# Complete Streets Chicago

Department of Transportation


## Design Guidelines

2013 Edition

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## *2013 Edition*

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# COMMISSIONER'S STATEMENT

Chicagoans experience city life through its streets in our daily commutes, street fairs and block parties, and even the view from our front porches. Public activity and neighborhood vitality often reflect the nature of surrounding streets. We must build and maintain our roads for healthy business districts, vibrant neighborhoods, and high quality of life– and move away from the narrow perspectives of the past. We must measure success on safety, choices, and livability.

Chicago residents need places to gather, conduct business, and recreate. We need systems that support choices to walk, bike, and connect to transit. Our street design should be reflective of our city; the historic boulevards, the elevated trains, the lakefront trail. Today, we are building a new Chicago for the next 100 years. When we say "complete streets," we mean designing streets for people. We mean designing for all users and all modes. We mean looking past the project level, to the surrounding community and economic systems. We mean protecting our most vulnerable users and eliminating pedestrian and bicyclist deaths.

*Complete Streets Chicago* builds upon Chicago's 2006 complete streets policy. That policy influenced our *Bikeway Design Guide* and *Bike 2015 Plan* and began creating complete streets. The Chicago Department of Transportation (CDOT) has now launched its *Streets for Cycling 2020* plan and *Chicago Pedestrian Plan*. This new policy and design guide will bridge these and similar planning efforts. It defines our processes, standards, and expected outcomes.

*Complete Streets Chicago* is the result of an integrated and inclusive process. CDOT's divisions were asked to look at methods for project delivery, measurement, and standards to identify areas for improvement. We went outside the agency to improve upon state-level project coordination. I applaud CDOT staff for contributions to this guide and their commitment to building complete streets.

CDOT's mission is to keep the city's surface transportation networks and public way safe for users, environmentally sustainable, in a state of good repair and attractive, so that its diverse residents, businesses and guests all enjoy a variety of quality transportation options, regardless of ability or destination.

We all want better, safer streets. This effort will bring the City closer to this goal.

**Gabe Klein**
Commissioner, Department of Transportation

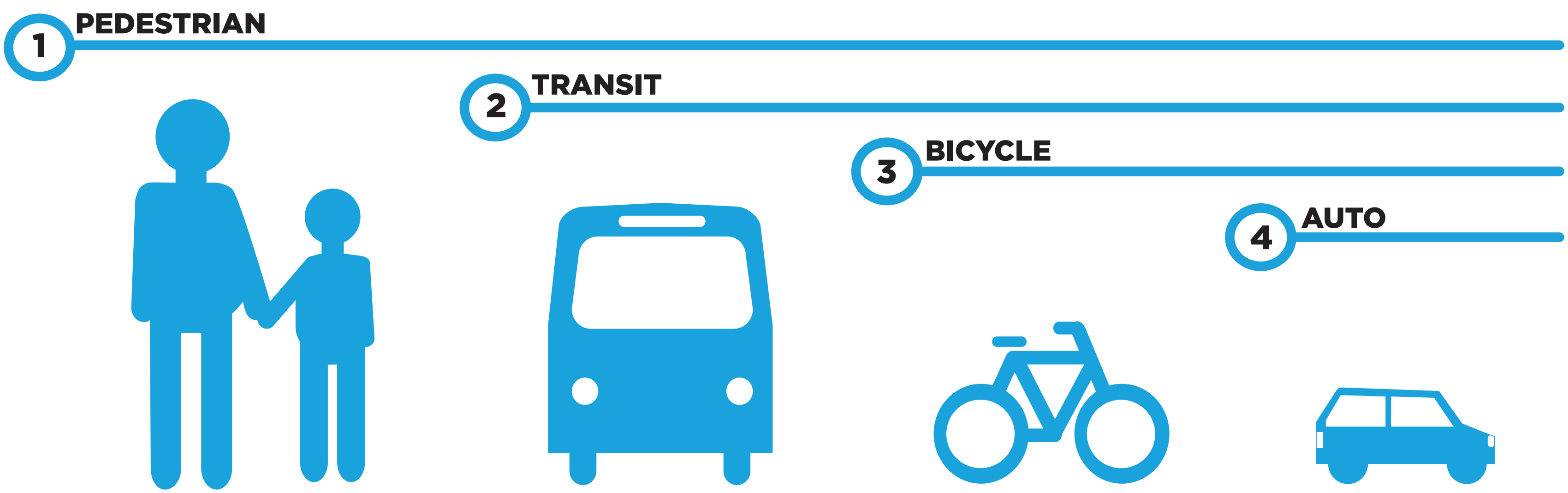
# EXECUTIVE SUMMARY

The Chicago Department of Transportation (CDOT) works to ensure that our streets are safe and designed for all users. The City of Chicago's Complete Streets policy states:

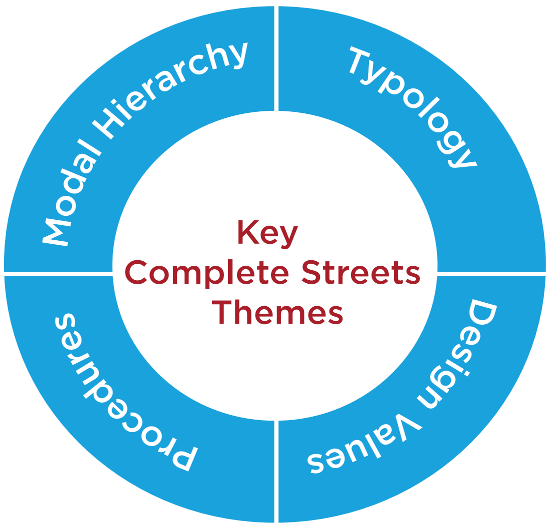
*The safety and convenience of all users of the transportation system including pedestrians, bicyclists, transit users, freight, and motor vehicle drivers shall be accommodated and balanced in all types of transportation and development projects and through all phases of a project so that even the most vulnerable – children, elderly, and persons with disabilities – can travel safely within the public right-of-way.*

CDOT issues *Complete Streets Chicago: Design Guidelines* to implement this policy. To create complete streets, CDOT has adopted a pedestrian-first modal hierarchy. All transportation projects and programs, from scoping to maintenance, will favor pedestrians first, then transit riders, cyclists, and automobiles.

This paradigm will balance Chicago's streets and make them more "complete." In addition, street design will be conducted in a manner that supports context and modal priorities and is not limited by rigid engineering standards. This will allow staff to develop innovative solutions that meet the over-arching goal of a complete street.



Including modal hierarchy, *Complete Streets Chicago* has four key themes.



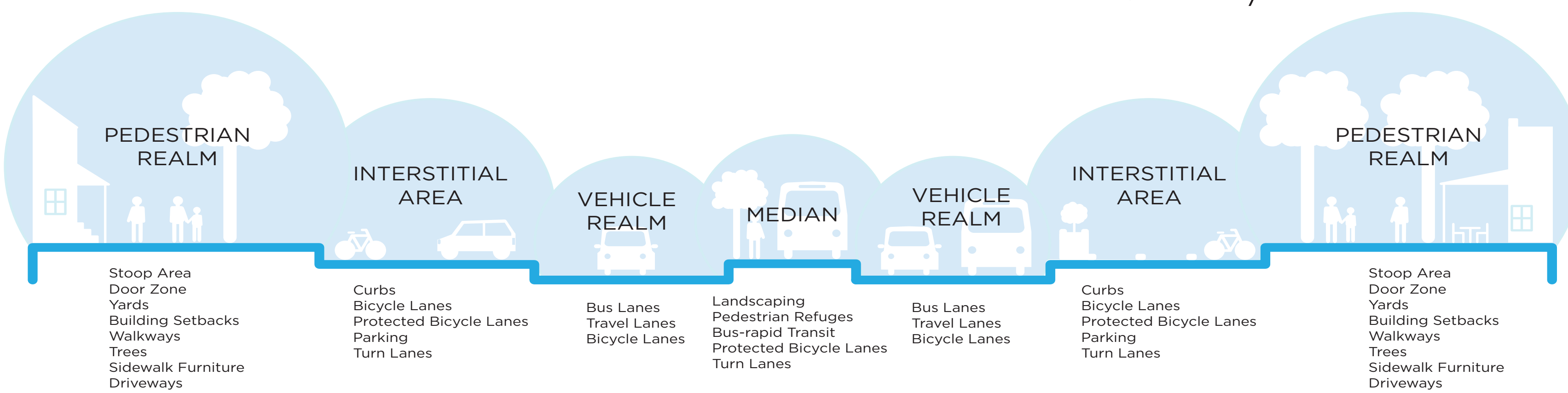

## *Typology*

Typology classifies streets by roadway function and surrounding context, including right-of-way width, building type, and land use. It will serve as a methodology to ensure that the design and use of a street will complement the surrounding area, and vice versa.

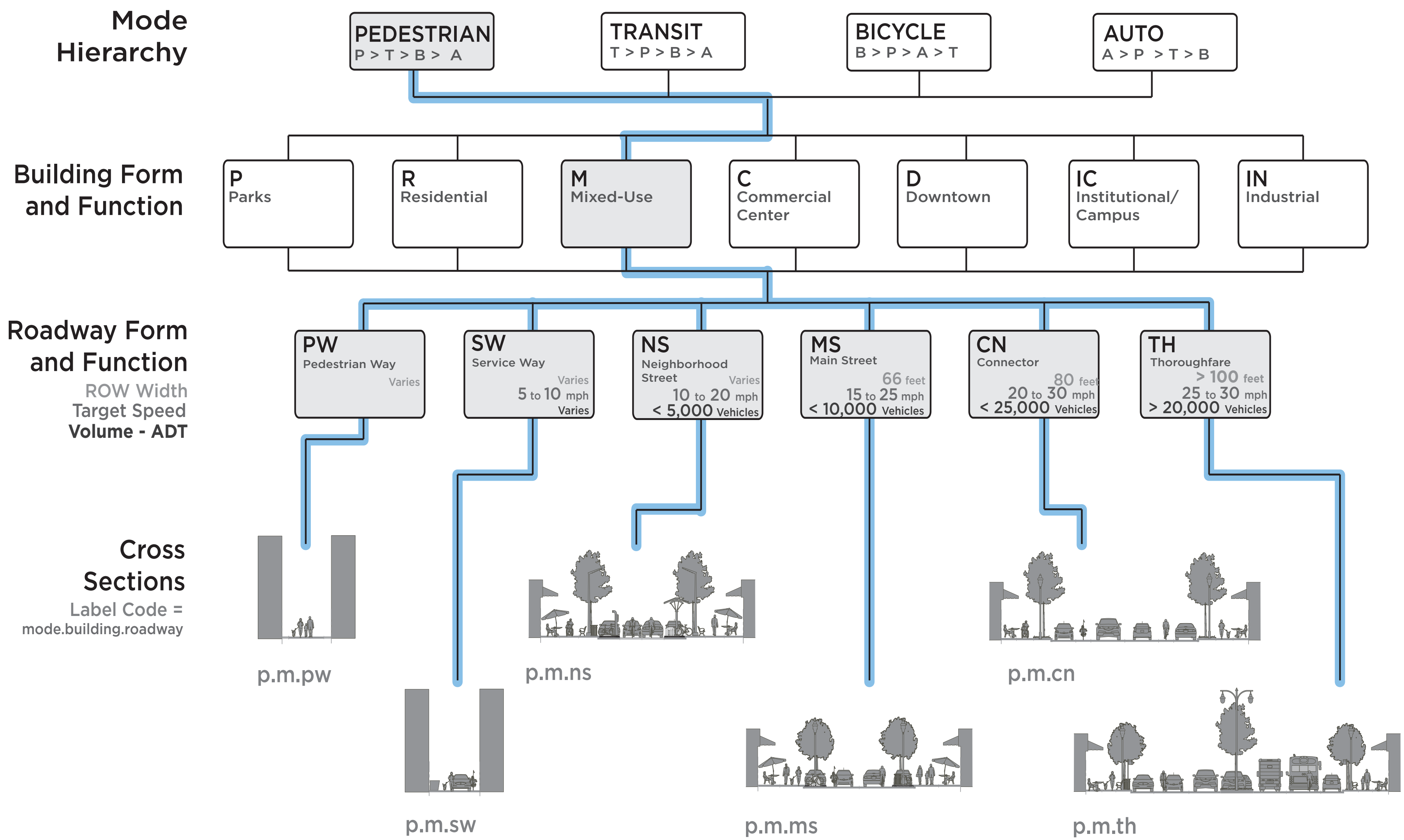
## *Design Values*

Design values provide flexible guidance for accommodating and balancing when making decisions. Design trees provide guidance towards the range of street design options. They can be used top down (given modal hierarchy and typology) or bottom up (given available right-of-way). They are intended to provide a simple and effective means to weigh street design options, given a various range of conditions.

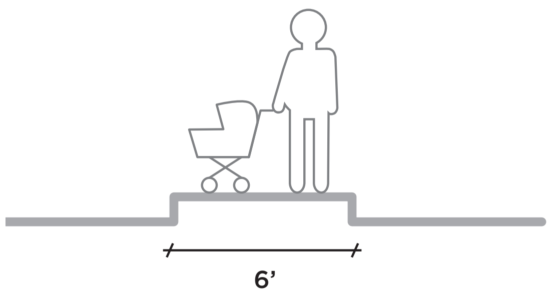
Streets cannot be 'complete' without proper intersections and crossings. The policies and procedures focus on creating compact and safe junctions. They provide pragmatic guidance such as planning the width of a pedestrian refuge island to protect a person pushing a stroller, and directing designers to slow drivers from highway speeds before they arrive at the city street intersection.

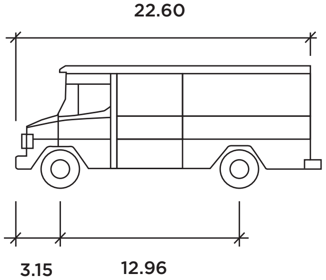


# COMPLETE STREET DESIGN TREES - Pedestrian, Mixed-Use.



CDOT's geometric and operational policies are established to support the modal hierarchy. The agency will begin using more performance-based guidance including designing streets for target speeds, which will be at or below the speed limit. Level of service for motor vehicles will be consistent with modal hierarchy. A new design vehicle, based on a delivery truck, will ensure that neighborhood streets remain neighborhood streets.



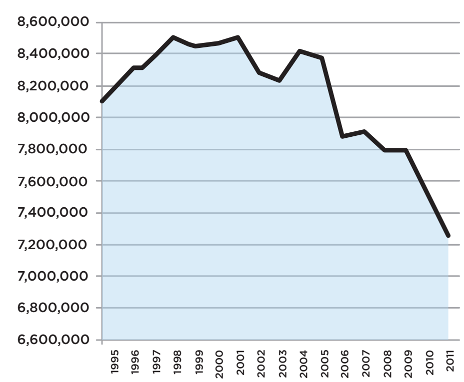

| O2 | feet |
|---|---|
| Width | : 7.12 |
| Track | : 7.12 |
| Lock to Lock time | : 6.0 |
| Steering Angle | : 42.0 |

## Procedures

CDOT's project delivery process is defined in six steps - project selection, scoping, design, construction, measurement, and maintenance - with feedback loops, stakeholder involvement, and approval processes. The process can be scaled to fit the size of the individual project, from repaving to reconstruction. A complete streets notebook clarifies important tasks within each step.

*Chicago Forward: Department of Transportation Action Agenda* calls for reducing total crashes and injuries in the city by 10% every year, a 50% reduction in bicycle and pedestrian injuries by 2017, and the elimination of traffic fatalities by 2022. In addition, *Chicago Forward* has called for an increase in the share of all trips under five miles made by cycling to at least 5%. It is through these policies and procedures that CDOT intends to achieve these goals.

Chicago Non-Interstate AVMT (Thousands)



# COMPLETE STREETS PROJECT DELIVERY PROCESS

## stage 1 — project selection

**GOAL: Identify and promote projects that advance Complete Streets**

**external:**
alderman requests
311
developments

**internal:**
pavement condition
strategic planning
safety

**moving forward:**
needs analysis
performance
easy wins

## stage 2 — scoping

**GOAL: Address all modes - consider land use and roadway context** +

**project needs:**
existing conditions
modal deficiencies
plans and funding

**exceptions:**
prohibited modes
cost vs. benefit
no foreseen use

**desired outcomes:**
community needs
system opportunities
modal hierarchy

## stage 3 — design

**GOAL: Address objectives defined during scoping stage** + *

**cross section:**
develop alternatives
address all modes
community needs

**intersection design:**
geometric layout
signal timing
modal conflict points

**trade-offs:**
exceptions process
modal hierarchy
allow for feedback

feedback loop

## stage 4 — construction

**GOAL: Ensure project is built as designed for Complete Streets** +

**issues and conflicts:**
refer to project manager
address problems
do not sacrifice modal components

**opportunities:**
communicate priorities to contractors
allow for design improvements
reward efficiency

## stage 5 — measurement

**GOAL: Measure the effectiveness of the Complete Street** *

**safety:**
no exceptions
decrease severity
normalize measures

**modeshare:**
measure people
establish targets
favor bike and walk

**others:**
health and economic impacts
transit consistency and travel times
process streamlining, coordination, and feedback

## stage 6 — maintenance

**GOAL: Ensure all users are accommodated through the projects lifespan** +

**coordinate:**
include maintenance staff in scoping (2)
include maintenance staff in design (3)

**funding:**
program funds for maintenance
maintenance should not limit complete designs

## Scoping:

Step 1: Establish Objectives
Step 2: Perform Research
Step 3: Conduct Site Visits
Step 4: Assemble Data
Step 5: Set Mode Hierarchy
Step 6: Revisit Objectives

## Design:

Step 1: Draft Alternatives
Step 2: Develop Design
Step 3: Evaluate Impact
Step 4: Obtain Feedback
Step 5: Prepare Final Design

### + ENGAGE PUBLIC STAKEHOLDERS

find key opportunities to interface with community groups, residents, and business owners - allow projects to be influenced by lessons learned through outreach efforts

### * ENGAGE AGENCIES & DEPARTMENTS

coordinate CDOT projects and measurement with external agencies and other city departments to assure the best use of resources and meet multiple objectives through complete design processes

CDOT will launch pilot projects to win support for complete streets while enabling staff to fine tune for better overall solutions. The arterial resurfacing program will be steered towards prioritizing streets that need improved walking, cycling and transit facilities.

A Complete Streets Compliance Committee will be charged with implementing, updating and enforcing this guide. Staff-led working groups will clarify the policies and procedures in this document and work with other agencies to facilitate a common understanding and approach. This includes working with the Department of Housing and Economic Development, the Chicago Transit Authority, and the Illinois Department of Transportation.

With this guide, the City begins implementing *Chicago Forward Action Agenda* and the *Chicago Pedestrian Plan* goals. These policies will benefit the physical and mental health and economic vitality of the entire city.

At the dawn of the automobile age a local judge stated that "the streets of Chicago belong to the city, not to the automobilists". Nearly a century later, *Complete Streets* seeks to make it true.

**SPEEDER WANTS ALL STREET**

**Motorist Complains to Judge Because Pedestrian Gets in Way.**

**COURT FINES HIM $200.**

**Declares That the Thoroughfares Belong to the City.**

Harold Bracken, the 19 year old son of a saloonkeeper at 2122 West Fifty-ninth street, learned yesterday that the streets of Chicago belong to the city and not to motorists. The lesson cost him slightly over $200.

According to Adam Papiros, Bracken on Sunday night while speeding on Michigan avenue, knocked him down and injured him. Papiros jumped into a passing car, caught up with Bracken, and had him arrested.

" He was in the way, " said Bracken lightly. " If he had been on the sidewalk where he belonged he would not have been hurt."

" The streets of Chicago belong to the city, not to automobilists," said Municipal Judge Fry. " Fined $200 and costs."

Mrs. Rose Hebuthmott, 553 North Monticello avenue, died yesterday from injuries incurred in a motorcycle acident on April 27.

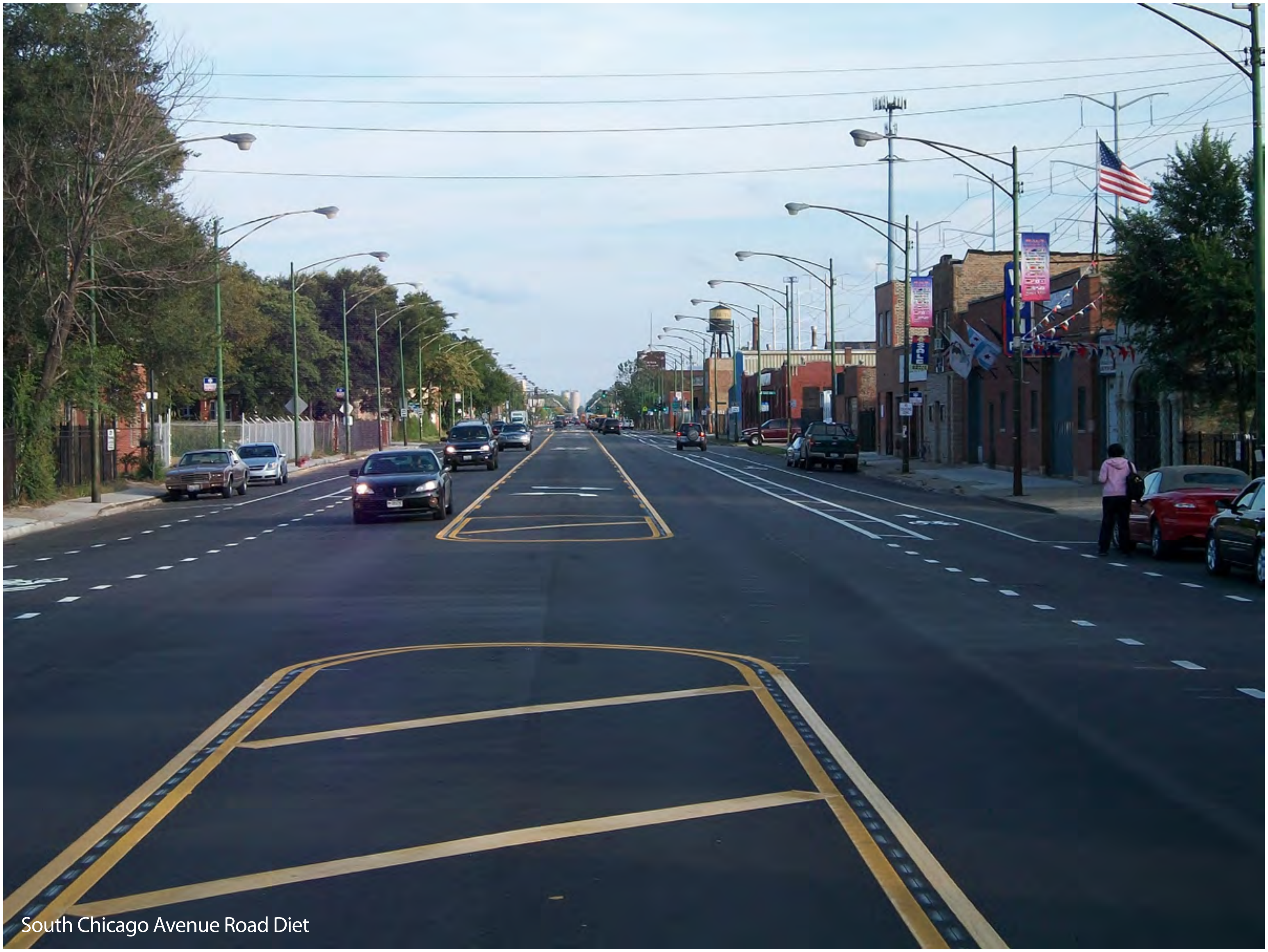
Mrs. Minnie McKeon, 22 Wendell street, was seriously injured by an automobile at West Huron and North Clark streets.

A skidding taxicab crashed into a wagon and two automobiles in front of 115 South La Salle street in the afternoon. A driver on the wagon was hurt. The taxicab was wrecked.

**AVIATOR KILLED AT AKRON, O.**

**Charles Carlson of Milwaukee Victim**

Chicago Tribune, May 6, 1913.


South Chicago Avenue Road Diet

# CHAPTER ONE: INTRODUCTION

# CHAPTER ONE: INTRODUCTION

Almost all trips begin and end with walking. Reflecting that, the pedestrian will be the beginning and end of CDOT's new design and implementation process.

These policies and procedures provide the tools and strategies to design the City's streets and transportation infrastructure for all users and modes, and to maximize their social and environmental benefits.

### Chicago's Complete Streets Policy

The safety and convenience of all users of the transportation system including pedestrians, bicyclists, transit users, freight, and motor vehicle drivers shall be accommodated and balanced in all types of transportation and development projects and through all phases of a project so that even the most vulnerable – children, elderly, and persons with disabilities – can travel safely within the public right-of-way[1].

## 1.1 Purpose and Need

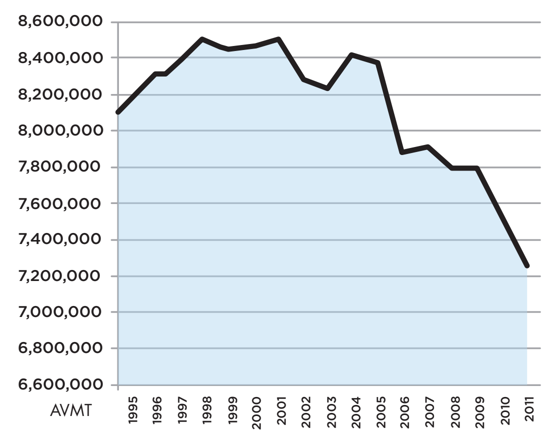
- **To create complete, safe and sustainable streets in the City of Chicago.**
- **To provide simple, on-point design guidance that empowers CDOT staff.**
- **To provide a clear process and direction.**

Following Mayor Richard M. Daley's public release of the Chicago Complete Streets Policy in 2006, CDOT issued a brief internal memo that outlined a few design strategies to implement the policy in CDOT projects. CDOT has successfully incorporated complete design elements into many of its projects, but the department lacked a comprehensive strategy for policy implementation.

In 2010 CDOT issued the *Complete Streets Policy Implementation* report, which assessed the department's efforts to address the 2006 policy. The report recommended developing a design guide, establishing a Compliance Committee, and creating a dedicated staff position to manage the implementation of complete streets. *Complete Streets Chicago* is the design guide recommended in that report.

The report also recognized that in the latter half of the 20th century roadways were built to optimize motor vehicle traffic while pedestrians, bicyclists, and transit were often neglected. Recent evidence suggests that people are driving less on Chicago's streets. Annual vehicle miles traveled flattened out between 1997 and 2004 around 8.2 billion, and has been falling steady every year since to just over 7.2 billion in 2011 (Figure 1). This parallels national data showing annual vehicle miles traveled peaked in 2005[2] and has been steadily declining since.

**FIGURE 1**




Driving on Chicago's streets has fallen in the past 15 years[3]

[1]Mayoral Executive Order, October 10, 2006
[2]Urban Vehicle Miles Travelled (per lane mile). As referenced in the Bureau of Transportation Statistics. Table 1-36: Roadway VMT and VMT per Lane-Mile by Functional Class
[3]Source: Chicago Metropolitan Agency for Planning

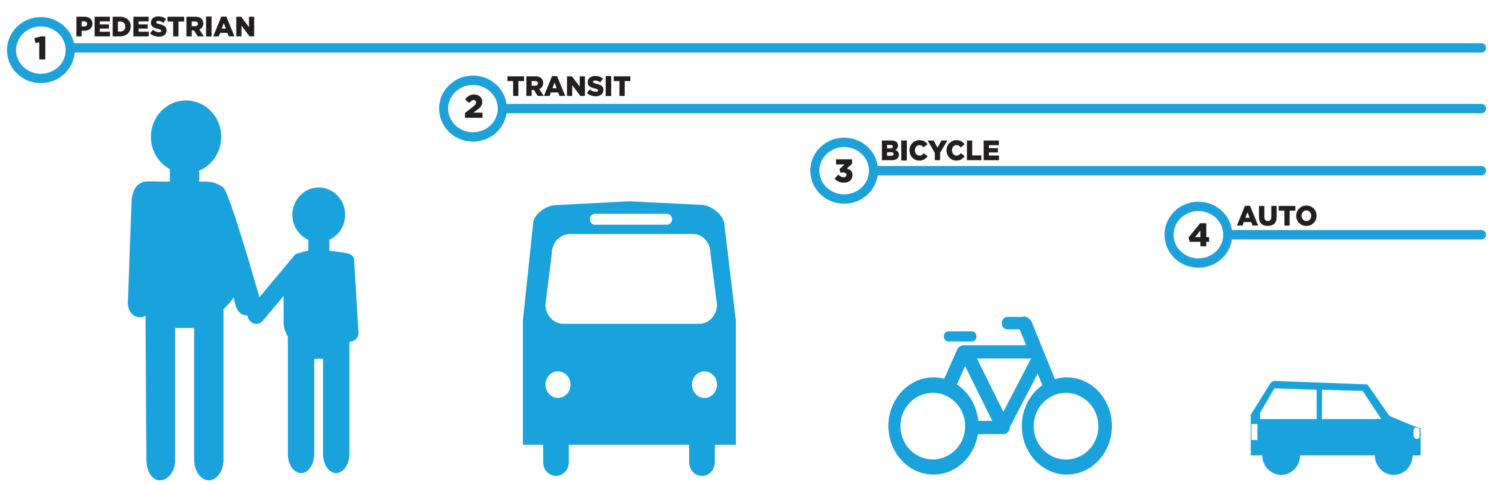
These policies and procedures can help Chicago adjust to these trends. Reversing the effect of over 50 years of auto-focused development requires a new paradigm, but it should not require another 50 years. The pedestrian-first modal hierarchy resets CDOT's default premise.

*Complete Streets Chicago* will influence all decisions and actions within CDOT, from the big picture (project prioritization, level of service analysis) to design details such as cross-section selection, geometric design and signal timing. Decisions made everyday within CDOT at all levels will lead toward more complete streets: streets that add value to residents, commerce and visitors at the street, neighborhood and citywide levels.

## 1.2 Pedestrian First

To further implementation of complete streets in Chicago, CDOT will begin operating under a pedestrian-*first* policy, see Figure 2. The walking public will be given primacy in the design and operation of all CDOT projects and programs, from capital to maintenance. Transit will come second in this new order, followed by Bicycle then Automobiles (private motor vehicles). This inversion of the dominant, auto-based paradigm will allow the city's transportation network to grow safely, sustainably and equitably into the 21st Century.

**FIGURE 2**



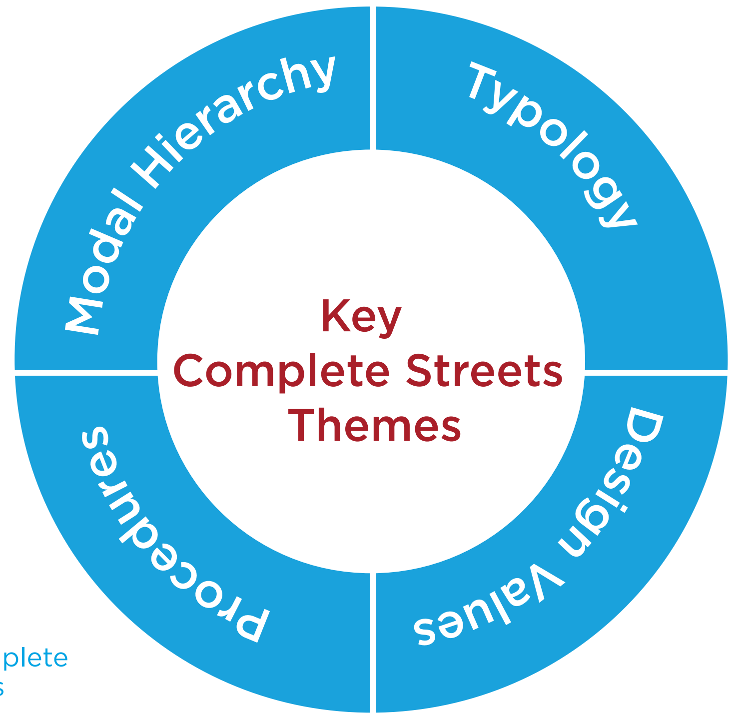

Pedestrian First Modal Hierarchy

## *1.3 Key Themes*

To effect this change, these policies and procedures address four key themes, see Figure 3:

- **modal hierarchy** - the design and operation of CDOT facilities will prioritize modes in this order: pedestrians > transit > bicycle > automobiles. In some circumstances, the hierarchy may be adjusted somewhat, such as transit along a BRT corridor or bikes along a protected bike lane corridor. Modal hierarchy will influence cross-sections, intersection design, signal timing, maintenance scheduling, and other agency operations. See Chapter 3.
- **typology** - departing from the traditional, highway-based functional classification system, CDOT projects will be seen through the lens of roadway and building typology. This system is built on a more holistic consideration of a street's component parts, from roadway width and sidewalk use to building form and function. See Chapter 2.
- **design values** - this document establishes policies to support complete streets, see Chapter 3.
- **procedures** - the project delivery process is key to delivering complete streets. Long after this document has been published, committed CDOT staff will need to continue to work together to advance the change envisioned. See Chapter 4.

**FIGURE 3**




Four Key Complete
Street Themes

## 1.4 Compliance & Oversight

A Complete Streets Compliance Committee will be charged with implementing, updating and enforcing this guide. Staff-led working groups will clarify the policies and procedures in this document and work with other agencies to facilitate a common understanding and approach. This includes working with the Department of Housing and Economic Development, the Chicago Transit Authority, and the Illinois Department of Transportation.

The committee will be comprised of five members representing Managing Deputy Commissioner (de facto chair), Engineering Division, Project Development Division, Department of Housing and Economic Development, Complete Streets Manager, see Figure 4. The compliance committee should meet monthly and develop a work plan annually to guide implementation.

