, community, and environmental goals;
- Involve the public and stakeholders early and continuously;
- Use an interdisciplinary design team tailored to project needs;
- Address needs of all users;
- Apply flexibility inherent in design standards and guidelines; and
- Incorporate aesthetics as an integral part of good design.

The first recommendation in updating the Austin TCM is to review these old documents stated above and find their most updated version. Further recommendations are shown below in each section.

3.1 Transit Recommendations

Major Recommendation: The City of Austin and Capitol Metro should enter into an inter-local agreement to develop criteria for new transit designs. Guidelines should also be developed as to when it is required to install those new transit designs and infrastructure.

The current TCM uses the 1988 Transit Facility Design Guide as transit standards. However, technology has changed many transit operations. The City of Austin and Capitol Metro should enter into an inter-local agreement to develop criteria for these new transit designs. Guidelines should also be developed as to when it is required to install those new transit designs and infrastructure. New ITS strategies, such as signalization priority, need to be addressed. Criteria for bus-only lanes, bike/bus only lanes, new bus bulbs, bus rapid transit, and bicycle/pedestrian connections also need to be added. Los Angeles (Los Angeles 2011) provides design guidelines for newer transit options, such as the following material on signal prioritization and bus bulbs. All transit geometry features need to take into account the classification of the street, width requirements for emergency access, drainage issues, and other traffic needs so as to not affect the integrity of the road.

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Signal prioritization is a component of technology-based “intelligent transportation systems” (ITS). These systems are often used by road authorities in conjunction with transit agencies to help improve a roadway system’s overall operations in the following ways:

- Reduce traffic signal delays for transit vehicles
- Improve an intersection’s person throughput
- Reduce the need for transit vehicles to stop for traffic at intersections
- Help reduce transit vehicles’ travel time
- Help improve transit system reliability and reduce waiting time for people at transit stops

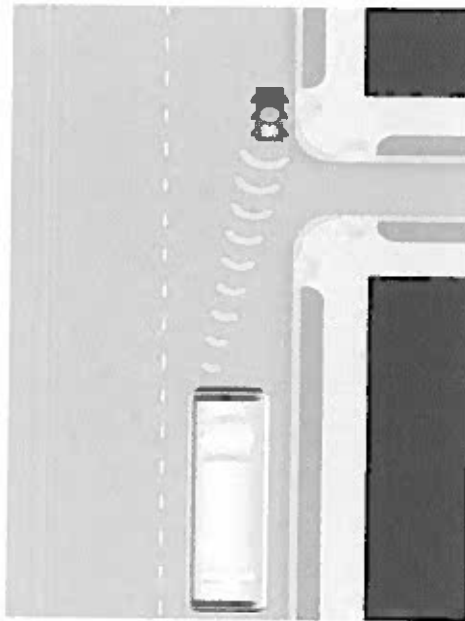


Figure 3.1: Example of Signal Prioritization

Source: Los Angeles Model Design Manual for Living Streets

Signal prioritization projects include signal timing or phasing projects and transit signal priority projects.

- Signal timing projects optimize the traffic signals along a corridor to make better use of available green time capacity by favoring a peak directional traffic flow. These passive systems give priority to roadways with significant transit use within a district-wide traffic signal timing scheme. Transit signal prioritization can also be achieved by timing a corridor’s traffic signals based on a bus’s average operating speed instead of an automobile’s average speed.
- Transit signal priority projects alter a traffic signal’s phasing as a transit vehicle approaches an intersection. This active system requires the installation of specialized equipment at an intersection’s traffic signal controller and on the transit vehicle. It can either give an early green signal or hold a green signal that is already being displayed in order to allow buses that are operating behind schedule to get back on schedule. Signal-priority projects also help improve a transit system’s schedule adherence, operating time, and reliability.

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- Although they may use similar equipment, signal-priority and pre-emption are two different processes. Signal-priority modifies the normal signal operation process to better accommodate transit vehicles, while signal pre-emption interrupts the normal signal to favor transit or emergency vehicles.

Bus bulbs are curb extensions that extend the length of the transit stop on streets with on-street parking. They improve transit performance by eliminating the need for buses to merge into mixed traffic after every stop. They also facilitate passenger boarding by allowing the bus to align directly with the curb; waiting passengers can enter the bus immediately after it has stopped. They improve pedestrian conditions by providing additional space for people to wait for transit and by allowing the placement of bus shelters where they do not conflict with a sidewalk's pedestrian zone. Bus bulbs also reduce the crossing distance of a street for pedestrians if they are located at a crossing. In most situations, buses picking up passengers at bus bulbs block the curbside travel lane. However, this blockage is mitigated by the reduced dwell time, as it takes less time for the bus driver to position the bus correctly, and less time for passengers to board.

One major advantage of bus bulbs over pulling to the curb is that bulbs require less parking removal: typically two on-street parking spots for a bus bulb instead of four for pulling over.



Figure 3.2: Figure : Bus bulb in Alhambra, CA
Source: Los Angeles Model Design Manual for Living Streets :

The following conditions should be given priority for the placement of transit bus bulbs:

- Where transit performance is significantly slowed by the transit vehicle's merging into a mixed-flow travel lane
- Roadways served by express or Bus Rapid Transit (BRT) lines
- Stops that serve as major transfer points

- Areas with heavy transit and pedestrian activity and where narrow sidewalks do not allow for the placement of a bus shelter without conflicting with the pedestrian zone

Bus bulbs should not be considered for stops with any of the following:

- A queue-jumping lane provided for buses
- Sections where on-street parking is prohibited during peak travel periods
- Near-side stops located at intersections with heavy right-turn movements, except along streets with a “transit-first” policy

Bus lanes provide exclusive or semi-exclusive use for transit vehicles to improve the transit system’s travel time and operating efficiency by separating transit from congested travel lanes. They can be located in an exclusive right-of-way or share a roadway right-of-way. They can be physically separated from other travel lanes or differentiated by lane markings and signs.

Bus lanes can be located within a roadway median or along a curb-side lane, and are identified by lane markings and signs. They should generally be at least 11 feet wide—but where bicycles share the lane with buses, 13 to 15 feet wide is preferred. Figure 3.3 shows an example of a bus only lane. When creating bus lanes, cities should consider the following:

- Exclusive transit use may be limited to peak travel periods or shared with high-occupancy vehicles.
- On-street parking may be allowed depending on roadway design, especially with bus lanes located in the center of the street.
- A mixed-flow lane or on-street parking may be displaced; this is preferable to adding a lane to an already wide roadway, which increases the crossing distance for pedestrians and creates other problems discussed in other chapters.
- Within a mixed-flow lane, the roadway can be delineated by striping and signs.
- High-occupancy vehicles and/or bicycles may be permitted to use bus only type lanes.



Figure 3.3: Bus-only lane in Santa Monica, CA
Source: Los Angeles Model Design Manual for Living Streets

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Connecting bicycle facilities to transit stations helps extend the trip length for cyclists and reduces automobile travel. Secure bicycle parking must be provided at or within close proximity to a bus stop, preferably sheltered. At a minimum, the accommodations can be bike racks or lockers. Bike stations and automated bicycle parking can be located at areas with high levels of transit and bicycle use.

3.2 Street Design Criteria Recommendations

Recommendation: We recommend amending the TCM to include sections on streetscape criteria (lighting, seating, trees and other streetscape elements; funding and maintaining these elements) and guidelines for roundabouts and other traffic calming devices that are outlines in NCHRP Report 672.

The current street design criteria use street classification to create geometric design guidelines. They follow the principles of AASHTO Policy on Geometric Design of Highways and Streets, ITE Recommended Guidelines for Subdivision Streets and Guidelines for Major Street Design. We recommend amending the TCM to include sections on streetscape criteria (lighting, seating, trees and other streetscape elements; funding and maintaining these elements) and guidelines for roundabouts and other traffic calming devices that are outlines in NCHRP Report 672. The amendment should include information on incorporating green storm water infrastructure to these street designs. Los Angeles provides general design elements of roundabouts (Los Angeles 2011)

3.2.1 Roundabouts

Before starting the design of a roundabout it is very important to determine the following to comply with the ADA and design guidelines:

- Number and type of lane(s) on each approach and departure as determined by a capacity analysis
- The design vehicle for each movement
- Whether the street is a bicycle route
- Goal/reason for the roundabout, such as crash reduction, capacity improvement, speed control, or creation of a gateway or a focal point
- Right-of-way and its availability for acquisition if needed
- The existence or lack of sidewalks
- The approach grade of each approach
- Transit, existing or proposed

Figure 3.4 depicts a roundabout and its four design sections.

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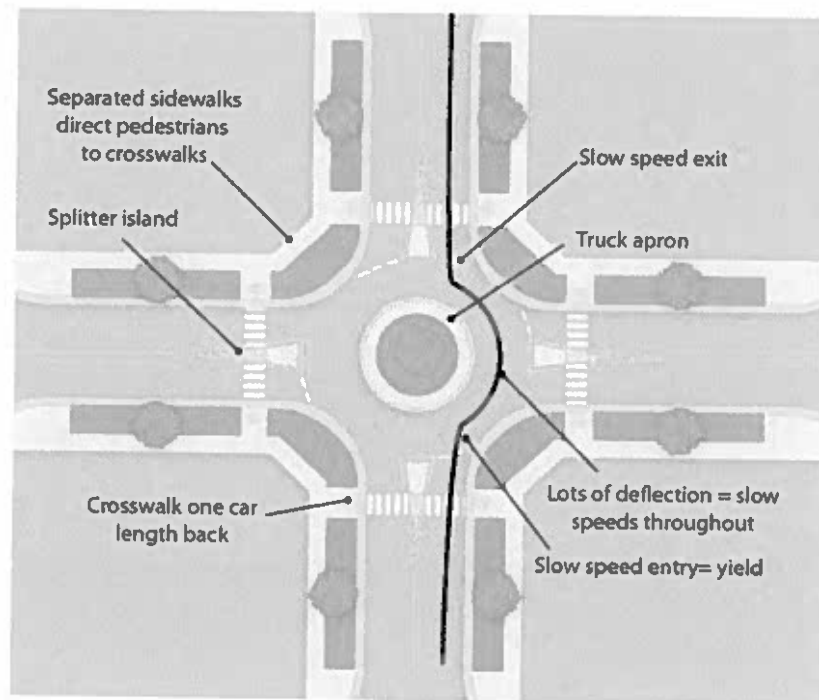


Figure 3.4: Roundabout Schematic

Source: Los Angeles Model Design Manual for Living Streets

Central Island: The design of the central island is an important element of a roundabout. In conjunction with well-designed approach and departure lanes, the central island controls vehicle speeds through deflection and controls the size of vehicles that can pass through and turn at a roundabout. It provides space for landscaping to beautify an intersection or create a focal point or community enhancement, but it also provides space for the inclusion of a vertical element such as a tree, which is important in providing long range conspicuity of a roundabout. The geometry should follow the guidelines in NCHRP Report 672.

Splitter Islands: Splitter islands and/or medians on each approach serve several functions. Most importantly, they provide a refuge for pedestrians crossing at the roundabout, breaking the crossing into two smaller crossings. This allows pedestrians to select smaller gaps and cross more quickly. Splitter islands and medians direct vehicles toward the edge of the central island and limit the ability of drivers to make left turns the wrong way into the circulating roadway. Splitter islands should have a minimum width of 6 feet, and preferably 8 feet, from the face-of-curb to the opposite face-of-curb. The geometry of the splitter island should follow the guidelines in the NCHRP Report 672.

Truck Apron: Because central islands must be made large enough to deflect and hence control the speed of passenger vehicles, they can limit the ability of trucks to pass through or turn at a roundabout. To accommodate large vehicles, a truck apron (a paved, load-bearing area) is included around the edge of the central island. The truck apron is often paved with a fairly rough texture, and raised enough to discourage encroachment by smaller high-speed passenger cars. The truck apron should be 3 inches high. The geometry of the splitter island should follow the guidelines in the NCHRP Report 672.

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Pedestrian Crossings: Pedestrian crossings are located one car length away from the circulating roadway to shorten the crossing distance, separate vehicle-to-pedestrian conflicts from vehicle-to-vehicle conflicts, and allow pedestrians to cross between waiting vehicles.

Signing and Marking: Signing and marking should be in compliance with the current version of the MUTCD. For detailed design guidance on roundabouts, refer to the NCHRP Report 672, *Roundabouts: An Informational Guide*, Second Edition, 2010. However, care must be taken to not oversign roundabouts by including every sign allowed at roundabouts, except for needed directional signs; most roundabouts are designed so their function and use are self-explanatory.