**FIGURE 4**


Complete Streets Compliance Committee

### 1.4.1 Exceptions

These policies and procedures apply to all City-owned, controlled, and/or operated streets and intersections. A primary role of the Compliance Committee will be to evaluate the instances where it is prudent to deviate from the requirements herein, for example:

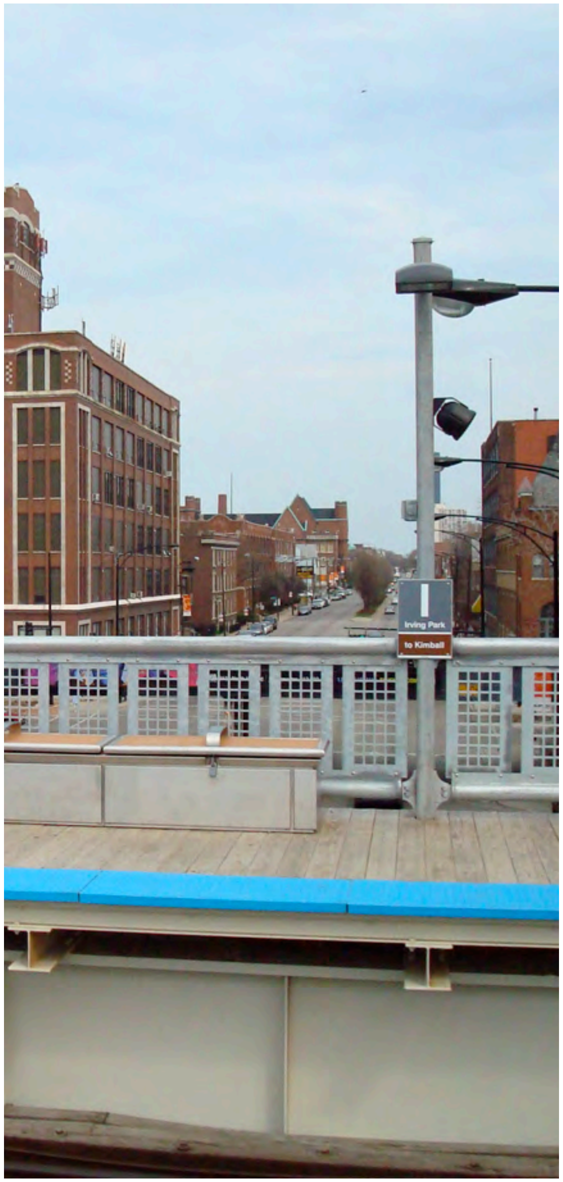
- A limited access roadway (from which pedestrians and cyclists are prohibited) or a pedestrian only street need not accommodate the prohibited modes.
- The cost of establishing facilities for a particular mode would be excessively disproportionate to the need *or probable future use.*
- There is an indisputable lack of need for a particular mode at present *and in the future.*
- A particular location requires a design value exception.

Project managers should broach these questions during scoping. The committee will review the issue and make a recommendation to the CDOT commissioner, who will determine whether to grant exceptions. The committee will also decide on alternate approaches.

### 1.4.2 Working Groups

The Compliance Committee will establish working groups. These groups will be charged with vetting the complete streets processes and recommendations, determining procedures, and providing feedback for future policy revisions.

1. Compliance Committee - clarify composition and protocols.
2. Typology - further develop the typologies in Chapter 2 with the Department of Housing and Economic Development (DHED), and incorporate it into a transportation master plan and the zoning code.
3. Geographic Information Systems (GIS) - determine protocols for better incorporating GIS mapping, see Chapter 2.
4. Operations - finalize the Level of Service (LOS), Traffic Control Devices (TCD) and Right Turn on Red (RTOR) policies described in Chapter 3, including the possibility that LOS would not be used at all.
5. Project Development Process - finalize the process described in Chapter 4.
6. Performance Measures - finalize the measures described in Chapter 4.
7. Arterial Resurfacing - steer this program towards prioritizing streets that need improved walking, cycling and transit facilities or those that could benefit from a road diet, see Chapter 4.
8. Illinois DOT (IDOT) Coordination - continue to work with IDOT in applying these policies and procedures to joint projects.
9. Maintenance of Traffic, Utilities - ensure streets remain usable by all modes during roadwork, utility work and other construction projects.



## 1.5 Coordination with Other Efforts and Agencies

This project complements other efforts within CDOT, the City of Chicago, Cook County and IDOT. Recent parallel initiatives include the *Chicago Forward Action Agenda*, the *Chicago Streets for Cycling Plan 2020*, the *Chicago Pedestrian Plan*, the *Sustainable Urban Infrastructure Guidelines and Policies*, and the *Make Way for Play* project. Many prior projects like the *Streetscape Guidelines*, the *Street and Site Plan Design Guide*, and the *Bikeway Design Guide* informed and complemented this effort. Figure 5 illustrates how these policies and procedures fit within other efforts.

This document is designed to work with the *Sustainable Urban Infrastructure Guidelines and Policies*. These two guidelines propose the same process of project development and design decision-making. Together they work to create a safe, convenient, and sustainable transportation system that supports pedestrians, transit, bicyclists, automobiles, freight, and the environment.

### 1.5.1 Coordination with Illinois DOT

The application of these policies and procedures to joint IDOT-CDOT projects within the city is the subject of ongoing discussions. As noted above, a working group has been established to collaborate between the agencies. CDOT's policy is to work toward completing all of Chicago's streets, regardless of jurisdiction.

## FIGURE 5

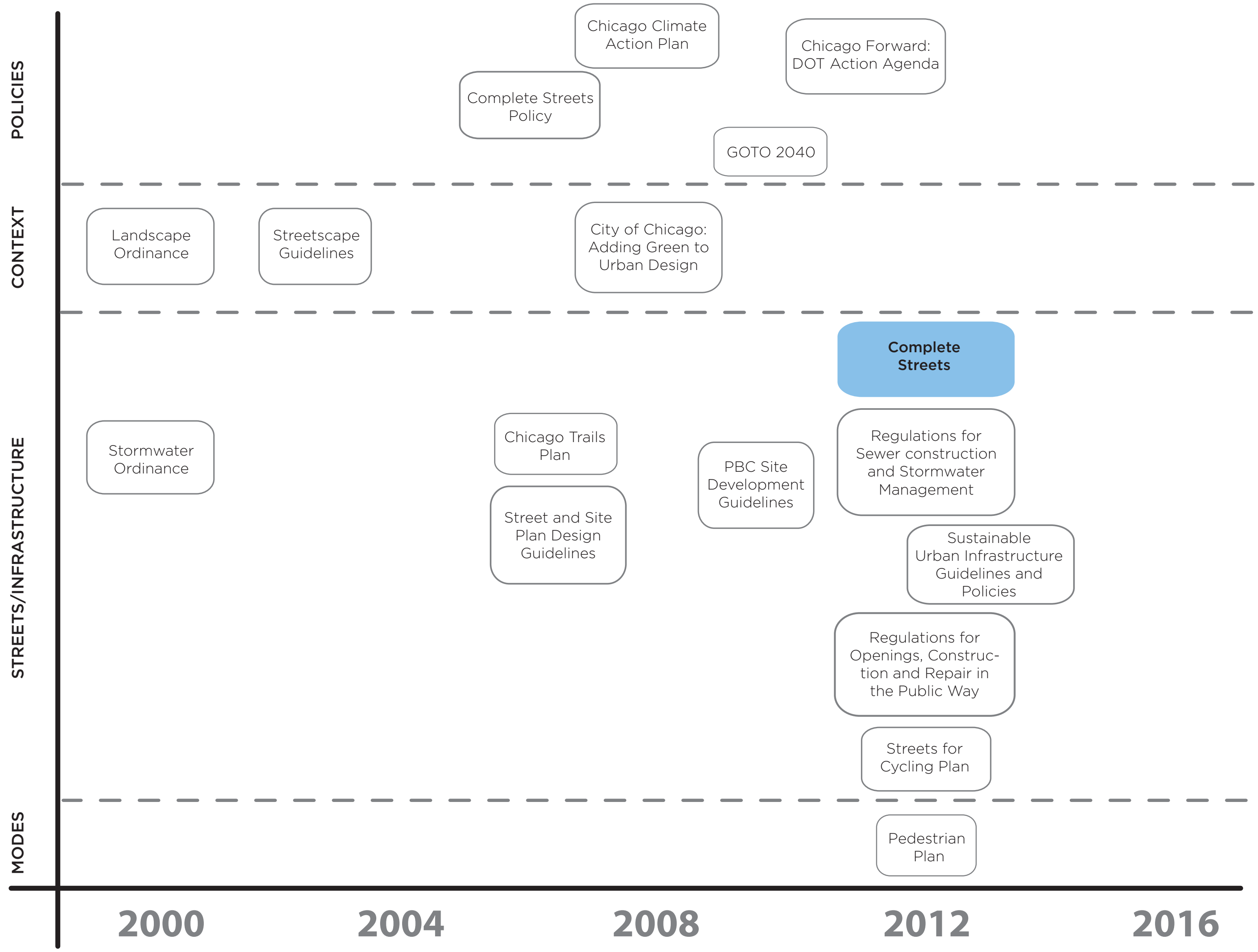



Diagram of Various Related Efforts

## 1.6 Legal Resources

Local jurisdictions generally follow some established standards for designing streets. Much confusion exists as to what they must follow, what is merely guidance, when they can adopt their own standards, and when they can use designs that differ from existing standards. The text below untangles the myriad of accepted design documents. It is critical for cities and counties to understand how adopting a complete streets design manual meshes with other standards and guides. The most important of those standards and guides are the following:

» The American Association of State Highway and Transportation Officials' (AASHTO) *A Policy on Geometric Design of Highways and Streets* (the "Green Book")

» Illinois DOT's *Bureau of Design and Environment Manual* (BDE)

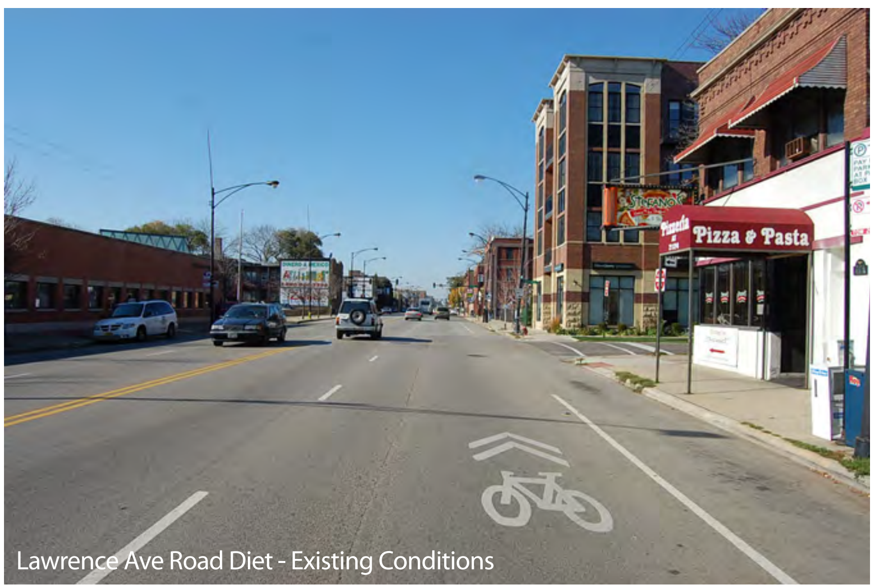
» Ilinois DOT's *Bureau of Local Roads and Streets Manual* (BLR)

» Other local manuals or street design standards

» The *Manual on Uniform Traffic Control Devices* (MUTCD)

» The Illinois Fire Code

» Illinois Vehicle Code



Lawrence Ave Road Diet - Existing Conditions

A discussion of the federal-aid roadway classification system helps to frame the requirements of each of these documents. Local governments that wish to use certain federal funds must use a functional classification system based on arterials, collectors, and local streets. These funds are for streets and roads that are on the federal-aid system. Only arterials and certain collector streets are on this system. The federal aid system encourages cities to designate more of these larger streets, and to concentrate modifications along these larger streets. Complete streets design often recommends using a system of street typologies to supplement the functional classification system. To maintain access to these federal funds, local jurisdictions can use both systems.

### 1.6.1 AASHTO Green Book

The Green Book provides guidance for designing geometric alignment, street width, lane width, shoulder width, medians, and other street features. The Green Book applies only to streets and roads that are part of the National Highway System (NHS). These are Interstate Freeways, principal routes connecting to them, and roads important to strategic defense. These streets and roads comprise about 4% of all roadway miles[4]. Although the Green Book's application is limited to these streets, some cities apply its recommendations to all streets.

Further, the Green Book provides guidance that cities often unnecessarily treat as standards. The Green Book encourages flexibility in design within certain parameters, as evidenced by the AASHTO publication, *A Guide to Achieving Flexibility in Highway Design*. For example, 10-foot lanes, which cities often shun out of concerns of deviating from standards, are well within AASHTO guidelines.

### 1.6.2 Bureau of Design and Environment Manual

Illinois Department of Transportation's Bureau of Design and Environment Manual (BDE) applies only to State Highways. If cities deviate from the minimum widths and geometric criteria they are advised to follow the variance process or experimental process as applicable. Chapter 17 of the BDE outlines standards for pedestrian and bicyclist accommodations. Chapter 17 defers to the AASHTO guide for bikeway design. The BDE does not establish legal standards for designing local streets.

### 1.6.3 Bureau of Local Roads and Streets Manual

Illinois Department of Transportation's Bureau of Local Roads and Streets Manual (BLR) is used by IDOT to review local and county projects that receive state funding, motor fuel tax or others. It plays mostly a procedural role in IDOT's review of projects. Locals may adopt the BLR; however, they may also adopt local standards. Units of government without locally adopted standards may use BLR for projects that do not receive state funding to provide additional liability protection.

Lawrence Ave Road Diet - Proposed Conditions

[4]Urgo, J., Wilensky, M., and Weissman, S., *Moving Beyond Prevailing Street Design Standards*, The Center for Law, Energy, and the Environment at the Berkeley Law School, 2010.

### 1.6.4 Local Street Manuals

Local jurisdictions follow the Green Book, the BDE, the BLR, or design guidance from organizations such as the Institute of Transportation Engineers (ITE) out of liability concerns. Neither federal nor state law mandates adoption or adherence to these guides. However, municipalities often adopt them to protect themselves from lawsuits. Further, many don't have the resources to develop their own standards and practices, so they adopt those in the Green Book, the BDE, or another previously adopted manual, or those of other cities.

A question often posed by plaintiffs' attorneys in traffic-related crashes is, "Were established or prevailing designs, standards, and guidance, followed?" If the attorneys can prove that the local jurisdictions deviated from established practices, they enhance their chances of winning a judgment against the jurisdiction. Therefore, agencies can get increased protection by adopting guidelines that reflect their design preferences.

Cities are authorized to adopt or modify their own practices, standards, and guidelines that may reflect differences from the Green Book, the BLR, and the BDE. If these changes generally fall within the range of acceptable practice allowed by nationally recognized design standards, the adopting agencies are protected from liability to the same extent they would be if they applied the Green Book, the BLR, or the BDE. The content of *Complete Streets Chicago* falls within this range of acceptable practices.

Working within previously established regional guidelines generally should result in a design that is protected from liability. However, the Green Book, the BLR, and the BDE are silent on many design features, and do not consider the needs within unique urban contexts. In these cases, it is common practice for agencies to develop their own guidelines and standards that incorporate international equivalents or practices from other cities. In developing unique City standards, the City demonstrates due diligence and reasonable action in their roadway development process.

When agencies elect to utilize designs that fall outside the guidelines of nationally recognized documents, they need to use additional care to ensure they do not expose themselves to liability. In these cases, to minimize liability, local jurisdictions either need to adopt their own standards (which should be based on rationale or evidence of reasonableness), or they can conduct a pilot project. When conducting an experimental pilot project, agencies need to show that they are using the best information that is reasonably available to them at the time, document why they are doing what they are doing, use a logical process, and monitor the results and modify accordingly. This is because the agency may be required in the future to show that its design is reasonable, and the agency may not be able to cite a nationally published guideline or recommendation to support its local action.

Often, pilot projects are conducted because the design engineer has reason to believe that the new or evolved design will be safer or otherwise more effective for some purpose than if a prevailing standard and guideline is used. The reasons or rationales for pilot projects are based on engineering judgment and should be documented to further minimize exposure to liability. Unless otherwise noted, everything in *Complete Streets Chicago* can readily be adopted and incorporated without fear of increased liability.

In some cases, AASHTO design guidelines may not provide information on innovative or experimental treatments that have shown great promise in early experiments and applications. Since AASHTO is a design guide, agencies have some flexibility to use designs that fall outside the boundaries of the AASHTO guide. Deviation from the range of designs provided in the AASHTO guide requires agencies to use greater care and diligence to document their justification, precautions, and determination to deviate from the guidelines. These include consideration/analysis and approval by a registered engineer qualified to sign the plans, and could include certification by a reviewing body clearly indicating the agency's intent. This process documents the engineering judgment that went into the design.

Many cities today use various traffic calming measures to slow traffic and to improve neighborhood livability. Traffic calming measures are not traffic control devices and therefore the state exercises no jurisdiction over them.

Local agencies may currently use many other reports and documents to guide their roadway design and transportation planning. Other documents provide valuable procedure and reference data, but they do not set standards. They can be referred to and defined as standards by local agencies, but the local authority often has the flexibility to selectively endorse, modify, or define how these informational documents can be used or incorporated into its engineering and planning processes. Also, newer versions of these documents have additional information that can conflict with the local historical approach.

The expected results of the design approaches presented in *Complete Streets Chicago* are intended to improve safety and/or livability. As a result, implementation of these features should generally reduce liability and lawsuits. There is no way to prevent all collisions or lawsuits, but adopting policies, guidelines, and standards, and doing pilot projects with reasonable precautions is a defensible approach.

### 1.6.5 Manual on Uniform Traffic Control Devices (MUTCD)

The MUTCD provides standards and guidance for the design and application of all allowed traffic control devices including roadway markings, traffic signs, and signals. The Federal Highway Administration oversees application of the MUTCD. Illinois cities must also follow the Illinois Supplement to the MUTCD, which has some additional standards for Illinois not included in the federal MUTCD.

The rules and requirements for the use of traffic control devices are different than for street design criteria. Local agencies have limited flexibility to deviate from the provisions of the MUTCD in the use of traffic control devices due to the relationship between the MUTCD and state law. The MUTCD does provide flexibility within its general provisions for items such as application of standard traffic control devices, use of custom sign legends for unique situations, traffic sign sizes, and sign placement specifics.

In contrast, agencies do not generally have the flexibility to develop signs that are similar in purpose to signs within the manual while using different colors, shapes, or symbols. Agencies are also not authorized to establish traffic regulations that are not specifically allowed or are in conflict with state law. The provisions of the MUTCD and related state laws thus make it difficult to deploy new traffic control devices in Illinois. This can result in complications, especially in the areas of speed management, pedestrian crossings, and bikeway treatments.

The federal MUTCD and Illinois Supplement to the MUTCD establish warrants for the use of some traffic control devices. For example, stop signs, traffic signals, and flashing beacons are expected to meet minimum thresholds before application. These thresholds include such criteria as number of vehicles, number of pedestrians or other uses, distance to other devices, crash history, and more. These warrants often prevent local engineers from applying devices that, in their opinion, may improve safety. For example, trail and/or pedestrian crossings of busy, high-speed, wide arterial streets may need signals for user safety, but they may not meet the warrants.

As with street design guidelines, cities may establish their own warrants or modify those suggested by the MUTCD to suit their context in order to use some traffic control devices. In special circumstances that deviate from their own warrants, cities need to document their reasons for the exception. For example, they may say trail crossings or school crossings qualify for certain traffic control devices.

### 1.6.6 Illinois Fire Code

The Illinois Fire Code and the City of Chicago Fire Prevention Code can impede street design in limited circumstances. Both use the National Fire Code as a basis. The National Fire Code is written by a private agency and has no official legal standing unless states or municipalities adopt its guidelines, as is the case in Illinois and the City of Chicago. The primary barrier caused by this adoption is the requirement for a minimum of 20 feet of unobstructed clear path on streets. This prevents municipalities from designing "skinny" and "yield" streets to slow cars and to make the streets safer, less land consumptive and more hospitable to pedestrians and bicyclists.

There are ways around this requirement. If the local jurisdiction takes measures such as installing sprinklers and adding extra fire hydrants, or the adjacent buildings are built with fire retardant materials, it may be able to get the local fire department to agree to the exception.

Alternatively, the state legislature could repeal its adoption of the 20-foot clear path requirement due to:

- » The arbitrary and un-researched nature of the provision;
- » The safety problems associated with the resulting excessively wide streets;
- » The contradiction that this provision causes with properly researched guidelines and standards by ITE, CNU, AASHTO, and others for streets under 34 feet wide; and,
- » The potential liability that the 20-foot clear provision creates for designers who maintain, modify, or design streets that do not provide 20-foot clear paths.

It is likely that the state legislature and the City were unaware of these issues when adopting their existing fire codes.

### 1.6.7 Illinois Vehicle Code

The Illinois Vehicle Code includes laws that must be followed in street design. These are embodied in the MUTCD and Illinois Supplement to the MUTCD. Changes to the Illinois Vehicle Code may cause the MUTCD and Illinois Supplement to the MUTCD to change.

# CHAPTER TWO: TYPOLOGY

# CHAPTER TWO: TYPOLOGY

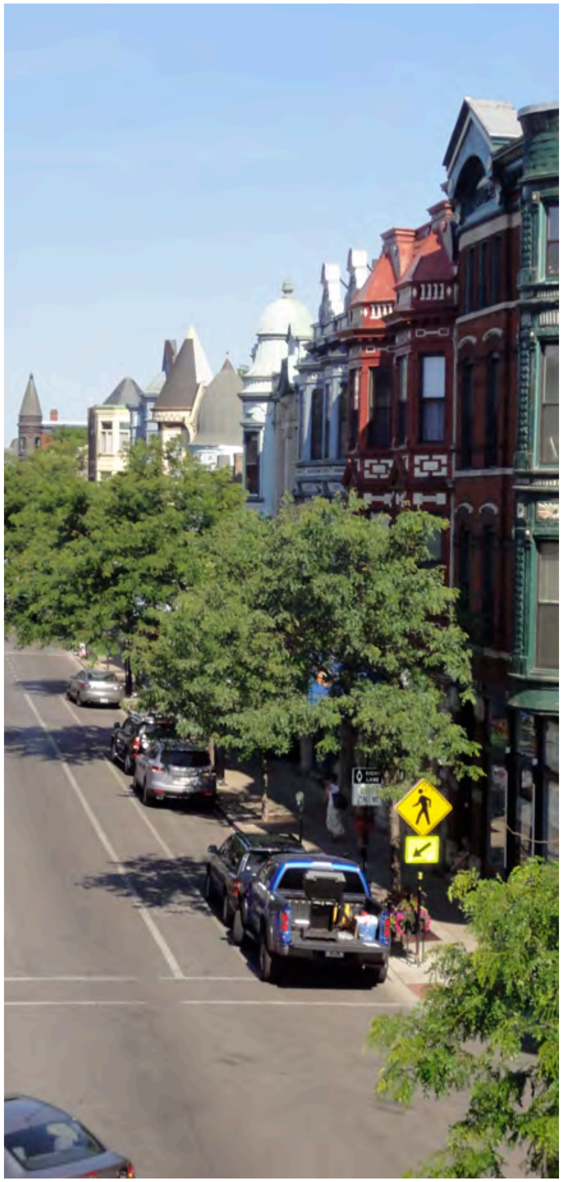
Typology, the study of types, is used by transportation professionals to categorize streets and their contexts by type, or similar characteristics. They help in the selection of treatments which best reflect the surrounding environment, best accommodate all modes, best reflect regulatory strictures, and best affect desired outcomes: complete streets. Historical, existing, proposed and desired conditions may be considered when establishing typologies.

## Complete Zoning

Typologies can be used to establish a citywide street classification system, similar to the zoning and land use process. A citywide street classification system would require a master planning process and may need to involve more structured collaboration with other city agencies, IDOT, and Cook County. Such a process should look beyond existing conditions to articulate a plan for future conditions.

These policies and procedures will utilize four sets of typologies:

1. Building Form & Function – describes the character of the surrounding land uses, structures, regulatory framework, environmental, and economic characteristics.
2. Roadway Form & Function – describes the character of the roadway and its uses and function within the modal systems. Characteristics include right-of-way, design/target speeds, number of lanes, parking demand, traffic operations, and modal volumes.
3. Intersections & Crossings – categorizes how streets meet.
4. Overlays – describes the various statutory, operational, and planning categories such as snow routes, truck route, modal plans, and jurisdictions which impact design decisions.



## 2.1 Typology Sets

### 2.1.1 Building Form and Function

The important relationship between land use and transportation is well-established but often ignored. Understanding the context within which a street exists is an important first step.

The seven types for building form and function are specific to Chicago. They are influenced by the City's Zoning Ordinance as well as the Transect, an urban development theory. They simplify land use and zoning and apply them to street design; in effect serving as a code between roadway standards and zoning. See Figure 7 for a fuller description.

» R – residential

» M – mixed-use

» C – commercial center

» D – downtown

» IC – institutional or campus

» IN – industrial

» P – parks

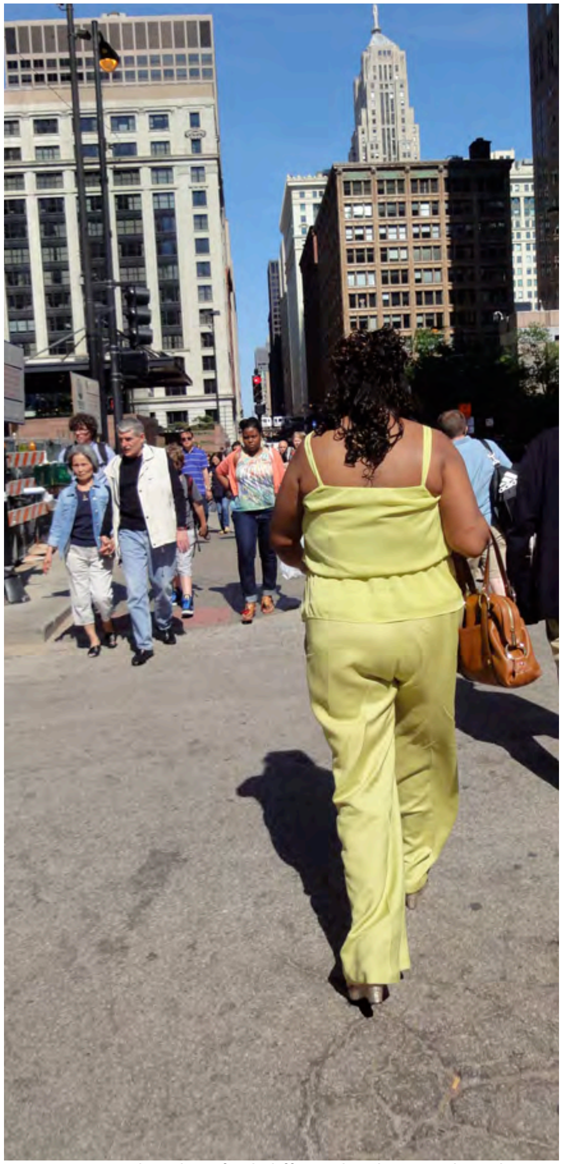
### *Transect*

The Building Form and Function types described above are modeled on the Transect. Transect is an urban development theory created by the Congress for New Urbanism which describes the progression of development from the center city to rural and natural areas. It can bridge land use regulation and roadway design. Transect promotes observing development patterns - population, housing, and parcel density; building setbacks; building types; roadway grid characteristics; land use; transit service - to classify streets and context.

Chicago can be categorized into two Transect zones:

» Urban – Urban areas are intense, and compact; with high transportation demand for all modes. Mass transit and mixed-use development are commonplace. The transportation network is highly connected. Most of the City of Chicago is within urban areas of the transect, including the downtown core, the center/corridor transitional areas, and the neighborhood areas. Examples include Wicker Park, Hyde Park, Pilsen, Lakeview, Edgewater, Chinatown, Logan Square, and Ukrainian Village.

» Suburban – Suburban areas are less intense. Suburban areas typically are designed to support separated land uses and promote residential character. Suburban regions have some transit service and areas of mixed use, often coinciding with historic development along thoroughfares. The transportation network is less connected; traffic is frequently routed to large arterials and freeways. Examples include Edison Park, Beverly, Peterson Park, Sauganash, Norwood Park, Hegwisch, and Morgan Park.



### 2.1.2 Roadway Form and Function

Historical focus on roadway characteristics such as traffic volume, speed and functional classification does not always yield complete streets. Using typologies inverts this approach: design decisions are informed by roadway context and by a hierarchy of mode prioritization, switching the "burden of proof" for design from traffic measurements and functional classification to placemaking and community preferences.

The six types for roadway form and function describe the physical layout of the roadway.[5] See Figure 8 for a fuller description.

» TH – Thoroughfare

» CN – Connector

» MS – Main Street

» NS – Neighborhood Street

» SW – Service Way

» PW – Pedestrian Way

[5]A street may be classified differently along its length. For example, Madison Street is a *Thoroughfare* to the west and a *Connector* within the Loop.

### Typologies and Functional Class

Functional classification is required by the Federal Highway Administration for projects that use federal funds. This system is largely auto-centric and its utility is limited in urban contexts; the street typology system presented in these policies and procedures is an alternative. To ensure that such a system does not preclude the city from applying for and receiving federal money, Figure 6 converts terminology.

### 2.1.3 Intersections and Crossings

The typologies above focus primarily on street segments. The seven types below describe intersections and crossings in the city. Their design is particularly important due to the potential for modal conflicts and thus crashes. See Figure 9 for a fuller description.

- SIG – signal
- RBT – roundabout, traffic circle
- AWS – all-way stop
- STY – stop, yield
- UNC – uncontrolled
- MID – midblock pedestrian crossing
- DW – driveway

**FIGURE 6**

| | Thoroughfare | Connector | Main Street | Neighborhood Street, Service Way, Pedestrian Way |
|---|---|---|---|---|
| Primary Arterial | | | | |
| Secondary Arterial | | | | |
| Collector | | | | |
| Local | | | | |

Conversion Chart for CDOT Street Typology and FHWA Functional Classification System

### 2.1.4 Overlays

The last set of types consists of overlays - jurisdiction, special use - that have an impact on design. For example, the design of a street overlaid with a state route will have to be coordinated with IDOT. A transit-priority street is one set to receive bus rapid transit. See Figure 10 for a fuller description.

- SRT – State Route
- CTY – County Route
- TRK – Truck Route
- SNW – Snow Route
- SRA – Strategic Regional Arterials
- MOB – Mobility Priority Street
- PED – Pedestrian Priority Street
- BIK – Bicycle Priority Street
- BRT – Transit Priority Street
- HBS – Historic Boulevard System
- TOD – Transit-Oriented District
- HZ – Home Zone

## *2.2 Typology Tables*

The following tables describe the typical characteristics of each typology along with examples and photos.

FIGURE 7

# BUILDING FORM AND FUNCTION

***Residential (R)***

Linden Place

Washington Boulevard

| | |
|---|---|
| **Typology Code** | R |
| **Typology Name** | Residential |
| **Characteristics** | » single-family houses<br>» low-density multi-family buildings<br>» non-residential uses such as schools and churches |
| **Typical Zoning Districts**[6] | RS, RT |
| **Typical Buildings** | Height is 1-3 stories with a front yard setback of 15 feet. Properties may have a gated front yard in addition to a sidewalk and parkway. |
| **Examples** | » Ravenswood<br>» Beverly<br>» Belmont west of Western<br>» Ashland north of Belmont<br>» South Shore Drive south of 71st Street |

[6]Chicago Zoning Ordinance.

FIGURE 7 (CON'T)

# BUILDING FORM AND FUNCTION

*Mixed-Use (M)*

Armitage Avenue

Halsted Street

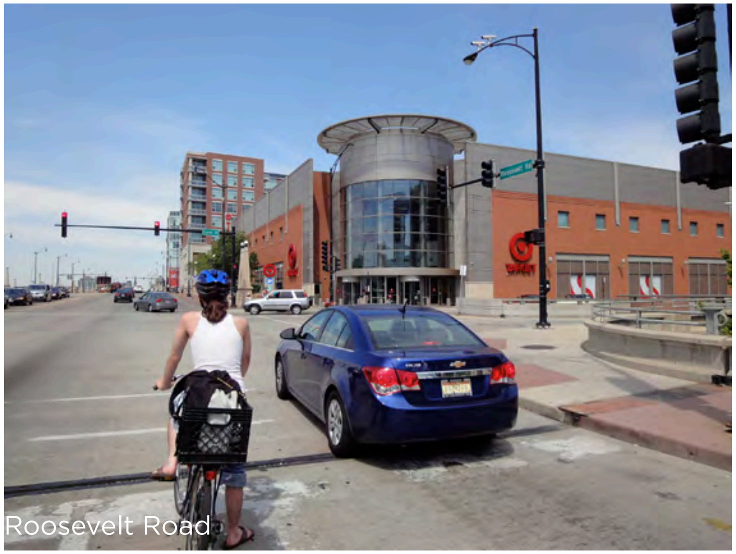
| | |
|---|---|
| **Typology Code** | M |
| **Typology Name** | Mixed-Use |
| **Characteristics** | » buildings with service and commercial uses on the ground floor that serve surrounding neighborhoods<br>» residential or office uses above the ground floor |
| **Typical Zoning Districts[6]** | RM, B1, B2 |
| **Typical Buildings** | Height is 2 or more stories and buildings typically abut the sidewalk |
| **Examples** | » 103rd (Longwood to Wood)<br>» Damen Avenue |

[6]Chicago Zoning Ordinance.

FIGURE 7 (CON'T)

# BUILDING FORM AND FUNCTION

## *Commercial Center (C)*


Roosevelt Road

North Avenue

| | |
|---|---|
| **Typology Code** | C |
| **Typology Name** | Commercial Center |
| **Characteristics** | » concentration of commercial uses that draw from a large area<br>» may be stand-alone commercial buildings<br>» may be part of mixed-use buildings |
| **Typical Zoning Districts**[6] | RM, B2, B3, C1, C2 |
| **Typical Buildings** | Height varies considerably from one-story commercial buildings to high-rise mixed-use, residential and office buildings. Buildings abut the sidewalk. Surface parking lots and parking structures are common |
| **Examples** | » Ashland Avenue<br>» Sheridan Road<br>» Madison Street<br>» Broadway Avenue<br>» Milwaukee Avenue<br>» North Avenue |

[6]Chicago Zoning Ordinance.

FIGURE 7 (CON'T)

# BUILDING FORM AND FUNCTION

***Downtown (D)***

Dearborn Street

Randolph Street

| | |
|---|---|
| **Typology Code** | D |
| **Typology Name** | Downtown |
| **Characteristics** | » high-rise mixed-use, residential or office buildings centrally located within the city. |
| **Typical Zoning Districts**[6] | DR, DS, DC, DX |
| **Typical Buildings** | Buildings are tall and dense. Sidewalks are wide and buildings abut the sidewalk |
| **Examples** | » Loop<br>» River North |

[6]Chicago Zoning Ordinance.

FIGURE 7 (CON'T)

# BUILDING FORM AND FUNCTION

## *Institutional or Campus (IC)*


DePaul University: Fullerton Avenue


Illinois Medical District: Taylor Street

| | |
|---|---|
| **Typology Code** | IC |
| **Typology Name** | Institutional or Campus |
| **Characteristics** | » large-scale development (2+ acres) under unified control and organized like a campus typically surrounded by gates and controlled access |
| **Typical Zoning Districts[6]** | PD |
| **Typical Buildings** | Various building types mostly facing inward to a courtyard; not the street |
| **Examples** | » St. Joseph Hospital<br>» University of Illinois-Chicago |

[6]Chicago Zoning Ordinance.

FIGURE 7 (CON'T)

# BUILDING FORM AND FUNCTION

## *Industrial (IN)*


Kinzie Industrial Corridor


Hubbard Street

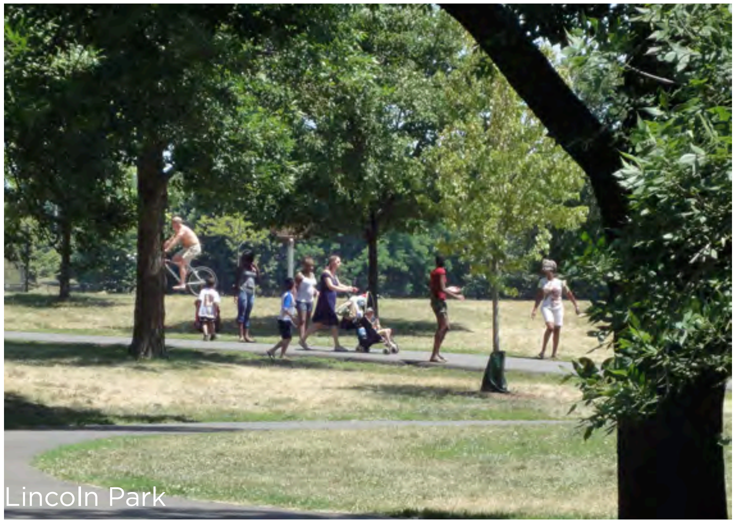
| | |
|---|---|
| **Typology Code** | IN |
| **Typology Name** | Industrial |
| **Characteristics** | » manufacturing, wholesale and industrial uses<br>» may be organized into a campus or industrial corridor<br>» requires accommodation for large trucks |
| **Typical Zoning Districts[6]** | C3, M2, M3, PMD |
| **Typical Buildings** | Height is 1-4 stories. Buildings may abut the sidewalk but entrances are oriented away from streets, to internal access |
| **Examples** | » Blue Island Avenue<br>» Kinzie Street from Kedzie Avenue to Halsted Street<br>» Goose Island |

[6]Chicago Zoning Ordinance.

FIGURE 7 (CON'T)

# BUILDING FORM AND FUNCTION

## *Parks (P)*


Lincoln Park


Ping Tom Park

| | |
|---|---|
| **Typology Code** | P |
| **Typology Name** | Parks |
| **Characteristics** | » intentional open spaces such as parks, forest preserves, and bodies of water<br>» street entirely within or bordering a park<br>» park-like medians |
| **Typical Zoning Districts**[6] | POS |
| **Typical Buildings** | These areas are not defined by their buildings (which are internal) but do have discernible edges[7]. |
| **Examples** | » Millennium Park<br>» Washington Park<br>» Chicago River<br>» Museum of Science and Industry<br>» Munoz Marin in Humboldt Park<br>» Lincoln Park West<br>» Stony Island<br>» Cannon Drive<br>» South Shore Drive |

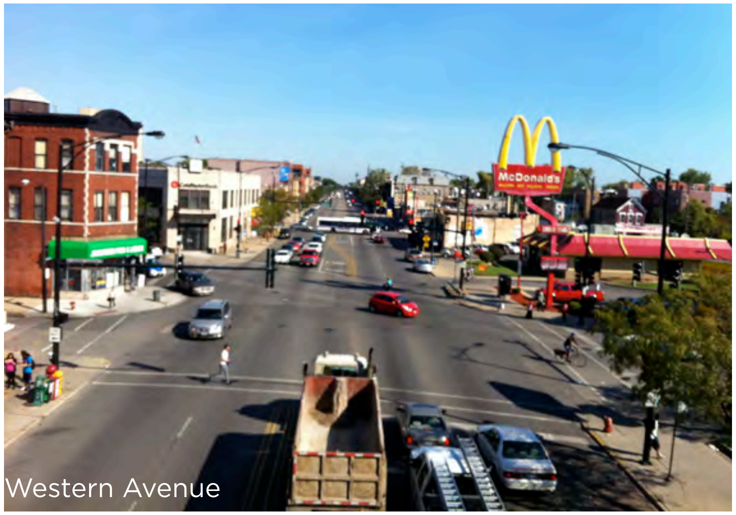
[6]Chicago Zoning Ordinance.
[7]More information can be found in CDOT's *Make Way for Play*.

FIGURE 8

# ROADWAY FORM AND FUNCTION

## *Thoroughfare (TH)*


Logan Boulevard



Western Avenue

| | | |
|---|---|---|
| **Typology Code** | TH | |
| **Typology Name** | Thoroughfare | |
| **Definition** | » widest right-of-way<br>» raised medians<br>» may have side medians, green space, large sidewalks<br>» serves through and local functions<br>» not generally commercial | |
| **Characteristics** | Lanes | 4+ |
| | Speed[8] | 25-30 mph |
| | Blocks | 660-1320 ft |
| | ADT | 20k and higher |
| | Flow | 2 way |
| **Examples** | » Logan Boulevard<br>» Garfield Boulevard<br>» Stony Island<br>» Western Avenue<br>» Fullerton Avenue<br>» Ogden Avenue<br>» Cicero Avenue | |

[8]Speed refers to Target Speed, see Section 3.5.5.

FIGURE 8 (CON'T)

# ROADWAY FORM AND FUNCTION

## *Connector (CN)*


Indiana Avenue


Ashland Avenue

| | | |
|---|---|---|
| **Typology Code** | CN | |
| **Typology Name** | Connector | |
| **Definition** | » main roads<br>» may have median<br>» connects between urban centers<br>» may be commercial | |
| **Characteristics** | Lanes | 2 to 4 |
| | Speed[8] | 20-30 mph |
| | Blocks | 300-660 ft |
| | ADT | 5-25k |
| | Flow | 1 or 2 way |
| **Examples** | » North Avenue<br>» Harlem Avenue<br>» Ashland Avenue<br>» Milwaukee Avenue<br>» Most of the streets in the Loop | |

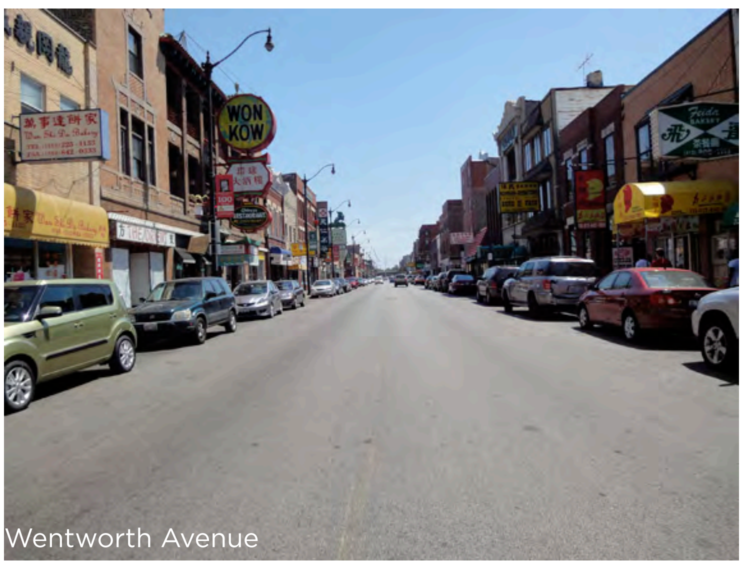
[8]Speed refers to Target Speed, see Section 3.5.5.

Figure 8 (CON'T)

# ROADWAY FORM AND FUNCTION

## *Main Street (MS)*

Peoria Street




Wentworth Avenue

| | | |
|---|---|---|
| **Typology Code** | MS | |
| **Typology Name** | Main Street | |
| **Definition** | » serves mostly local traffic<br>» connects neighborhoods and commercial areas<br>» may be commercial | |
| **Characteristics** | Lanes | 1 to 3 |
| | Speed[8] | 15-20 mph |
| | Blocks | 150-300 ft |
| | ADT | 3-15k |
| | Flow | 1 or 2 way |
| **Examples** | » Grace Street<br>» 35th Street<br>» South Hyde Park Boulevard | |

[8]Speed refers to Target Speed, see Section 3.5.5.

FIGURE 8 (CON'T)

# ROADWAY FORM AND FUNCTION

## *Neighborhood Street (NS)*

Concord Place

Wolcott Avenue

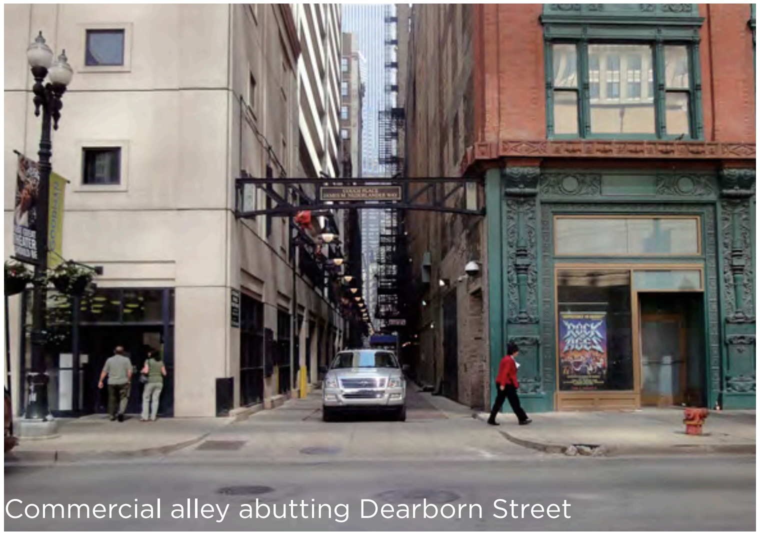
| | | |
|---|---|---|
| **Typology Code** | NS | |
| **Typology Name** | Neighborhood Street | |
| **Definition** | » almost all local traffic<br>» serve residential areas<br>» no centerline or lane striping required | |
| **Characteristics** | Lanes | 1 |
| | Speed[8] | 10-20 mph |
| | Blocks | <300 ft |
| | ADT | <6k |
| | Flow | 1 or 2 way |
| **Examples** | » Albany Street in Logan Square<br>» South Ingleside Avenue at University of Chicago | |

[8]Speed refers to Target Speed, see Section 3.5.5.

FIGURE 8 (CON'T)

# ROADWAY FORM AND FUNCTION

## *Service Way (SW)*



Commercial alley abutting Dearborn Street

Residential alley abutting Honore Street

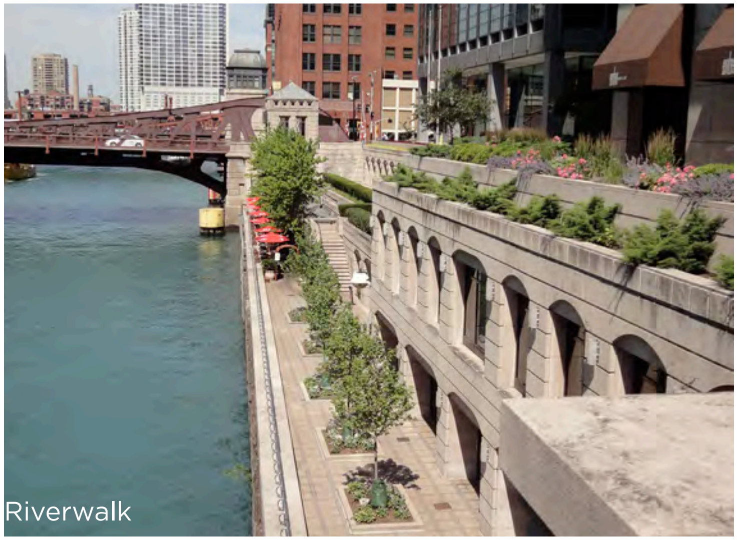
| | | |
|---|---|---|
| **Typology Code** | SW | |
| **Typology Name** | Service Way | |
| **Definition** | » narrow roadway<br>» no sidewalks<br>» provides a short service link between two streets | |
| **Characteristics** | Lanes | 1 |
| | Speed[8] | 5-10 mph |
| | Blocks | NA |
| | ADT | NA |
| | Flow | 1 or 2 way |
| **Examples** | » Court Place<br>» WOOGMS Alley | |

[8]Speed refers to Target Speed, see Section 3.5.5.

FIGURE 8 (CON'T)

# ROADWAY FORM AND FUNCTION

## *Pedestrian Way (PW)*



Riverwalk


Museum Campus

| | | |
|---|---|---|
| **Typology Code** | PW | |
| **Typology Name** | Pedestrian Way | |
| **Definition** | » pedestrian passageway or walkway<br>» not necessarily along a typical roadway<br>» pedestrian access between buildings | |
| **Characteristics** | Lanes | NA |
| | Speed[8] | NA |
| | Blocks | NA |
| | ADT | NA |
| | Flow | NA |
| **Examples** | » Millennium Park<br>» Riverwalk<br>» Chicago Pedway | |

[8]Speed refers to Target Speed, see Section 3.5.5.

FIGURE 9

# INTERSECTIONS AND CROSSINGS

## *Signal (SIG)*

103rd Street

Damen/Milwaukee/North

| | |
|---|---|
| **Typology Code** | SIG |
| **Typology Name** | Signal (including 6-way intersections) |
| **Definition** | Intersections controlled by a traffic signal |
| **Characteristics** | Complete signals address all modes and are ADA-compliant |
| **Examples** | » North Avenue-Milwaukee Avenue-Damen Avenue<br>» Clark Street and Division Street |

## Figure 9 (CON'T)

# INTERSECTIONS AND CROSSINGS

### *Roundabout (RBT)*

Belden Avenue

Catalpa Avenue

| | |
|---|---|
| **Typology Code** | RBT |
| **Typology Name** | Roundabout (traffic calming circle, mini-roundabout) |
| **Definition** | Circular island within the intersection. May have splitter islands. Not signalized |
| **Characteristics** | Roundabouts should be consistent with the modal hierarchy, should accommodate all modes, and must be ADA-compliant |
| **Examples** | » Altgeld Street & St. Louis Avenue<br>» Catalpa Avenue & Wayne Avenue |

FIGURE 9 (CON'T)

# INTERSECTIONS AND CROSSINGS

## *All-way Stop (AWS)*


Winchester Street


Oakley Street

| | |
|---|---|
| **Typology Code** | AWS |
| **Typology Name** | All-way Stop |
| **Definition** | Intersections where all legs of the intersection are controlled by stop signs |
| **Characteristics** | In that stop and yield signs are typically installed to manage auto traffic, the locations need to be analyzed to ensure that other modes are accommodated |
| **Examples** | » Oakley Street & Polk Street<br>» Howard Street-Rogers Avenue-Greenview Avenue |

**Figure 9 (CON'T)**

# INTERSECTIONS AND CROSSINGS

## *Stop, Yield (STY)*

Westhaven Park


Commercial Avenue

| | |
|---|---|
| **Typology Code** | STY |
| **Typology Name** | Stop, yield (1-way or 2-way) |
| **Definition** | Intersections where the major street is uncontrolled, but the minor street is controlled by a stop or yield sign |
| **Characteristics** | These locations need to be analyzed to ensure that non-motorized modes are accommodated, see Pedestrian Crossings, Sections 3.4.3, and CDOT's Bicycle Section |
| **Examples** | » Kinzie Street & Clinton Street<br>» Jackson Boulevard & Albany Avenue |

FIGURE 9 (CON'T)

# INTERSECTIONS AND CROSSINGS

## *Uncontrolled (UNC)*

California Avenue

Dickens Street

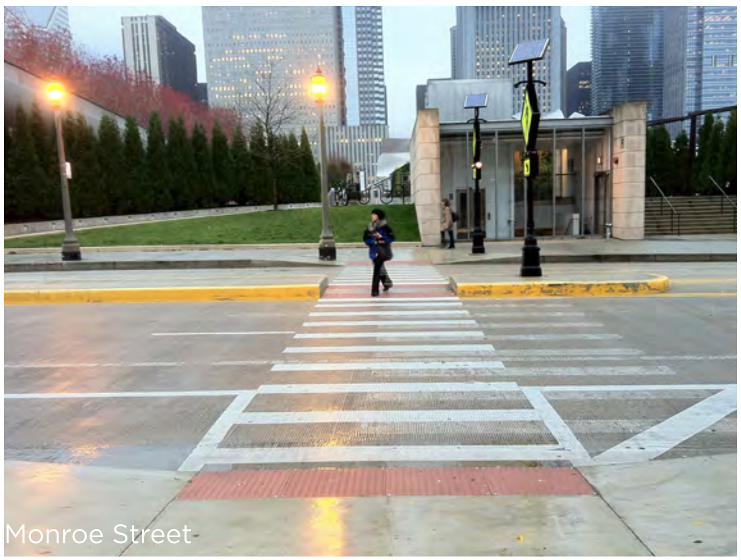
| | |
|---|---|
| **Typology Code** | UNC |
| **Typology Name** | Uncontrolled |
| **Definition** | Intersections that have no traffic control device (stop sign, signal) |
| **Discussion** | Typically these occur at low vehicle volume locations; nevertheless they need to be analyzed for pedestrian and bicycle access, especially crossings |
| **Examples** | » California Blue Line Stop<br>» Dickens Street & Honore Street |

Figure 9 (CON'T)

# INTERSECTIONS AND CROSSINGS

***Mid-block Crossing (MID)***

Clark Street



Monroe Street

| | |
|---|---|
| **Typology Code** | MID |
| **Typology Name** | Mid-block pedestrian crossing |
| **Definition** | Street crossing between formal intersections. May or may not have designated crossing faciities or traffic control devices |
| **Characteristics** | See Pedestrian Crossings, Section 3.4.3 |
| **Examples** | » City Hall<br>» Humboldt Park |

## FIGURE 9 (CON'T)

# INTERSECTIONS AND CROSSINGS

***Driveway (Curb Cuts) (DW)***

Exchange Avenue


Honore Street

| | |
|---|---|
| **Typology Code** | DW |
| **Typology Name** | Driveway (curb cuts) |
| **Definition** | Access to private property. Considered an intersection as auto traffic intersects the sidewalk |
| **Characteristics** | See Driveways, Section 3.4.4 |
| **Examples** | » Residential driveways<br>» Commercial parking lots |

## FIGURE 10

# OVERLAYS

### *State Route (SRT)*


North Avenue

Irving Park Road

| | |
|---|---|
| **Typology Code** | SRT |
| **Typology Name** | State Route |
| **Source** | IDOT |
| **Discussion** | Approximately 37% of Chicago's major roadways are under state jurisdiction. This limits the city's ability to control and maintain its street network. An inter-agency directive provides guidance on when and how to use jurisdictional transfer for such streets. |

FIGURE 10 (CON'T)

# OVERLAYS

## *County Route (CTY)*

Lincoln Avenue

Ashland Avenue

| Typology Code | CTY |
|---|---|
| Typology Name | County Route |
| Source | Cook County |
| Discussion | Most county highways within the city fall into one of two categories: 1) county jurisdiction but maintained by the city, and 2) municipal extensions of county highways that are under city jurisdiction. CDOT effectively controls these streets; coordination with the County is often a formality. |

## FIGURE 10 (CON'T)

# OVERLAYS

### *Truck Route (TRK)*

North Avenue

Halsted Street

| | |
|---|---|
| **Typology Code** | TRK |
| **Typology Name** | Truck Route |
| **Source** | CDOT |
| **Discussion** | CDOT maintains a GIS layer of truck routes.[8] In addition to being designated as a truck route, there should be at least 5% multiple-unit truck traffic. |

[8] A task order to update the City's truck routes is forthcoming

## FIGURE 10 (CON'T)

# OVERLAYS

***Snow Route (SNW)***


Snow Route Signage

Snow Truck

| | |
|---|---|
| **Typology Code** | SNW |
| **Typology Name** | Snow Route |
| **Source** | CDOT |
| **Discussion** | There are two types of snow routes in Chicago: 1) where parking is restricted from Dec 1 to April 1, and 2) where parking is restricted when 2" or more of snow accumulates. Snow plowing is planned for and accommodated on these routes. |

FIGURE 10 (CON'T)

# OVERLAYS

*Strategic Regional Arterial (SRA)*


Roosevelt Road

Halsted Street

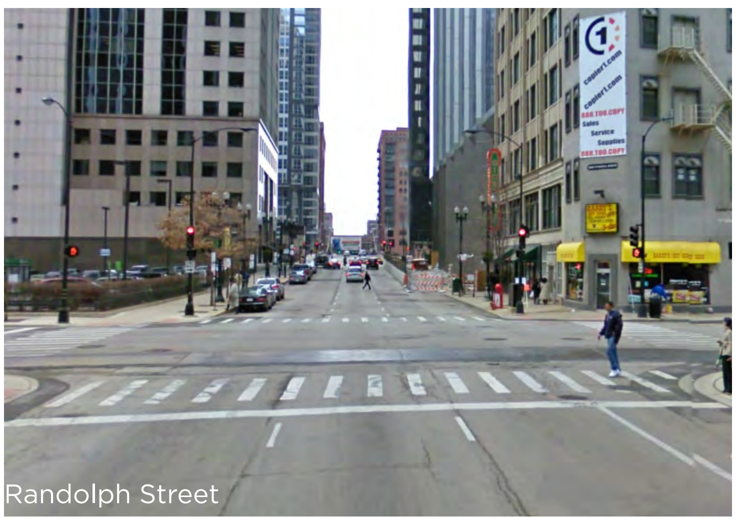
| | |
|---|---|
| **Typology Code** | SRA |
| **Typology Name** | Strategic Regional Arterial |
| **Source** | CMAP, IDOT |
| **Discussion** | Streets designated to carry higher volumes and speeds as a complement to the expressway system. Parking and traffic signals are restricted. |

FIGURE 10 (CON'T)

# OVERLAYS

## *Mobility Priority Street (MOB)*

Monroe Street



Randolph Street

| Typology Code | MOB |
|---|---|
| Typology Name | Mobility Priority Streets |
| Source | CZO |
| Discussion | Connect commuter rail stations with the downtown employment core. Section 17-4-0600 of the Chicago Zoning Ordinance designates Mobility Streets and requires 14' sidewalks to accommodate special pedestrian movement needs. |

## FIGURE 10 (CON'T)

# OVERLAYS

### *Pedestrian Priority Street (P Street) (PED)*

Lincoln Avenue

| | |
|---|---|
| **Typology Code** | PED |
| **Typology Name** | Pedestrian Priority Street (P-street) |
| **Source** | CZO |
| **Discussion** | Sections 17-3-0500 and 17-4-0500 of the Chicago Zoning Ordinance designate Pedestrian Streets for Chicago's best examples of pedestrian-oriented shopping streets. Curb cuts are not allowed and other building design standards (setbacks, window transparency) are also required. |


Wentworth Avenue

FIGURE 10 (CON'T)

# OVERLAYS

## *Bicycle Priority Street (BIK)*


Kinzie Street


Elston Avenue

| | |
|---|---|
| **Typology Code** | BIK |
| **Typology Name** | Bicycle Priority Street (bicycle spoke route, signal timing for bikes) |
| **Source** | CDOT (proposed) |
| **Discussion** | CDOT will identify select corridors where cycling will be prioritized ahead of other modes, which will influence the modal hierarchy and subsequent design. |

FIGURE 10 (CON'T)

# OVERLAYS

*Transit Priority Street (BRT)*

Madison Street

Milwaukee Avenue

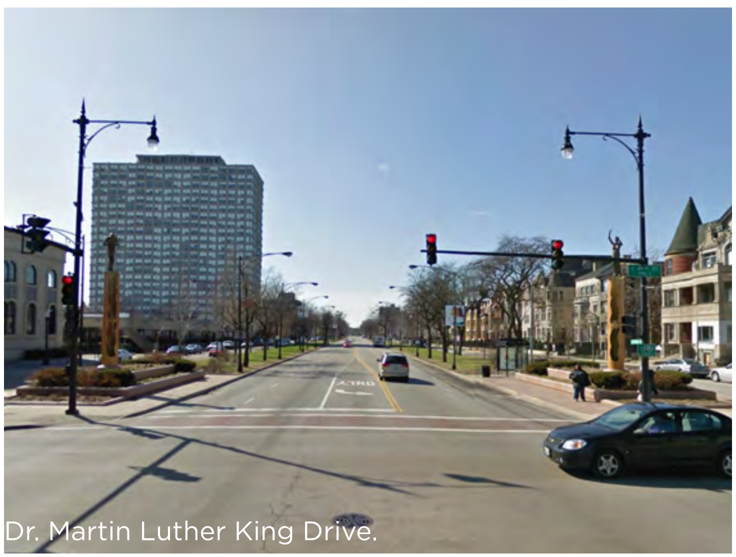
| | |
|---|---|
| **Typology Code** | BRT |
| **Typology Name** | Transit Priority Street |
| **Source** | CDOT/CTA (proposed) |
| **Discussion** | CDOT & CTA will identify select corridors where transit will be prioritized ahead of other modes, which will influence the modal hierarchy and subsequent design. |

FIGURE 10 (CON'T)

# OVERLAYS

## *Historic Boulevard System (HBS)*

Logan Boulevard



Dr. Martin Luther King Drive.

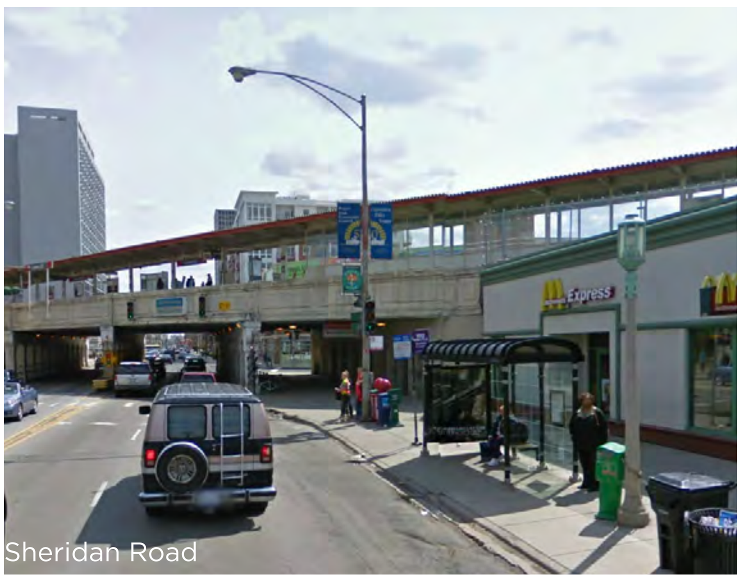
| | |
|---|---|
| **Typology Code** | HBS |
| **Typology Name** | Historic Boulevard System |
| **Source** | DHED |
| **Discussion** | Chicago's historic boulevards are listed on the National Register for Historic Places and a defining characteristic of the city's street network. |

FIGURE 10 (CON'T)

# OVERLAYS

## *Transit-Oriented District (TOD)*

Damen Avenue



Sheridan Road

| | |
|---|---|
| **Typology Code** | TOD |
| **Typology Name** | Transit-Oriented District (El stops) |
| **Source** | CDOT/CTA/DHED (proposed) |
| **Discussion** | These areas require special consideration for riders who arrive on foot, by bicycle, bus or taxi. The City has a working group to formally zone these areas. |

FIGURE 10 (CON'T)

# OVERLAYS

## *Home Zone (HZ)*


Albany Street

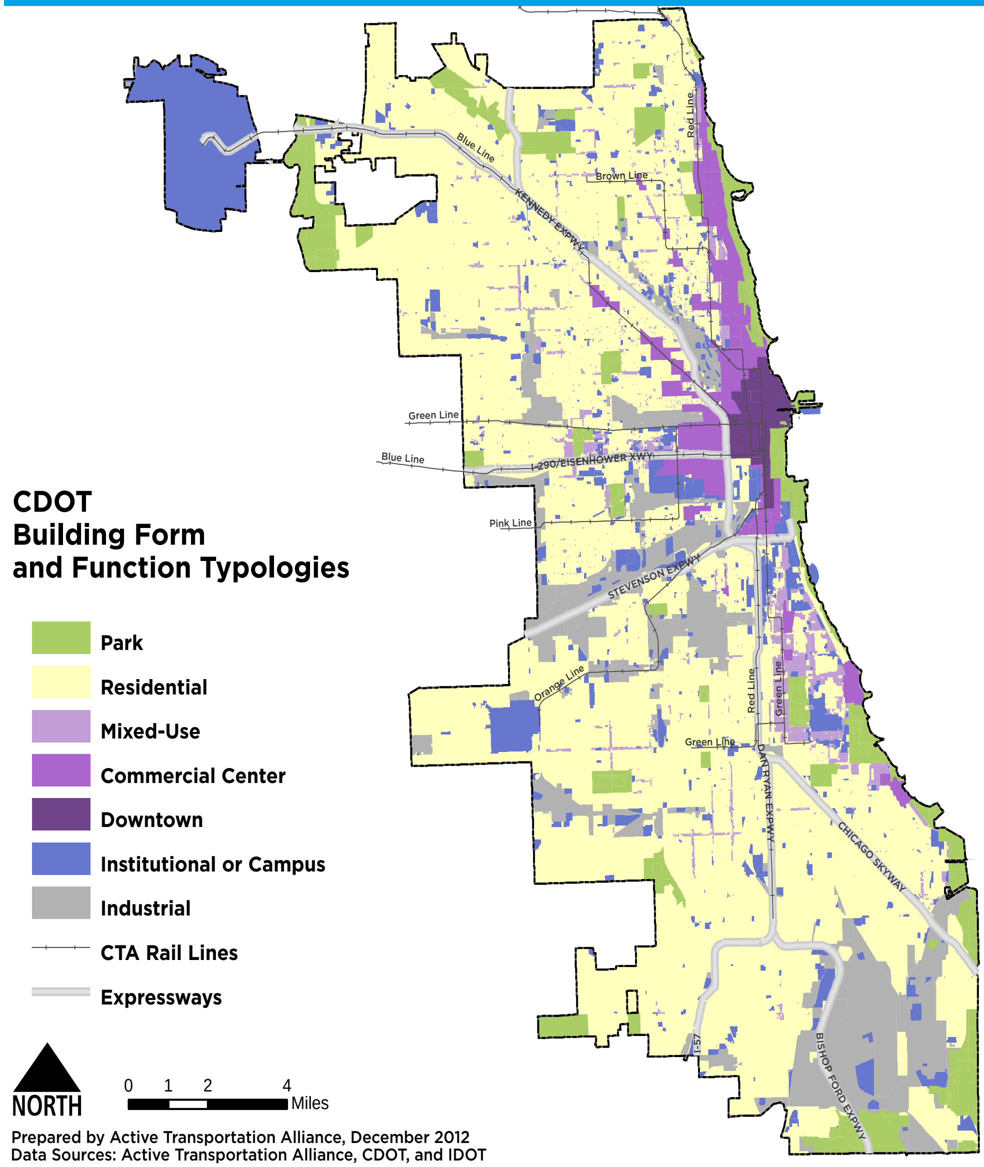

Harding Street

| | |
|---|---|
| **Typology Code** | HZ |
| **Typology Name** | Home Zone (shared street) |
| **Source** | CDOT (proposed) |
| **Discussion** | Home Zone is a new type of street to be developed by CDOT. It is a residential street, maybe with some commercial, that uses physical traffic calming techniques to slow vehicles to walking speed. Typically it is a shared space with no separation between modes. |

## Using Typology Maps as a First Step to a Transportation Master Plan

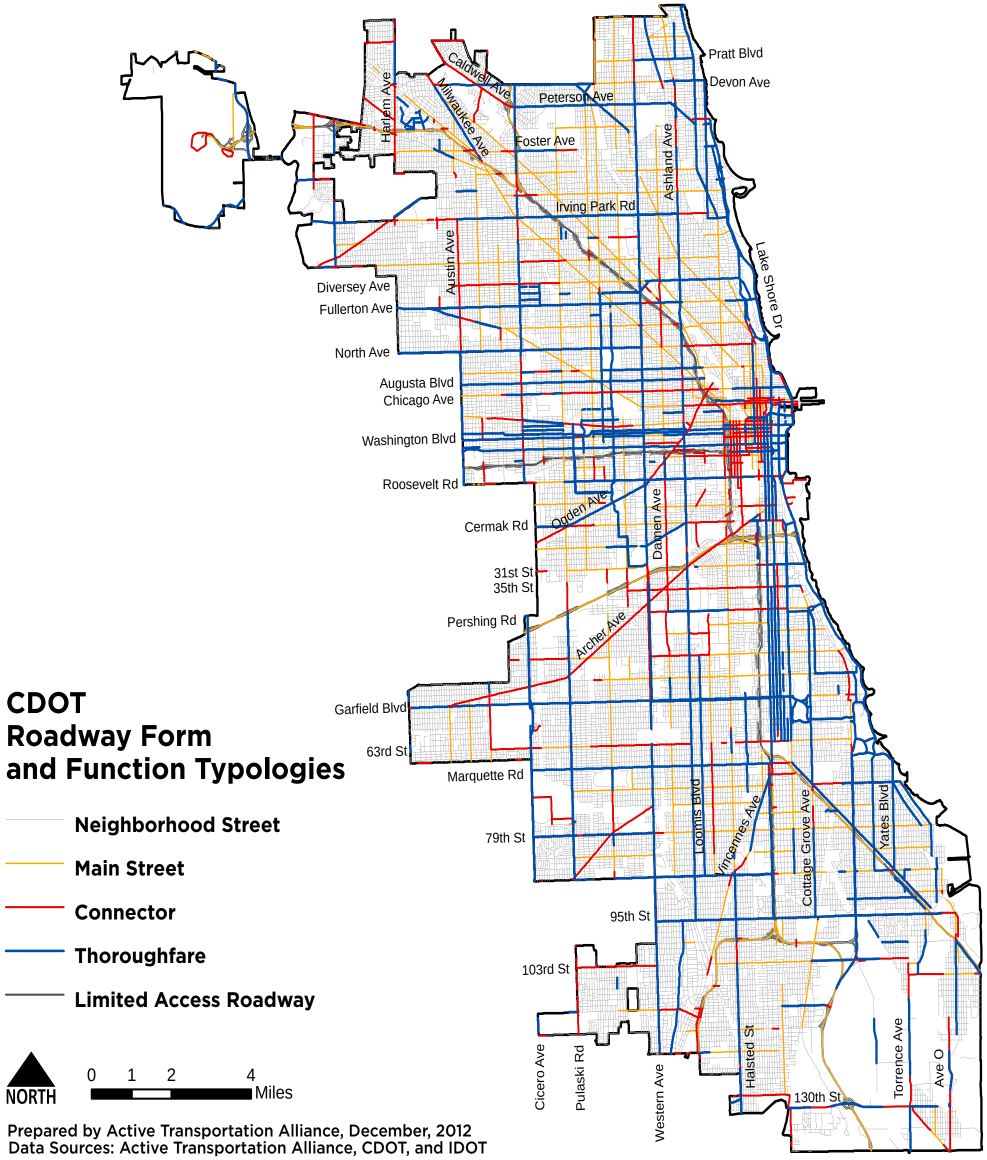
The maps in Figure 11 demonstrate how this typology system would inform a master planning process. The map on the left shows the building form and function, as extrapolated from land use and zoning data. It clearly illustrates the pattern of development in the city - along the waterfront, along transit lines, and in neighborhood nodes. The map on the right shows the street network, coded by the typologies above. Technical documentation can be found in Appendix A.