3.2.2 Traffic Calming

San Diego (San Diego 2002) mentions the following as typical traffic calming techniques:

- Horizontal deflections (chicanes, mini traffic circles, median slow points or chokers)
- Vertical deflections (road humps, speed tables, and raised crosswalks)
- Intersection pop-outs
- Traffic diverters (semi-diverters)
- Channelization

The guidelines they follow for traffic calming installation are the following:

- Delays to emergency vehicles should be minimized by the appropriate placement and design of traffic calming devices. In some cases, certain traffic calming devices may not be appropriate.
- Traffic calming installations should not divert traffic to other local residential streets. Traffic calming installations should support the street classifications established in community plans. Traffic may be diverted from residential streets to classified through streets. The potential impacts of traffic diversion should be evaluated for all traffic calming installations.
- Traffic calming devices on designated transit routes should be limited to those that permit the efficient movement of transit vehicles.
- Traffic calming installations must meet State and Federal accessibility requirements.
- Traffic calming should not impair the mobility of non-motorized users to of the street.
- Traffic calming installations must address drainage, sight distance, and location of underground utilities.

All TCM updates should be consistent with complete streets standards and reflect current best practice in street design. The designs should be prescriptive but allow for flexibility.

3.3 Clear Zones and Guard Fences Recommendations

Recommendation: Use updated version of AASHTO Policy on Geometric Design of Highways and Streets.

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The Clear Zones and Guard Fences section is based on the AASHTO Policy on Geometric Design of Highways and Streets. The TCM provides standards for utilities within the Public Right of Way.

3.4 Bicycles Recommendations

Recommendation: We recommend using the NACTO Guide to create bicycle infrastructure guidelines for Austin over other Bicycle Guides because it is more innovative and encompasses more of the bicycle treatments than other guides.

The current Bicycle Section describes three types of bikeways and their design. It uses the Texas Manual of Uniform Traffic Control Devices. Guidelines for the following need to be developed:

3.4.1 Bike sharrows



Figure 3.5: Bike Sharrow
Source: NACTO

3.4.2 Bike boxes



Figure 3.6: Bike Box
Source: NACTO

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3.4.3 Intersection markings



Figure 3.7: Intersection Markings

Source: Intersection Markings NACTO

- Colored pavement treatments
- Bicycle Boulevard
- Shoulder bikeways
- Shared use paths

The TMUTCD guidelines for bicycle facilities need to be followed in Austin. However, we recommended using the guidelines in the NACTO Urban Bikeway Design Guide for those bicycle facilities that haven't been included in the TMUTCD. The Design Guide can be found at <http://nacto.org/cities-for-cycling/design-guide/>. We recommend the NACTO Guide over other Bicycle Guides because it is more innovative and encompasses more of the bicycle treatments than other guides. All of the designs in the NACTO Guide are used internationally and in many U.S. cities, such as Chicago.

3.5 Sidewalk Recommendations

Recommendation: It is recommended that the City breaks the sidewalk area up into four distinct zones and creates specific design guidelines for those zones.

The sidewalk section of the TCM provides design guidelines for various sidewalk types and location criteria for streetscape elements on sidewalks. It uses City of Austin standards and complies with the Americans with Disabilities Act. It is recommended that the City breaks the sidewalk area up into four distinct zones and creates specific design guidelines for those zones. The four zones are described in figure 3.8 (Toronto 2011):

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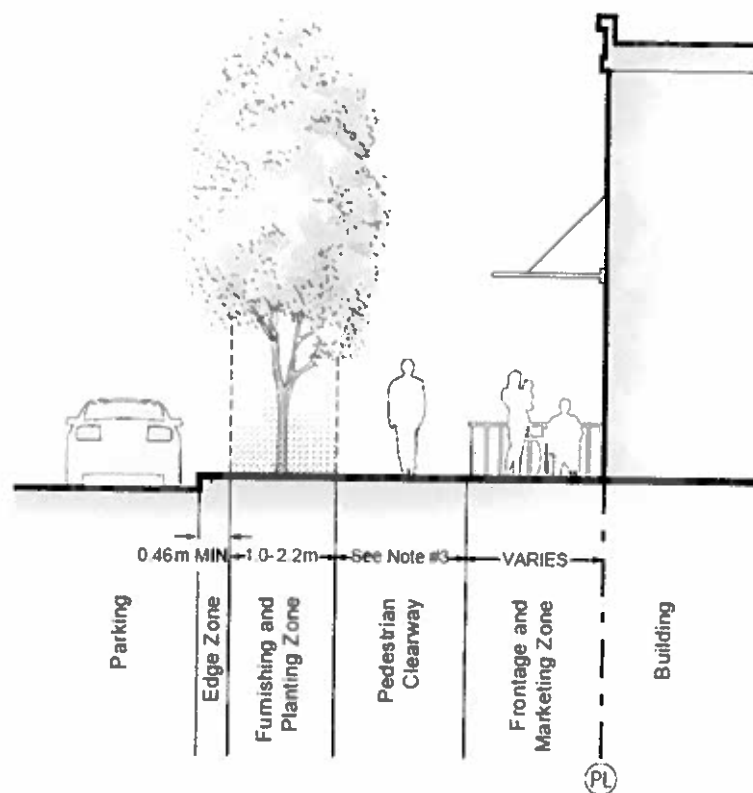


Figure 3.8: Streetscape
Source: Toronto Streetscape Manual 2012

- *Edge Zone* - Immediately adjacent to the roadway, the Edge Zone provides clearance between the traveled portion of the road or parked vehicles and other sidewalk functions. This zone provides a safety buffer against door swings, mirrors, etc., and possibly can accommodate sign and utility posts, garbage set out and snow windrow storage. The Edge Zone should be a minimum of 0.46 meters wide, including the width of curb.
- *Furnishing and Planting Zone* - The Furnishing and Planting Zone, which is adjacent to the Edge Zone, may contain street furniture, sidewalk cafes, trees and other fixed objects, and may be characterized by decorative paving features. Coordinated alignment of such services within this zone is desirable, and these features should be placed in a manner that does not obstruct the Pedestrian Clearway. This zone provides an important comfort buffer between pedestrian and vehicular traffic. The Furnishing and Planting Zone may typically vary between 1.0 and 2.2 meters wide, depending on available space. To accommodate tree planting in the Furnishing and Planting Zone, the preferred minimum width is 1.8 meters, and must be no less than 1.2 meters. If the Furnishing and Planting Zone is less than 1.0 meter, consider placing furniture in an alternate location. http://www.toronto.ca/planning/urbdesign/pop_streetscape_zones.htm - top

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- *Pedestrian Clearway* - The Clearway accommodates pedestrian movement; a clear, unobstructed continuous linear path of sidewalk with an appropriate width to serve pedestrian flow. Provision of this zone is a high priority. The width of the Pedestrian Clearway should be determined prior to the width of the Furnishing and Planting Zone, to ensure it supports the existing and projected volume of pedestrian traffic. The minimum width of the Pedestrian Clearway is 2.1 meters, unless this cannot be accommodated within the sidewalk width, in which case consideration may be given to reducing it to no less than 1.53 meters.
- *Frontage and Marketing Zone* - The Frontage and Marketing Zone is adjacent to the building/property line that buffers pedestrians from windows, doorways, and other building appurtenances. This zone may consist of marketing, outdoor merchandise displays, boulevard cafes, and/or landscaping, and in some cases may support street furniture.
- While Main Streets sidewalks typically have all four zones, the arrangement of Green Streets is slightly different. As Green Streets often have open spaces nearby and a residential component, typically there is no Frontage and Marketing Zone. Instead, the Furnishing and Planting Zone can be on either side of the Pedestrian Clearway (depending on the space available).

The width of the Frontage and Marketing Zone varies, depending on the building set back and location of the property line. If street furniture is to be placed within the Frontage and Marketing Zone, it must have a minimum width of 1.0 meter. Bicycle guidelines also need to be added to the proper sidewalk zone if they be allowed on certain sidewalk areas. Further design guidelines can be formulated based on these four zones. The Subdivision Code will describe which type of design to use and the TCM will provide quantitative details.

3.6 Traffic Control/Parking Recommendations

Recommendation: Both of these sections should be updated based on the updated versions of the Texas Manual on Uniform Traffic Control Devices.

The traffic control section uses the Texas Manual on Uniform Traffic Control Devices. The parking section uses the Land Development Code. Both of these sections should be updated based on the updated versions of those specific manuals.

3.7 Pedestrian Recommendations

Recommendation: Add chapter on pedestrians, that includes criteria for pedestrian crossings, signals/detectable warnings, lighting issues, and other pedestrian specific designs should be added to the section.

Right now the TCM has no specific pedestrian section. However, the addition of such a section is recommended as walking becomes a more ideal way to travel. Criteria for pedestrian crossings, signals/detectable warnings, lighting issues, and other pedestrian specific designs should be added to the section.

The following issues should also be considered when planning and designing crossings according to Los Angeles (Los Angeles 2011):

- Ideally, uncontrolled crossing distances should be no more than 21 feet, which allows for one 11-foot lane and one 10-foot lane. Ideally, streets wider than 40

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feet should be divided (effectively creating two streets) by installing a median or two crossing islands.

- The number of lanes should be limited to a maximum of three lanes per direction on all roads (plus a median or center turn lane).
- There must be a safe, convenient crossing at every transit stop.
- Double (or triple) left or right turns concurrent (permissive) with pedestrian crossings at signalized intersections must never be allowed.
- Avoid concurrent movements of motor vehicles and people at signalized intersections.
- Pedestrians' wait time to cross at a signalized intersection should be minimized.
- Pedestrian signals should be provided at all signalized crossings where pedestrians are allowed.

Los Angeles also provides a Pedestrian Crossing Toolbox that covers various crosswalk designs. It is shown in Appendix A.

For lighting in pedestrian zones, see Figure 3.9, which is from the American National Standard Institute "Roadway Lighting" 2005.

Functional Classification	Average Maintained Illumination at Pavement by Pedestrian Area Classification [FC]		
	High	Medium	Low
Major / Major (boulevard)	3.4 fc	2.6 fc	1.8 fc
Major / Collector (boulevard/avenue)	2.9 fc	2.2 fc	1.5 fc
Major / Local (avenue)	2.6 fc	2.0 fc	1.3 fc
Collector / Collector (avenue)	2.4 fc	1.8 fc	1.2 fc
Collector / Local (street)	2.1 fc	1.6 fc	1.0 fc
Local / Local (street)	1.8 fc	1.4 fc	0.8 fc

Figure 3.9: Lighting information
Source: American National Standard Institute

With the addition of the light rail in Austin, pedestrian railroad crossings should also be added. The LA Guide (Los Angeles 2011) provides the following:

- Pedestrian gates
- Channelization of pedestrians through gates and across tracks
- Warning flashers
- Signs
- Audible signals

The City of Austin should add a pedestrian section and include their own standards for crossings, lighting, and pedestrian specific design.

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3.8 Driveway Recommendations

Recommendation: A more robust guideline on minimizing the number of driveways should be developed.

The driveway section has design criteria for three types of driveways. A more robust guideline on minimizing the number of driveways should be developed.

3.9 Freight Recommendations

Recommendation: Recommend adding a section on designing for freight transportation.

The current TCM does not provide information on designing for freight. However, freight movement is important to the Austin economy. Therefore, we recommend a section on designing for freight transportation. Seattle (Seattle 2011) provides information on how to include them in the manual:

- *Freight Networks:* All arterial streets support freight movement. The Major Truck Street network is defined and mapped in the Transportation Strategic Plan (TSP). The roadways defined in these networks are key routes for freight movement. Projects that impact the freight network must recognize and consider the impacts of a proposed project on freight facilities to reduce project impacts.

Baltimore has recently completed a study on how to include freight in complete streets. We recommend reviewing this document. Further information on the new Baltimore plan is included in chapter 5 of this report.

Chapter 4 provides the recommendation in a matrix form for ease of use.

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Chapter 4. Imagine Austin Actions for Transportation Criteria Manual Update

The following elements from the Imagine Austin Comprehensive Plan Action Matrix (page 228) relate to land develop, compact and connected growth, transportation, and generally provide for the type of development set forth within the Comprehensive Plan.