**FIGURE 11**




Sample Citywide Typology Maps

## CDOT Roadway Form and Function Typologies




Prepared by Active Transportation Alliance, December, 2012
Data Sources: Active Transportation Alliance, CDOT, and IDOT

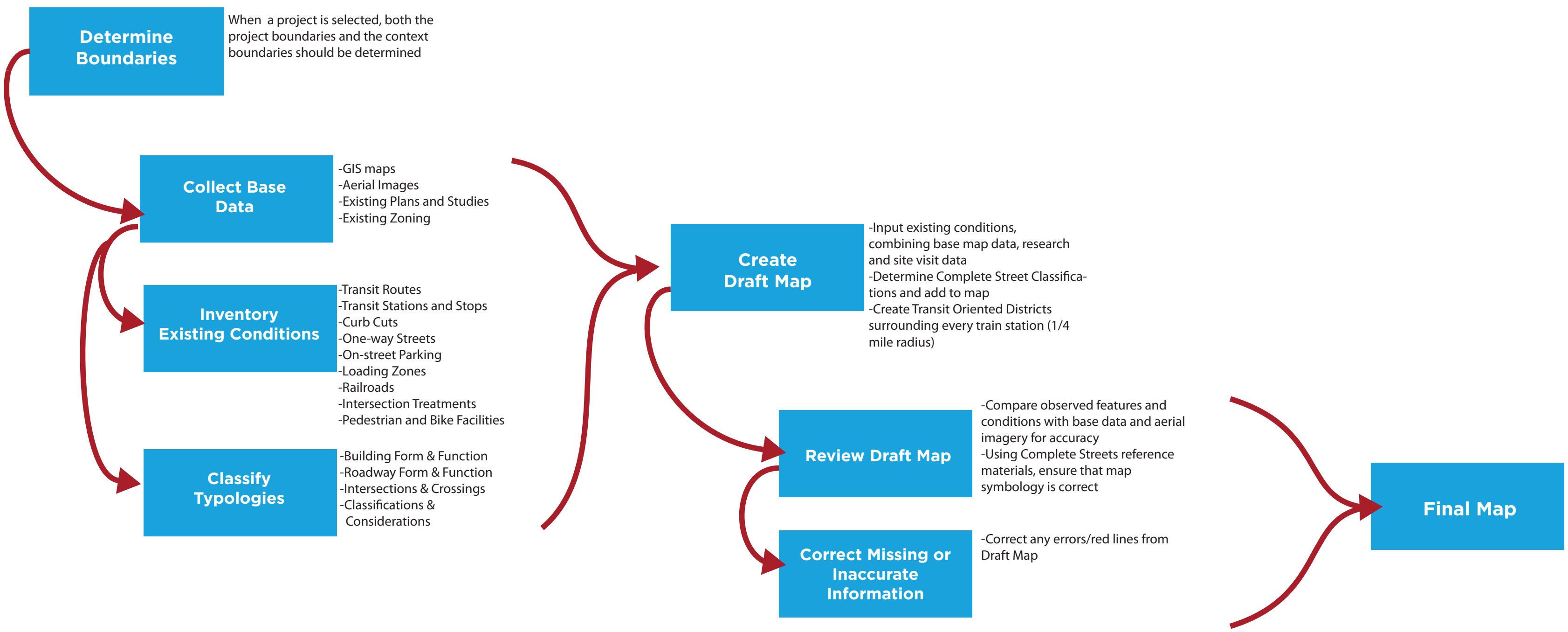
## 2.3 *Typology Protocols*

As described above, classifying streets by type will ensure recognition of all users and contexts. This section establishes protocols for mapping the four typology sets and other typical project information, see Figure 12. The information will be assembled and mapped in the scoping phase by project managers with assistance from various city GIS resources.

The GIS working group will review which data can be collected and mapped on a citywide basis, and which is to be collected for individual projects.

Chapter 4 includes a project list and information as to which CDOT projects will require a typology application, which projects will have the option of typology application, and which projects will not require the use of typology. Typology mapping will also be used for operations (signal timing) and maintenance work (resurfacing).

**FIGURE 12**




Typology Mapping Flow Chart

### 2.3.1 Information Sets

Project Managers will create a comprehensive project assessment, using data sets, on which to base scoping, planning and design decisions. Currently the following GIS layers are available.

**Street Network GIS Layers**

» CDOT_MIDL: All streets, ROW width, other attributes - CDOT Internal Data Set

» Major_streets: Major streets and freeways only (no speed limits or volumes) – CDOT Internal Data Set

» Chicago_streets_intersect: Most Chicago streets (no speed limits, volumes, or jurisdictional information) – CDOT Internal Data Set

» Bike_Routes: All major bicycle facilities (planned and existing) – CDOT Internal Data Set

» Curbs: curblines (some out of date) – CDOT Internal Data Set

» Jurisdiction: jurisdiction of most streets, between IDOT, CDOT, IDOT owned/ CDOT maintained. Doesn't cover all streets, but presumably covers all IDOT streets – CDOT Internal Data Set

» Pedway_Routes: Designates the downtown Pedway system – CDOT Internal Data Set

**Transit GIS Layers**

» CTA_Line: CTA Rail Lines – CTA Data Portal

» CurrentBus: CTA Bus Lines (with Route Name) - CTA Data Portal

» CTA_Stations: CTA Rail Stations – CTA Data Portal

**Other GIS Layers**

» Chicago_City_Limits – polygon of the city limits – City of Chicago Data Portal

» Chicago_Parcels – parcels (does not appear to be up to date) – City of Chicago Data Portal

» Cook_County_Parcels – parcels (does not appear to be up to date) – City of Chicago Data Portal

» Buildings – (does not appear to be up to date) – City of Chicago Data Portal

» (Facilities) – various shapefiles for landmarks (hospitals, schools, libraries, parks, community centers) – City of Chicago Data Portal

To complement the existing GIS layers, other GIS layers and information sets will need to be created either systematically or on a project-by-project basis. This includes data to map the four typologies and other data typically collected for a project. For the four typologies, refer to the tables above, consulting with other departments and agencies as necessary. For example a particular corridor might be slated for bus rapid transit by CDOT and the CTA which would give it the BRT designation in Figure 11. Determining the Building Form and Function will require a qualitative assessment using Figure 7 as a guide in consultation with DHED. Other data (number of lanes, intersection control, volumes) can be assembled from existing reports and field visits.

***Creating project maps with typologies and multi-modal information is an important step in creating complete streets. This will move the agency away from decisions based solely on vehicle level of service.***

## 2.3.2 Sample Maps

The following maps apply typology mapping to two locations. Figure 13 is North Milwaukee Avenue between West Kinzie Street and West Chicago Avenue. North Milwaukee Avenue is a major street that connects downtown Chicago to the northwestern suburbs. The area is approximately eight blocks in length with a diversity of land uses and multiple modes of transportation.

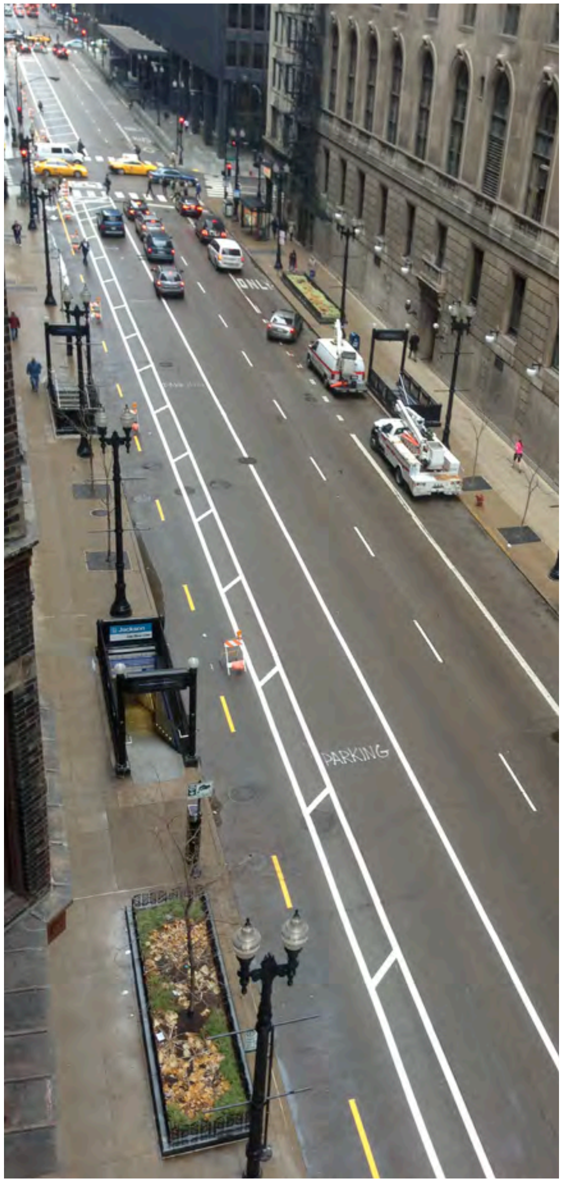
Figure 15 is the area centered around the intersection of West 26th Street and South Central Park Avenue. This is a largely residential area with a commercial strip. The study area boundaries are West 24th Street, South Homan Avenue, West 28th Street, and South Hamlin Avenue. The first map shows the existing conditions and overlays. The second lists the typologies. Depending on the amount of information, it may be helpful to create more maps and/or different scales to better show information. Since most CDOT projects are corridor-based, the typical map should include the length of the corridor and two blocks on either side.

**Crash Maps**

Mapping crashes is an important step in project selection and development. To be meaningful, crash maps should convey the following:

- Five years of crash data
- Crash mode (automobile, ped, bike, transit) and injury severity to show relative degree of problem
- A sense of exposure using factors such as volume or population
- Field observations of "near-misses" to complement crash data

Figures 14 and 16 show crashes at the sample locations. Each of the maps paints a different picture. The All Crashes map becomes too cluttered to make an informed decision. The severity map begins to show groupings and suggests on which intersections to focus. The pedestrian crash map shows that Milwaukee Avenue may not be problematic, yet West 26th Street might be. The bicycle crash map shows that Milwaukee is the scene of many crashes; however, it also has high ridership, demonstrating a need to control and normalize crash data.



## FIGURE 13

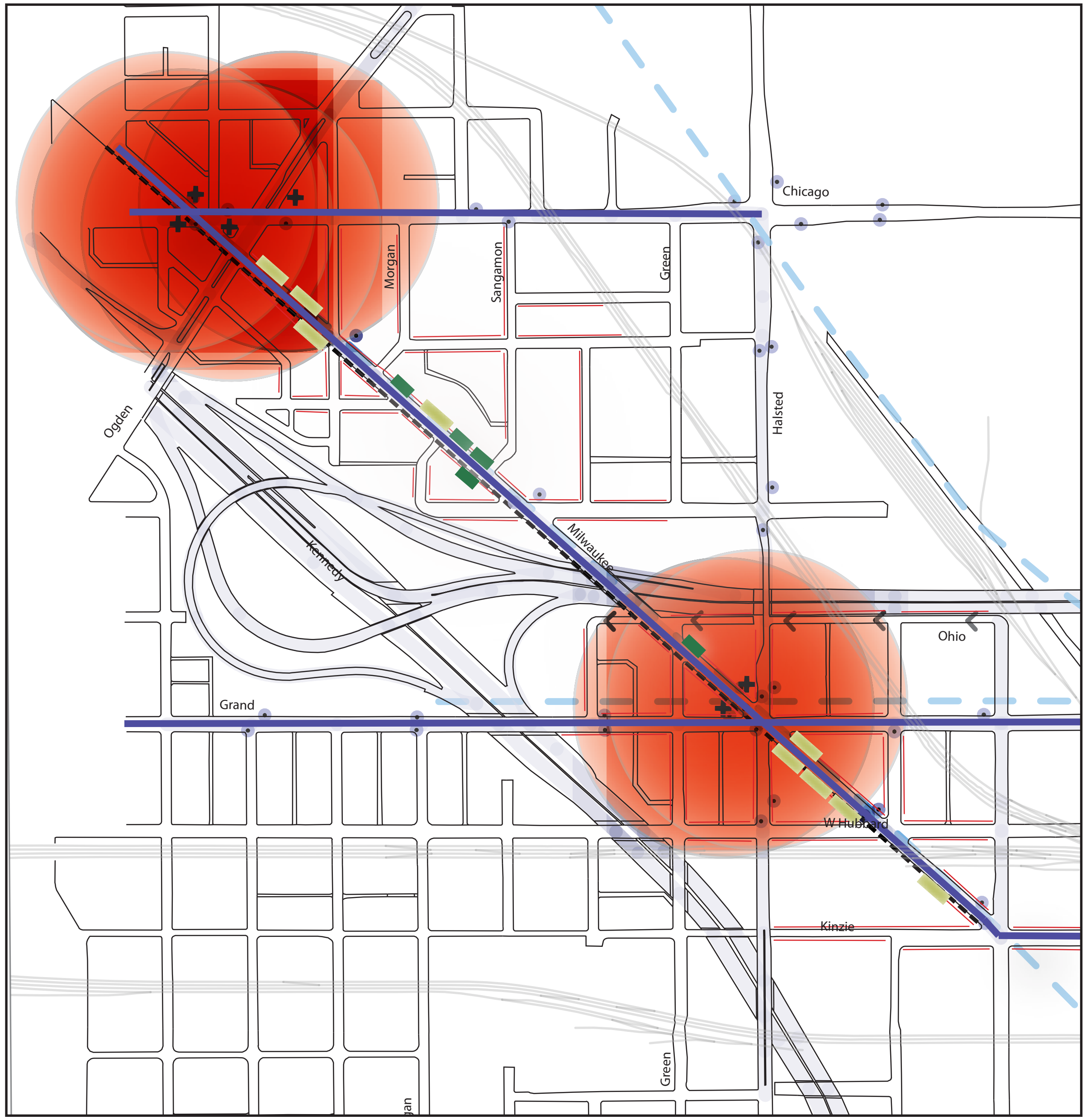
**Existing Conditions**

- Transit Lines
- CTA Station Exit
- CTA Bus Stop
- Curb Cut
- One-Way Street
- On-Street Parking
- Loading Zone
- Railroad

**Overlays**

- SRT- State Route
- CTY- County Route
- TRK- Truck Route
- SNW- Snow Route
- SRA- Strategic Regional Arterial
- MOB- Mobility Street
- PED- Pedestrian Priority Street
- BIK- Bicycle Priority Street
- BRT- Transit Priority Street
- HBS- Historic Boulevard System
- TOD- Transit-oriented District
- HZ- Home Zone

N




North Milwaukee Avenue: Existing Conditions, Overlays on the left, Typologies on the right

## FIGURE 13


**Building Form & Function**

- R- Residential
- M- Mixed-use
- C- Commercial Center
- D- Downtown
- IC- Institutional or Campus
- IN - Industrial
- P- Parks

**Roadway Form & Function**

- TH- Thoroughfare
- CN- Connector
- MS- Main Street
- NS- Neighborhood Street
- SW- Service Way
- PW- Pedestrian Way

**Intersections & Crossings**

- SIG- Signal
- RBT- Roundabout
- AWS- All Way Stop
- STY- Stop, Yield
- UNC- Uncontrolled
- MID- Mid-block Crossing
- DW- Driveway

## FIGURE 14

Existing Conditions, All Crashes, 2006-2010*

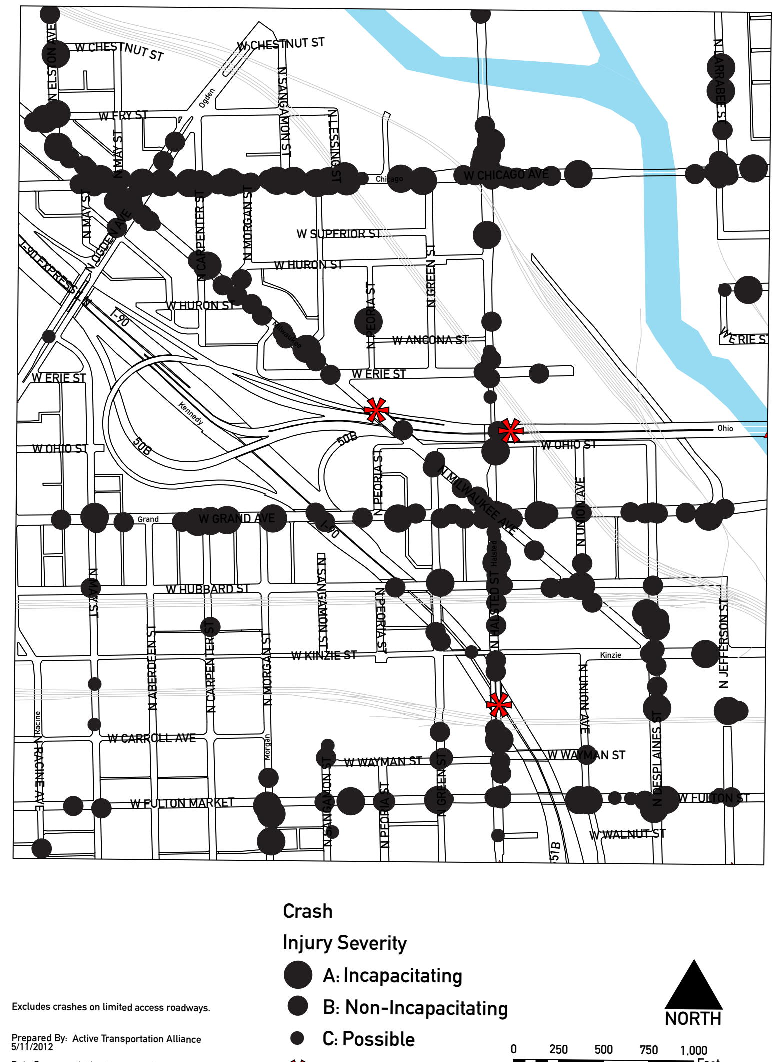

Note: Data excludes crashes with less than $500 of damage for years 2006 though 2009 and data exludes crashes with less than $1500 of property damage for year 2010. For total crash numbers request CDOT crash report for the study area
Excludes crashes on limited access roadways.

• Crash

Prepared By: Active Transportation Alliance
5/11/2012

Data Source: Active Transportation Alliance, IDOT & Navteq

Existing Conditions, All Crashes that Resulted in Injuries with Severity, 2006-2010




Crash

Injury Severity

- A: Incapacitating
- B: Non-Incapacitating
- C: Possible
- K: Fatal

Excludes crashes on limited access roadways.

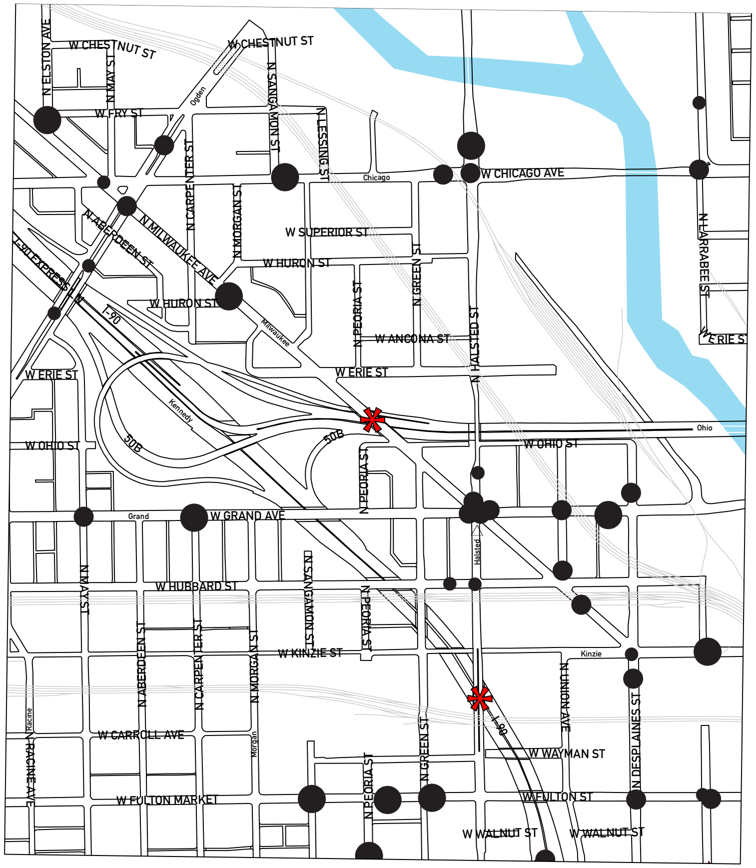
Prepared By: Active Transportation Alliance
5/11/2012

Data Source: Active Transportation Alliance, IDOT & Navteq

North Milwaukee Avenue Crash Maps

# FIGURE 14

Existing Conditions, Pedestrian Crashes with Severity, 2006-2010




Excludes crashes on limited access roadways.

Prepared By: Active Transportation Alliance
5/11/2012

Data Source: Active Transportation Alliance, IDOT & Navteq

Pedestrian

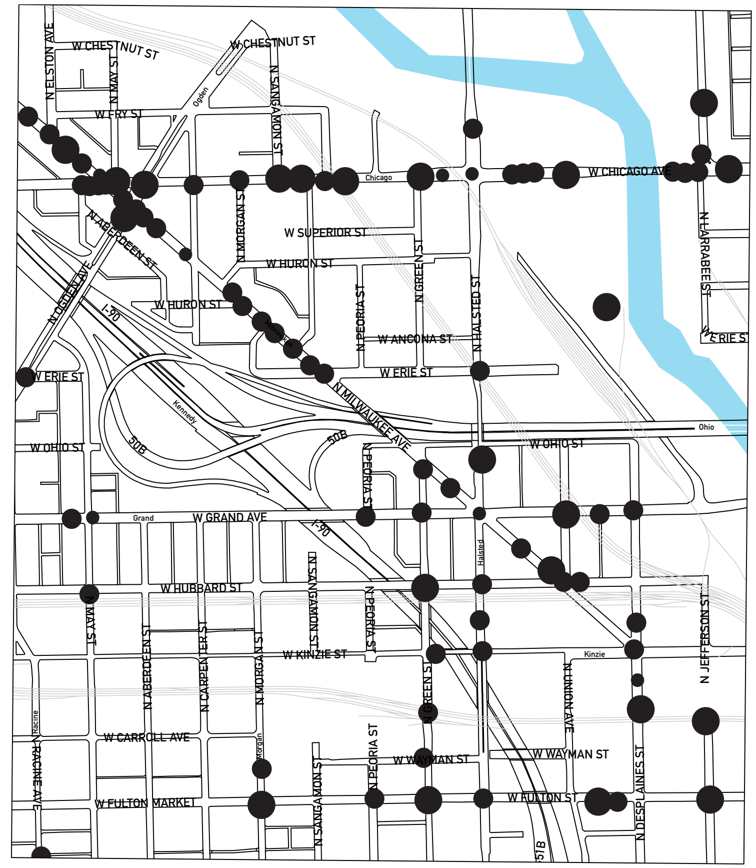
Injury Severity

- A: Incapacitating
- B: Non-Incapacitating
- C: Possible
- K: Fatal

NORTH

0 250 500 750 1,000 Feet

Existing Conditions, Bicycle Crashes wth Severity, 2006-2010




Excludes crashes on limited access roadways.

Prepared By: Active Transportation Alliance
5/11/2012

Data Source: Active Transportation Alliance, IDOT & Navteq

Bicycle

Injury Severity

- A: Incapacitating
- B: Non-Incapacitating
- C: Possible
- K: Fatal

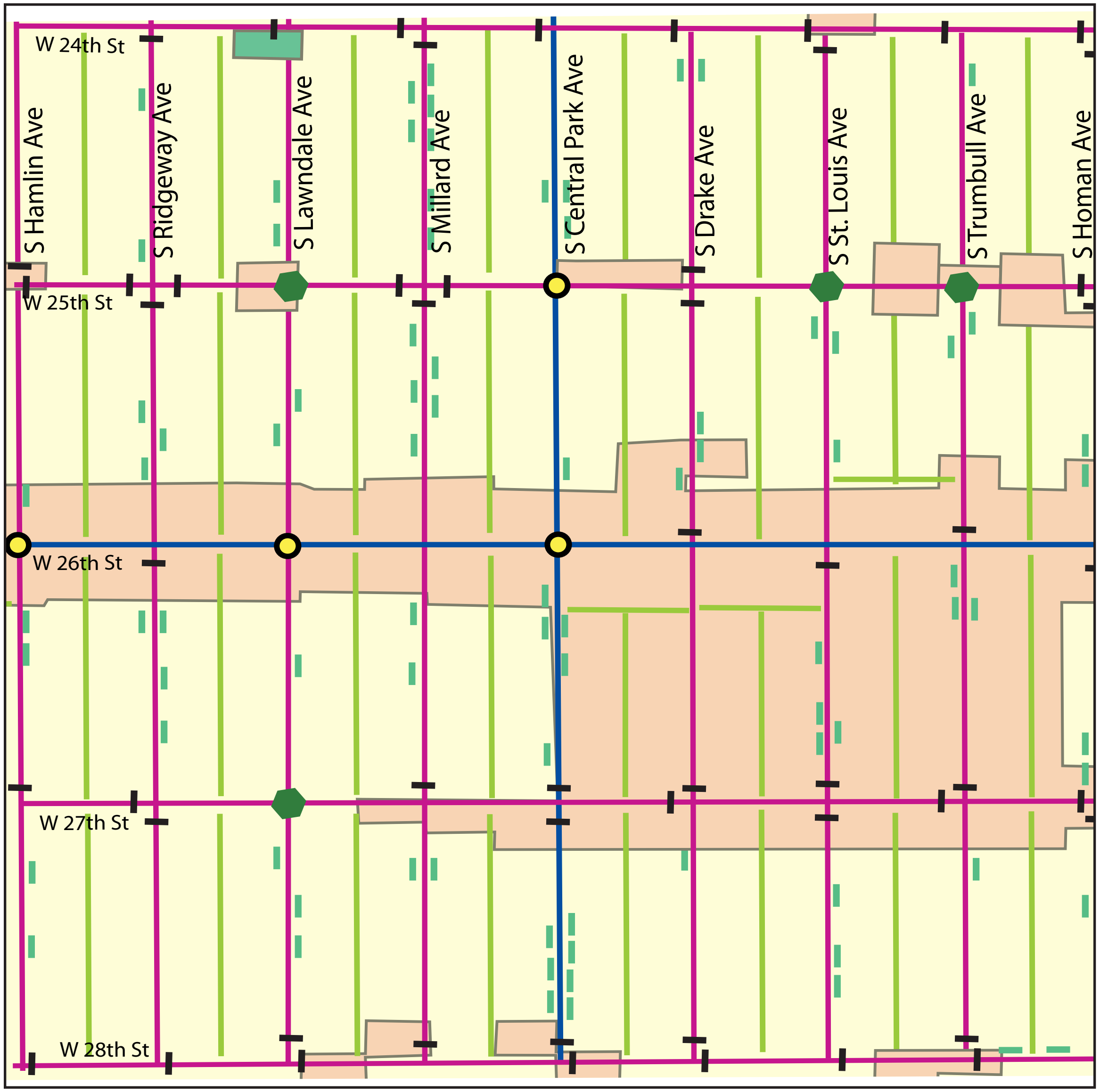
NORTH

0 250 500 750 1,000 Feet

# FIGURE 15


West 26th Street and South Central Park Avenue- Existing Conditions, Overlays on the left

## FIGURE 15




Typologies on the right

R- Residential
M- Mixed-use
C- Commercial Center
D- Downtown
IC- Institutional or Campus
IN - Industrial
P- Parks

**Roadway Form & Function**

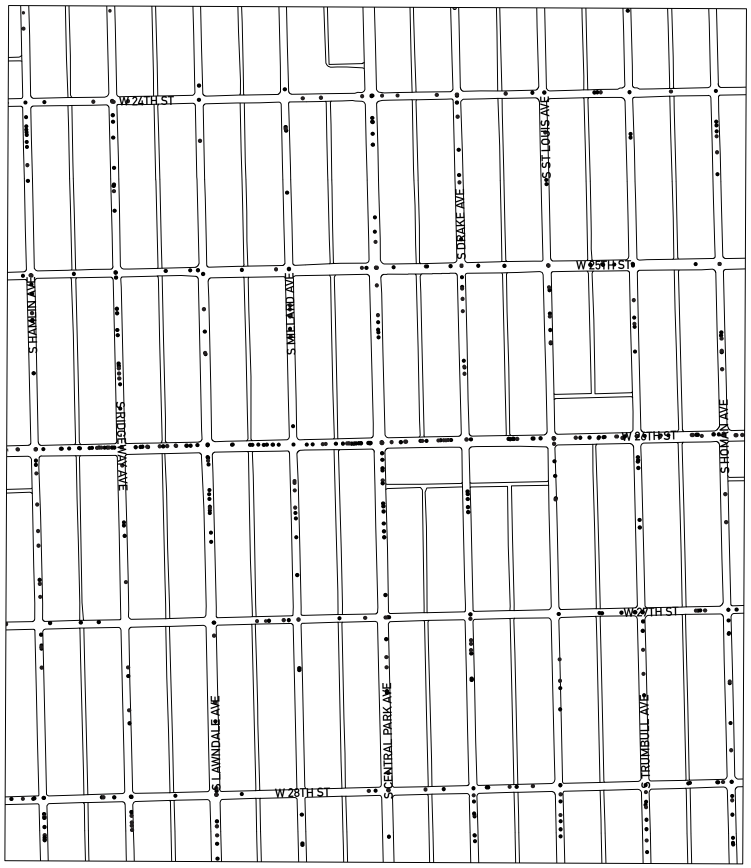
TH- Thoroughfare
CN- Connector
MS- Main Street
NS- Neighborhood Street
SW- Service Way
PW- Pedestrian Way

**Intersections & Crossings**

AWS- All Way Stop
SIG- Signal
RBT- Roundabout
STY- Stop, Yield
UNC- Uncontrolled
MID- Mid-block Crossing
DW- Driveway

## FIGURE 16

Existing Conditions, All Crashes, 2006-2010*




Note: Data excludes crashes with less than $500 of damage for years 2006 though 2009 and data exludes crashes with less than $1500 of property damage for year 2010. For total crash numbers request CDOT crash report for the study area.

• Crash

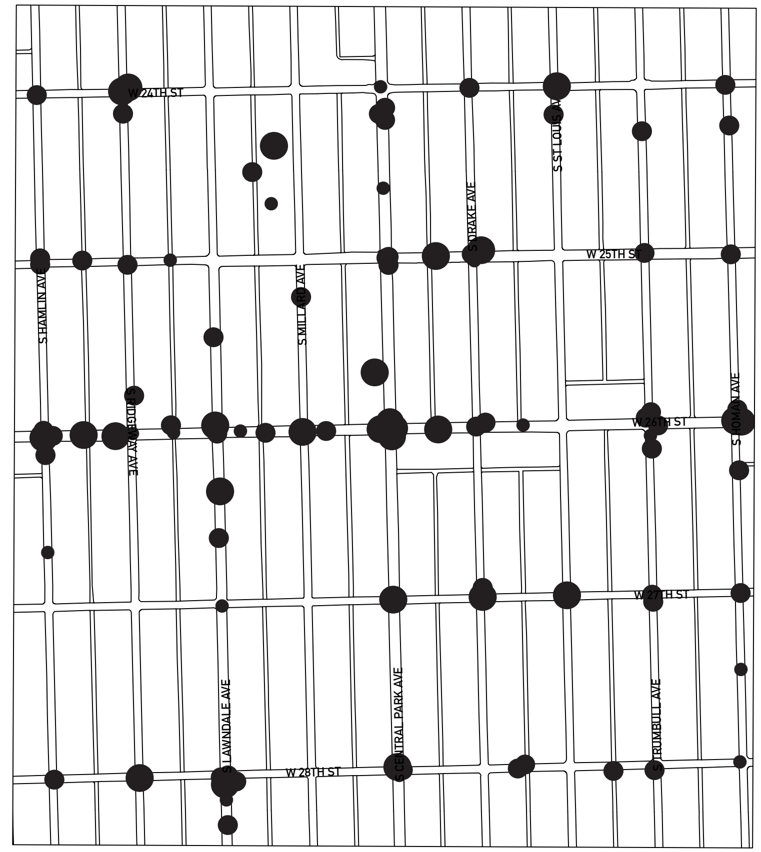
NORTH

0 170 340 510 680 Feet

Prepared By: Active Transportation Alliance
5/11/2012

Data Source: Active Transportation Alliance, IDOT & Navteq

Existing Conditions, All Crashes that Resulted in Injuries with Severity, 2006-2010




Prepared By: Active Transportation Alliance
5/11/2012

Data Source: Active Transportation Alliance, IDOT & Navteq

Crash

Injury Severity

- A: Incapacitating
- B: Non-Incapacitating
- C: Possible
- K: Fatal

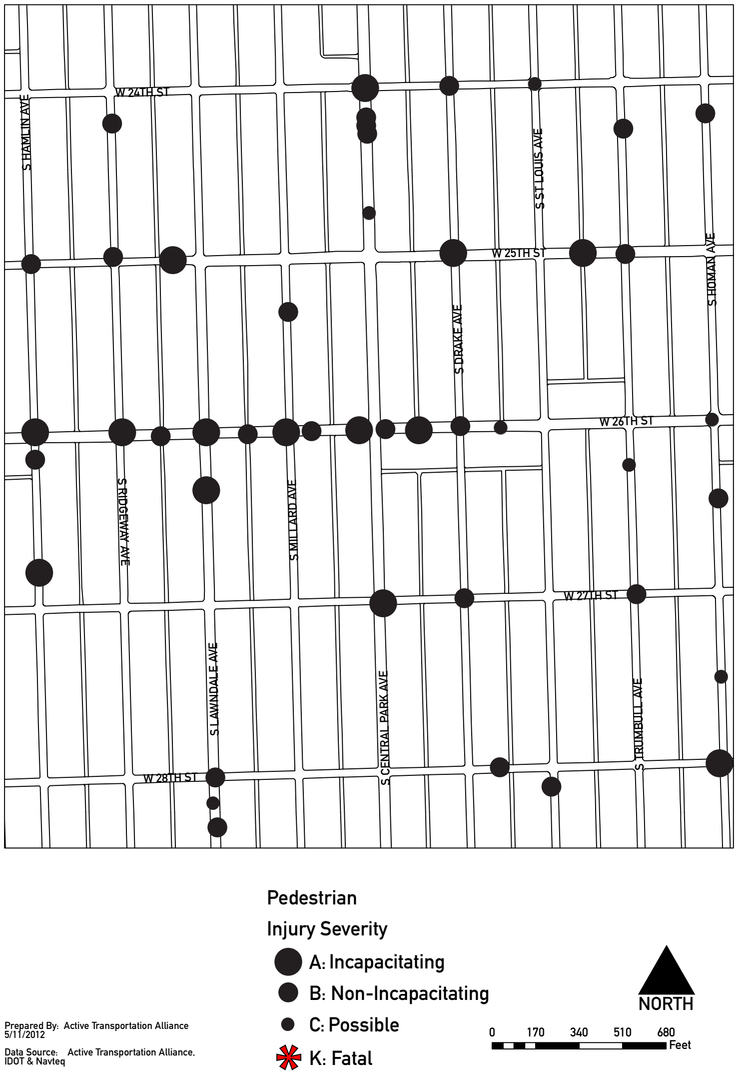
NORTH

0 170 340 510 680 Feet

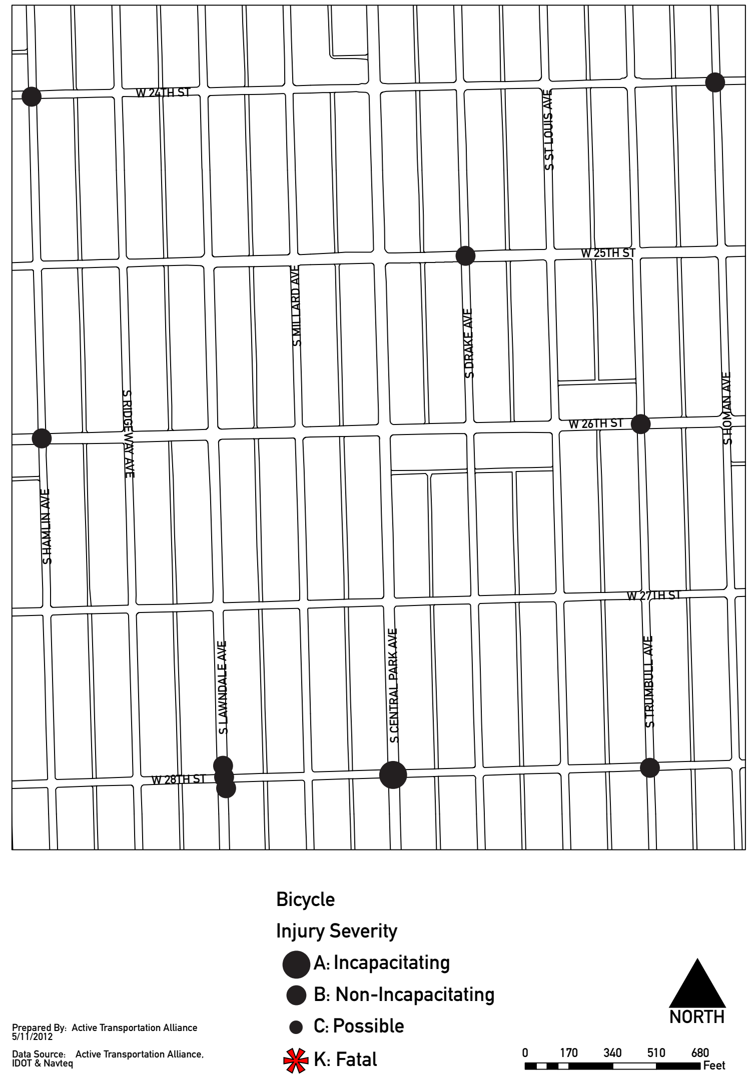
West 26th Street and South Central Park Avenue Crash Maps

# FIGURE 16

Existing Conditions, Pedestrian Crashes with Severity, 2006-2010




Existing Conditions, Bicycle Crashes wth Severity, 2006-2010




**Volume and Speed Diagrams**
Diagramming volumes of all modes and vehicle speeds helps to tell the story and lead to more insightful solutions. It is not required for all projects but is an important tool for project managers.