Table 4.1: Major Recommendations for TCM Update Based of Imagine Austin Goals

Comprehensive Plan Direction	Code Component Issue	Current Manual	Comments/Action items
LUT A14: Increase public transit ridership. <ul style="list-style-type: none"> - Expand service to compact centers and activity corridors - Increase the number of people who use transit by choice - Create inviting public spaces at stops and transfer centers - Provide real-time schedule information - Add more covered bus shelters - Make stops more convenient - Add park and ride facilities - Make routes more convenient and the system more intuitive - Create street design standards (bus turnouts, sidewalk width, benches, shelter) - Give transit priority (queue jumpers, signal priority, managed lanes, and dedicated lanes) - Launch an informative and enticing public relations campaign - Implement first and last mile solutions such as carpooling, vanpools, and bicycle and car sharing - Add more bicycle carrying capacity to buses and trains 	Transit	Uses 1988 Transit Facility Design Guide	Study new ITS for use in Austin, such as signalization priority Include bicycle connections Include guidelines for new bus bulbs Criteria for bus only type lanes Require installation of transit infrastructure

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Comprehensive Plan Direction	Code Component Issue	Current Manual	Comments/Action items
LUT A19: Develop complete streets design guidelines for all new road construction and reconstruction; <ul style="list-style-type: none"> - Pedestrian and bicycle facilities and amenities - Green street techniques - Green Street Techniques/Green Infrastructure Best Management Practices - Interconnected, navigable, grid-like streets and blocks - Flexibility in design and regulations - Create pedestrian-activated crosswalks at mid-block intersections on arterials to improve pedestrian safety - Traffic calming measures - Transit accommodations - Use of native landscaping 	Street Design	Geometric Design guidelines based on street classification AASHTO Policy on Geometric Design of Highways and Streets ITE Recommended Guidelines for Subdivision Streets Guidelines for Major Street Design	Criteria for Roundabouts Include streetscape criteria with lighting, seating, trees, signs, and other streetscape features Includes criteria for traffic calming devices Include criteria for incorporating green stormwater infrastructure Amend all TCM cross sections and requirements to be consistent with complete streets standards Revise street cross-sections and methodology to reflect current best practice in street design and the complete street vision; street cross sections should be prescriptive but allow for flexibility
LUT A20: Develop roadway and rights-of-way design standards that accommodate the needs of street trees and above and below ground utilities and infrastructure.	Clear Zones and Guard Fences	AASHTO Policy on Geometric Design of Highways and Streets	Use the most current AASHTO Policy
LUT A21: Create a network of on-and off-street physically separated bicycle and walking routes or trails linking all parts of Austin and the region.	Bicycle	Describes three types of bikeways and their design Uses Texas Manual on Uniform Traffic Control Devices	Guidelines for bike sharrows, boxes, intersection markings, colored pavement treatments Bicycle boulevards, shoulder bikeways, bike lanes, shared use paths
LUT A23: Develop standards to connect all new neighborhoods to adjacent neighborhoods and commercial areas by streets, sidewalks, and bicycle lanes and/or paths.	Sidewalk	Location criteria for streetscape furnishings Design guidelines for various sidewalk types Uses ADA	Break sidewalk area up into four distinct zones for specific design guidelines

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Comprehensive Plan Direction	Code Component Issue	Current Manual	Comments/Action items
LUT A26: Set targets for vehicle miles traveled per capita and incorporate those targets into traffic impact studies for new development.	Traffic Control	Uses Texas Manual on Uniform Traffic Control Devices	Update based on most current MUTCD
Ensure the creation of a high-quality street and sidewalk environment that is supportive of pedestrian, bicycle and transit mobility and that is appropriate to the roadway context.	Pedestrians	No specific pedestrian section	Create pedestrian specific section Lighting in pedestrian areas Criteria for Signals/detectable warnings Criteria for pedestrian crossings (marked crosswalks, medians, scrambles)
Ensure that vehicular parking is accommodated in a manner that enriches and supports, rather than diminishes, the roadside pedestrian and bicycle environment, and that does not create a barrier between the roadside environment and the roadside buildings.	Parking	Uses Land Development Code	Update based on the most current Land Development code
Ensure that sites are developed in a manner that supports and encourages connectivity for all modes of travel and that new and existing development, pedestrian and bicycle paths, and open spaces complement and link to one another.	Driveways	Design Criteria for 3 types of driveways	Develop more robust guidelines on minimizing the number of driveways

4.2 Further Research

This paper only addresses the Subdivision Code (Section 4 of the Land Development Code) and the Transportation Criteria Manual. Further research is recommended to make Austin more connected and complete street friendly. The Traditional Neighborhood District (TND) needs to be reviewed for either updating if it will continue to be used or review of its shortcomings if it will no longer be used. The complete Land Development Code needs to be reviewed for connectivity, complete street policy, and healthy living initiatives in all areas, such as water/wastewater, common open space, parkland dedications, trails, drainage, and the environment. This will insure all of Austin's codes and guides are compatible.

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Chapter 5. Best Practices and Case Studies

5.1 Introduction

The following chapter provides a best practices review of cities that are undergoing or have undergone changes to their policies, ordinances, and guidelines to accommodate multimodal transportation and connectivity (e.g. complete streets) appropriate to the context of the community, elements of which, contribute to healthy and active living. In doing so, this document offers the City of Austin preliminary recommendations for a holistic approach to these goals, which would include (but not be limited to) revising the TCMTCM and the subdivision regulations of the LDC.

Cities and streets were once designed for people. Many of the great cities in the United States we admire today (e.g. Boston, New York, Chicago, and San Francisco) were developed before the age of automobiles. Even Downtown Austin, an area that still thrives today and is traversed daily was built for distances accommodating people and those by horse and buggy. As the common story goes thereafter, cities in the US underwent a revolutionary change with the advent of the car and the rising middle-class following the events of World War II. Extensive motor vehicle networks were built and people relocated further away from the city centers. However, people have found their love with cities again - centers that attract culture and blend work, recreation, and life. Thus, all of the things that have always been present in cities suddenly became new again, focusing attention on how to once again comfortably accommodate people, and not only people in automobiles.

5.2 Evolving Approaches to Transportation and Land Planning

With changing paradigm shifts in understanding linkages between the built environment and transportation considerations, even federal legislation affecting the funding of transportation, and consequently, the overall planning of communities and regions indirectly, the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 was passed into law. This federal transportation act, which is part of a sequence of acts promulgating rules and regulations to fulfill transportation planning criteria and fund distribution nationally, is widely recognized as the first such legislation in the "post-Interstate Highway System" to offer an intermodal approach to highway and transit funding in a collaborative context between various stakeholders (Dwyer, 1994).

Following ISTEA, subsequent federal legislation built on this momentum for participatory, collaborative planning approaches that considered multiple modes of transportation and offered increasingly available funds for non-motorized transport, in particular. This was a timely consideration, during which, the Americans with Disabilities Act was also passed in 1990, serving as a requirement for persons-with-disabilities accommodations (McCann and Rynne, 2010), and linkages between rising rates of obesity (among other public health concerns) and the built environment were established (Design, Community & Environment Design, et. al, 2006).

Moreover, with pedestrian and bicycle crashes and fatalities on the rise during the 1990's, it became even more evident that federal guidance be issued around the 2000 timeframe to assist in clarifying how states and regions should better accommodate these active transportation choices (Arvidson, 2012). As such, the Federal Highway Administration (FHWA) issued guidance entitled *Accommodating Bicycle and Pedestrian Travel: A Recommended Approach*,

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which the National Complete Streets Coalition seems to even draw upon in their *Complete Streets Policy Analysis 2011*.

As research and approaches have further evolved, many movements and ideas related to best practices to achieve a marriage between all facets of issues affecting the built environment and transport, as discussed above, have included everything from "smart growth" to "new urbanism" to "context-sensitive design" to "complete streets" and much more. Some cities also use form-based code, such as Miami 21, to create these complete streets. The goals are to create a more mix-use area with offices and living spaces in the same neighborhood and promote transit by having more concentrated nodes. According to the City of Miami's Planning Department, Form-based Zoning Codes are a method of regulating development to achieve a specific urban form. They place an emphasis on the relationship between the street and buildings, pedestrian and vehicles, public and private spaces, and the relationship between multiple buildings, a block, a neighborhood and transitions in scale. They create a predictable public realm by controlling physical form of private developments, with a secondary focus on land use regulations. Each of these designs all attempt to create multi-modal well connected healthy cities. The following map shows the states that have adopted a form of complete street policies (Figure 5.1):

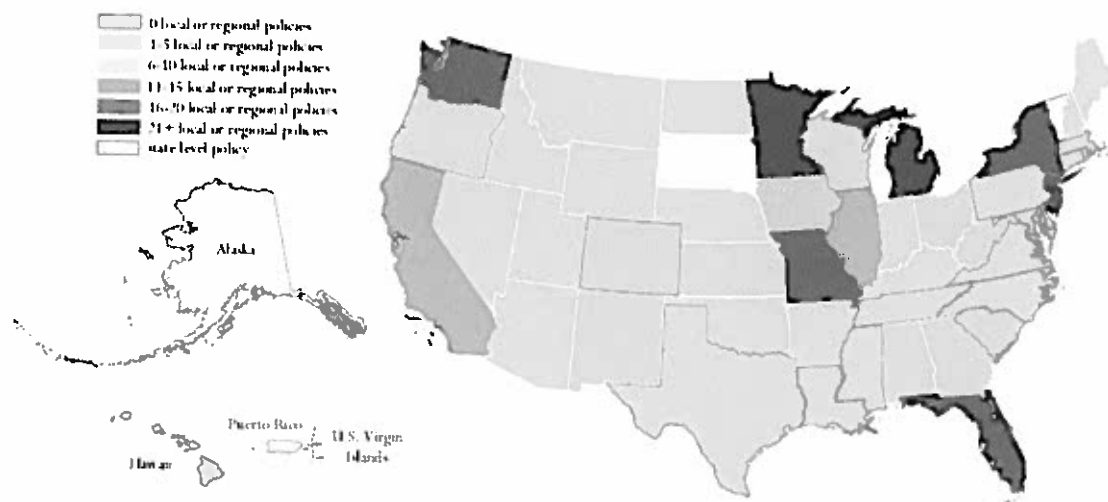


Figure 5.1: States who have adopted Complete Street Policies
Smart Growth America 2011

Based on an examination of multiple sources, our team has determined that the National Complete Streets Coalition, the national champion of the complete streets movement, offers the most readily-available tools for communities, such as the City of Austin, in achieving a common vision, policy, and implementation strategies complete streets for multimodal, context-sensitive approach for transportation planning and design. In particular, the *Complete Streets Policy Analysis 2011* and the *Complete Streets Local Policy Workbook* are highly recommended resources worth further review.

What does seem to come to the forefront is the crucial first step in creating a comprehensive, implementation plan or policy in guiding the future direction of achieving a complete street-type vision. Some successful cities, which are covered in more detail later in this chapter, which have specific components of their implementation documents, have followed a

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general approach, such as advocated by the National Complete Streets Coalition in their *Complete Streets Policy Analysis* guide, as follows:

- Includes a vision for how and why the community wants to complete its streets
- Specify that ‘all users’ includes pedestrians, bicyclists, and transit passengers of all ages and abilities, as well as trucks, buses and automobiles.
- Encourage street connectivity and aims to create a comprehensive, integrated, connected network for all modes.
- Is understood by all agencies to cover all roads.
- Applies to both new and retrofit projects, including design, planning, maintenance, and operations, for the entire right of way.
- Makes any exceptions specific and sets a clear procedure that requires high-level approval.
- Directs the use of the latest and best design criteria and guidelines while recognizing the need for flexibility in balancing user needs.
- Directs that complete streets solutions will complement the context of the community.
- Establishes performance standards with measurable outcomes.
- Includes specific next steps for implementation of the policy.

A 2011 study conducted by the Complete Streets Coalition and Smart Growth America found that, while the concept of complete streets is “simple and inspiring,” the policy document needs to do more than affirm support for complete streets. The policy document must require implementation and development of the next steps for policy implementation. This study also focused on the strength of language used in complete street policies, noting that clarity of intent and writing makes it “easy for those tasked with implementation to understand the new goals and determine what changes need to be made to fulfill the policy’s intent” (Complete Streets, 2011).

5.3 Cities Activities in the Past Ten Years: Subdivision Audits

Over the past 10 years, many cities have undertaken review of their zoning and subdivision regulations as a method to improve development patterns—often in conjunction with the principles of smart growth—and to improve connectivity between existing and proposed communities. Between 1997 and 2006 the Environmental Protection Agency (EPA) funded the Smart Growth Network (a partnership with other nonprofits, private sector firms, and governmental organizations to work toward development that serves the economy, community, and environment). The Smart Growth Leadership Institute (SGLI) was a recipient of the grant money and it launched a smart growth technical assistance program to assist cities in designing and implementing effective smart growth strategies (Smart Growth). Nashville-Davidson County in Tennessee was one of the grant cities that undertook a subdivision regulations audit in 2004 using the grant monies obtained by SGLI. They completely amended their subdivision regulations in 2006 and the last amendment took place in May 2011.

During the past five years, many other cities have begun to focus their attention on the philosophy and design components of complete streets and connectivity, and further audits of ordinances, regulations, and codes have taken place. The Smart Growth Coalition defines a complete street as safe, comfortable, and convenient for travel for everyone, regardless of age or ability – motorists, pedestrians, bicyclists, and public transportation riders. The literature review revealed that multiple cities have undertaken land development code audits to address perceived

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subdivision deficiencies. In fact, Austin itself undertook a subdivision audit process over ten years ago. They also created the Great Streets Development Program that provides a mechanism to improve the quality of downtown streets and sidewalks, aiming ultimately to transform the public right-of-ways into great public spaces. The City of Austin's LDC also includes a Traditional Neighborhood Design, which provides optional recommendations for a more connected neighborhood. Other recommendations from the literature and audits have included developing performance goals, an implementation plan, advisory board, and reports/audits on implementation activities.

From the mid-1990s through the mid-2000s nearly a hundred cities also undertook smart growth audits using grant money from the EPA's Smart Growth Network program. Des Moines, Iowa for example, undertook a smart growth audit in 2006 (Des Moines, 2006). Recently Ellensburg, Washington undertook an audit of its subdivision code in an effort to identify gaps based on their recently completed comprehensive plan goals (Ellensburg, 2010). The Ohio, Kentucky, and Indiana Regional Council of Governments in early 2007 reviewed the challenges of and the options for improving street connectivity and produced examples of model regulations that could be utilized as a "starting point for considering zoning provisions that encourage connectivity in certain situations" (OKI, 2007). In 2011 Knoxville Tennessee undertook a review of how its subdivision code created barriers to healthy living. Knoxville found that the way that subdivisions are designed, neighborhoods are developed, and community infrastructure is improved play a significant role in allowing a way of life that incorporates active living and healthy eating (Knoxville 2011).

Another tactic that cities and counties have taken is to amend their subdivision regulations to include new types of subdivisions—which allows flexibility in planning for new and infill type developments—and also can preserve natural resources and the rural character of areas. Nashville-Davidson County, for example, amended their subdivision regulations in 2006, after conducting the audit in August 2004, to allow three types of subdivisions. Developers have the option to utilize any one of these three types of subdivision:

1. Regular (or conventional) subdivision
2. Conservation (rural) subdivision
3. Walkable subdivision

The next segment of this report reviews selected case studies that were undertaken during the projects duration. These are listed in alphabetical order.

5.4 Baltimore

Baltimore is a 300-year-old city built on commerce and transportation preparing for an increase in international freight shipments expected because of the widening of the Panama Canal in 2014. In 2011 Baltimore had the fastest growing maritime port in the U.S. by volume. Freight movement within the Baltimore region is expected to continue to increase, potentially compounding existing tensions between businesses handling the freight and those living in communities along major freight routes.

In 2011 the City Commissioned a Port Communities Freight Management Plan Report. This was released as a draft in August 2012. As part of the stakeholder workshops' that were held during the studies timeframe truck traffic was the most frequently cited complaint from affected communities and has been the subject of several studies in the past decade. During the

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interviews stakeholders noted the ongoing concerns with truck noise, especially overnight truck movements and the presence of trucks on residential streets in some residential areas of Southeast Baltimore.

Based on the strategies and approaches used by other US port cities, recommendations made by previous studies in the study area, community concerns are being considered as part of a 'toolkit' of components to manage freight movement in the study area and create a more complete street friendly Baltimore. These include:

- Improve signing and routing for truck traffic
- Develop and apply design standards for truck routes and "complete streets with truck accommodations" that:
 - Accommodate truck movements and use enhanced pavement sections to support vehicles with GVW of 110,000 and using pavement technologies to minimize noise (tire whine)
 - Strengthen transit connections by improving bus stops and establish bus shelters at strategic locations serving residents and employment centers
 - Establish a pedestrian-friendly environment by providing wide sidewalks and offsetting them from the travel lanes, planting street trees, including visible and safe crosswalks, and adding pedestrian amenities such as trash receptacles and benches where appropriate
- Fully implement the city-wide truck routing study.
- Redesigning street intersections and provide bike connections.
- Considered and identified truck routes as candidates for complete streets that will accommodate trucks, automobiles, transit, bicyclists and pedestrian alike while designing new streets or retrofitting old ones. This also includes identifying popular truck short cuts through neighborhoods and apply traffic-calming techniques to those streets to discourage truck traffic.
- Work with MTA to evaluate and assess bus stop locations in relationship to current employment locations in the study area
- Establish a grant program to allow neighborhood groups to provide more visual interest in the residential areas with street trees and furniture, brick pavement, park improvements and public art, using funds from the new port fee
- Organize educational programs, open houses and community meetings

A variety of tools and practices are available to Baltimore, according to the draft plan to complete these recommendations. Baltimore, states that a complete street should:

- Enhance pedestrian circulation and create open space opportunities in medium to high density areas lacking adequate public open space
- Create a vibrant pedestrian environment in the street right-of-way that attracts pedestrians
- Strengthen connections between residential enclaves and commercial amenities by improving the streetscape for pedestrians, bicycles and transit patrons
- Support economic activity in downtown neighborhoods by creating an attractive and welcoming "front door" for pedestrians
- Accommodate freight movement without increasing risks to other users of the street
- Balance the need for pedestrian-friendly streets and commercial activity
- Create a comfortable space with appropriate buffers for pedestrians and bicyclists on freight corridors

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Complete Streets seek to change the paradigm so that pedestrian, bicycle, and transit accommodations are no longer seen as “amenities” to be included when “possible,” but rather as core elements of road design and implementation, left out only if there is a truly compelling reason. For streets that serve not only as neighborhood throughways but also as truck routes, additional accommodations are necessary so that higher volumes of truck traffic can mix safely with pedestrians and bicyclists. Figure 5.2 shows a sample design of a complete street that incorporates trucks which was developed for the draft freight management plan.

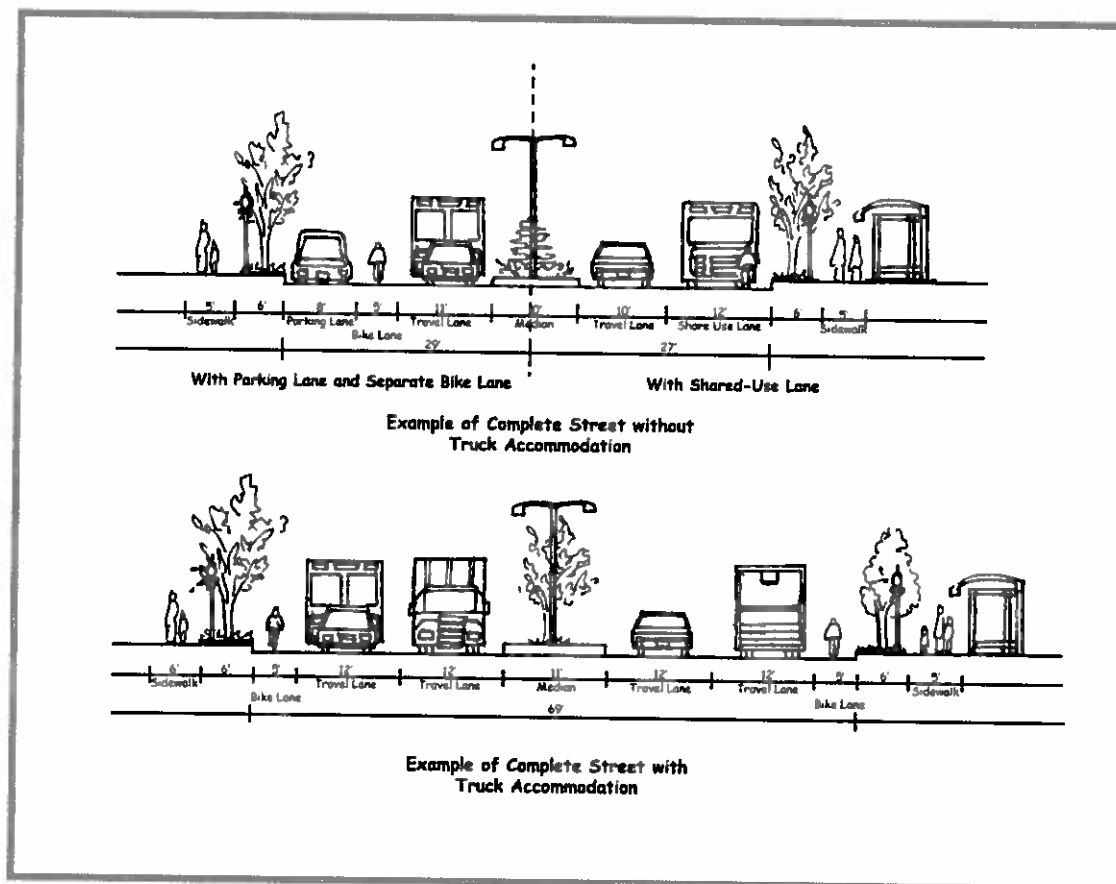


Figure 5.2: Sample Design Complete Street With Truck Accommodation

Source: City of Baltimore Draft Freight Management Plan August 2012

According to the city, Complete Streets also include the following:

- **Low-Impact Street Design** increases green space by adding landscaped buffers and water quality treatments along streets. Changing part of the impervious street surface into water quality landscaped features, like vegetated swales, bioretention features, sidewalk tree boxes and rain gardens, that capture stormwater runoff and let water soak into the ground reduces stormwater runoff, helps recharge groundwater and filters pollutants.
- **Decorative LED Lighting:** LED lighting is now available for both new installation and retrofit environments. Retrofitting existing lighting technologies, such as metal halide, high pressure sodium and sodium vapor lights, can significantly extend bulb life and reduce energy use. The return on investment is usually 1-3 years. The City of Baltimore

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is currently testing the use of LED lights along a limited number of city streets. If performance is satisfactory, the practice can be extended to additional areas and streets.

- **Streetscape Furnishings:** Benches, litter receptacles, planters, tables, chairs, bike racks, tree grates, tree guards, trench grates, paver grates and bollards are typical examples of furnishings that can complement street designs. Adoption of an agreed upon standard for such furnishing can contribute to community identity and sense of place.
- **Traffic Calming:** For those residential streets, traffic calming strategies that narrow lanes and add visual and physical cues to slow vehicles can have the added benefit of discouraging through truck movements. These include speed humps/speed tables, bulbouts/neckdowns/chokers, center island/raised medians, narrow traffic lanes, reducing turning radius, shared use lanes and traffic roundabouts.

According to Valerie Lacour in the planning department, the city is now in the final stages of revising its zoning code which was last updated in the 1970's (Lacour, 2012). The complete street's design component that incorporates freight is being incorporated via the Baltimore Port Communities Draft Freight Management Plan which was prepared by KCI Technologies for the city in August 2012. The city is currently taking comments from the community on the zoning code changes and other components and plans that are accompanying the zoning changes. These are expected to be finalized during 2013.

5.5 Charlotte North Carolina

The City of Charlotte first recognized the need for Complete street policies in 2002 when they adopted Smart Growth Principles. These principles included expanding transportation choices beyond the automobile, identify new bike/pedestrian connections, guide development into appropriate areas in the City, and develop new street design guidelines that were context sensitive. In 2006, Charlotte adopted the Transportation Action Plan (TAP) which was later updated in 2011. They realized the population of the City was increasing and they had an opportunity to plan and design their city's growth to support livability and economic development. Some of the objectives of the TAP include the following (City of Charlotte 2011):

- The City intends for all transportation projects to improve safety and neighborhood livability, foster economic development, promote transportation choices and active living, and support the Centers, Corridors and Wedges Growth Framework.
- The Charlotte Area Transit System (CATS) will improve the quality of life for everyone in the greater Charlotte region by providing outstanding community-wide public transportation services while proactively contributing to focused growth and sustainable regional development.
- The City will complete at least 150 miles of bikeway facilities within the city by 2015, and an additional 350 miles by 2035.
- The City will construct over 375 miles of new sidewalks by 2035. The City will continue to implement traffic calming in an effort to improve safety and neighborhood livability, promote transportation choices and meet land use objectives.