To be meaningful, volume maps should convey the following:

» all four modes (pedestrian, bicycle, transit, auto) and any others (freight) relevant to the location

» temporal fluctuations such as AM peak, PM peak, Noon, Weekend, and Night

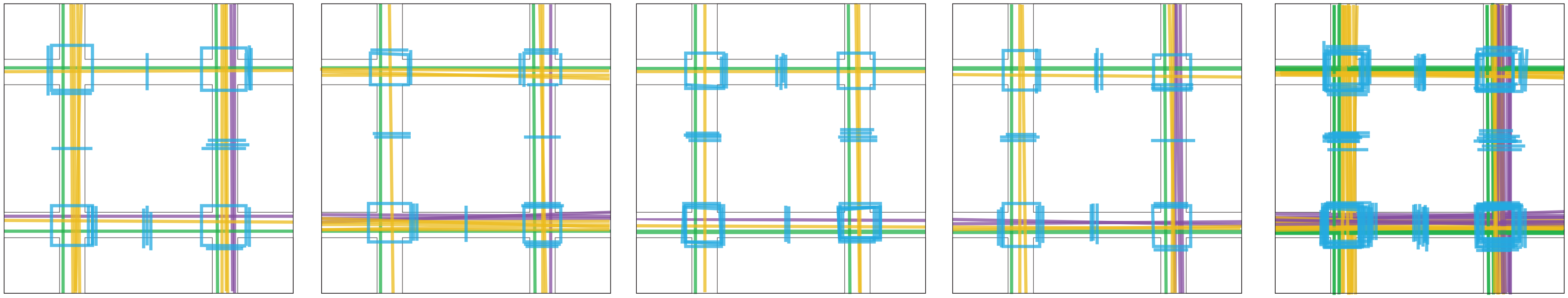
» volumes wherever they occur, such as mid-block, not just at prescribed locations

» cross-flows, especially on corridor-specific projects

Figure 17 illustrates the above principles and reflects a typical AM peak hour with higher flows on the north-south streets. Note also the pedestrian cross-flows. In the PM the flows become more concentrated east-west, especially transit. During the lunch hour the volume is mostly pedestrian, with many mid-block crossings. Over the weekend, flows are more balanced, but with more cycling. The final image combines the four time periods to give an aggregate. This methodology is useful in defining problems and ensuring a balanced solution.

Figure 18 shows a comparison of volume and speed maps. The top set shows measured vehicle volumes along a corridor. The bottom shows speeds. Note how the speeds increase as volumes decrease. This information is helpful to identify issues and opportunities, and make the case for design decisions such as using signals or other treatments to slow speeds.

## FIGURE 17

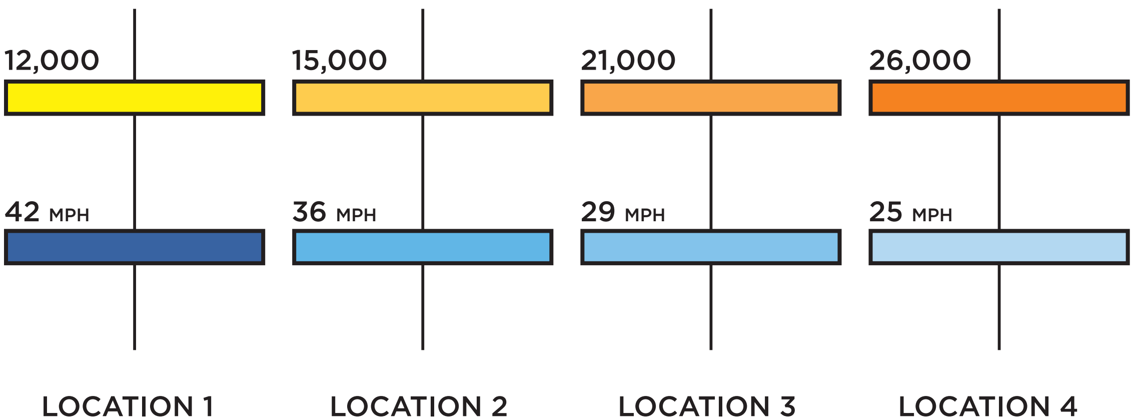


Volumes: Morning | Volumes: Evening | Volumes: Noon | Volumes: Weekend | Volumes: Aggregate

Illustrative Volume Diagrams

- PEDESTRIAN
- BIKE
- TRANSIT
- AUTO

## FIGURE 18




Volume and Speed Diagrams

# CHAPTER THREE: DESIGN GUIDANCE

# CHAPTER THREE: DESIGN GUIDANCE

The previous section focused on assembling and applying planning-level information at the beginning of a project. This chapter provides design guidance for creating complete streets. This section describes design trees, which serve as a starting point for the street cross section. It then provides flow charts of best practices for decision making, specifically what to prioritize in design. Lastly, geometric and operational policies are described that are supportive of complete street principles.

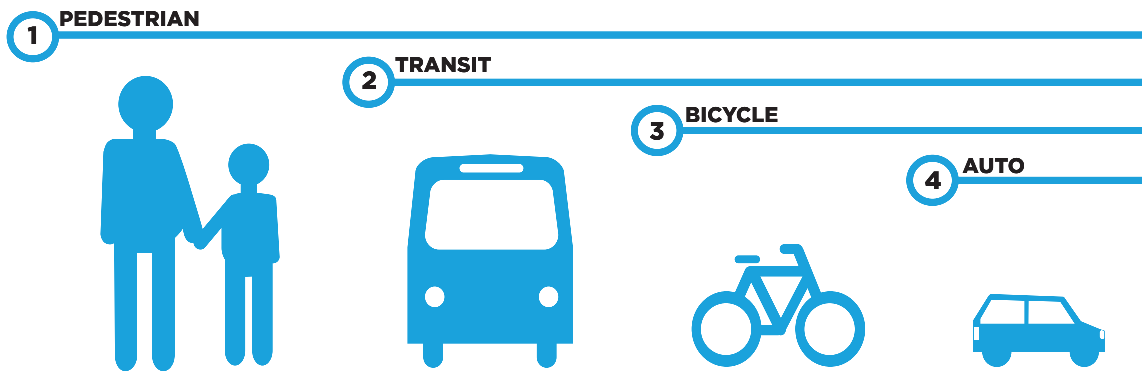
## 3.1 Modal Hierarchy

CDOT will use *modal hierarchies* to inform design and operation decisions. The default hierarchy is: **Pedestrian > Transit > Bicycle > Automobile**. Project-specific alternative hierarchies may be submitted for Compliance Committee approval. Some possible hierarchies include:

- **Transit > Pedestrian > Bicycle > Automobile** - along a major transit corridor
- **Bicycle > Pedestrian > Transit > Automobile** - along a bicycle priority street with bikeways or a bicycle boulevard
- **Automobile > Pedestrian > Bicycle > Transit** - in an industrial corridor or along a parkway with no bus service

### Direction, Observation, Iteration

Complete streets design requires direction, observation, and iteration. 1) *Direction* requires both leadership and support: leadership to establish CDOT policies and priorities, and support of the resulting projects and staff who implement them. 2) Street design is not simply a technical or quantitative exercise that should remain fixed for generations. Rather, street design requires *observation* of how people use the space, from drivers to people sitting on stoops. It is with these observations that we can craft the best design. 3) Unlike highway design, street design is *iterative*. At freeway speeds, one needs uniformity and consistency. As speeds slow, options expand. With more possibility comes the need to experiment and adjust based on how users react. The design of a street can always be improved.




Pedestrian First Modal Hierarchy

### 3.1.1 Modes

**Pedestrians**

Pedestrians are the lifeblood of cities. Downtowns, commercial districts, and entertainment areas attract high volumes of pedestrian activity and demand a high quality walking environment. Even when pedestrians are not the dominant roadway user, vibrant street design must provide for people walking, shopping, strolling or simply sitting. People walking are extremely vulnerable to injury and death when hit by vehicles and the design and operations of streets and intersections must protect them. Sidewalks, crosswalks, pedestrian signals, and other pedestrian facilities must accommodate pedestrians of all abilities and comply with the Americans with Disabilities Act (ADA). As stated previously, most trips begin and end on foot; urban streets that do not embrace this are not complete.

**Transit**

Buses and trains extend the range of activity for Chicago's citizenry. They provide access to essential services, jobs, housing and recreation and reduce the demand for automobile trips. Buses are a critical element of street design given their size and operational characteristics. The consequences for street design include lane width, intersection design (corner radius or width of channelization lane), transit-priority lanes (and queue jump lanes), signal timing (often adjusted to give transit an advantage, transit-signal priority), pedestrian access (street crossings at bus stops), sidewalk design (making room for bus shelters), and bus stop placement and design (farside/nearside at intersections, bus pullouts, or bulb outs). Access and volumes at train stations and stops also affects street design, especially where there are large volumes of pedestrians.

## The Prudent Driver

Pivoting to a pedestrian-first modal hierarchy may frustrate people who drive. Nevertheless, the transportation profession is coming to understand that more roads, more lanes, and longer signal cycles only induces more traffic. Complete streets favors the prudent driver: people who drive slowly, safely, and respectfully. In urban settings, the pedestrian-first hierarchy adheres to the performance standard of optimizing the movement of people, and not simply the movement of vehicles, which has been the traditional priority in transportation.

**Bicycles**

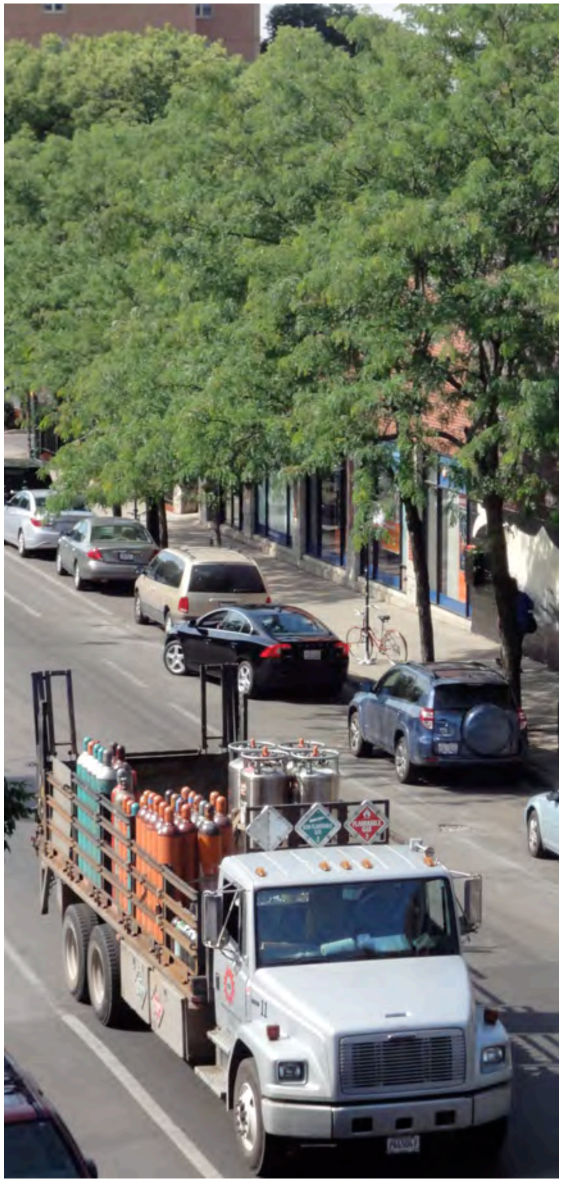
For a street to be complete, it needs to accommodate cyclists. Like pedestrians, bicyclists are vulnerable users who benefit from reduced traffic speed and dedicated facilities. However, bicyclists are significantly different from pedestrians. They travel faster than pedestrians but more slowly and less visibly than automobiles. Their skill level varies greatly, resulting in a wide range of speeds and behaviors. Also, bicycling is a social activity, and people often ride side-by-side or in groups. Bicycles can efficiently delivery goods and serve a critical link in the City's freight network. Bicycle facility selection requires an understanding of the street condition; bicycle usage, volumes, speeds and routes; and automobile volumes and speeds (if present). Refer to CDOT's Bicycle Program for specific criteria.

**Automobiles**

Private automobiles are an integral part of Chicago's circulation system. Even though they have been placed fourth in the default modal hierarchy, they still must be accommodated, within the constraints of lower speeds and more prudent driving. Commercial vehicles will be given more leeway, as the efficient delivery of goods and services is paramount to supporting a healthy economy and meeting needs of local businesses.

## Freight

Freight and goods delivery is an important part of Chicago's streets. It is not included as a specific mode because it is cross-modal - trucks (auto), bike trailer (bicycle), and delivery person (pedestrian). Additionally, much freight is delivered by rail, a tremendous factor in Chicago's history. In setting the mode priority of a particular street, especially one in an industrial area, consideration should be given to trucks, which would suggest a more auto-oriented hierarchy.



## 3.2 Design Trees

After the street typology and modal hierarchy have been established, *design trees* will guide cross-section selection, see Figure 19. The design trees contain the following three parameters:

» Modal Hierarchy – from 3.1 above.

» Building Typology – from 2.1.1 above.

» Roadway Typology – from 2.1.2 above.

This contains general parameters on speed, volume and width.

Additional design trees are contained in Appendix B.

Dimensions are not listed in the design trees, as they are meant to provide general direction and guidance during project scoping. Dimensions are provided in Cross section Assemblage below (see 3.2.1). Sample cross sections are provided in Appendix C.

### Volume and Speed are Outputs

Traditional street design process begins with automobile volume and speed as main inputs. This process inverts that approach by looking first at the building and roadway typology. Following the design trees, automobile volume and speed become outputs.

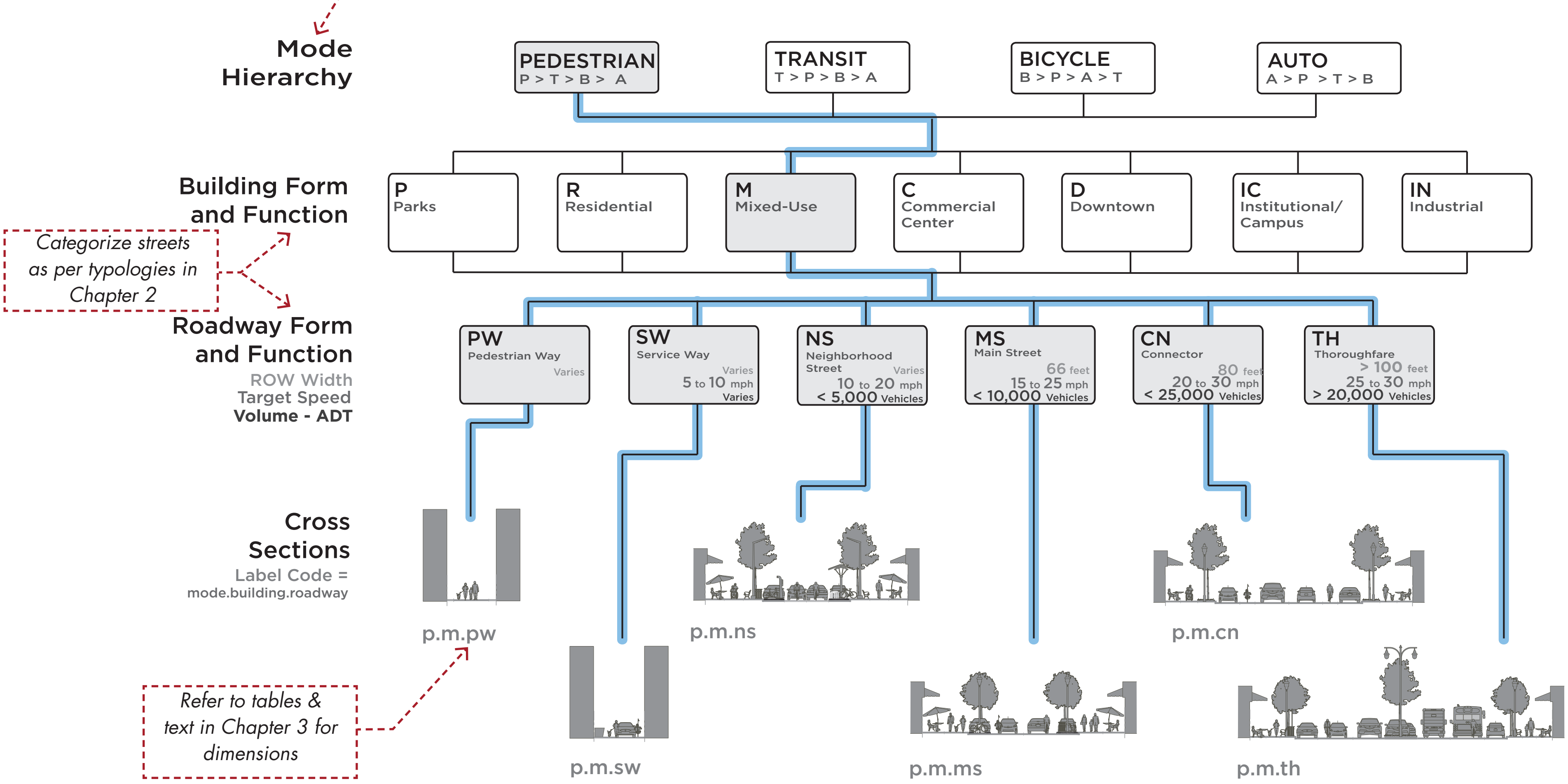
### Community Engagement

Design trees are intended to help engage the community through the process of street selection and design.

### Ecological Design

Regardless of spatial allocation for different uses through the design tree process, CDOT can achieve better ecological performance from its streets, above and below grade. As noted, the goal is to minimize the paved area.

## FIGURE 19




Design Tree for Mixed-Use


### 3.2.1 Cross Section Assemblage

With the rough cross-section in hand, the next step is to add dimensions and "assemble" the street. These policies do not dictate dimensions, as street design requires making tradeoffs within limited rights-of-way. Project managers are charged with developing cross-sections which respect the hierarchy and typology.

Figures 20.1 to 20.4 list target, maximum and constrained cross-section dimensions. They are presented as assemblages, as widths will vary based on adjacency (bike lanes can be narrower if next to a curb, but need to be wider if next to parked cars). They are ordered left to right as in a typical street, but the elements may be reordered. All elements will not be used on all streets. Also see Section 3.5.6.

### Notes for Figures 20.1 - 20.4

- » One travel lane on truck or bus route is to be 11 feet wide.
- » The target auto/bike shared lane is 14 feet.
- » The combination of travel and parking lane next to one another should be no less than 18 feet (11-foot travel and 7-foot parking or 10-foot travel and 8-foot parking).
- » Bikeway dimensions do not include buffers.
- » Parking lanes are typically 7 feet wide in residential areas and 8 feet wide on commercial streets.
- » A curb extension is the width of the parking lane minus 1-2 feet.
- » A frontage lane is the side travel lane of a multiway thoroughfare.
- » Dimensions are not listed for travel, parking and bike lanes on a Neighborhood Street because these are typically not marked.

## FIGURE 20.1

# ROADWAY FORM AND FUNCTION

**ALL DIMENSIONS ARE IN FEET**

| Building Form and Function | | | NS Neighborhood Street: Pedestrian Realm: Frontage | Pedestrian Realm: Pedestrian Zone | Pedestrian Realm: Furniture Zone | Interstitial Area: Curb Zone | Interstitial Area: Parking Area (n/a) | Vehicle Realm: Bikeway (n/a) | Vehicle Realm: Travel Lane (n/a) |
|---|---|---|---|---|---|---|---|---|---|
| P | Parks | Target | 0 | 6 | 6 | 1 | – | – | – |
| | | Maximum | 2 | 8 | 10 | 2 | – | – | – |
| | | Constrained | 0 | 5 | 5 | 0 | – | – | – |
| R | Residential | Target | 0 | 5 | 5 | 1 | – | – | – |
| | | Maximum | 1 | 6 | 8 | 2 | – | – | – |
| | | Constrained | 0 | 5 | 0 | 0 | – | – | – |
| M | Mixed Use | Target | 1 | 6 | 5 | 1 | – | – | – |
| | | Maximum | 2 | 8 | 8 | 2 | – | – | – |
| | | Constrained | 0 | 5 | 4 | 0 | – | – | – |
| C | Commercial Center | Target | 1 | 6 | 5 | 1 | – | – | – |
| | | Maximum | 2 | 8 | 8 | 2 | – | – | – |
| | | Constrained | 0 | 5 | 4 | 0 | – | – | – |
| D | Downtown | Target | 1 | 6 | 5 | 1 | – | – | – |
| | | Maximum | 2 | 8 | 10 | 2 | – | – | – |
| | | Constrained | 0 | 5 | 4 | 0 | – | – | – |
| IC | Institutional Campus | Target | 0 | 6 | 5 | 1 | – | – | – |
| | | Maximum | 4 | 8 | 6 | 2 | – | – | – |
| | | Constrained | 0 | 5 | 4 | 0 | – | – | – |
| IN | Industrial | Target | N/A | | | | | | |
| | | Maximum | | | | | | | |
| | | Constrained | | | | | | | |

Assemblage Table for Neighborhood Street

## FIGURE 20.2

# ROADWAY FORM AND FUNCTION

**ALL DIMENSIONS ARE IN FEET**

Assemblage Table for Main Street

| Building Form and Function | | | MS Main Street: Pedestrian Realm: Frontage | Pedestrian Realm: Pedestrian Zone | Pedestrian Realm: Furniture Zone | Interstitial Area: Curb Zone | Interstitial Area: Parking Area | Interstitial Area: Bikeway | Vehicle Realm: Travel Lane |
|---|---|---|---|---|---|---|---|---|---|
| P | Parks | Target | 0 | 6 | 8 | 1 | 7 | 6 | 10 |
| | | Maximum | 2 | 8 | 12 | 2 | 8 | 10 | 11 |
| | | Constrained | 0 | 5 | 6 | 0 | 7 | 5 | 9 |
| R | Residential | Target | 0 | 6 | 6 | 1 | 7 | 5 | 10 |
| | | Maximum | 1 | 8 | 10 | 2 | 8 | 6 | 11 |
| | | Constrained | 0 | 5 | 0 | 0 | 7 | 4 | 9 |
| M | Mixed Use | Target | 4 | 6 | 5 | 1 | 8 | 4 | 10 |
| | | Maximum | 5 | 12 | 8 | 2 | 8 | 6 | 11 |
| | | Constrained | 1 | 5 | 4 | 0 | 7 | 4 | 9 |
| C | Commercial Center | Target | 1 | 7 | 5 | 1 | 8 | 6 | 10 |
| | | Maximum | 5 | 10 | 8 | 2 | 8 | 8 | 11 |
| | | Constrained | 1 | 5 | 4 | 0 | 7 | 4 | 9 |
| D | Downtown | Target | 4 | 8 | 6 | 1 | 8 | 6 | 10 |
| | | Maximum | 5 | 10 | 10 | 2 | 8 | 6 | 11 |
| | | Constrained | 1 | 6 | 4 | 0 | 7 | 4 | 9 |
| IC | Institutional Campus | Target | 0 | 7 | 6 | 1 | 8 | 6 | 10 |
| | | Maximum | 4 | 9 | 8 | 2 | 8 | 7 | 11 |
| | | Constrained | 0 | 5 | 4 | 0 | 7 | 4 | 9 |
| IN | Industrial | Target | 1 | 5 | 5 | 1 | 9 | 6 | 10 |
| | | Maximum | 3 | 9 | 5 | 2 | 10 | 8 | 14 |
| | | Constrained | 1 | 5 | 0 | 0 | 8 | 4 | 10 |

## FIGURE 20.3

## ROADWAY FORM AND FUNCTION

ALL DIMENSIONS ARE IN FEET

| Building Form and Function | | | | CN | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Connector | | | | | | | |
| | | | | Pedestrian Realm | | | Interstitial Area | | | Vehicle Realm | Median |
| | | | | Frontage | Pedestrian Zone | Furniture Zone | Curb Zone | Bikeway | Parking Area | Travel Lane | Center Median |
| P | Parks | | Target | 0 | 8 | 10 | 1 | 8 | 7 | 10 | 8 |
| | | | Maximum | 2 | 10 | – | 2 | 10 | 8 | 11 | 16 |
| | | | Constrained | 0 | 5 | 6 | 0 | 5 | 7 | 9 | 6 |
| R | Residential | | Target | 0 | 8 | 8 | 1 | 5 | 7 | 10 | 6 |
| | | | Maximum | 1 | 10 | 12 | 2 | 6 | 8 | 11 | 16 |
| | | | Constrained | 0 | 5 | 0 | 0 | 5 | 7 | 9 | 6 |
| M | Mixed Use | | Target | 4 | 6 | 6 | 1 | 6 | 8 | 10 | 8 |
| | | | Maximum | 5 | 12 | – | 2 | 7 | 8 | 11 | 16 |
| | | | Constrained | 1 | 6 | 5 | 0 | 5 | 7 | 9 | 6 |
| C | Commercial Center | | Target | 1 | 8 | 6 | 1 | 6 | 8 | 10 | 10 |
| | | | Maximum | 5 | 12 | 10 | 2 | 8 | 8 | 11 | 18 |
| | | | Constrained | 1 | 8 | 5 | 0 | 5 | 7 | 9 | 6 |
| D | Downtown | | Target | 5 | 10 | 6 | 1 | 6 | 8 | 10 | 10 |
| | | | Maximum | 5 | – | 10 | 2 | 7 | 8 | 11 | 18 |
| | | | Constrained | 1 | 8 | 5 | 0 | 5 | 7 | 9 | 6 |
| IC | Institutional Campus | | Target | 0 | 8 | 6 | 1 | 6 | 8 | 10 | 8 |
| | | | Maximum | 4 | 10 | 10 | 2 | 7 | 8 | 11 | 16 |
| | | | Constrained | 1 | 6 | 5 | 0 | 5 | 7 | 9 | 6 |
| IN | Industrial | | Target | 1 | 6 | 6 | 1 | 6 | 10 | 10 | 6 |
| | | | Maximum | 3 | 9 | 5 | 2 | 8 | 10 | 14 | 18 |
| | | | Constrained | 1 | 5 | 0 | 0 | 5 | 8 | 10 | 6 |

Assemblage Table for Connector

**FIGURE 20.4**

# ROADWAY FORM AND FUNCTION

ALL DIMENSIONS ARE IN FEET

| Building Form and Function | | | | TH Thoroughfare: Pedestrian Realm | | | Interstitial Area | | | | | Vehicle Realm | Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Frontage | Pedestrian Zone | Furniture Zone | Curb Zone | Parking Area | Frontage Lane | Bikeway | Side Median | Travel Lane | Center Median |
| | P | Parks | Target | 0 | 10 | 10 | 1 | 7 | 9 | 8 | 8 | 10 | 10 |
| | | | Maximum | 2 | 12 | – | 2 | 8 | 10 | 12 | – | 11 | – |
| | | | Constrained | 0 | 5 | 6 | 0 | 7 | 8 | 6 | 6 | 10 | 6 |
| | R | Residential | Target | 0 | 6 | 8 | 1 | 7 | 9 | 6 | 6 | 10 | 6 |
| | | | Maximum | 1 | 10 | 12 | 2 | 8 | 10 | 8 | 10 | 11 | 16 |
| | | | Constrained | 0 | 5 | 5 | 0 | 7 | 8 | 5 | 4 | 10 | 4 |
| | M | Mixed Use | Target | 4 | 6 | 6 | 1 | 8 | 9 | 6 | 6 | 10 | 8 |
| | | | Maximum | 5 | 12 | – | 2 | 8 | 10 | 8 | 10 | 11 | 18 |
| | | | Constrained | 1 | 6 | 5 | 0 | 7 | 9 | 5 | 6 | 10 | 6 |
| | C | Commercial Center | Target | 1 | 10 | 6 | 1 | 8 | 10 | 7 | 8 | 10 | 10 |
| | | | Maximum | 5 | – | 10 | 2 | 9 | 10 | 8 | 10 | 11 | 20 |
| | | | Constrained | 1 | 8 | 5 | 0 | 7 | 9 | 6 | 6 | 10 | 6 |
| | D | Downtown | Target | 5 | 12 | 8 | 1 | 8 | 10 | 6 | 10 | 10 | 10 |
| | | | Maximum | 8 | – | 10 | 2 | 9 | 10 | 8 | 12 | 11 | 20 |
| | | | Constrained | 1 | 10 | 5 | 0 | 7 | 9 | 5 | 6 | 10 | 8 |
| | IC | Institutional Campus | Target | 0 | 9 | 6 | 1 | 8 | 9 | 6 | 8 | 10 | 8 |
| | | | Maximum | 4 | 12 | 10 | 2 | 9 | 10 | 7 | 10 | 11 | 18 |
| | | | Constrained | 0 | 6 | 5 | 0 | 7 | 8 | 5 | 6 | 10 | 6 |
| | IN | Industrial | Target | 1 | 6 | 5 | 1 | 10 | 10 | 6 | 6 | 10 | 6 |
| | | | Maximum | 3 | 9 | 5 | 2 | 10 | 10 | 8 | 10 | 14 | 18 |
| | | | Constrained | 1 | 5 | 0 | 0 | 8 | 9 | 5 | 6 | 10 | 6 |

## 3.3 Cross-Section Elements

This section describes, in limited detail, the elements that make up a cross-section. Please refer to the publications listed in Section 1.1 for more information.

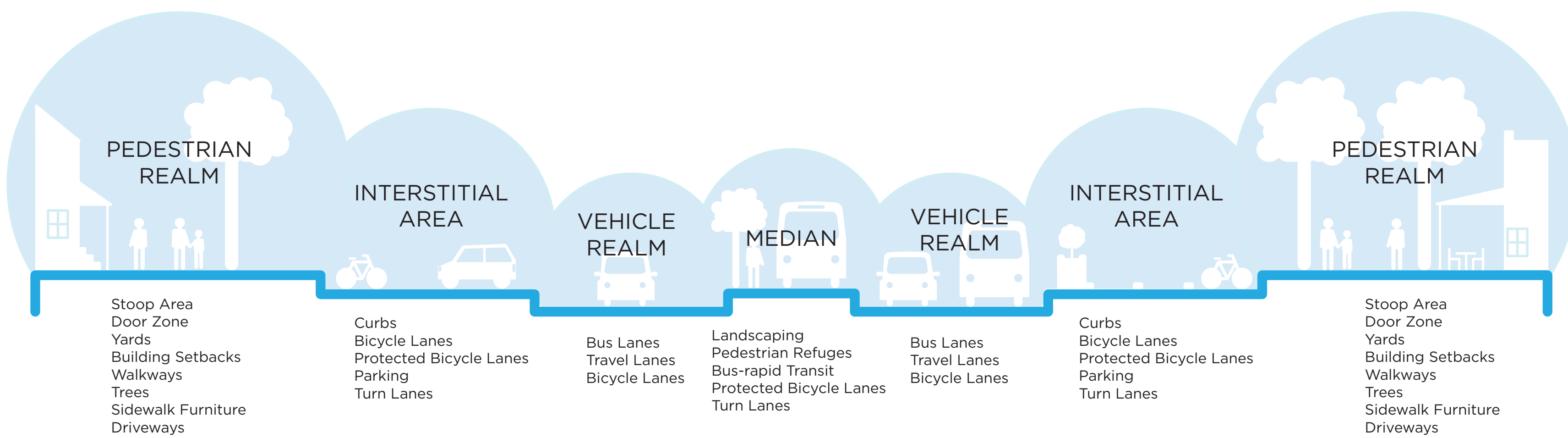
These policies and procedures divide streets into four component parts: pedestrian realm, interstitial area, vehicle realm and median, see Figure 21. These are not strict segregations, but a useful tool to understand how a street is assembled. The pedestrian realm contains items typically found on the sidewalk: walkway, sidewalk furniture, trees and stoops. The vehicle realm is where through vehicles operate (bike, transit, automobiles).