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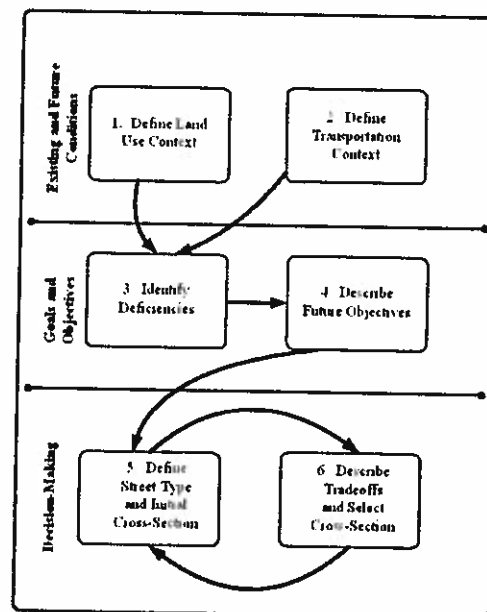
- The City will maintain its connectivity ratio³ of 1.45 inside Route 4, and increase its connectivity ratio outside Route 4 from 1.19 to 1.35, by 2020.

As more projects were taking form using these Smart Growth Principles, the City realized they needed a more robust design guide to further the TAP goals. In 2007, the City adopted the Urban Street Design Guidelines (USDG) which is a supporting document to the TAP. The USDG starts with a set of guiding principles to achieve complete street networks (City of Charlotte 2007):

- Streets are a critical component of public space.
- Streets play a major role in establishing the image and identity of a city.
- Streets provide the critical framework for current and future development.
- Charlotte's streets will be designed to provide mobility and support livability and economic development goals.
- The safety, convenience, and comfort of motorists, cyclists, pedestrians, transit riders, and neighborhood residents will be considered when planning and designing streets.
- Implement processes to ensure that the USDG street classifications and designs derived through the "six-step" process result in mutually reinforcing land use and transportation decisions.
- Require that certain block lengths and creek crossing intervals be created with new public or private land development projects, to ensure the continued development of a dense, well-connected network of streets and traffic-calmed route choices for all travel modes.

Charlotte has a six step process for applying the design guidelines and it can be seen in Figure 5.3:

Figure 5.3: Charlotte's Six Step Process
Source: City of Charlotte, NC



By following these steps for each project, Charlotte "ensures that the existing and future contexts are given adequate consideration, that any related plans are modified to reflect the outcome, and that all perspectives are given equal consideration in the process" (City of Charlotte 2007). The complete street guidelines are based on the type of segment or intersection: main street, avenues, boulevards, parkways, local residential streets, local office/commercial streets, and local industrial streets. All guides take into consideration pedestrians, bicycles, motorists, transit riders, and neighborhood residents.

³ The connectivity ratio provides a quantitative measure of connectivity in a given area and is defined as the number of street segments divided by the number of street segments, cul-de-sacs, and dead ends.

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While Charlotte has had much success, there have been lessons learned through the process. Michael Davis, Development Services Manager at CDOT, explains they did have one area they would like to change: *"What we did miss, or perhaps didn't consider thoroughly enough, was figuring out how to integrate various other land development ordinances that have an effect on streetscape design"*. He explained how since they hadn't thought about the tree ordinance, urban streetscapes became difficult to implement. Michael Davis also explained the reactions to the Urban Street Design Guides: *"I think that extremely few people understand how to determine what the impacts of the ordinance changes actually are. We were already negotiating for what we wanted over a period of years and the ordinance work was pretty consistent with what we had been getting. Therefore most things, good or bad, that people want to say about the ordinance (including a lot of staff) is either a very small slice of the big picture or, more commonly, someone's impressions of the ordinance, conjecture, or third-hand information."* (Davis, 2012). He says that even if there had been opposition in the process, once a complete street had been finished, the issues have been resolved through explaining the vision and the connectivity is a success. The following show examples of Complete street projects in Charlotte (Figure 5.4 and 5.4):



Figure 5.4: Streetscape elements Tryon Street Uptown
Source: (USDG 2007)



Figure 5.5: Bicycle path on Colony Road
Source:(USDG 2007)

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5.6 Cobb County, Georgia

Cobb County Georgia set up its Complete Streets Implementation Plan in 2009. This followed the creation of its Complete Streets Policy in January 2009. It was also tied into the Atlanta Regional Commission's Bicycle Transportation and Pedestrian Walkways Plan (Cobb county is a member), which also included a requirement for accommodation of complete streets in planning, design, and construction of all future roadways (Cobb County Complete Streets Policy, 2009). Cobb County's policy purpose was to assure that new roadway construction and existing roadway improvement projects on county roadways include consideration for adequate infrastructure, where appropriate and feasible, for bicyclists, pedestrians, use of public transit of all ages and abilities, and the physically disabled.

Cobb County's Implementation Plan noted that a complete streets program would require many years of commitment by the county. As part of the Complete Streets plan, the county reviewed elements and documents that they would need to develop. These were structured into immediate, mid-term, and long-term implementation goals.

For performance evaluation the county set an immediate goal to amend the engineering procedures manual to require pedestrian and bicycle counts before sidewalk or bike lane additions/improvements and/or road diets are developed. The mid-term implementation goal was to conduct bike and pedestrian counts after major maintenance, construction, or road diets, and to measure the miles of sidewalk and bike lanes to track progress of expanding bike and pedestrian network. They also wanted to measure transit ridership and land use changes along streets where improvements are made. The long-term implementation goal was to analyze data from bike and pedestrian counts and crash data to determine the effectiveness of improvements made and to make adjustments where necessary.

5.7 Denver, Colorado

Denver adopted a Complete Streets Policy on May 27, 2011. As part of the development process, the Metro Denver Living Streets Initiative was instigated. The philosophy behind this plan is to create vibrant places where people of "all ages and physical abilities feel safe and comfortable using any mode of travel (walking, biking, transit, or private auto)." Living Streets also meshes context-sensitive development principle with complete street's principles. According to Denver's planning division, Living Streets attract, concentrate, and connect vibrant and sustainable development that accommodates growth while preserving what makes Colorado special (City of Denver, not dated).

Denver is also famous for its Stapleton subdivision re-development, which repurposed the old Stapleton Airport site that was relocated in 1995 to an area that was annexed into the City. Stapleton has been viewed by many as a model for development of a subdivision that embodies the principles of connectivity, healthy and sustainable living, and community interaction. Its trailblazing process began in 1989 with six years of discussion in hundreds of town meetings to develop a plan for how to redevelop the 7.5 square miles of real estate that was within city limits into a place of value, provide for future growth, and serve as a model of sustainable development.

In 1991 the City Council adopted the Stapleton Tomorrow Concept Plan, which identified eight basic concepts for the site's reuse:

1. Generate economic development
2. Produce a positive on existing neighborhoods and businesses

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3. Enhance environmental quality within the site and surrounding areas
4. Create a positive identity unique to Denver and the region
5. Promote high standards of urban design
6. Generate revenues through assessment management to fund the new Denver International Airport
7. Create educational and cultural opportunities and systems
8. Provide balanced transportation options and spacious parks and open space

In 1990 the Stapleton Foundation was also created to advocate for, sustain, and realize the principles for the redevelopment. It released a Master Development Plan in 1995 and is commonly known as the Green Book.

The Green Book was created to guide the development of the site. It was not only a detailed development plan, but also included design guidelines for this type of master-planned infill development (Greenbook, 1995). The Green Book noted that the redevelopment would take at least 30 to 40 years to complete, and it was expected to influence the community for many generations. The plan envisaged that Stapleton would be a network of urban villages, employment centers, and significant open spaces, linked by a commitment to protect natural resources and connection of adjacent neighborhoods to promote a strong sense of community. The Development Plan was adopted as part of the city's comprehensive plan. The Development Plan was also supported by a technical resource document that had technical support material and illustrative examples to guide development (this was not adopted by City Council). The Development Plan also created a set of principles to guide, economic, environmental, and social objectives that were linked to the design aspects of the project. Many of these principles can now be seen in connectivity ordinances/resolutions and subdivision codes, smart growth principles, and complete streets. The Green Book (development plan) won the Sustainable Cities award in 2002 from the King of Sweden and Stapleton has been visited by multiple city planners over the years, including Austin's, who wanted to view the projects development and learn about its guiding principles (Leccese, 2005). Austin based the Mueller Redevelopment Corporation, according to news reports, on the ethos and methods of Stapleton.

The principles within the Green Book speak to the goals of sustainability, connectivity, complete streets, and healthy living. As an example, under city street grid and urban development patterns, Principle 3 requires the site to be planned as a mixed-use, balanced community incorporating a coordinated grouping of neighborhoods, specialized districts, and corridors. Within the design section of the plan, the basic grid of Denver was extended into Stapleton and street connections for bus service to the site were incorporated. The plan also developed a series of districts with detailed descriptions and visual aids to guide development. As an example, in the section on constructing elements, parking and parkway illustrations were given for the parkways and parking that had multiple use right-of-way designs (Figure 5.6).

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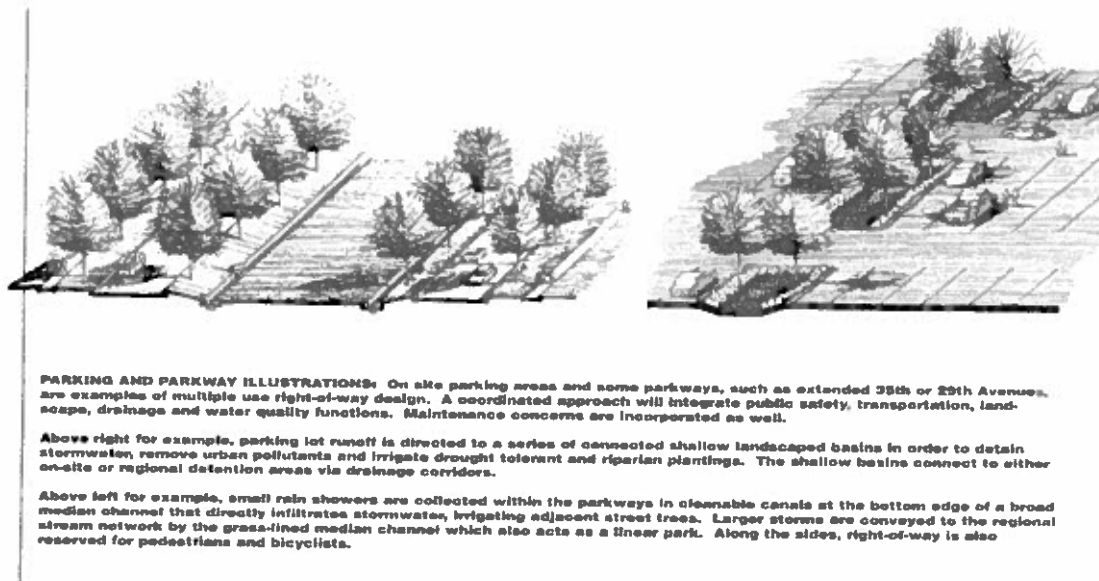


Figure 5.6: Parkway and Parking Design
Source: Greenbook, 1995

In May 2010 Denver updated its zoning code and it includes Complete Street concepts along with elements from the Stapleton Development that were incorporated into a Master Planned Context Description for planned unit development districts. The zoning code notes that a master-planned context consists of a

variety of block shapes and patterns, often depending on the intended land use. In all cases, there is a high degree of vehicle and pedestrian connection through this context. In residential neighborhoods and town centers, blocks are sized to promote circulation and include detached sidewalks, tree lawns and/or streetscape elements, street and surface parking (City of Denver, Zoning Code, 2010).

Other Selected Activities in the Denver Area

Other cities within the Denver area have also started to adopt complete streets policies. The City of Englewood developed its Complete Streets Toolbox in 2011. This was part of a \$10.5 million grant from the Centers for Disease Control and is initially focused on the downtown and medical center districts are part of the *Communities Putting Prevention to Work Initiative*, which will carry out community-based prevention and wellness strategies to address chronic diseases. This is being done by encouraging higher levels of physical activity, improving nutrition, and reducing obesity/overweight prevalence. Englewood envisages that this will be rolled out for other projects throughout the city (Englewood, 2011). The base complete streets schematic can be seen in Figure 5.7.

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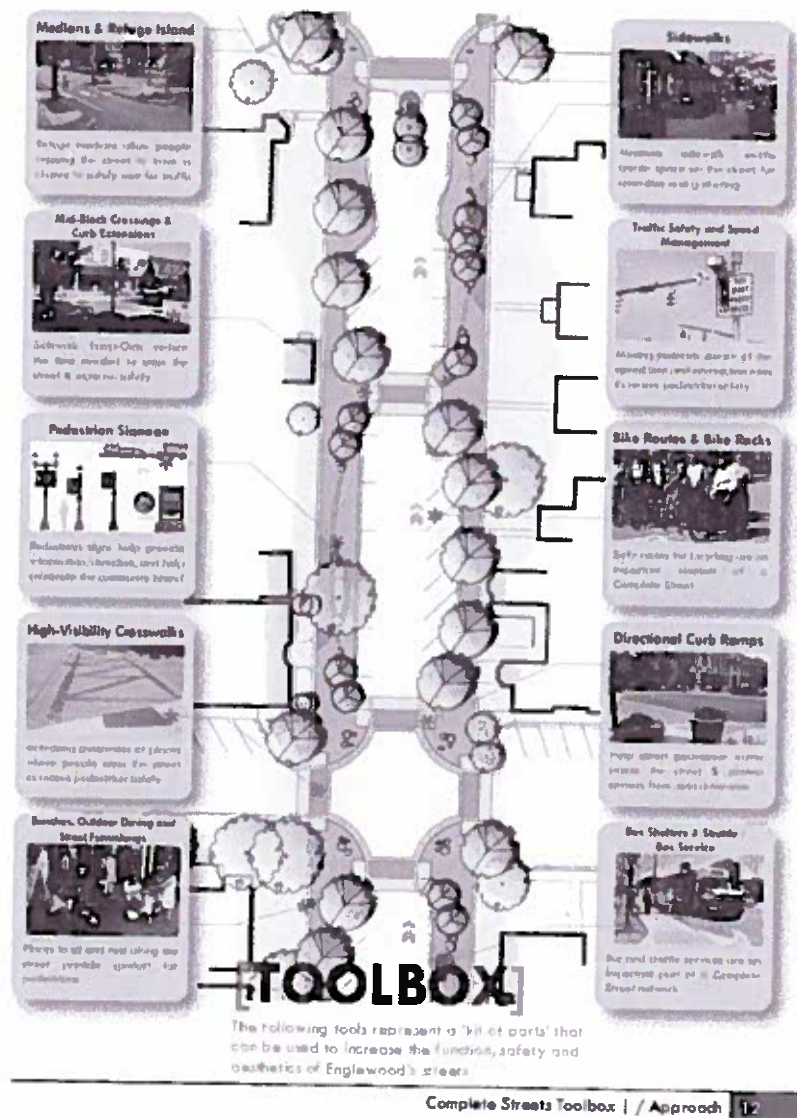


Figure 5.7: City of Englewood Complete Streets Toolbox
Source: City of Englewood, 2011

5.8 Louisville, Kentucky

In February 2008 Louisville introduced a Complete Streets Ordinance that was also adopted as an amendment to the comprehensive plan Cornerstone 2020. The ordinance set out a series of objectives that were to be achieved in future transportation projects.

1. Bicycle and pedestrian ways were to be established in all new constructions unless one of four conditions were met (legal prohibition, cost would be excessively disproportionate, topographic constraints and bike lanes not required on local streets if speed is < 25 mph).
2. In rural areas shoulders should be included, and could provide potential future use for bicyclists and pedestrians as roads develop.

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3. Sidewalk and shared-use paths, street crossings, and signs, street future, transit facilities and connecting paths were to be designed, constructed and operated so that all pedestrians including people with disabilities could travel safely and independently.
4. The design and development of transportation infrastructure was to be sensitive to context and character of the built environment. (Louisville, 2008)

In 2007 Louisville had also developed a Complete Streets Manual incorporating not only complete streets but also context-sensitive solutions design that considers neighborhood character in which streets pass through. The manual also serves as the Streetscape Design Manual for Chapter 10 of the City's Land Development Code. The manual is conceived to be a guide for residents, interest groups, policy-makers, developers, designers, and agency staff to improve the function and character of roads and corridors. It sets out the relationship of engineering, character, and users. The manual notes that street design is both an art and a science. Design standards balance sound engineering with the needs of users and the context/character of the right of way. Figure 5.8 shows this relationship.

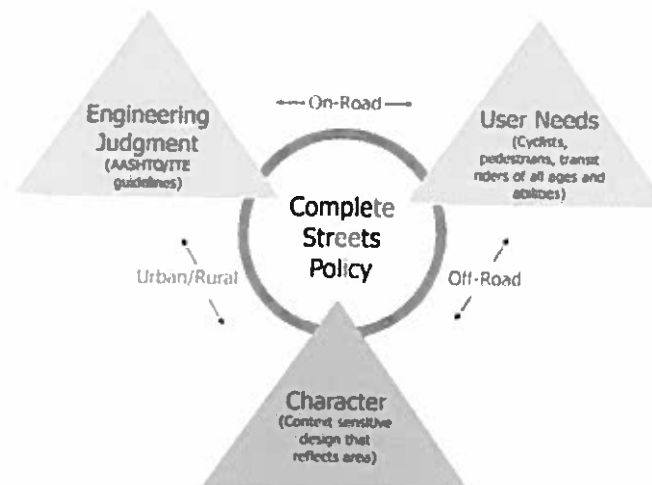


Figure 5.8: Relationship between Engineering, User Needs and Character
Source: Chapter 2 Context Streets Manual – Louisville KY

A local-level complete street illustration is provided early within the manual (Figure 5.10). The manual illustrates the different types of functional classes; Figure 5.9 shows a suburban character class.

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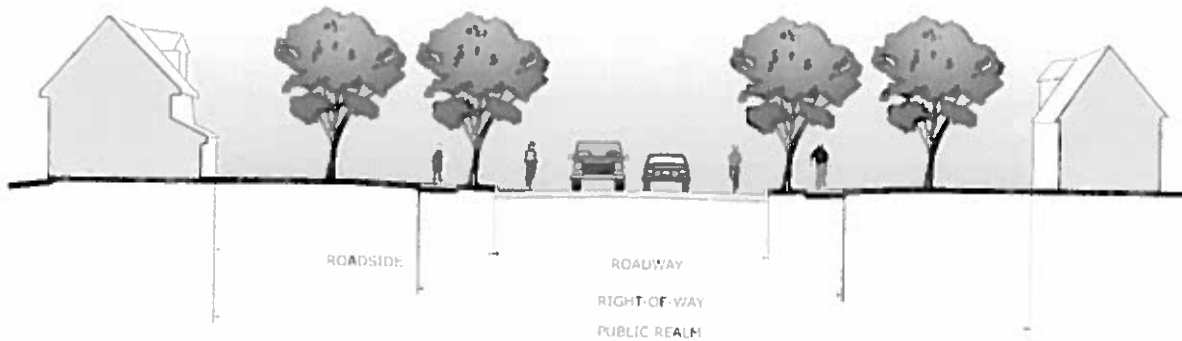


Figure 5.9: Local Level Complete Street Illustration
Source: Chapter 2 Context Streets Manual – Louisville KY

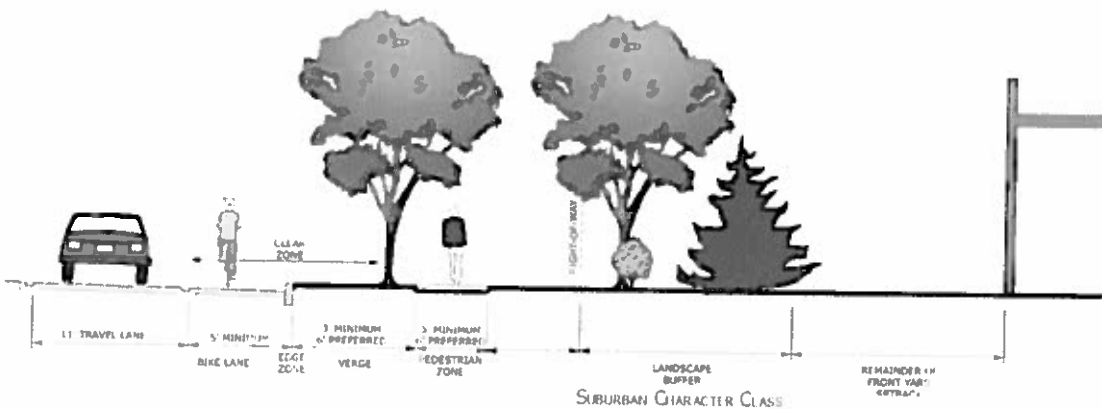


Figure 5.10: Suburban Character Class Section
Source: Chapter 2 Context Streets Manual – Louisville KY

The complete streets design guidelines shall be applied to both new and retrofit projects, and includes design, planning, maintenance, and operations for the entire right-of-way. All new and retrofit projects are required to be reviewed for compliance with the complete streets design guidelines by the Department of Public Works.

Louisville also updated its Land Development Code for the Louisville-Jefferson County Kentucky in March 2006. The land development code was entirely revamped and Chapter 7, Part 3 of the subdivision code encompasses measures to create complete streets and connectivity. For example, the standards require that subdivisions shall be designed to ensure that existing streets stubbing into the subject property can be extended. Sub-street dedication is also required to be sufficient to accommodate the extension of the street. Walkways are required when a block is over 800 feet to bisect the block and they must be at minimum 10 feet wide. Traditional residential subdivisions that have lots served by alleys require a common utility easement to accommodate transformers and pedestals. Figure 5.11 shows the design guidance for an alley/utility corridor.

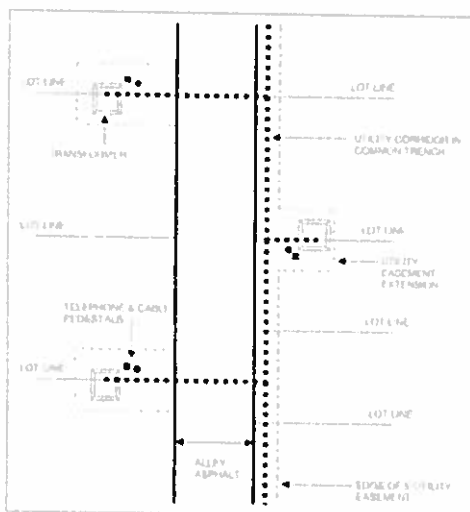


Figure 5.11: Design Guidance for Utility Corridor and Alley
Source: City of Louisville Land Development Code

5.9 Knoxville, Tennessee

In 2011 Knoxville, Tennessee undertook a review of how its subdivision code created barriers to healthy living. This was funded through the Robert Wood Johnson Foundation's "Healthy Kids, Healthy Communities" initiative. Knoxville found that the way that subdivisions are designed, neighborhoods are developed, and community infrastructure is improved play a significant role in allowing a way of life that incorporates active living and healthy eating (Knoxville 2011). Key recommendations from the Knoxville audit found include the following:

- Increase and improve pedestrian and bicycle facilities and adopt minimum standards to increase pedestrian and bicyclist safety and comfort;
- Require streets to be constructed in accordance with complete street standards to provide safe places for pedestrians, bicyclists, and transit users;
- Require traffic calming measures be included in streets when appropriate to slow traffic and improve pedestrian and bicyclist safety and comfort;
- Require street, sidewalk and greenway connectivity to enhance pedestrian and bicyclist use; and
- Require park and open space land dedication in accordance with adopted policies to increase the opportunities for activity within neighborhoods.

The Knoxville review also made recommendations that were required within the zoning ordinances to allow development of mixed-use communities that are walkable and connected to transit, and preserve and protect local agricultural resources along with expanding opportunities for urban agriculture.

5.10 Roanoke, Virginia

The City of Roanoke began to think about complete streets with their 2001 comprehensive plan "Vision 2001-2020." It was created as a strategic initiative to improve

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streetscapes to be “welcoming and attractive multi-modal linkages that carry vehicle traffic, pedestrians, and bicycles safely and efficiently” (City Guidelines). There was an action item in the Comprehensive Plan to adopt design principals and develop a manual to guide construction that affects streetscape. These guidelines were based on four goals:

1. To serve all users of the system
2. Maximize the number of transportation options available
3. To provide safe, convenient, and comfortable for non-motorized street users
4. To recommend street designs that encourage active living

Design principles were created to help Roanoke meet those goals:

- Pavement should be kept to the minimum width necessary
- All arterial and collector streets need pedestrian accommodations (sidewalks or shared-use pathways)
- Pedestrian accommodations should be separated from vehicle lanes
- All arterial and collector streets need bicycle accommodations
- Trees should be plants whenever a street is newly constructed or reconstructed.

The design of the streetscapes depends on the characteristics of the local area. Roanoke uses street types (arterial, collector, or local) and land characteristics (labeled as downtown, village center, recreation/open space, traditional residential neighborhood, suburban residential neighborhood, local commercial, regional commercial, and industrial) to determine the best way to make it a complete street. The recommendations for typical cross-sections for various street types based on the type of area they are. The suburban neighborhood character district collector street guidelines for retrofit options can be seen in Figure 5.12.