In between, the elements that relate to both: curb and gutter, dedicated bicycle facilities, parking areas, bus stops, etc. The complete street design process manages these interstitial elements.

It is important to consider ecological performance and placemaking in close conjunction with complete street design principles when developing a projects cross-section. Opportunities for ecological performance exist throughout all parts of the cross-section, pedestrian, interstitial, roadway and median, and are not limited to the ground plane only but, very importantly, include the space above and beneath the surfaces of the roadway.

The pedestrian realm and interstitial zone often have the greatest potential to address ecological performance as well as placemaking, and to maximize environmental comfort, economic development, culture, and beauty. For implementation strategies, refer to the *Sustainable Urban Infrastructure Guidelines and Policies*.

**FIGURE 21**




Cross-Section Elements

### 3.3.1 Pedestrian Realm

The pedestrian realm is commonly referred to as the sidewalk. It is divided it into three zones, much like the segmentation of a roadway. Figure 22 illustrates various arrangements of the zones, which are highly contextual and location specific. There are numerous permutations for high-quality pedestrian realm design. Refer to CDOT's *Sustainable Urban Infrastructure Guidelines and Policies* and *Streetscape Guidelines* for specific criteria.

**Frontage Zone**

The frontage zone is the area between the walkway and building, fence or yard. Typically this is the edge of the right of way. It may be nothing more than the "shy" distances adjacent to a building (the place where people stand to window shop, where the utility meters are, and where the door mat is). Or it may contain a stoop, outdoor café, landscaping, benches, and bike parking. Where there is a front lawn with no fence, the frontage zone width is zero.

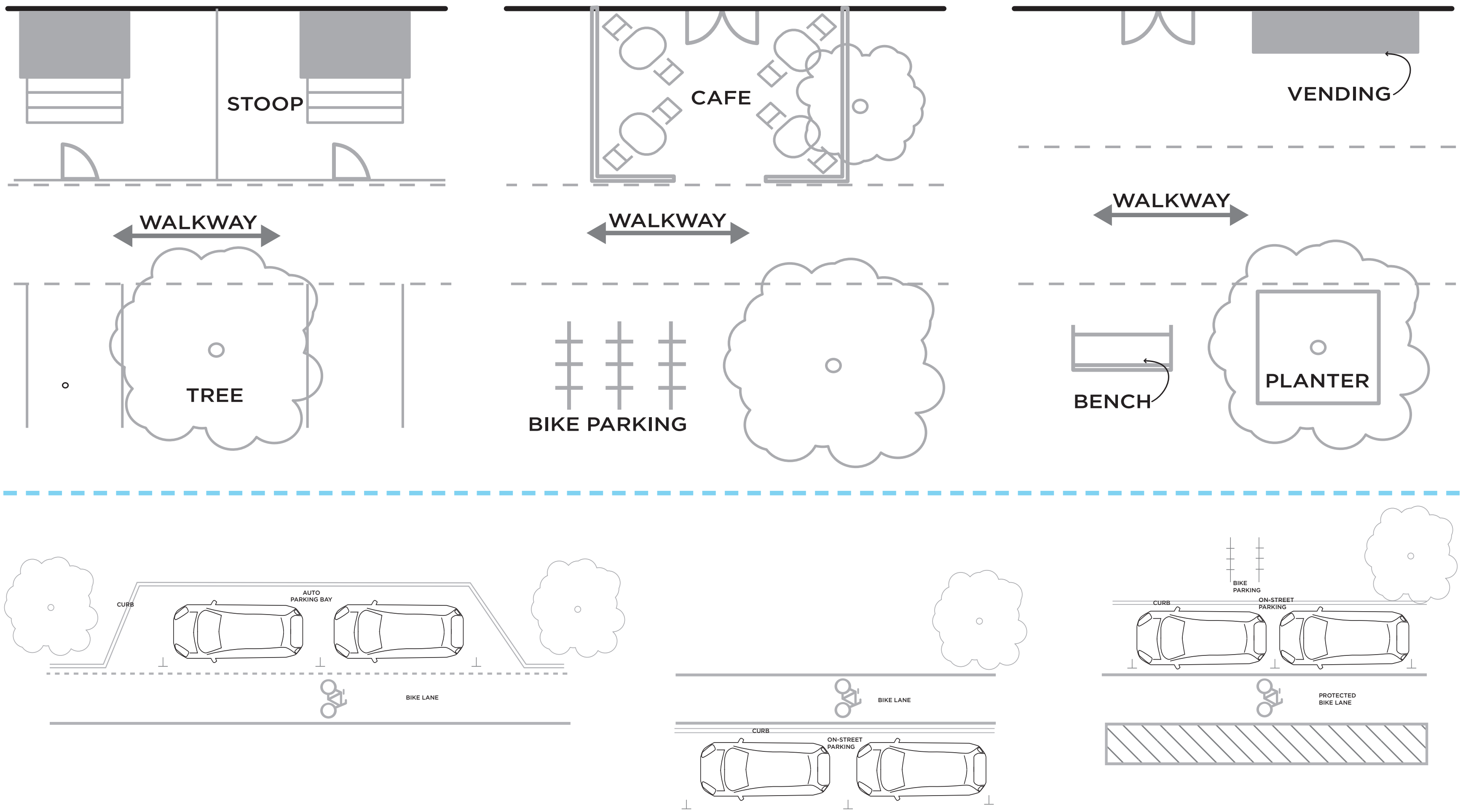
**Walking Zone**

The walking zone is the area dedicated to walking. Just like any travel lane, it should provide a logical path of travel. It must be ADA-compliant and clear of all obstructions. It should be straight and continuous. Attempts to create meandering sidewalks usually fail because people want to walk in the most direct route possible. It should be sized to provide sufficient space for the expected pedestrian volumes, but not overly wide as to appear barren.

**Sidewalk Furniture Zone**

The sidewalk furniture zone is located between the curb and walking zones, and contains items such as street trees, planters, bus shelters, parking meters, utility poles and boxes, lamp posts, signs, bike racks, news racks, benches, waste receptacles, and drinking fountains. Placing these items in this zone keeps the walking zone free of obstructions. This zone is often landscaped in residential neighborhoods and provides some level of separation between children playing on the sidewalk and moving traffic.

## FIGURE 22




Various Pedestrian Realm and Interstitial Area Arrangements

### 3.3.2 Interstitial Area

The interstitial area is between the walkway and roadway. This is a highly flexible area which contains elements used by all modes. On larger roads it is the primary place for cycling. Figure 22 illustrates various arrangements of the area's four zones. Refer to CDOT's *Sustainable Urban Infrastructure Guidelines and Policies*, and *Streetscape Guidelines* for specific criteria.

**Curbs**

The curb zone serves primarily to prevent water and cars from encroaching on the sidewalk, see Figure 23. People using assistive devices must traverse the curb to get from the street to the sidewalk, so its design is critical to accessibility. Curbs may be designed as rain gardens. They may be at a level-plane with the roadway (not vertical or raised) in a shared space or home zone environment. Refer to the *Sustainable Design Guidelines* for more information.

**Bicycle Facilities**

Locating and designing bicycle facilities is often a difficult challenge in street design because cyclists can operate like both pedestrians and automobiles. A high quality facility will separate cyclists from both automobiles and pedestrians. It will provide a direct connection for faster cyclists and a leisurely ride for everyone else. This may require duplicate facilities on a single street such as a marked shared lane, a protected bike lane, or a double wide protected bike lane. Refer to CDOT's Bicycle Program for specific criteria.

**FIGURE 23**

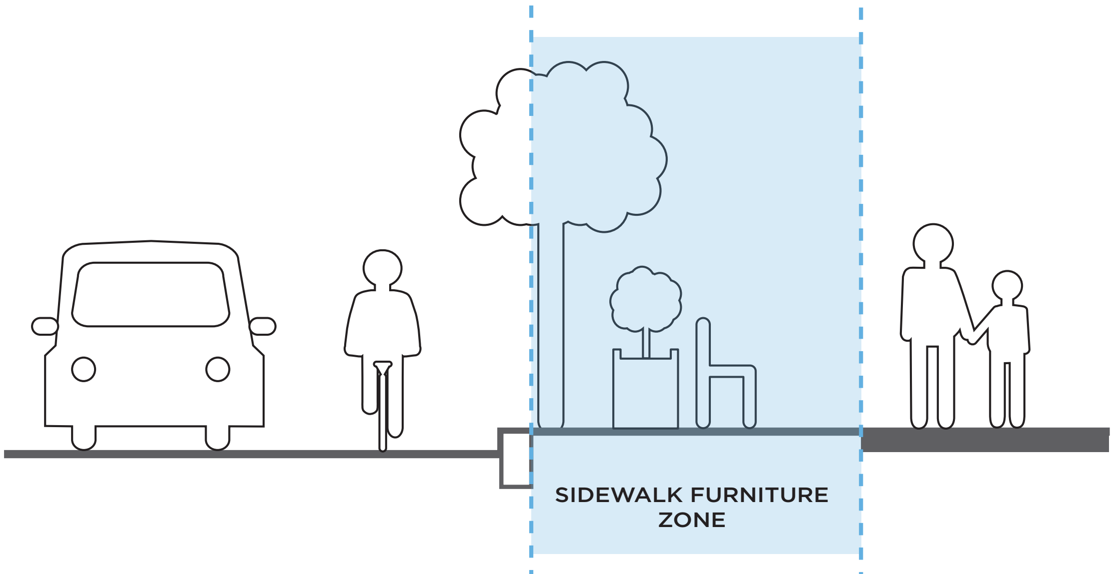



Diagram of the Curb Area

### On-street Parking

On-street parking can be positive or negative for complete streets. On the one hand, on-street parking supports storefront retail, slows moving traffic, and protects people from errant drivers and fast moving traffic. On the other hand, each parking space is valuable real estate that can be used for curb extensions, bus shelters, bicycle parking, trees, rain gardens, bus lanes and more. Parking is problematic for cycling due to the increase chance of being "doored" or cars idling in the travel lane waiting for a parking space to become available.

On-street parking does not make a street more or less complete, therefore these policies and procedures offer no opinion on its inclusion. If used, on-street parking should be clearly designed as separate from the travel lanes (described below). This can be accomplished by including curb extensions (so the roadway remains visually narrower when there is no parking), and paving the parking area differently than the roadway (concrete or pavers, not asphalt). In addition, project managers are encouraged to explore opportunities to organize parking with street trees, bus stops, and other elements in the interstitial area.

### Frontage Lanes on Multi-way Boulevards

Frontage lanes on multi-way boulevards should be reserved for slower traffic, turning traffic, and to serve adjacent properties. They are placed in the interstitial area because they are not considered part of the "through" roadway.

### Right Turn Lanes

Right turn lanes that align with a parking lane are considered to be in the interstitial area. Turn lanes adjacent to the walkway can be problematic when the buffer between the two is just the curb.

### 3.3.3 Vehicle Realm

The vehicle realm refers to the area primarily reserved for through vehicles (buses, automobiles, trucks). On smaller roads this will be the primary location for cycling.

**Bus Lanes**

Bus lanes are travel lanes designated for exclusive use by buses. They come in many forms and fashions, from rush-hour only lanes to physically separated transitways. When added to an existing street, a bus lane should be converted from an automobile travel lane, as opposed to widening the roadway or removing parking. Bus lanes can be shared with cyclists, especially if there are low buses or bike volumes. However, bus-bike lanes require some special accommodation to reduce potential conflicts at bus stops. On streets without dedicated bicycle facilities and where the bus lane is the right-most lane, cyclists by default should be allowed to share the bus lane, as there is no other practical place for cyclists to ride. See Section 3.5.6 for information on lane width.

**Travel Lanes**

Travel lanes are typically used by automobiles, bikes and transit. The number of lanes should be kept to a minimum. See Section 3.5.6 for information on lane width.

### 3.3.4 Median

A median is the center portion of a roadway, but not part of the roadway. To serve its purpose, it may be striped, protected with bollards, raised, or simply elevated with a drivable surface. Only Thoroughfares and some Connectors have medians. Medians can serve many functions including maintaining separation between opposing directions of traffic and providing refuge for pedestrians crossing the street (see below).

**Landscaping**

Landscaping medians offers an opportunity to replace a non-functional paved area with green infrastructure. Landscaping increases stormwater retention and $CO^2$ absorption, mitigates traffic noise, and makes Chicago's streets more attractive. The *Sustainable Urban Infrastructure Guidelines and Policies* contains detailed guidance and design recommendations for this space.

**Pedestrian Refuges**

Medians allow pedestrians to cross the street more easily. They reduce crossing distance, allow one to cross one direction of traffic at a time, and provide a refuge to wait. A median specifically located and designed for use by pedestrians is known as a pedestrian refuge island. See Section 3.4.3 for details.

**Bus Rapid Transit (BRT)**

BRT systems are typically located in the median, but can be designed to operate on a variety of streets and locations. When in the median, access to the station is critically important. For further information, see the Institute for Transportation and Development Policy's *Bus Rapid Transit Planning Guide* (2007).

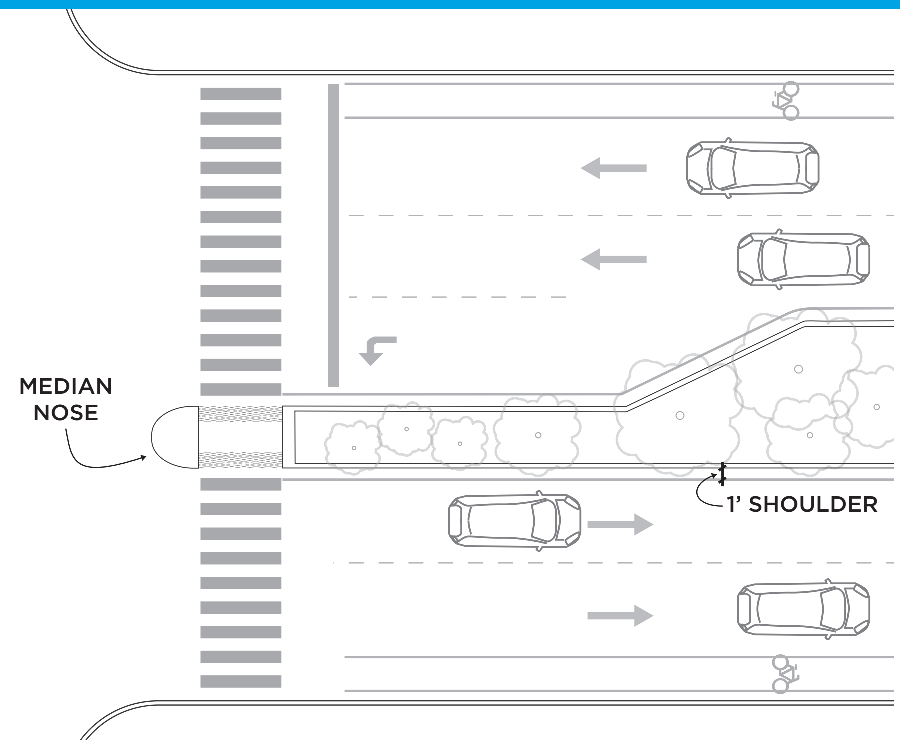
**Protected Bike Lane**
Protected bike lanes can be located in the median, especially in coordination with a BRT system.

**Left Turn Lanes**
Left turn lanes can be placed within the median proper; however this must not be at the expense of pedestrian crossing facilities.

***A key element of median design is the nose - the portion that extends past the crosswalk. The nose protects people waiting on the median and slows turning drivers.***

Figure 24 illustrates a solution where a turn lane is needed at a median with a crosswalk. By striping a shoulder along the median, the width of the median increases so that both the turn lane and pedestrian refuge can be included. Note also the nose of the median, which extends past the crosswalk.

**FIGURE 24**




Crosswalk and Turn Lane at Median

## 3.4 Intersections

After the basic cross-section has been set, how streets intersect needs to be established. This is often the most difficult task of street design, and clearly important as most pedestrian crashes in Chicago occur within 125 feet of an intersection.[10]

**Intersections should be as compact as possible.**

### 3.4.1 Layout

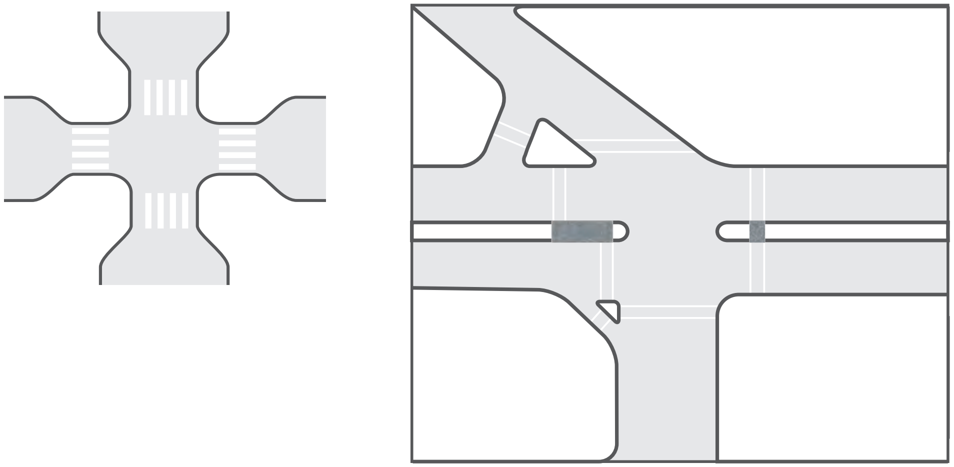
**Compact or Complex**

Intersections range from compact to complex, see Figure 25. The former has three or four legs and right angles. Most of the neighborhood junctions in Chicago fit this definition. The latter has multiple legs, traffic islands, skewed angles, and/or turn lanes. Chicago's six-point intersections, single point urban interchanges, and diverging diamond interchanges fall into this category.

Intersections should be as compact as possible. People walking and cycling can easily navigate them, and vehicle speed is kept to a minimum by traffic calming devices such as traffic circles, curb extensions, and raised intersections. They may be signalized, but this runs the risk of too much speed when drivers see multiple green lights along a corridor. The general idea is that all users approach the intersection with caution, and yield to others. Shared streets function in this manner.

If an intersection cannot be made to be compact, then it is preferred to separate traffic flows with islands and traffic control devices. The key is to make the intersection self-evident to all modes, and give each mode an opportunity to pass through the intersection with the fewest conflicts.

**FIGURE 25**



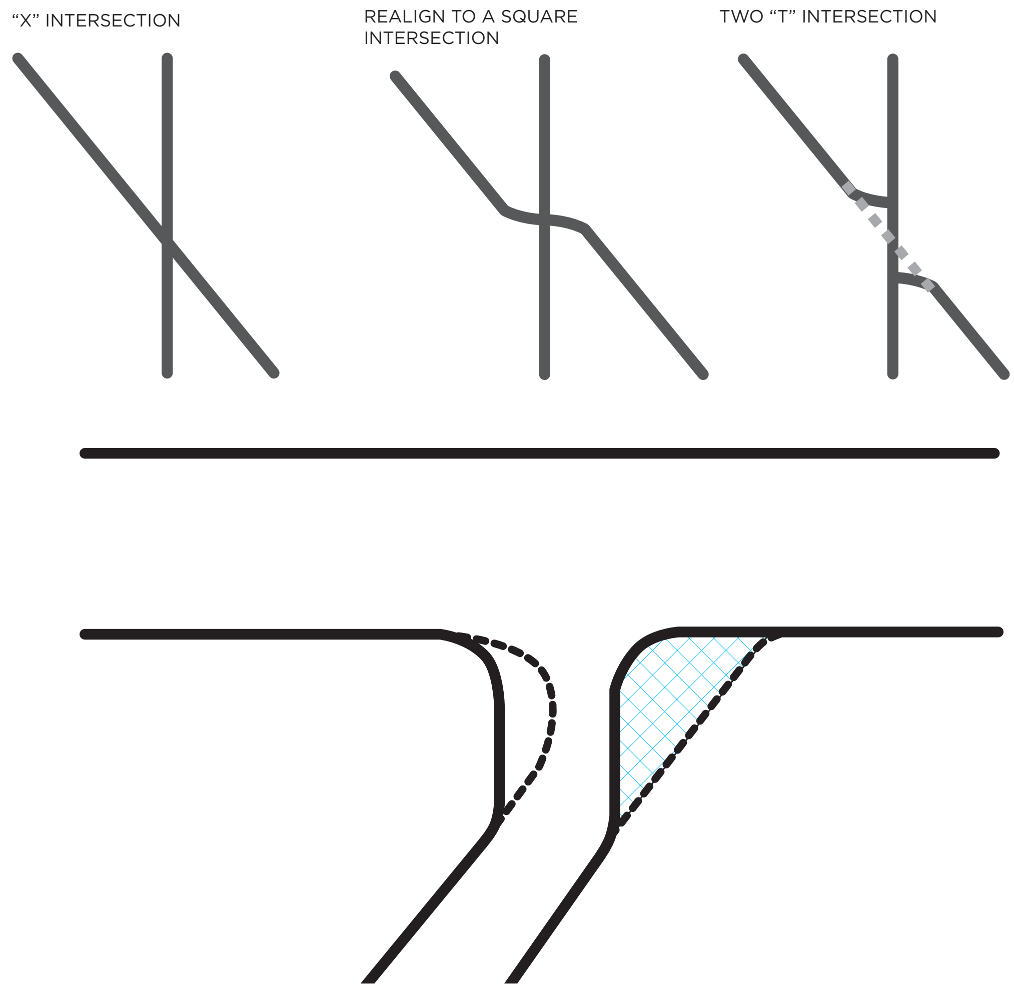
Compact and Complex Intersections

[10]*City of Chicago 2011 Pedestrian Crash Analysis.*

Not all complex intersections need remain so. Some can be reconfigured as a series of compact ones, such as converting an X-intersection into two T-intersections or squaring off Y-junctions. See Figure 26. This will lower turning speeds, increase visibility, and reduce crosswalk distances. It is important that the resulting intersections can be effectively operated with one or multiple signals, and that desire lines are not severed.

***More compact intersections are preferable to fewer, complex ones.***

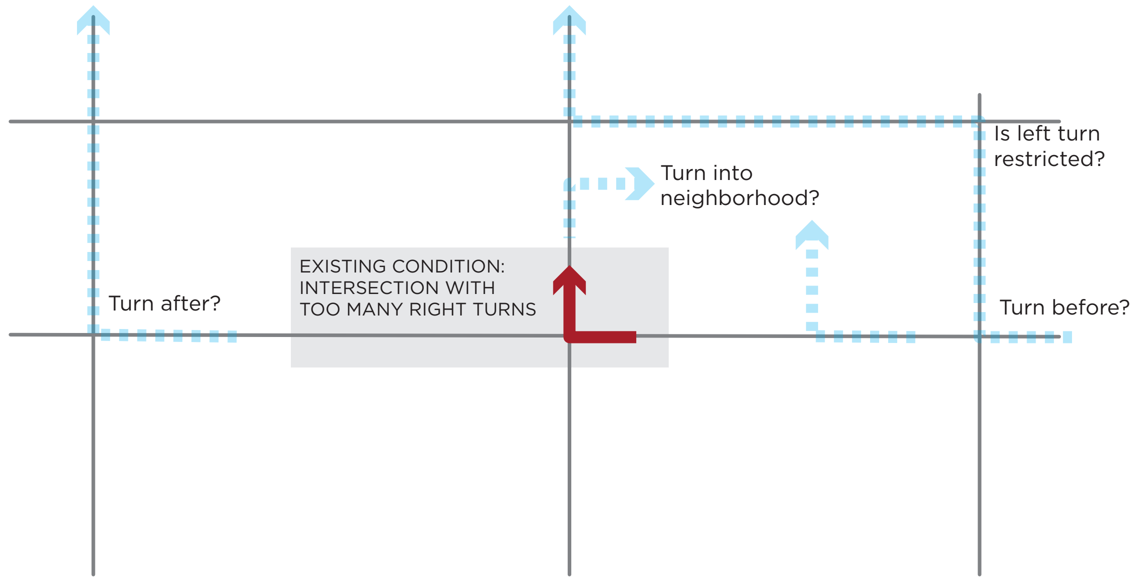
**FIGURE 26**




Converting an X-intersection into two Ts; Squaring off a Y-junction

**Connectivity**
Some complex intersections are a result of poor street connectivity. Figure 27 illustrates this point. The intersection in the center has a high number of right turns (east to north). An origin-destination survey might reveal that drivers would rather turn a block before or after, but cannot. Or perhaps another street does not go through. The network should be reviewed for mitigation possibilities before the subject intersection is enlarged.

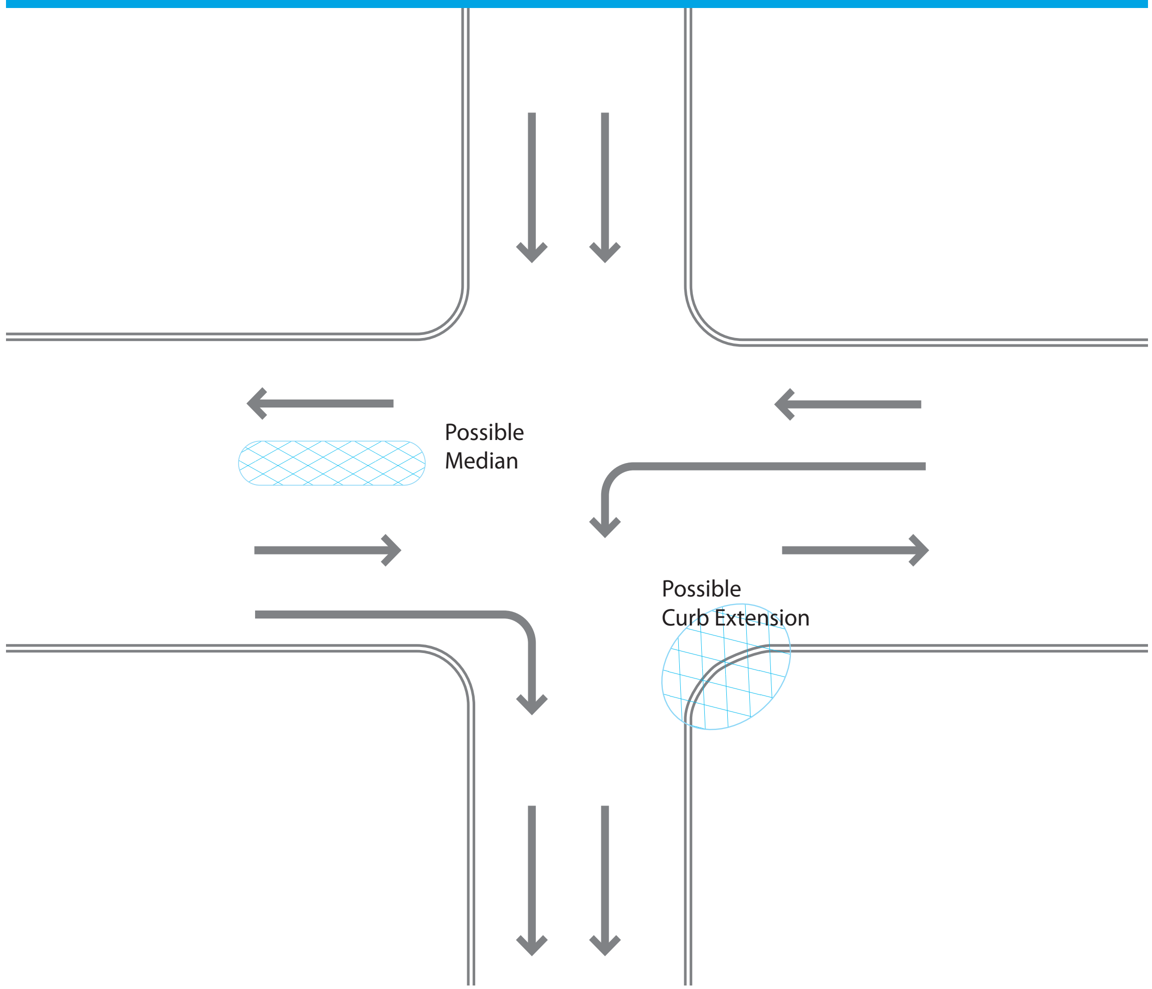
**FIGURE 27**



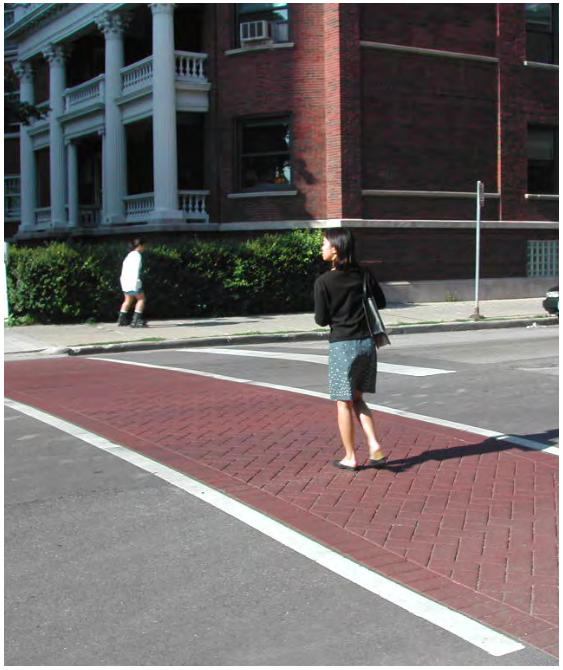

Network Mitigation Scenario

**Excessive Pavement**
In almost every intersection there are opportunities to minimize excessive pavement and impermeable surfaces, resulting in a benefit of reduced crossing distances and increased ecological functionality. The most common is with on-street parking, where curb extensions that include green infrastructure elements can almost always be added. Where there are turn lanes, often the opposite side can have a median, especially for turns onto one-way streets, see Figure 28. The *Sustainable Urban Infrastructure Guidelines and Policies* contains extensive references and design recommendations for these areas.

## FIGURE 28




Opportunities to Reduce Excessive Pavement at Intersections



**Key Principles**

The following principles will lead to complete, accessible, functional, sustainable and safe intersections.

1. Design intersection to be self-evident to all users
2. Make the intersection as small as possible
3. Align lanes so that number of approach and departure lanes are equal
4. Square off skewed intersections
5. Manage driver speed, especially turning speed
6. Limit opportunities for drivers to make sudden movements
7. Minimize crossing distances
8. Locate crossings along desire lines
9. Locate crossings and waiting areas within sight triangles
10. Organize bus stops to minimize transfer distances
11. Merge cyclists with slow speeds and low volumes, separate cyclists from fast speeds and high volumes
12. Prioritize cyclists over turning drivers
13. Ensure sufficient queue space for cyclists
14. Utilize predictable/ natural signal phasing
15. Minimize delay for all modes
16. Prioritize signals for pedestrians, cyclists and transit
17. Ensure that signal timing works for both commuters and slower walkers
18. Convert non-driving or cycling space to sidewalk or island
19. Landscape or use sustainable materials for all spaces not used for walking, cycling or driving

### 3.4.2 Corner Design

Corner design is critical to complete streets. Issues include turning and corner radius, crossing length and conflicts, pedestrian queue space and sight lines. The following protocols will assist the designer in accommodating users safely and efficiently.

**Turning speed**

Vehicle turning speed should be held to 15 mph or less for passenger vehicles. This is accomplished by restricting the *effective* turning radii with smaller corner radii, curb extensions and medians. Figure 29 presents the relationship between turning radius and speed. The formula for calculating turning speed is $R = V^2/15(.01\ E + F)$[11] where:

- R is centerline turning radius (effective)
- V is speed in miles per hour (mph)
- E is super-elevation. This is assumed to be zero in urban conditions.
- F is side friction factor[12]

**FIGURE 29**

| V (mph) | E | F | R (ft) |
|---|---|---|---|
| 10 | 0 | 0.38 | 18[13] |
| 15 | 0 | 0.32 | 47 |
| 20 | 0 | 0.27 | 99 |

Turning Speed and Radius Reference Chart

**Effective Radius and All Lanes**

The effective radius calculates the path of large vehicles traversing the intersection, and the speed at which passenger vehicles can turn. The effective radius is typically not the same as the corner radius, especially where there are parking and bike lanes. Many drivers will turn to the centermost lane to minimize centrifugal force. Similarly, truck drivers will swing wide in the receiving lanes of the turn in order to avoid running over the curb. At signalized intersections there is little incentive to turn into the nearest lane.

CDOT will minimize intersection size with smaller corner radii, set back stop lines, and other techniques; see Figure 30. Drivers of large vehicles will be expected to make the tightest turn possible at the lowest speed[14].

***A large corner radius should not be used to facilitate a truck turning from the right lane into the right lane.***

**Right/Left Turn on Red**

If accommodating a turn on red adversely impacts the design (larger corner radius, additional lane) the turn on red should be prohibited. See Section 3.5.5.

**Design & Control Vehicles**

It is preferable to have a smaller design vehicle, rather than a larger intersection. See Section 3.5.4.

[11]AASHTO Green Book 2011, Formula 3-8.

[12]Based on values "assumed for low speed design" from AASHTO Green Book 2011, Figure 3-6.

[13]The minimum centerline turn for a Passendger Car (P) is 21 feet, as per AASHTO Green Book 2011, Table 2-2b and Figure 2-1.

[14]The Illinois Vehicle Code (625 ILCS 5/11-801) directs drivers to turn as close to the curb as possible. For large vehicles including trucks and buses, swinging wide into multiple lanes IS as close to the curb as physically possible without running over the curb. Thus is it resonable for large vehicles to use multiple lanes to make turns at tight corners. The AASHTO Green Book 2011 discusses this on page 9-80.

**Turn Lanes**
In general dedicated right turn lanes are to be avoided because they widen the roadway and facilitate higher turning speeds. Before one is installed a traffic network analysis should be performed to determine if the turns may be accommodated elsewhere or spread through the network, see Figure 27.

**Slip Lanes**
Slip lanes (pork chop islands) are mitigation measures for overly wide and angled intersections. Their use is not encouraged, however, a well-designed slip lane is superior to an expanse of asphalt.