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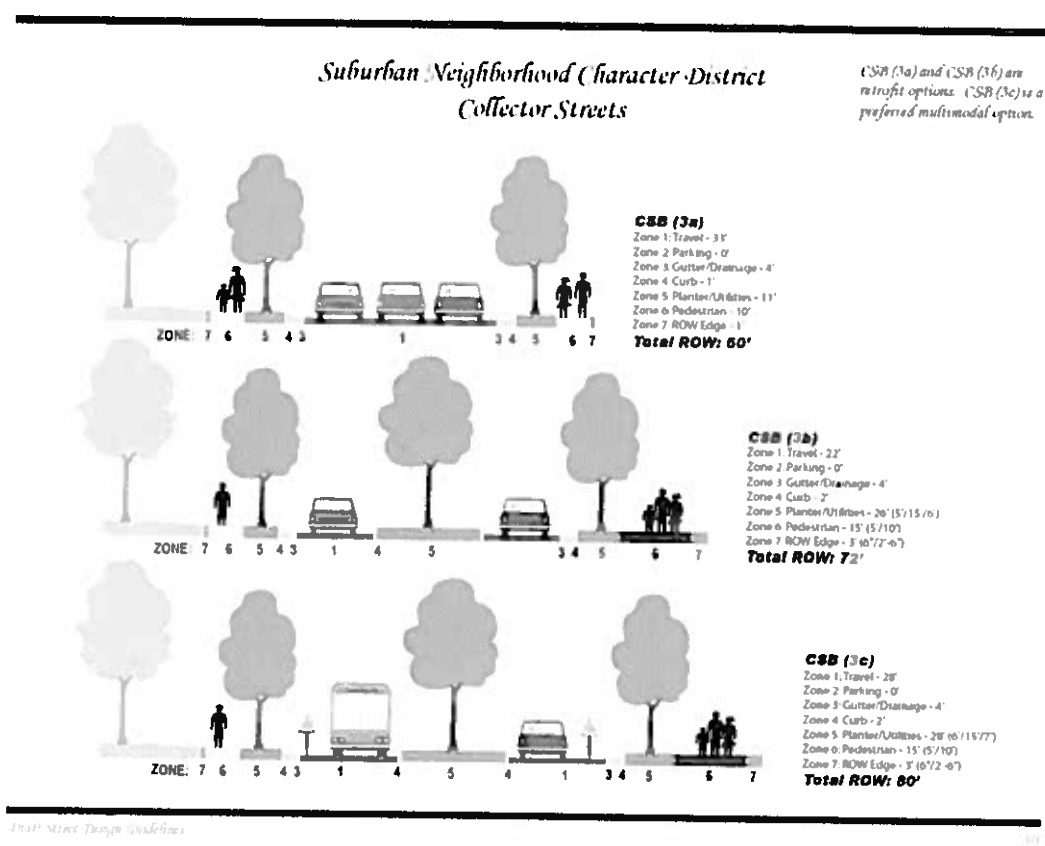


Figure 5.12: Retrofit Options: Suburban Neighborhood Character District Streetscape
 Source: City of Roanoke Street Design Guidelines

The full street design guidelines document can be found in the CD-ROM that accompanies this report, including guidelines for general streetscape elements.

Most complete street policy documents do not include performance measures, as they are normally added at a later implementation step. However, Roanoke is the exception and created a list of simple performance measures to quantify the connectivity of their city and judge their complete street work:

- Total miles of on-street bicycle routes defined by streets with clearly marked or signed bicycle accommodation
- Linear feet of new pedestrian accommodation
- Number of new curb ramps installed along city streets
- Number of new street trees planted along city streets
- Pedestrian and bicycle counts before and after program implementation
- Pedestrian and bicycle crash data before and after program implementation

Using these performance measures, Roanoke can measure their progress from year to year on creating complete streets. The performance measures are compiled and tracked by the City's Planning Department.

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Design Guidelines were adopted by the Roanoke Planning Commission in 2007. In 2008, the City Council passed the Complete Street Resolution, which formally endorsed the street design guidelines. This resolution states the following:

all transportation agencies within the City shall routinely plan, fund, design, construct, operate, and maintain their streets according to the Complete Street principles of the City's 'Street Design Guidelines' with the goal of creating an attractive connected multimodal network that balances the needs of all users, except where there are demonstrated exceptional circumstances.

5.11 San Francisco, California

San Francisco has placed a multitude of elements to enhance sustainability, connectivity, complete streets, and healthy living. These are also encapsulated within its Charter, Administrative Code, and Public Works Code.

The City passed a Transit-First Policy in 2007 that forms part of the City Charter at Section 16.102. A Better Streets Policy was passed in February 2006 and this forms part of City Administrative Code at Chapter 98. The Complete Streets Policy can be found in Public Works Code 2.4.13. Passed in March 2006, this policy *requires* the city to consider multiple uses for streets in improvement projects and to prioritize street improvements that enhance transit, pedestrian, bicycle, and carpool trips over other transportation modes, and *requires* the City to coordinate to create streets that are pedestrian-oriented and multi-functional. These elements also sit within other planning elements, including Stormwater Design Guidelines that were released in February 2009, a Transit Effectiveness Project that made recommendations in October 2008, and the San Francisco Bicycle Plan adopted by the San Francisco Metropolitan Transportation Agency in June 2009.

After the passage of the *Better Streets Policy*, the city began to work upon the Better Streets Plan (BSP) in the fall of 2006. The team included multiple city, city agencies, and mayoral departments (including the city planning department; public works and public health departments; the Mayors' offices on Disability and City Greening; San Francisco's Municipal Transportation Agency and County Transportation Authority; and the San Francisco Public Utilities Commission). A technical advisory committee of 50 city staffers from departments engaged in the design, construction, management, and maintenance of streets was also formed to provide comment and guidance on the technical aspects, including feasibility of the BSP's proposals, which includes street designs and streetscape elements. During April through June 2007 the city held a kick-off meeting and then 4 public workshops, 7 focus groups, and 25 neighborhood meetings. These were followed by a secondary round of outreach from July to September.

In December 2010 the BSP was adopted by the City along with accompanying legislation, which took effect on January 16, 2011. This is now an official plan of the County and City of San Francisco. The BSP includes design guidelines for streetscape features and the legislation describes the streetscape requirements for all new developments (downtown, urban, suburban, and commercial, etc.) along with an implementation plan.

As part of the BSP process in late 2009 the city, also requested the Controller's office to make recommendations for how the city could improve its street delivery process. The Controller issued a report in January 2010. The Controller's report recommended that an inter-agency Street

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Design Review Team be established. It would provide policy-level review of any major projects—publicly or privately initiated—and would determine the degree to which such projects meet city objectives within the BSP.

The BSP is divided into seven chapters with an executive summary and appendices. Chapter 3 sets out goals and policies, Chapter 4 the approach to designing great streetscapes, Chapter 5 provides street designs, and Chapter 6 streetscape design elements including utilities, wastewater and storm water guides, and lighting and vegetation. Chapter 7 lays out the implementation process: The BSP's vision of better streets contains 10 elements:

1. *to be memorable,*
2. *support diverse public life,*
3. *vibrant places for commerce,*
4. *promotes human use comfort and health,*
5. *are safe,*
6. *accessible, convenient,*
7. *attractive,*
8. *inviting*
9. *well cared for and*
10. *ecologically sustainable.*

As part of the BSP the City adopted an Ordinance (310-10) on December 7, 2010 amending the municipal code to adopt the BSP. The ordinance amends a chapter within the administrative code and *requires* that street improvements conform with the policies and guidance of BSP. It also amended some segments of planning code to consolidate the street improvement requirements, and again *requires* that these follow the policy/guidance of BSP. *Projects will be required* to submit a streetscape plan with their application submission. It also amended portions of the Public Works Code to be consistent with the BSP. This included waiving occupancy fees for public ROW for BSP elements, and amending three sections of subdivision code to require *pedestrian, streetscape, and stormwater improvements that were consistent with BSP as part of subdivision approvals*. The amended code also requires that whenever the Department or other municipal excavator undertakes a project involving the planning, construction, reconstruction, or repaving of a public right-of-way, such project shall include, to the maximum extent practicable and feasible, other pedestrian and streetscape elements listed as appropriate to the relevant street type as identified and defined in the BSP, and other street and sidewalk improvements consistent with the City's *Transit First Policy* and the BSP. An Ordinance amending the General Plan was also passed to incorporate the BSP by reference in December 2010. These ordinances can be found in the cd-rom that accompanies this report.

Figure 5.13 shows the BSP highlights outlined in its introductory chapter. San Francisco does not specifically use the term “connectivity between subdivisions” but it does note that the BSP will improve *pedestrian connections and linkages among the city's nodes, hubs, destinations, transit system, and major land centers*.

The BSP implementation chapter specifies these next steps:

- Creating a roadway design manual
- Updating the transportation element of the general plan
- Update to traffic calming guidelines that are not specifically called-out in BSP

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- Reform analysis in environmental review to consider measures that prioritize transit, bicycles, and pedestrians.

In 2005 San Francisco also established the Great Streets Program (GSP) to improve neighborhood streets within the city. This program works in coordination with the BSP, Bicycle Plan, and the Transit Effectiveness Project. It was funded through the federal highway bill (Safe, Accountable, Flexible, Efficient Transportation Equity Act) and other federal and state grants. As part of the GSP plan a major goal was to undertake projects that would maximize the use of public space. Projects under this new program can include multiple elements, such as the following:

- Sidewalk extension – Increase the usable sidewalk space for pedestrians and greening
- Bulb-out – shorten the street crossing distance and provide visibility for pedestrian safety
- Crosswalk treatment – Highlight pedestrian crossing areas for pedestrian safety
- Pedestrian countdown signals/lighting – Install pedestrian countdown signals and pedestrian upgrade lighting for energy efficiency and safety
- Utility Undergrounding – Remove visible utility overhead service wires and poles and install conduits underground to connect services to homes
- Street tree planting – Provide traffic calming and ecological benefits
- Roadway median expansion and/or planting – Provide traffic calming and ecological benefits
- Road lighting– Improve and upgrade street lighting for safety and energy efficiency
- Bicycle improvements – Improve bicycle conditions using bicycle lanes, bicycle racks, or other amenities
- Public art elements – Create a sense of place, interest, and neighborhood identity
- Site furnishings – Provide resting areas, bicycle racks, trash receptacles
- Stormwater elements (low impact design) – Improve drainage and reduce flooding