Protocols for slip lane selection are as follows:

» First, minimize intersection size as discussed above.

» Second, analyze the traffic network to determine if the turn can be made elsewhere and/or if the turns can be redistributed throughout the network. For example, it is usually possible to turn before or after a diagonal street. Also, turns for large vehicles can be restricted.

» If a slip lane is used, stop control and a raised crosswalk are preferred.

» See Figure 30 for slip lane dimensions[15].

***Slip lanes require Compliance Committee approval.***

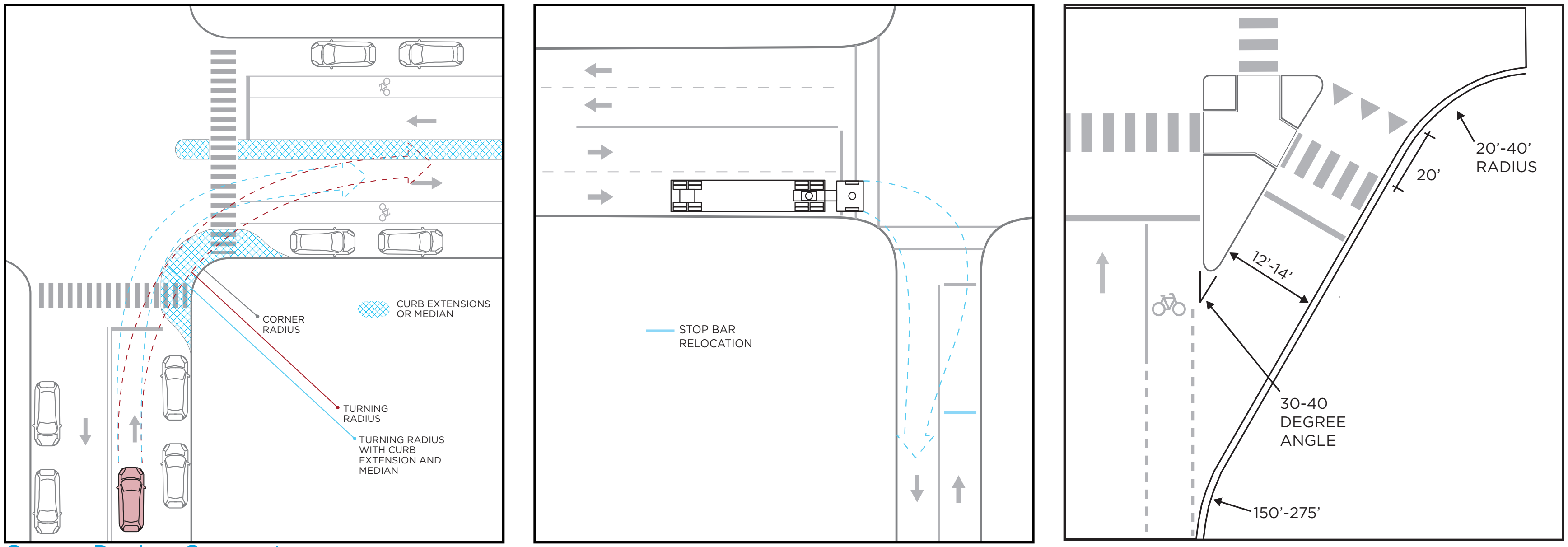
**Highway Ramps**
Corner design protocols apply where highway and other ramps meet the city street. This may require longer ramps and deceleration lanes. Intersections adjacent to highway ramps are not meant to process high automobile speeds at the expense of other users.

It is preferable to slow drivers from highway to street speeds before they arrive to the intersection.

Figure 30 illustrates corner design concepts. The left shows the difference between the actual corner radius and the effective turning radius. Note how the parking and bike lanes allow a larger turning radius. The addition of a curb extension and median reduces the turning radius and will limit turning vehicle speed. The center image demonstrates how a truck driver makes a turn into a smaller street with curb extensions by crossing over the center line. If this is a routine movement, such as along a bus route, then it is prudent to move the stop line back. On the right is a slip lane. Note the raised crosswalk and position of the crosswalk that enhances visibility for pedestrians entering from either side.

[15]For more information on slip lanes see the 2011 AASHTO Green Book, Section 9.6.5; FHWA's Selecting Pedestrian Safety Improvements Countermeasure Matrix on "Well-designed Right-turn Slip Lanes"; 2003 Oregon DOT Highway Design Manual, pg 9-27.

## FIGURE 30




Corner Design Concepts

### 3.4.3 Pedestrian Crossings

Pedestrians cross the street at a variety of locations: at the intersection of two streets, at the intersection of a street and a path, midblock, when they exit a parked car, when there is a gap in traffic. Shared streets, home zones and other locations where people routinely walk in the street need no pedestrian crossings, per se. Complete streets recognize and accommodate this activity.

Within the City of Chicago, pedestrians have the right-of-way at crosswalks unless directed otherwise by traffic-control devices, police officers or traffic control aides.[16] A crosswalk is the extension of the sidewalk or walking area across the road. It does not necessarily have to be painted or otherwise marked.[17] Drivers shall stop and yield to pedestrians in crosswalks on their half of the road.[18]

## Pedestrians Had to be Trained

"...streets used to be different than they are today. Modern 'improvements' were not universally embraced when they were first put in place...in the 1920s and 1930s pedestrians had to be trained to cross at intersections and wait at traffic signals."[19]

**FIGURE 31**


Pedestrian Crossing Facility Selection Methodology

Figure 31 presents a three-step process for locating and designing pedestrian crossing facilities. First, locate the crossing according to the pedestrian network. Second, determine the crossing treatment (signal, refuge island, marked crosswalk). Last, design the crossing and its operation.

**Location**

Selecting a pedestrian crossing location is based on two simple rules: it should be located where pedestrians want to cross, and where drivers can reasonably expect pedestrians to cross.

» People generally cross where it's most convenient, expedient, efficient, and in as direct a line to their destination as possible. This is known as the **desire line**.

» Locate crossings according to the **walking network**, not the driving network. For example, people walk through the alleys and plazas downtown, so there should be crossing opportunities where these meet streets. There should be some way to cross the street at every bus stop. An analysis might determine that no formal crossing (marked or signalized crosswalk) is needed, or that pedestrians should be redirected; nevertheless, it is incumbent on CDOT to assess the situation.

[16]City of Chicago Municipal Code 9-24-050.
[17]State of Illinois Vehicle Code 5-1-113.
[18]State of Illinois Vehicle Code 5-11-1002.
[19]Clay McShane, *Down the Asphalt Path: The Automobile and the American City*, 1994

» There is no hard and fast rule for **crossing spacing**, such as every 150 feet. Crossings should be provided where an analysis shows a concentration of origins and destinations directly across from each other.

» The organization of buildings, doors, paths, fences, and gates greatly influences the location of street crossings. **Site design** and **landscaping** can orient people to preferred crossings, and street design can respond to the site. A successful complete street network treats the two in harmony.

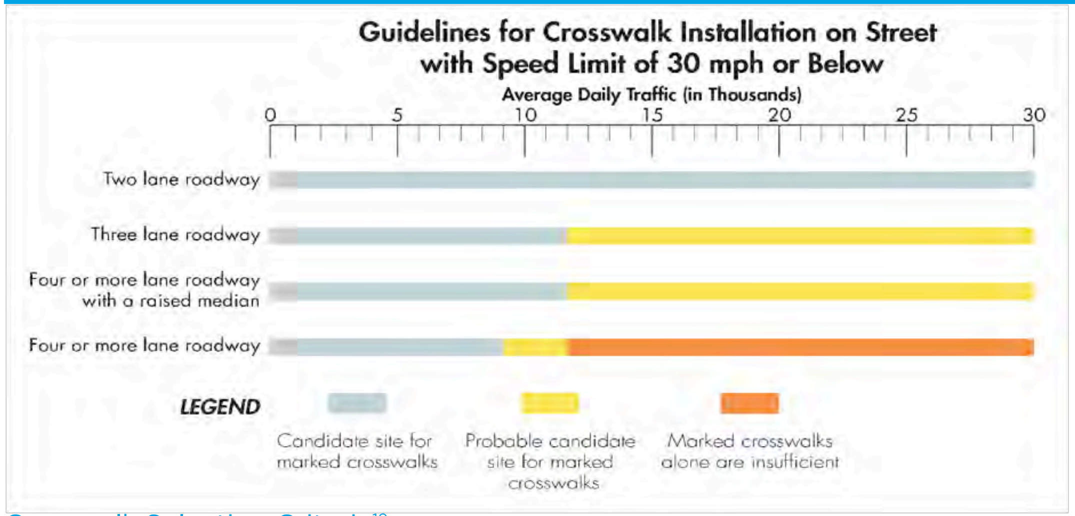
***No amount of design can make up for a crossing in the wrong location.***

**Treatment**

Once the location has been established, the crossing treatment can be determined, see Figure 32. The crossing treatment is largely a function of automobile speed, automobile volume, and roadway configuration. People informally cross narrow streets with low automobile volume and speed. Refuge islands, curb extensions, raised crossings, and overhead lighting can enhance these crossings. Multi-lane, high-speed, and high-volume roads require more aggressive treatments such as lane narrowings, medians, overhead signs, and advance stop lines.

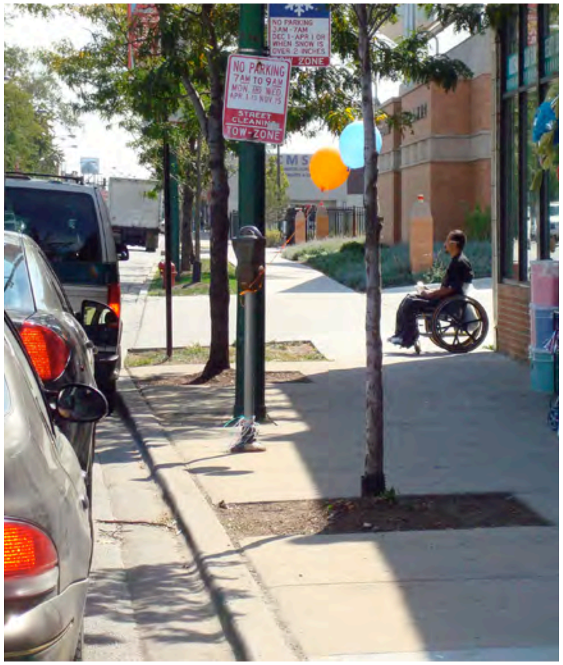
Fundamentally altering a street, for example through a road diet, accomplishes much of this simultaneously. Traffic control devices such as crosswalk striping, yield signs, and signals may be warranted. At locations with a documented crash history, traffic should be calmed or controlled more aggressively. Crosswalks shall not be eliminated based on the notion that not marking a crosswalk is safer. Instead they should be enhanced, for further guidance, see the CDOT *Pedestrian Plan*.

**FIGURE 32**




Crosswalk Selection Criteria[19]

[19]CDOT *Pedestrian Plan*




**Design & Operation**

After setting the location and type, the crossing can be designed. While many designs may be standard, each should be altered as per context. For example, the crossing should be located so that people getting off the bus cross behind the bus (far-side bus stop). Combination pedestrian-bicycle crossings must cater to both users needs. People crossing at corners need protection from turning drivers via leading pedestrian intervals or turn on red restrictions. In general the width of a crosswalk should be equal to or greater than the width of the sidewalk. This will accommodate the two platoons of pedestrians that meet in the crosswalk from opposite sides of the intersection. Pedestrian ramps should be equal to the size of the crosswalk so that all may benefit from a flush transition. Bollards may be necessary to restrict driver access.

***Marked crosswalks should not be longer than three lanes.***

**Lighting**

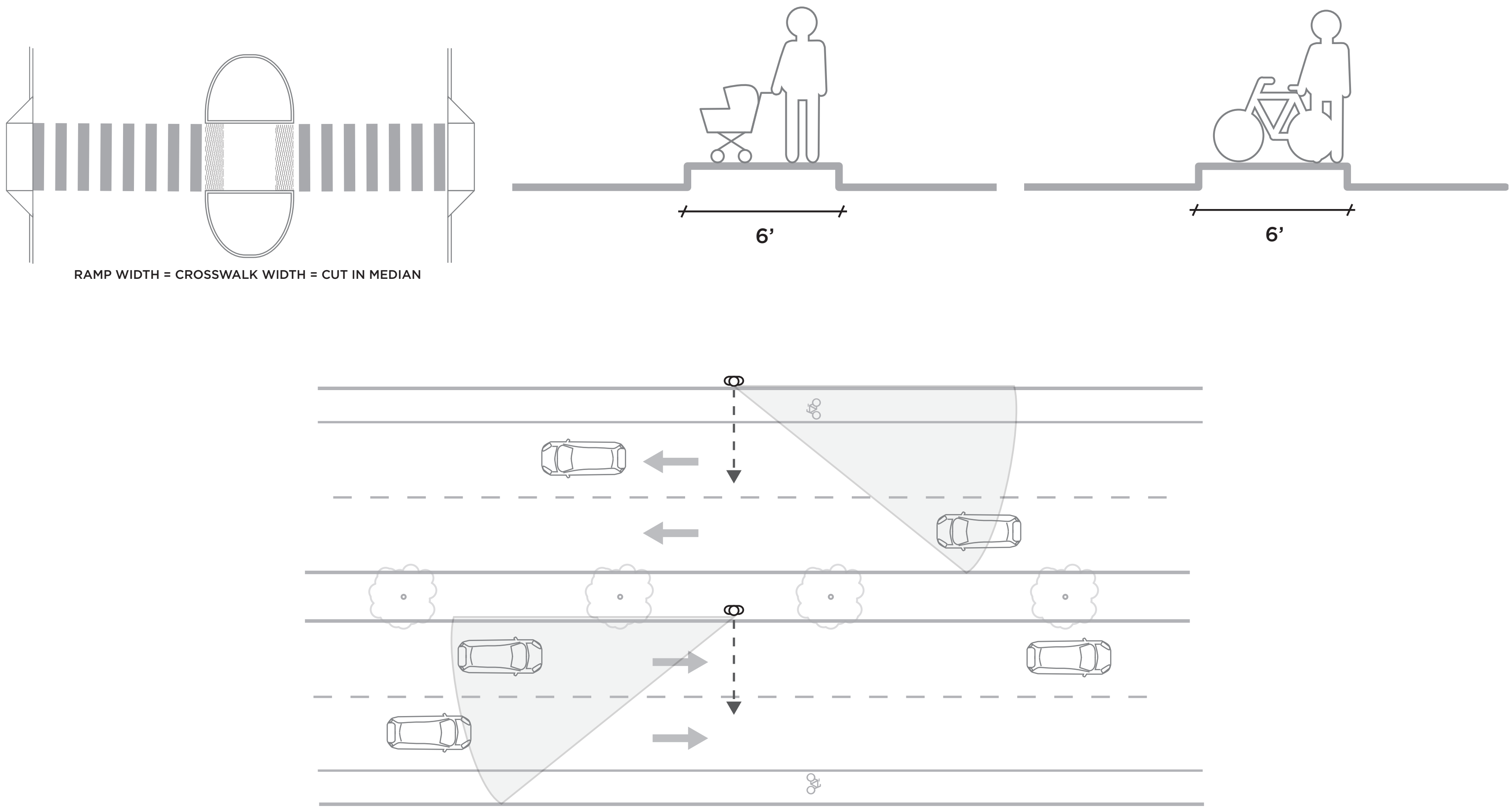
Unsignalized marked crosswalks shall be lit as brightly as a signalized intersection in compliance with the lighting requirements in the *Sustainable Urban Infrastructure Guidelines and Policy*.

**Refuge Islands (Medians)**

It is easier to cross a street with a median than without. A median or refuge island allows a person to cross one direction of traffic at a time, making it much easier to find and correctly identify acceptable gaps. Designers should seek opportunities to install medians or refuge islands on two-way streets and anywhere else (turn lanes) where they would assist a crossing. Figure 33 presents key design concepts.

- The preferred width of a pedestrian refuge is eight to 10 feet, with additional area to accommodate the expected number of people. The minimum protected width is six feet, based on the length of a bicycle or a person pushing a stroller. Where a six-foot median width cannot be attained, a narrower raised median will still improve crossing safety. The refuge is ideally 40 feet long.
- Medians and refuge islands should include curbs, bollards or other features to protect people waiting.
- Vertical elements such as trees, landscaping, and overhead signage identify the island to drivers. Where landscaping is not possible, alternate treatments should be installed to increase conspicuity.
- The cut-through or ramp width should equal the width of the crosswalk.

## FIGURE 33



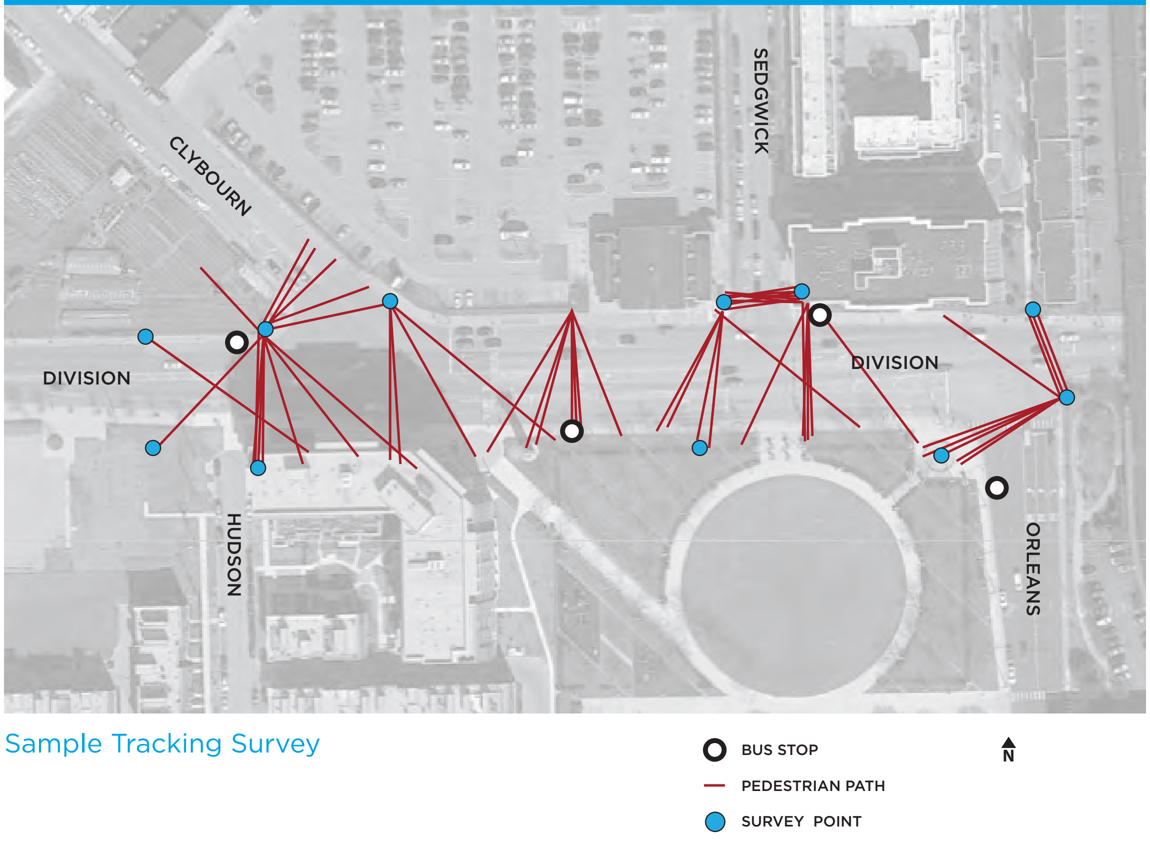

Pedestrian Refuge Island Concepts

## Tracking Surveys

A tracking survey documents exactly where and how people cross a street, complex intersection, or plaza. This information is useful in locating crosswalks and refuge islands, redesigning intersections, and understanding the interface between streets and the surrounding buildings and spaces. The best time to perform this type of survey is a weekday between 3 and 6 PM, when there is an overlap of school, rush hour, and evening traffic. This is also the time period when most vehicle-pedestrian crashes occur[21]. Typically 20 minutes is required to establish a pattern, more or less depending on the volumes. Additional surveys can be done at different times of the day to highlight temporal fluctuations.[22]

Figure 34 envisions a tracking survey at the complex intersection of Clybourn-Division-Orleans-Sedgwick.[23] The diagram identifies 14 likely pedestrian destinations and funnel points: bus stops, park gates, building entrances, parking lot entrances, and sidewalks. These are shown as blue dots. A surveyor would stand at each of these points and "track" every person that passed and crossed the street. The lines track where a person would cross the street, irrespective of crosswalk. One line is shown for each person. Thicker lines indicate more people crossing at the same location.

**FIGURE 34**




Sample Tracking Survey

[21]Chicago Forward: DOT Action Agenda.
[22]For more information, refer to "Best Practices for Pedestrian Counts," CDOT, 2012.
[23]This drawing is speculative; no actual survey was conducted.

### 3.4.4 Driveways[24]

The fundamental principle in driveway design is that a driveway is subservient to the sidewalk. Drivers turning into and exiting a driveway must yield. The principal way to accomplish this is to ramp the driveway up to meet the sidewalk, and carry the sidewalk grade and surface material across the driveway. This will visually reinforce the continuity of the sidewalk, see Figure 35. Other techniques to reinforce this include:

» Keep the driveway as small as possible, including width and corner radii.

» Design for 10 mph.

» Orient the driveway 90 degrees to the street.

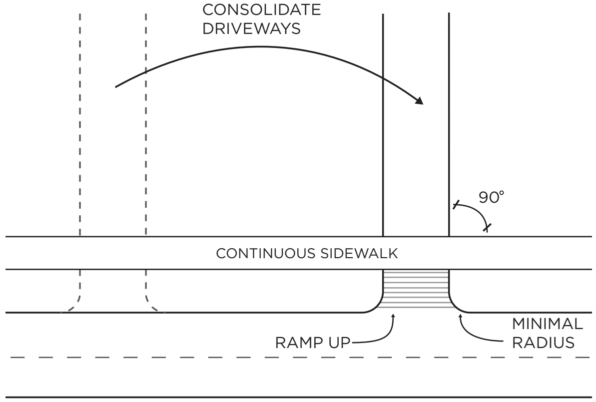
» Include stop/yield signs for exiting traffic where sight distance is limited.

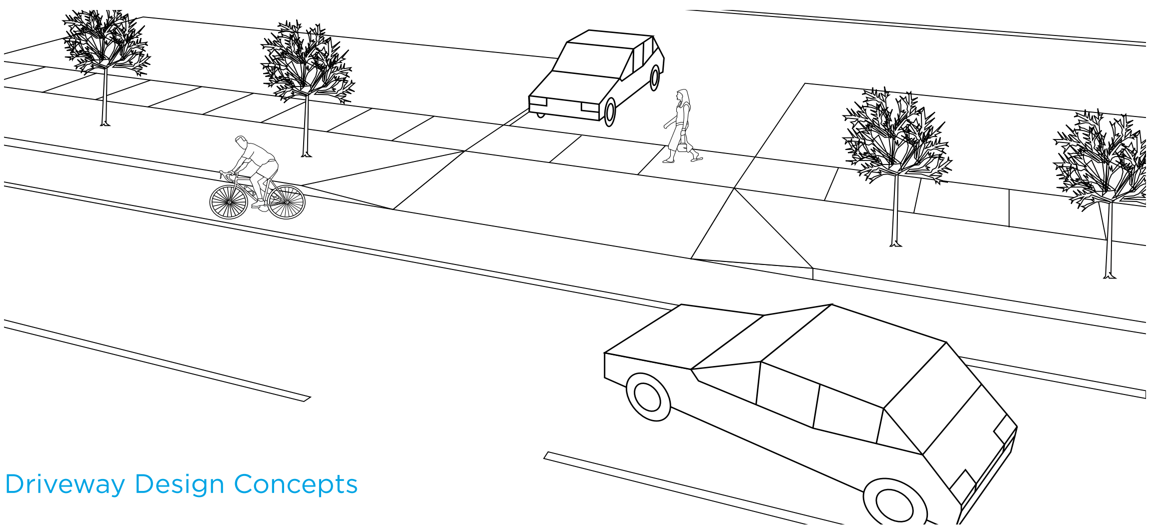
The number of driveways should also be minimized, as this will reduce conflict potential for all modes on the street or sidewalk. During project scoping, driveways should be surveyed and efforts made to consolidate or eliminate as many as possible. Utilizing an alley instead of a driveway for access is a recommended practice. Locating the buildings along the street and parking along the alley accomplishes this.

[24]Even though driveways are typically discussed as a sidewalk element, they are placed here because of the cross-traffic conflicts, which have more to do with intersection design.

**FIGURE 35**

***Compliance Committee approval is required if the driveway does not ramp up to meet the sidewalk.***



Driveway Design Concepts

## Three Tenets of Street Design

1. **Vehicle speed** is a significant determinant of crash severity, especially between modes. The operating speed along a street must reflect not on the roadway but also the context. Reducing vehicle speeds opens up a range of design options that allows a street to resemble less a speedway and more a neighborhood street.
2. Minimizing **exposure risk**, the time that users are exposed to conflicting movements, creates safer streets. Narrower streets, smaller intersections, leading pedestrian intervals, protected bicycle facilities all achieve this.
3. Being able to **predict** what others will do, where they will go and when makes a street safer. Streets with consistent speed profiles, intersections with predictable signal operations, and low-speed streets where drivers make eye contact with each other, cyclists and pedestrians are generally safer streets.

[25]LOS is typically assumed to refer to motor vehicles. In this document LOS refers to level of service generically. MVLOS refers to LOS for motor vehicles.

## *3.5 Geometric and Operational Policies*

This final section outlines key CDOT geometric and operational policies.

3.5.1 Level of Service Level of Service[25] is a qualitative assessment used to describe the perceived service a street provides to the people who use it. Motor Vehicle Level of Service (MVLOS) assesses delay for motorists along a roadway section or at a signalized intersection, using a letter grade system that assigns an A for minimal delay and an F for greatest delay. MVLOS evaluation is not well suited for complete streets outcomes as it does not take into consideration other modes or goals such as safety and convenience. In fact, increases in MVLOS often come at the expense of other modes and goals. In Chicago's downtown core, congestion is often more of an issue than MVLOS.

***Relying primarily on MVLOS produces two outcomes inconsistent with complete streets:***

***1. streets are routinely "upgraded" for higher traffic volumes at the expense of other users***

***2. streets designed for rush hour volumes end up with excess speed and width off-peak and at night***

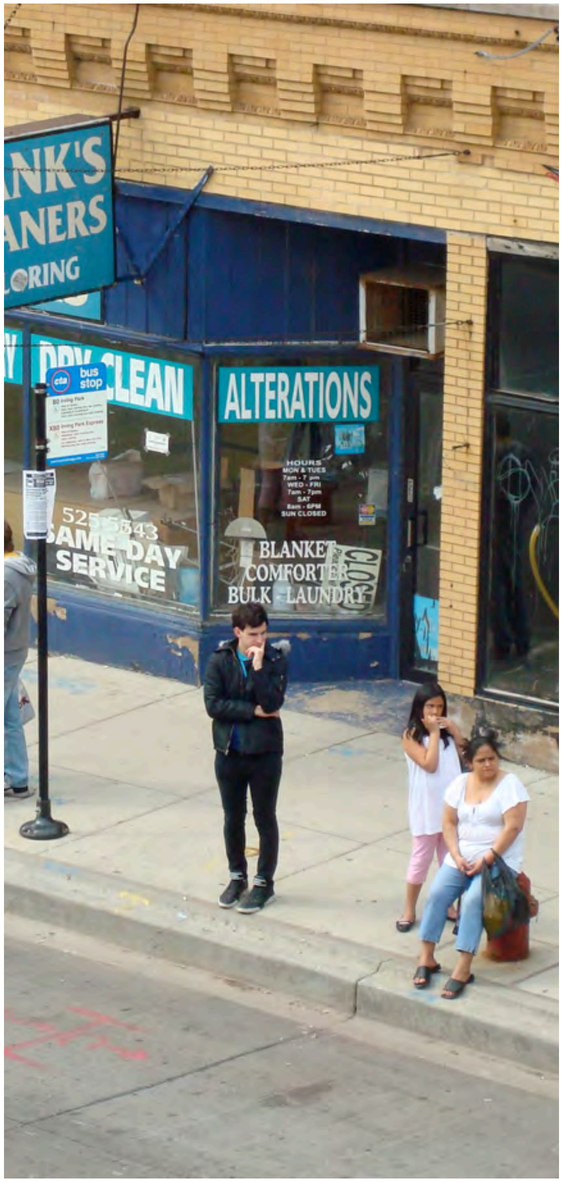
**Level of Service Policy**

1. LOS should be consistent with modal hierarchy. In a typical project, pedestrians will enjoy the highest LOS, while drivers will have the lowest. In essence, all LOS is relative by mode. LOS should not purposely be *lowered*; a street where all modes rate A is acceptable.
2. There shall be no minimum MVLOS for any project. Within the Loop and River North,[26] the default maximum MVLOS for CDOT-initiated projects shall be E. This is not to say that the MVLOS must purposely be *lowered*, but efforts should not be made to increase it above E. Developer-initiated projects may not negatively impact the MVLOS, unless corresponding increases are made in pedestrian, bicycle, and transit level of service, consistent with the modal hierarchy.
3. LOS evaluations shall consider cross flows (especially pedestrian) as well as corridor flows.
4. Delay for pedestrians at signals shall not exceed 60 seconds.[27] Along streets with typology NM, C, D or IC, the minimum peak-hour sidewalk pedestrian LOS should be B.
5. A working group will best decide how to evaluate LOS, whether using traditional methods or more recent multi-modal level of service methodologies.[28] Project managers are encouraged to utilize multi-hour evaluations instead of peak-hour-only calculations, see Figure 17.
6. LOS evaluation is only required for projects identified in the Project Delivery Process (see 4.1). It should be calculated when required by funding sources, but may be balanced with other factors.

[26]As bounded by and inclusive of Roosevelt Road, Halsted Street, Chicago Avenue, and Lake Michigan. The operations working group should review the area encompassing Northwestern, Prentice Women's, and Lurie Children's Hospital.

[27]Average pedestrian delay, as described in the *2010 Highway Capacity Manual*.

[28]For more information on multi-modal LOS, refer to the *2010 Highway Capacity Manual*; *NCHRP 3-70, Multimodal Level of Sesrvice for UrbanStreets*; and *NCHRP 3-79, Measuring and Predicting Performance of Automobile Traffic on Urban Streets*. Note the science on bicycle level of service is in its infancy.




**Considerations**

Typically LOS is concerned only with through movement, whether driving or walking. The following list presents other considerations, which either affect LOS or are affected by it. For example, driveways and frequency of use affect pedestrian LOS but are not included in typical calculations. Project managers and the Compliance Committee should consider these items when applying LOS to a particular project.

*Pedestrian facilities*

- edge - building, setback, fence, open space
- walkway - window shopping, seating, vending, cross-flows at corners and building entrances
- sidewalk furniture - café seating, trees, plantings, bicycle racks, bus stops
- corner - queuing, accessibility
- interference - driveways, alleys, parking, deliveries

*Transit facilities*

- headways
- stops - amenities, spacing
- interference - turns, deliveries, parking
- bicycle facilities
- separation, from pedestrian realm and roadway
- guidance and prioritization, especially at conflict points
- interference - turns, deliveries, parking

*Automobile facilities*

- volume fluctuation - peak hour and off-peak, weekday and weekend, seasonal
- loading and parking - coordinated with volume fluctuation
- peak-hour operational issues - transportation demand management, signal synchronization
- interference - pedestrian crossings, bicycle operations

***It may be in the best interest of CDOT to move away from the LOS paradigm.***

### 3.5.2 Traffic Control Devices

Traffic control devices (TCD) (signals, stop and yield signs) are important tools for implementing complete streets. Signals can be synchronized to manage automobile speeds, and facilitate bicycle travel. Yet, a well designed intersection can be made unusable by many if the signal is optimized for automobile flow. Too many stop signs can make a roadway seem like a driving gauntlet. And, the lack of traffic control, especially at minor intersections, may make it impossible for people who wish to cross the street. Many streets can be made more complete simply through signal timing and other minor changes in traffic management.

***All traffic control devices shall support the complete streets modal hierarchy.***

**Policy**

The following list is not meant to be an exhaustive review of TCDs, rather it is intended to tie their use to complete streets. TCDs will continue to meet MUTCD warrants; however CDOT will seek exception to warrants that are at odds with this policy, see Section 1.6.5 MUTCD.[29] Exceptions to these policies must be reviewed by the Compliance Committee.

1. Synchronized signals are preferred and shall be set at or below the target speeds listed in Section 3.5.5 as projects are completed.
2. Signal timing shall be adjusted during off peak hours to manage automobile speeds.
3. Fixed time signals are the preferred option. When actuated signals are replaced or upgraded, they should become fixed time and include countdown signals.
4. Left turns should occur after the through movement (lagging).
5. All legs of all signalized intersections shall have marked crosswalks unless pedestrians are prohibited from the roadway or section thereof, or there is physically no pedestrian access on either corner and no likelihood that access can be provided.
6. "NO PEDESTRIANS" signs shall not be used unless they are accompanied by a physical barrier and positive information about where pedestrians are to walk and/or cross the street.
7. Leading pedestrian intervals will be installed as per *Chicago Pedestrian Plan*.
8. Signals on transit-priority roadways should be timed to prioritize transit, see Section 2.1.4.
9. Signals on bicycle-priority roadways should be timed for bicycle commute speeds (15 mph), see Section 2.1.4.

## Chicago's First Signals

An anecdote about the first use of signals in Chicago is telling. "Chicago traffic officials found pedestrians would not conform to the system. Because signal timings in coordinated systems were based on vehicle speeds, they helped to redefine streets as motor thoroughfares where pedestrians did not belong."[30] Re-timing traffic signals to facilitate travel by pedestrians, cyclists and transit will ensure more complete streets.

[29]Specifically, CDOT finds that the warrant limiting pedestrian signals to a spacing of 300 feet and subjugating them to auto flow (*MUTCD 2009*, Section 4C.05, Paragraph 04) is contrary to the mode hierarchy described in this document.
[30]*Fighting Traffic* by Peter Norton, MIT Press 2011, p138.

### 3.5.3 Turns on Red

Right or Left Turns on Red (RTOR, LTOR) is a common practice across the United States. RTOR allows a driver to turn right when the signal is red, after a complete stop and yielding to any oncoming traffic or pedestrians in the crosswalk. LTOR occurs at the junction of two one-way streets. Turns on red were implemented in the 1970s in a (questionable) effort to save fuel.[31]

Turns on red adversely impact pedestrian comfort and safety. The classic example occurs as the driver looks to the left for oncoming traffic and fails to see the pedestrian in the crosswalk to the right. As they wait for a gap in traffic, drivers also tend to advance and block the crosswalk - the one with the WALK signal. Turns on red also negatively impact walking conditions for those with limited vision.