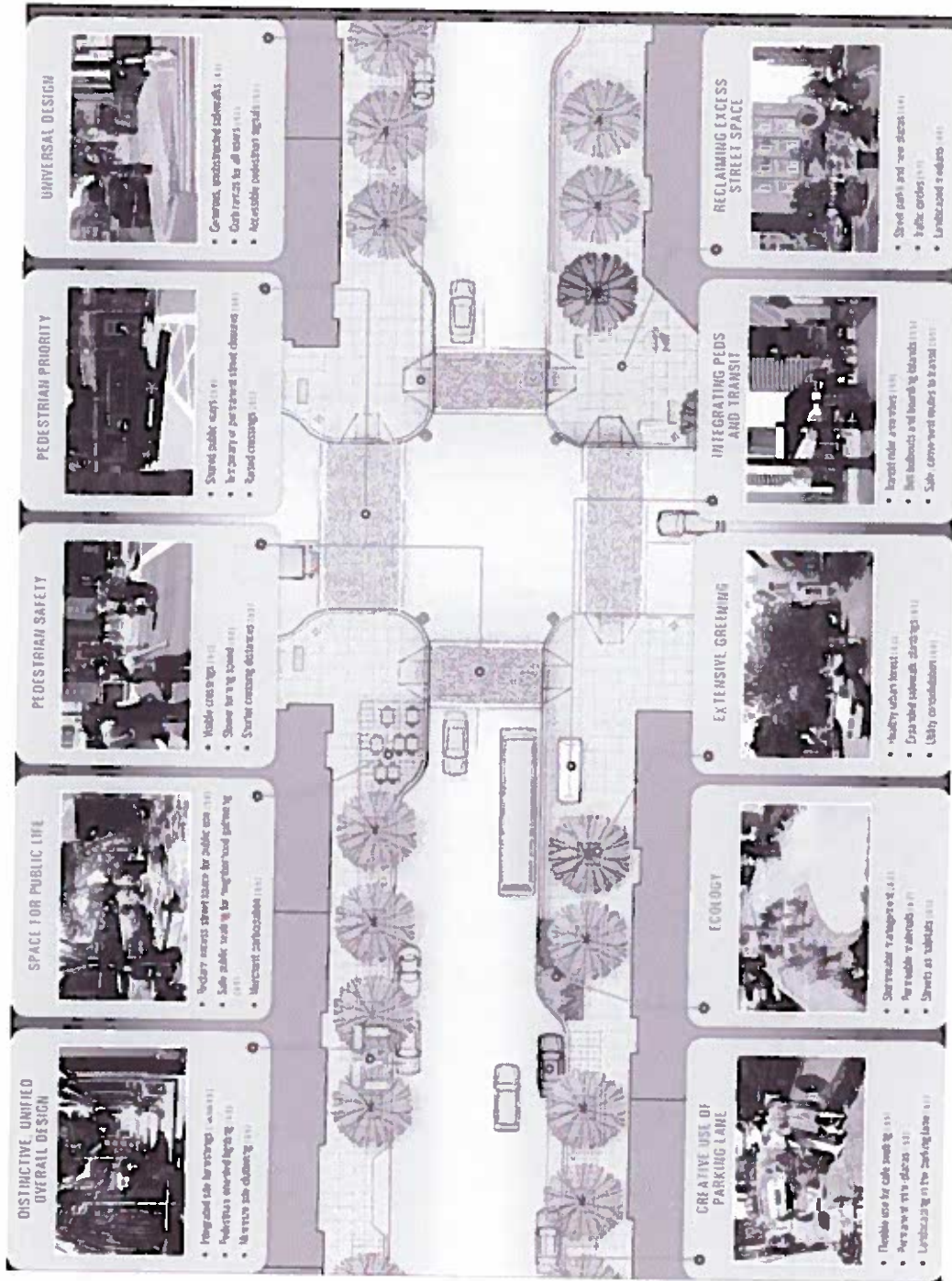


Figure 5.13: BSP Plan Highlights

Source: San Francisco Better Streets Plan, Chapter 1

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A 2011 Street Safety Bond program was also providing funding to implement other streetscape improvements including signals and lighting, bulb outs and bicycle improvements, sidewalk extensions, and landscaping elements.

It should also be noted that the State Department of Transportation in California (Caltrans) has also adopted a Complete Streets Program. This was adopted under Deputy Directive 64-R1 on October 2, 2008, and contributes to the Department's mission to "improve mobility across California." California's Vehicle Code and Streets and Highways Codes also identifies the rights of bicyclists and pedestrians and establishes legislative intent that people of all ages using all types of mobility devices can access and travel on roads. Caltrans established a Complete Streets Implementation Action Plan in February 2010. This included the development of a Technical Advisory Committee. The implementation plans highest focus areas was the update of the highway design manual, including pavement design guidance, system. The technical advisory committee last met in June. The Highway Design Manual has undergone revision, with every chapter being updated in 2012. For example, Chapter 1000 for bicycle transportation design complies with the Complete Streets Deputy Directive and the AASHTO guide for development of bicycle facilities. The highway design manual's philosophy according to Caltrans mirrors the concepts of context sensitive solutions.

Criticisms

Notwithstanding the multiple elements that are being incorporated in San Francisco, some criticisms have been made regarding the difficulty in meeting complete streets obligations. For example, Livable City felt that that the five-year repaving plan was not with being integrated the policies of the Complete Streets Ordinance and the BSP (Roth, 2009).

Other criticisms have noted that while a complete streets policy may be on the books, implementing this policy on real streets is difficult (Schmitt, 2012), with even the deputy director for the SF Municipal Transportation Agency stating the "*there are unique difference on urban streets*" (Goebel 2011). Caltrans (California's state department of transportation) incurred criticism for its adoption of its Complete Streets Guidelines. The Caltrans advisory committee that sets design standards for signs, signals, and markings of urban streets has been criticized for meeting too infrequently and for not including representation from all users (Goebel, 2011). Some feel that Caltrans design standards were still set to favor the movement of automobiles over other modes (Bialick, 2012). The deputy director believes that there needs to be a better monitored and more well rounded committee stating that "*[w]e need to open up this idea of a state highway function dictating the design standards and the traffic control devices for urban streets.*" (Goebel 2011).

5.12 Seattle, Washington

In 2006, Seattle Mayor Greg Nickles wanted Seattle to be "the most bicycle and pedestrian friendly city in the nation." The Seattle Department of Transportation (SDOT) started creating a Bicycle Master Plan with involvement from local bicycle advocacy groups and elected officials. As they were in this process, they realized they needed a more robust Complete Street Policy. In November of 2006, Seattle voters passed a transportation funding measure called "Bridging the Gap" that generated \$545 million over nine years for transportation maintenance and improvements. They also passed a funding measure for transit service and facilities. Bridging the Gap laid out five goals:

Reduce the infrastructure maintenance backlog.

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- Pave and repair Seattle streets.
- Make seismic upgrades to our most vulnerable bridges.
- Improve pedestrian and bicycle safety and create safe routes to schools.
- Increase transit speed and reliability.

As a result of these events, in 2007, The City Council adopted Complete Street Ordinance 122386: *"An ordinance relating to Seattle's Complete Streets policy, stating guiding principles and practices so that transportation improvements are planned, designed and constructed to encourage walking, bicycling, and transit use while promoting safe operations for all users."*

This ordinance also includes a freight component since Seattle's freight operations are a key component of the economy. Corridors designated Major Truck Streets have the needs of freight movement as the highest priority (APWA Reporter 2010).

SDOT infuses complete street principles in all of its documents from the transit plan to the transportation strategic plan. Since these principles are included in all documents, the staff is used to handling complete street issues on a daily basis. They use a system of street types based on the roadway's classification and the surrounding area to have cross sections of desirable street designs. Instead of having a Complete Street Design Guide, SDOT created internal standards that they piloted on different projects. This way, complete street designs are more flexible and reflect project-specific designs. From those internal standards Seattle's Design Guidelines was created and can be found in the CD-ROM that accompanies this report.

Financing complete streets in Seattle has not been an issue; while the Bridge the Gap tax levy funds some of the projects, most are traditionally funded. *"Good planning and information shared across departments"* (Complete Streets: Best Policy) let Seattle plan in advance and incrementally fund projects to accomplish Complete street goals. When other road work is being done (such as repaving or moving signal detectors), complete street improvements (such as new configuration of right of way or installing bike loop detectors) can be added to the existing project. Major maintenance or construction projects are evaluated using Seattle's Complete Street Checklist (which is on the cd-rom that accompanies this report) to determine how to leverage multiple project elements and fund sources to create a Complete Street. This Checklist also compiles data (such as traffic volume, parking restrictions, and sidewalk conditions) that can later be used to measure a project's connectivity. Even when using the checklist, City engineers' judgment is used when prioritizing improvements. For every Complete Street project, Seattle conducts a before and after study to evaluate mode shifts, volumes, and crash to data to measure performance. Since 2007, Seattle has undertaken over 50 complete street projects and no longer considers it new but "just [their] system now." In 2010, Seattle had (Seattle.gov)

- Installed pedestrian countdown signals at 40 intersections
- Made 42 crossing improvements
- Striped 20 miles of bike lanes and sharrows
- Added 350 bike parking spaces
- Planted 817 new street trees
- Funded 14,800 hours of new transit service
- Repaired or built over 38 blocks of sidewalk

Figure 5.14 shows improvements made on 6th Avenue, a busy International district in Seattle.



Figure 5.14: 6th Avenue Improvements

Source: Washington Department of Transport

5.13 San Antonio, Texas

In September 2011, San Antonio adopted a complete streets policy. In December of 2010, complete street work groups were formed from various city employees. By January of 2011, these workgroups had created a working definition for their complete streets policy. In March, SA 2020 was created with a mission *"to catalyze the entire San Antonio community into passionate, focused, and sustained action to achieve the shared goals that will transform San Antonio into a world-class city by the year 2020 in eleven key vision areas."* These eleven areas include arts and culture, community safety, downtown development, economic competitiveness, education, family well-being, government accountability and civic engagement, health and fitness, natural resources and environmental sustainability, neighborhoods and growth management, and transportation. With set goals of increasing the number of pedestrian-oriented neighborhoods, triple public transportation ridership, and decrease adult obesity by 10% (SA2020 Steering Committee 2011), the complete street policy was being cited as a way to reach these goals. By July of 2011, the full complete street policy was created and projects were being evaluated. In September of that year, the Policy was adopted. The Policy includes five main objectives with subheadings describing how San Antonio will meet these objectives (San Antonio City Council 2011):

1. **San Antonio supports Complete Streets.** They describe complete streets that take into account all users, including mode type and demographic of user. The context of the land will shape the street and not all complete streets need to be the same.
2. **San Antonio promotes healthy living and fitness through Complete Streets.** They want safe access to recreation areas, better user of active forms of transportation, and better connections between neighborhoods.
3. **San Antonio supports pedestrian-oriented neighborhoods through Complete Streets.** They will encourage multi-modal trips to employment and community facilities, safe travel within the neighborhoods, and connections will take into account all types of roads.

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4. **Commercial Corridors and Districts will be enhanced through the application of Complete Streets.** They will create multi modal connections to commercial districts from neighborhoods, encourage green infrastructure in the downtown area, and help develop streetscape that enhances the beauty of the city.
5. **San Antonio will maximize benefits of investment in capital projects through application of Complete Streets.** They will consider all complete street elements in maintenance projects, balance costs with benefits, and will be designed to maximize the benefits of all users.

They are currently implementing the policy, assessing current projects, and hosting outreach meetings in the community. They plan on measuring the success of these projects using safety metrics, fiscal impacts, user group metrics, health impacts, and miles of complete streets (PEPP 2012). Some of the projects are shown in Figures 5.15 and 5.16.



Figure 5.15: Pedestrian walking paths in San Antonio

Source: SA2020



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Figure 5.16: Bridge connection that was rehabilitated on the Missions Hike and Bike Trail

Note: Parts of this trail are still closed in 2012 for maintenance as San Antonio enhances it for users.
Source: Brandy, 2011

San Antonio, it should be noted, also uses connectivity metrics with its unified development code (UDC). The city has also included in its UDC provisions from its master plan. These include requiring ecological management of floodplains and the promotion of their use as open space within the subdivision code, and the sub-dividers providing for recreation through the dedication of parkland. It also includes urban design policy to prepare design and construction policies and standards for utility and transportation infrastructure, capital improvement projects, public facilities and development projects that reinforce neighborhood centers and provide diverse, pedestrian-friendly neighborhoods (Article 5, Division 6.). The code also sets out minimum acreage for gaining park facilities credit in land that is sub-divided.

The UDC also contains an entire section on connectivity, noting that

The city council hereby finds and determines that discontinuous street systems are inefficient and have the effect of channeling traffic onto relatively few points of the transportation network. A well-connected street spreads traffic efficiently, provides greater opportunities for access by service and emergency vehicles, and furthers pedestrian and bicycle mobility by increasing the number of destinations. (See Master Plan, Urban Design, Policy 1c). Accordingly, this section provides for both external and internal connectivity. External connectivity is promoted by requiring developers to connect to the existing street network. Internal connectivity is promoted by requiring a connectivity index for internal streets. The city council acknowledges that there is a market for culs-de-sac and streets with few connections. The connectivity index preserves the opportunity to provide culs-de-sac while, at the same, maintaining the

integrity of the network as a whole. See R. Ewing, Best development Practices: Doing the Right Thing and Making Money at the Same Time (Jan. 1997).

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The connectivity index for internal streets must be no less than 1.20 for units that have 125 single family lots (35-506-(e) (1).

Section 35-506 (e) (2) also requires connection between areas not subdivided (or undeveloped) and existing communities. It further requires that parcels be arranged to allow the opening of future streets and logical further subdivision. Dead-end streets are prohibited except as short stubs to permit future expansion. A *short stub* is defined as having an average depth of the adjacent lots with a maximum of 150 feet. The UDC also includes specifications for the different types of existing streets. For a major thoroughfare plan, a primary arterial is required to be a minimum of 60 feet in width, with the pavement half width at 24 foot with curbs. For a secondary arterial, width is 43 feet with the same pavement half width. Sidewalks are also required on both sides of all internal streets and the subdivision side of all adjacent or perimeter streets (subject to a few exceptions).

5.14 Conclusion

The cities presented in the Best Practices above provide a cross section of complete street policies, approaches, and implementations. Not all of the ideas shown will be applicable for the City of Austin; however, they are shown as a best practice for certain situations. Different cities have different priorities based on the demographics of their population, geography, and other variables. Building a Complete Street Program will require taking various elements from other cities' best practices and deciding how to apply it to Austin.

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