Pedestrian safety at transit stops is compromised when drivers turn while people are crossing the street after getting off the bus. Right turns on red also restrict bicycle travel. It is safer for cyclists to queue ahead of automobiles stopped at a signal, either in a bike box or in the bike lane. With right turns on red, drivers are more likely to inhabit this space.

The *Chicago Pedestrian Plan* calls for the development of an implementation plan to restrict right turns on red. The operations working group will assist in the development of this plan, which will include guidance on signage, enforcement, and allowing exceptions.

**Policy**

While turns on red are legal in the City of Chicago, they are a privilege, not a right. Designing or operating an intersection to accommodate or favor turns on red is not a preferred practice. If accommodating turns on red adversely impacts the design, the turn will be prohibited. Figure 36 lists conditions where restrictions to turns on red should be considered.

**FIGURE 36**

| Time Period | Location |
|---|---|
| All Times | » In Child Safety Zones |
| From 6 am until Midnight | » Within the Loop and River North[32]<br>» Along designated Pedestrian (P) Streets<br>» Along designated Bicycle Priority Streets, see Section 2.1.4<br>» Within 300 feet of libraries, senior centers, transit station entrances (CTA and Metra)<br>» At any crosswalk where the MUCTD pedestrian volume and/or school crossing warrant is met[33] |

Turns on Red Restrictions

[31] *ITE Journal*, Institute of Transportation Engineers, January 2002, p32.

[32] As bounded by and inclusive of Roosevelt Road, Halsted Street, Chicago Avenue, and Lake Michigan.

[33] MUTCD 2009, Section 4C, Warrants 4 and 5.

### 3.5.4 Design & Control Vehicles

The design vehicle influences several geometric design features including lane width, corner radii, median nose design, and slip lane design. It is critical not to use a larger design vehicle than necessary, due to negative impacts such as turning speed, yielding behavior and crossing distances. Likewise, using a design vehicle that is too small may result in frequent instances of trucks driving over curbs on street corners, endangering pedestrians. Nevertheless, it is best to err on the side of too small than too large in an urban setting.

#### Delivery Van

These policies and procedures introduce a new design vehicle: Delivery Van (DL-23). It is based on the mail or package truck commonly used in Chicago. For design purposes, it is 23 feet long, 8.5 feet wide (10 feet with mirrors), and 10 feet high. Its turning radii is 29 feet outside, 23.3 feet centerline, and 22.5 feet inside[34], see Figure 37.

***Using a design vehicle greater than a WB-50 requires approval from the Compliance Committee.***

#### Policy

Design vehicle selection is to be made as per the roadway typology of the receiving street at an intersection.

- » Thoroughfare: WB-50
- » Connector: BUS-40[35]
- » Main Street: SU-30[36]
- » Neighborhood Street: DL-23
- » Service Way: DL-23

A larger vehicle may be used if a vehicle classification study identifies that a particular vehicle making a *specific turning movement* is larger than the vehicle specified above.

#### Control Vehicle

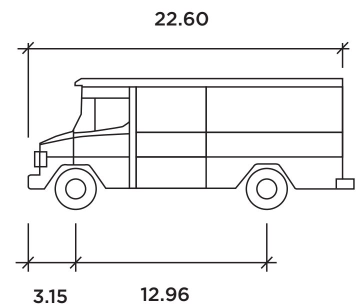
To ensure that access for Emergency Medical Service (EMS) vehicles, fire engines, moving trucks, and sanitation vehicles is not precluded, CDOT will use control vehicles. A control vehicle utilizes all traversable parts of an intersection, including driving over curbs and across centerlines. In addition, fire engines typically drive over break-a-way signs and other obstacles. The design and control vehicles work in tandem: the design vehicle keeps an intersection compact for everyday use, the control vehicle allows access by necessary vehicles.

[34]These dimensions were taken from a United Parcel Service P-80 truck. The turning radii was calculated using AutoTurn.

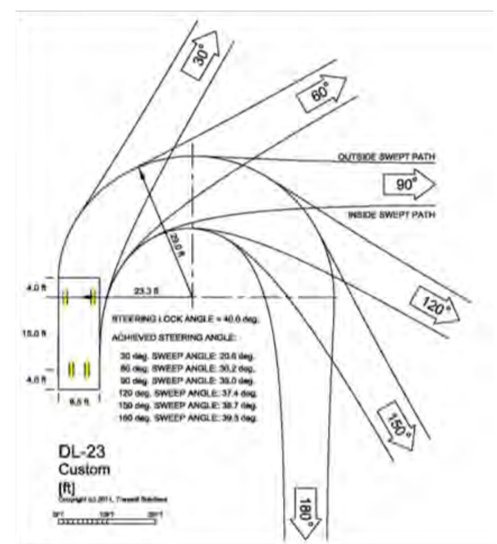
[35]If there is no scheduled bus route making this turn, then use SU-30.

[36]If a scheduled bus route makes this turn, then use BUS-40.

**FIGURE 37**




| O2 | feet |
|---|---|
| Width | : 7.12 |
| Track | : 7.12 |
| Lock to Lock time | : 6.0 |
| Steering Angle | : 42.0 |




DL-23 Profile and Turning Template


### 3.5.5 Design & Target Speed

Motor vehicle speeds have a significant effect on whether a street is complete. A low-speed street looks and feels vastly different than a high-speed street, whether traveling along, crossing, living or doing business on it. With lower speeds, design options increase as the need to protect all users from the unintended consequences of higher speeds lessens. While faster speeds can reduce travel time for motorists and transit users, the vulnerability of other users and uses is increased.

Complete streets speed treatment is philosophically different from conventional transportation practices. Conventionally, a design speed is set as high as practical, usually over the speed limit. This has roots in the calculation of design loads in the building industry; for example a roof should be designed to withstand the weight of the heaviest predicted snowfall. Unfortunately, drivers react to a design speed that exceeds the speed limit by driving faster. In contrast, complete streets utilize target speeds, where the design and operation of a street is set to induce drivers to drive at or below the speed limit.

## Speeding and Fatalities

Speeding is a contributing factor in almost one-third of all fatal crashes in the United States.[37]

**Policy**

CDOT will use target rather than design speed. The target speed of each street will be equal to or less than the speed limit, as per roadway type.

» Thoroughfare: 25-30 mph

» Connector: 20-30 mph

» Main Street: 15-25 mph

» Neighborhood Street: 10-20 mph

» Service Way: 5-10 mph

The prima facie speed limit in the City of Chicago is 30 mph. The use of target speeds may require lowering the speed limit, or posting speed advisory signs. The target speed should account for specific geometric elements such as curves and traffic calming devices. The *Chicago Pedestrian Plan* proposes a 20 mph target speed for residential streets. These will generallly be on Main Streets and Neighborhood Streets.

***Target speeds higher than 30 mph require approval of the Compliance Committee.***

[37]2010 Traffic Safety Facts - Speeding. National Highway Traffic Safety Administration

### Speed Control Elements

Speed control elements are often necessary to maintain target speeds. Simply posting a lower speed limit is usually not effective. A variety of operational and geometric elements can be used to control speeds, such as:

» Signals synchronized to target speed

» Narrower lanes, especially on Main Streets, Neighborhood Streets and Service Ways

» Roadway physically narrowed through bicycle facilities, on-street parking, raised medians/islands, curb extensions

» Traffic calming devices - speed humps, mini-roundabouts, chicanes

» Limited sight distance such as buildings on the corner

» Terminating vistas, such as at a T-intersection or at a traffic circle. When drivers cannot see to the horizon, they tend to driver slower.

» Rhythms created with trees, poles, landscaping, and crosswalks

## Three Primary Speed Concepts

» As speeds increase, there is more kinetic energy, which means more energy to be dissipated in the event of a crash. This is most noticeable for pedestrians, who have an 85% chance of being killed by a vehicle traveling at 40 mph, but only a 5% chance of being killed at 20 mph.[38]

» As speeds increase, the distance traveled by a vehicle during the driver's reaction time and braking increases exponentially.[39]

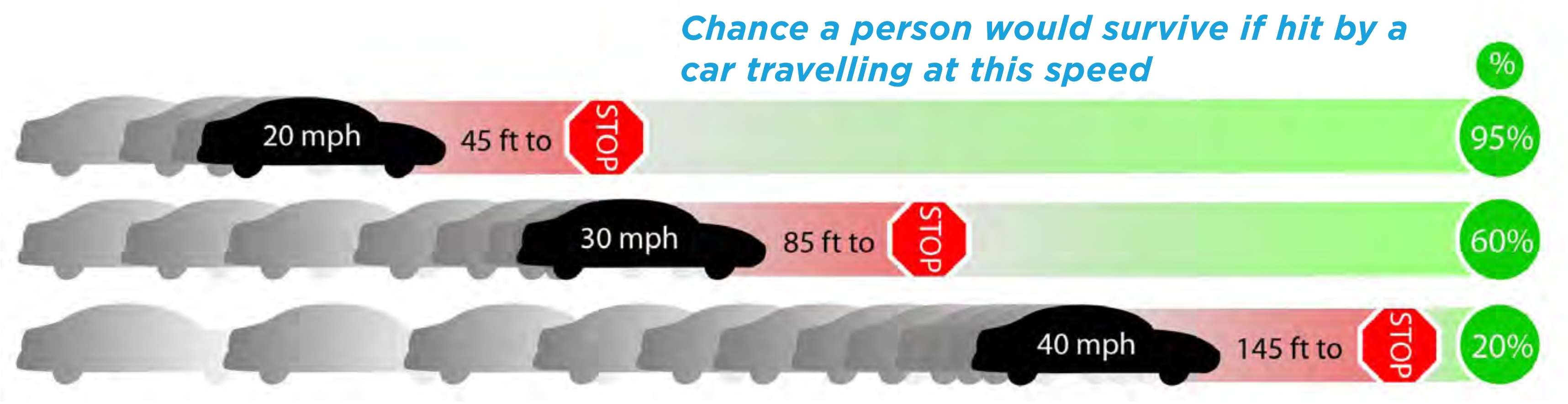
» As speeds increase, our brains process less of what is "seen" in our peripheral vision. This is most problematic on wider streets with activity (parking, cycling, children chasing balls in the street) on the side of the roadway.[40]


[38]2012 *Chicago Forward Action Agenda*.

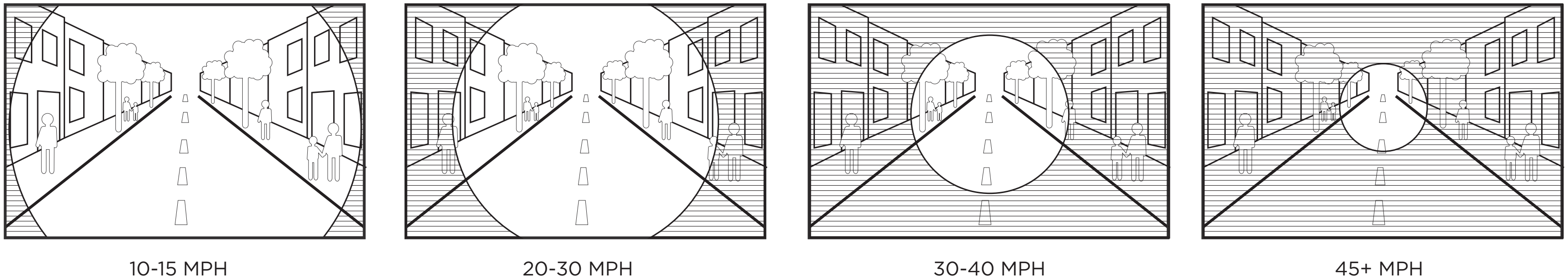
[39]Ibid.

[40]Muller, Alexandra S and Lana Trick. "Driving in Fog: The effects of driving experience and visibility on speed compensation and hazard avoidance." Accident Analysis & Prevention. 2012.

## FIGURE 38




*Tunnel Vision: as speed increases, peripheral vision decreases.*




Speed Concepts

### 3.5.6 Lane Width

The width of a travel lane affects the completeness of a street in subtle ways. The difference between a 10 and 12 foot lane is but 24 inches. Yet on a six lane roadway, this equals another lane, two bike lanes, a wider sidewalk, on-street parking, or a median. Similarly the crossing distance becomes longer, which impacts signal timing. It has also been shown that wider lanes lead to higher travel speeds and are no safer than 10-foot lanes.[41]

**Policy**

The standard width for automobile travel lanes, including turning lanes, shall be 10 feet. One lane per direction on scheduled Chicago Transit Authority (CTA) bus routes and/or on a mapped truck route may be 11 feet wide. Lanes widths are measured from the face of curb, where present. Lane widths are further articulated in section 3.2.1 above. In general, they will be as follows:

» Thoroughfare: 10-11′

» Connector: 9-11′

» Main Street: 9-10′

» Neighborhood Street: n/a

***Lanes wider than 11 feet require Compliance Committee approval.***

[41]Macdonald, Sanders and Supawanich. 2008. "The Effects of Transportation Corridors' Roadside Design Features on User Behavior and Safety, and Their Contributions to Health, Environmental Quality, and Community Economic Vitality: a Literature Review." UCTC Research Paper No. 878.

# CHAPTER FOUR: IMPLEMENTATION

# CHAPTER FOUR: IMPLEMENTATION

Implementation of these policies and procedures is to begin immediately. Projects already initiated should be allowed to proceed; however, they should include as many complete streets practices as possible.

## *4.1 Project Delivery Process*

As stated previously, many existing conflict points on Chicago's streets can be traced to the existing project delivery process. These policies and procedures contain a six stage process to ensure that future projects will be more *complete*. A working group will continue to evaluate the process and update the document accordingly.

**Stage 1:** Selection: Identify and promote projects that advance complete streets

**Stage 2:** Scoping: Address all modes - consider land use and roadway context

*Step 1*: Establish Project Objectives

*Step 2*: Perform Project Research

*Step 3*: Conduct Site Visits

*Step 4*: Assemble Data, Maps and Analysis

*Step 5*: Set Modal Hierarchy

*Step 6*: Revisit Objectives

**Stage 3:** Design: Address objectives defined during scoping stage

*Step 1*: Draft Alternatives

*Step 2*: Develop Design

*Step 3*: Evaluate Impacts

*Step 4*: Obtain Feedback & Approvals

*Step 5*: Prepare Final Design

**Stage 4:** Construction: Ensure project is built as designed for complete streets

**Stage 5:** Measurement: Measure the effectiveness of complete streets

**Stage 6:** Maintenance: Ensure all users are accommodated through the project's lifespan

The project delivery process chart illustrates the six stages, with goals and elements of each, see Figure 39. The process is inclusive, allowing for opportunities for public input, stakeholder and interagency outreach, and iterative design. The process puts project managers in control of the design process but also formalizes Compliance Committee involvement.


CDOT conducts a wide range of projects, from ADA curb cut retrofits, to major highway reconstructions. All projects need to address all users, but not all projects require the same types of analysis. The project matrix illustrates suggested and optional analyses for each project stage by project type, see Figure 40. Similarly, the *Sustainable Infrastructure Guidelines and Policies* use the complete streets project matrix as a base for establishing sustainability goals as they relate to project types, under the premise that different projects will need to address sustainability at varying degrees, based on scope and project size. Refer to The *Sustainable Infrastructure Guidelines and Policies* as well as the Complete Streets Notebook, which includes guidance to provide organizational assistance for this process.

Appendix D, the Complete Streets Notebook, is a tool to help organize the complete streets project delivery process. It can be used by project managers, consultants, working groups, and the Compliance Committee to take notes on each stage and help track decisions and data related to assuring all modes and users are considered in each phase. It also includes places to define modal hierarchy, assign typology, write project objectives, and consider sustainability measures. The notebook will help track many of the activities CDOT already does and help communicate CDOT's Project Delivery Process to outside agencies, partners, and new employees.

Finally, a presumed benefit of an established formal project delivery process is that it will communicate the steps taken for project delivery in the City of Chicago to contractors, consultants, elected officials, and residents. Establishing a complete streets project delivery process will create transparency and efficiency for the department. Initially, there may be a learning curve, but as CDOT staff and consultants become familiar with procedures, cost savings should be realized.

## FIGURE 39

# COMPLETE STREETS PROJECT DELIVERY PROCESS

### project selection — 1 stage

**GOAL: Identify and promote projects that advance Complete Streets**

| external: | internal: | moving forward: |
| --- | --- | --- |
| alderman requests | pavement condition | needs analysis |
| 311 | strategic planning | performance |
| developments | safety | easy wins |

### scoping — 2 stage

**GOAL: Address all modes - consider land use and roadway context** +

| project needs: | exceptions: | desired outcomes: |
| --- | --- | --- |
| existing conditions | prohibited modes | community needs |
| modal deficiencies | cost vs. benefit | system opportunities |
| plans and funding | no foreseen use | modal hierarchy |

### design — 3 stage

**GOAL: Address objectives defined during scoping stage** + *

| cross section: | intersection design: | trade-offs: |
| --- | --- | --- |
| develop alternatives | geometric layout | exceptions process |
| address all modes | signal timing | modal hierarchy |
| community needs | modal conflict points | allow for feedback |

### construction — 4 stage

**GOAL: Ensure project is built as designed for Complete Streets** +

| issues and conflicts: | opportunities: |
| --- | --- |
| refer to project manager | communicate priorities to contractors |
| address problems | allow for design improvements |
| do not sacrifice modal components | reward efficiency |

### measurement — 5 stage

**GOAL: Measure the effectiveness of the Complete Street** *

| safety: | modeshare: | others: |
| --- | --- | --- |
| no exceptions | measure people | health and economic impacts |
| decrease severity | establish targets | transit consistency and travel times |
| normalize measures | favor bike and walk | process streamlining, coordination, and feedback |

### maintenance — 6 stage

**GOAL: Ensure all users are accommodated through the projects lifespan** +

| coordinate: | funding: |
| --- | --- |
| include maintenance staff in scoping (2) | program funds for maintenance |
| include maintenance staff in design (3) | maintenance should not limit complete designs |

**Scoping:**

- Step 1: Establish Objectives
- Step 2: Perform Research
- Step 3: Conduct Site Visits
- Step 4: Assemble Data
- Step 5: Set Mode Hierarchy
- Step 6: Revisit Objectives

feedback loop

**Design:**

- Step 1: Draft Alternatives
- Step 2: Develop Design
- Step 3: Evaluate Impact
- Step 4: Obtain Feedback
- Step 5: Prepare Final Design

**+ ENGAGE PUBLIC STAKEHOLDERS**
find key opportunities to interface with community groups, residents, and business owners - allow projects to be influenced by lessons learned through outreach efforts

*** ENGAGE AGENCIES & DEPARTMENTS**
coordinate CDOT projects and measurement with external agencies and other city departments to assure the best use of resources and meet multiple objectives through complete design processes

Complete Streets Project Delivery Process

# FIGURE 40

## COMPLETE STREETS PROJECT DELIVERY PROCESS: STAGES 1 THROUGH 3

| | Stage 1: Project Selection | | | | | | | Stage 2: Scoping | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Goal: Identify and Promote projects that will advance Complete Streets | | | | | | | Goal: Address all needs identified during scoping | | | | | | | | | | | | | | |
| | Steps 1.1 to 1.5 | | | | | | | Steps 2.1 to 2.3 (Substeps formatted 2.X.X) | | | | | | | | | | | | | | |
| CDOT Project Types | Mayoral Request | Aldermanic Request | 311 Request | Safety Analysis | Neighborhood and Modal Plans | Capital Projects Programming System | Other | Establish Project Objectives | Perform Project Research | Examine Crash Report Summaries | Examine Neighborhood and Modal Plans | Examine Relevant Planned/ Programmed Roadway Projects | Examine Notable Developments Within or Near Project Area | Review Prior Transportation Studies | Summarize Prior Public Engagement | Conduct Site Visits | Initial Observation | Traffic Observations | Building Form and Function | Roadway Form and Function | Segment Worksheets | Intersection and Mid-block Crossing Worksheets |
| | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 2.1 | 2.2 | 2.2.1 | 2.2.2 | 2.2.3 | 2.2.4 | 2.2.5 | 2.2.6 | 2.3 | 2.3.1 | 2.3.2 | 2.3.3 | 2.3.4 | 2.3.5 | 2.3.6 |
| ADA ramp improvements | | | | | o | x | | x | | | | | | | | | | | | | | |
| Alley improvements | x | x | x | | | x | | | | | | o | o | o | | | o | o | | | | |
| Arterial resurfacing | x | x | x | x | o | x | | x | | x | o | x | x | x | | | x | x | x | x | x | x |
| Bike facility projects | x | x | x | x | x | o | x | x | | x | x | x | x | x | x | | x | x | x | x | x | x |
| Bike Stations | x | x | x | | o | o | o | x | | | x | | | | | | | | | | | |
| Bridge repair | | | | | | x | | | | | | x | x | x | | | x | x | | | | |
| Child Safety Zones | x | x | x | x | o | | | x | | x | o | | | | | | | | o | o | o | o |
| City funded capital projects | x | x | x | x | x | x | | x | | x | x | x | x | x | x | | x | x | x | x | x | x |
| CREATE/rail projects | | | | | o | x | | x | | | x | o | o | o | x | | o | o | | | | |
| Development-funded public way improvements | | | | | x | | | x | | x | x | x | x | x | x | | x | x | | | | |
| Landscaped median improvements | x | x | x | | o | x | | x | | x | x | x | x | x | x | | x | x | x | x | x | x |
| Lighting projects | x | x | x | | o | x | | | | x | x | | | | | | | | | | | |
| Major Roadway Realignment Project (New & Reconstruction) | | | | x | x | x | | x | | x | x | x | x | x | x | | x | x | x | x | x | x |

**PROJECT STEPS KEY: X = SUGGESTED O = OPTIONAL BLANK = NOT SUGGESTED**

| Stage 2: Scoping | | | | | | | | | | Stage 3: Design | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goal: Address all needs identified during scoping | | | | | | | | | | Goal: Address all objectives defined during scoping | | | | | | | | | | | | | | | | | | | |
| Steps 2.4 to 2.6 (Substeps formatted 2.X.X) | | | | | | | | | | Steps 3.1 to 3.5 (Substeps formatted 3.X.X) | | | | | | | | | | | | | | | | | | | |
| Assemble Data, Maps and Analysis | Generate and Analyze Typology Maps | Generate and Analyze Activity Maps | Generate and Analyze Volume Maps | Generate and Analyze Crash Maps | Conduct Tracking Surveys | Sustainability Analysis | Initial Public Engagement | Set Modal Hierarchy | Revisit Objectives and Establish Environmental Standards | Draft Alternatives | Summarize Project Information | Sustainable Design Considerations | Cross Section Development Worksheet | Rank and Select Preferred Alternative | Development Design | Crash Mapping and Normalization | Street and Intersection Reading | Identify Modal Conflict Points | Geometric Layout | Engage Public Stakeholders | Evaluate Impacts | Conduct Intersection Design Studies | Conduct Signal Timing Analysis | Conduct Traffic Impact Studies | Calculate Projected MMLOS | Obtain Feedback and Approvals | Engage Internal Partners | Engage External Agencies | Prepare Final Design |
| 2.4 | 2.4.1 | 2.4.2 | 2.4.3 | 2.4.4 | 2.4.5 | 2.4.6 | 2.4.7 | 2.5 | 2.6 | 3.1 | 3.1.1 | 3.1.2 | 3.1.3 | 3.1.4 | 3.2 | 3.2.1 | 3.2.2 | 3.2.3 | 3.2.4 | 3.2.5 | 3.3 | 3.3.1 | 3.3.2 | 3.3.3 | 3.3.4 | 3.4 | 3.4.1 | 3.4.2 | 3.5 |
| | | | | | | | | | x | | o | x | | | | | | | x | | | | | | | | | | x |
| | | o | | | | | | | | | x | x | | | | | | | | | | | | | | | | | |
| | o | | o | o | o | o | | x | x | | x | x | x | x | | o | o | x | x | x | | o | x | | o | | o | o | x |
| | o | o | o | x | | | o | x | x | | x | x | x | x | | o | o | x | x | x | | o | x | | o | | o | o | x |
| | | o | | | | | | | x | | o | | | | | | | o | x | | | | | | | | o | o | x |
| | | | x | | | | | | | | | x | | | | | | | | | | | | | | | | | |
| | | o | | o | | | | x | x | | o | x | o | o | | o | o | o | x | x | | | | o | o | | o | o | x |
| | o | o | x | x | o | o | x | x | x | | x | x | x | x | | o | o | x | x | x | | x | x | x | o | | x | x | x |
| | | | | | | | | x | x | | x | x | x | x | | x | | x | x | x | | x | x | x | o | | x | x | x |
| | x | o | x | x | o | o | | x | x | | x | x | x | x | | x | | x | x | x | | x | x | x | o | | x | x | x |
| | x | o | x | x | o | o | x | x | x | | x | x | x | x | | x | o | x | x | x | | | | | | | x | x | x |
| | | o | o | o | | | | x | | | | x | | | | | o | | | | | | | | | | x | x | |
| | x | o | o | x | o | o | x | x | x | | x | x | x | x | | x | o | x | x | x | | x | x | x | o | | x | x | x |

## FIGURE 40 (CON'T)

## COMPLETE STREETS PROJECT DELIVERY PROCESS: STAGES 1 THROUGH 3 (CONT.)

| | Stage 1: Project Selection | | | | | | | Stage 2: Scoping | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Goal: Identify and Promote projects that will advance Complete Streets | | | | | | | Goal: Address all needs identified during scoping | | | | | | | | | | | | | | |
| | Steps 1.1 to 1.5 | | | | | | | Steps 2.1 to 2.3 (Substeps formatted 2.X.X) | | | | | | | | | | | | | | |
| CDOT Project Types | Mayoral Request | Aldermanic Request | 311 Request | Safety Analysis | Neighborhood and Modal Plans | Capital Projects Programming System | Other | Establish Project Objectives | Perform Project Research | Examine Crash Report Summaries | Examine Neighborhood and Modal Plans | Examine Relevant Planned/ Programmed Roadway Projects | Examine Notable Developments Within or Near Project Area | Review Prior Transportation Studies | Summarize Prior Public Engagement | Conduct Site Visits | Initial Observation | Traffic Observations | Building Form and Function | Roadway Form and Function | Segment Worksheets | Intersection and Mid-block Crossing Worksheets |
| | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 2.1 | 2.2 | 2.2.1 | 2.2.2 | 2.2.3 | 2.2.4 | 2.2.5 | 2.2.6 | 2.3 | 2.3.1 | 2.3.2 | 2.3.3 | 2.3.4 | 2.3.5 | 2.3.6 |
| Major Roadway Reconstruction Projects | | | | x | x | x | | x | | x | x | x | x | x | x | | x | x | x | x | x | x |
| New Bridge Replacement | | | | x | x | x | | x | | x | x | x | x | x | x | | x | x | x | x | x | x |
| Ped safety infrastructure improvements | x | x | x | x | o | x | o | x | | x | x | x | x | x | x | | x | x | x | x | x | x |
| Placemaking Activities | x | x | x | | o | o | | | | | | | | | | | | | | | | |
| Red light running cameras/Speed Cameras | | | | x | | | | | | x | | x | x | x | x | | x | x | | | | |
| Riverwalk Projects | x | x | x | | o | o | | x | | | | | | | | | | | | | | |
| Sidewalk and miscellaneous concrete projects | x | x | x | x | o | x | o | x | | | x | | | | | | | | | | | |
| Signage & pavement marking improvements | x | x | x | x | x | | o | x | | x | x | x | x | x | | | x | x | x | x | x | x |
| Signal modernizations, new signals, signal interconnects | x | x | x | x | x | x | | x | | x | x | x | x | x | x | | x | x | x | x | x | x |
| Streetscaping projects | x | x | x | | o | x | | x | | x | x | x | x | x | x | | x | x | x | x | x | x |
| Traffic Calming | x | x | x | x | o | | o | x | | x | x | x | x | x | x | | x | x | | | | |
| Transit projects | | | | | o | x | | x | | x | x | x | x | x | x | | x | x | x | x | x | x |
| Tree planting | x | x | x | | o | x | o | | | | x | | | | | | | | | | | |
| WPA/industrial streets | x | x | x | | o | x | | x | | | x | x | x | x | x | | x | x | | | | |

**PROJECT STEPS KEY: X = SUGGESTED O = OPTIONAL BLANK = NOT SUGGESTED**

| Stage 2: Scoping | | | | | | | | | | Stage 3: Design | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goal: Address all needs identified during scoping | | | | | | | | | | Goal: Address all objectives defined during scoping | | | | | | | | | | | | | | | | | | | |
| Steps 2.4 to 2.6 (Substeps formatted 2.X.X) | | | | | | | | | | Steps 3.1 to 3.5 (Substeps formatted 3.X.X) | | | | | | | | | | | | | | | | | | | |
| Assemble Data, Maps and Analysis | Generate and Analyze Typology Maps | Generate and Analyze Activity | Generate and Analyze Volume Maps | Generate and Analyze Crash Maps | Conduct Tracking Surveys | Sustainability Analysis | Initial Public Engagement | Set Modal Hierarchy | Revisit Objectives and Establish Environmental Standards | Draft Alternatives | Summarize Project Information | Sustainable Design Considerations | Cross Section Development Worksheet | Rank and Select Preferred Alternative | Development Design | Crash Mapping and Normalization | Street and Intersection Reading | Identify Modal Conflict Points | Geometric Layout | Engage Public Stakeholders | Evaluate Impacts | Conduct Intersection Design Studies | Conduct Signal Timing Analysis | Conduct Traffic Impact Studies | Calculate Projected MMLOS | Obtain Feedback and Approvals | Engage Internal Partners | Engage External Agencies | Prepare Final Design |
| 2.4 | 2.4.1 | 2.4.2 | 2.4.3 | 2.4.4 | 2.4.5 | 2.4.6 | 2.4.7 | 2.5 | 2.6 | 3.1 | 3.1.1 | 3.1.2 | 3.1.3 | 3.1.4 | 3.2 | 3.2.1 | 3.2.2 | 3.2.3 | 3.2.4 | 3.2.5 | 3.3 | 3.3.1 | 3.3.2 | 3.3.3 | 3.3.4 | 3.4 | 3.4.1 | 3.4.2 | 3.5 |
| | x | o | x | x | o | o | x | x | x | | x | x | x | x | | x | o | x | x | x | | x | x | x | o | | x | x | x |
| | x | o | x | x | o | o | x | x | x | | x | x | x | x | | x | o | x | x | x | | x | x | x | o | | x | x | x |
| | x | o | x | x | o | o | | x | x | | x | x | o | o | | x | o | x | x | o | | x | x | | o | | x | x | x |
| | | x | | | | | | | | | o | x | o | o | | | o | o | | o | | | | o | o | | o | o | |
| | | | x | x | | | | | | | | | | | | x | | | | | | | x | | | | | | |
| | | | | | | | | | x | | | x | | | | | | | | | | | | | | | | | |
| | | o | | | o | o | | x | x | | | x | | | | | o | x | x | | | | | | | | x | x | x |
| | o | | x | x | | | | x | x | | x | | x | x | | o | o | x | x | | | | x | o | o | | x | x | x |
| | x | | x | x | o | o | | x | x | | | | | | | o | o | x | x | | | x | x | x | o | | | | x |
| | x | o | x | x | o | o | x | x | x | | x | x | x | x | | o | o | x | x | x | | x | x | | o | | x | x | x |
| | x | o | x | x | | | x | x | x | | x | | | | | o | o | x | | x | | | x | | | | x | x | |
| | x | o | o | | o | o | x | x | x | | x | x | x | x | | | o | x | x | x | | x | x | x | o | | x | x | x |
| | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | |
| | x | | | | | | x | x | x | | x | x | x | x | | | | x | x | x | | | | | | | x | x | x |

## FIGURE 40 (CON'T)

## COMPLETE STREETS PROJECT DELIVERY PROCESS: STAGES 4 THROUGH 6

Use Figure 40 - Updated 2014, Appendix E

| | Stage 4: Construction | | | | | Stage 5: Measurement | | | | | | | Stage 6: Maintenance | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Goal: Ensure project is built as designed for Complete Streets | | | | | Goal: Measure the effectiveness of the Complete Street | | | | | | | Goal: Ensure all users are accommodated though the lifespan of the process | | | | |
| | Steps 4.1 to 4.5 | | | | | Steps 5.1 to 5.7 | | | | | | | Steps 6.1 to 6.5 | | | | |
| CDOT Project Types | Communicate project objectives to staff and contractors | Consider design changes and impact on objectives & hierarchy | Address any MOT Issues | Public Outreach | Practice Sustainable Construction | Safety | Mode Share | Process Efficiency | Health | Transit Consistency | Economic | Sustainable Measures | Identify Maintenance Needs | Establish Program Maintenance and Replacement Cycle | Program Funding for Maintenance | Identify CS Improvements During Maintenance* | Best Practices for Sustainability |
| | 4.1 | 4.2 | 4.3 | 4.4 | 4.5 | 5.1 | 5.2 | 5.3 | 5.4 | 5.5 | 5.6 | 5.7 | 6.1 | 6.2 | 6.3 | 6.4 | 6.5 |
| ADA ramp improvements | | | x | o | x | | | o | | | | | | | | x | |
| Alley improvements | | | x | x | x | | | x | | | | x | x | | | o | x |
| Arterial resurfacing | | x | x | o | x | x | x | x | | | | x | | | | o | |
| Bike facility projects | | | | x | x | x | x | x | x | | x | | | | | o | |
| Bike Stations | | | | o | | x | x | | o | | x | o | x | | | o | x |
| Bridge repair | x | | x | o | x | | | x | | | x | x | x | x | x | o | |
| Child Safety Zones | | | | x | | x | x | | o | | | | | | | | |
| City funded capital projects | x | o | x | x | x | x | x | x | x | x | x | x | x | x | x | o | |
| CREATE/rail projects | x | o | x | x | x | | x | x | | x | x | x | | | | o | |
| Development-funded public way improvements | x | o | x | x | x | x | x | | x | x | x | x | x | x | x | o | |
| Landscaped median improvements | | | | o | x | x | x | x | | | x | | x | | x | o | |
| Lighting projects | | | | o | x | x | | x | | | x | x | x | x | x | o | |

*Note - this step would involve asking maintenance staff look to out for potential Complete Streets improvements during maintenance activities. If this is a feasible step, appropriate project types should be identified and a worksheet can be developed.

Use Figure 40 - Updated 2014, Appendix E

## FIGURE 40 (CON'T)

## COMPLETE STREETS PROJECT DELIVERY PROCESS: STAGES 4 THROUGH 6 (CONT.)

| | Stage 4: Construction | | | | | Stage 5: Measurement | | | | | | | Stage 6: Maintenance | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Goal: Ensure project is built as designed for Complete Streets | | | | | Goal: Measure the effectiveness of the Complete Street | | | | | | | Goal: Ensure all users are accommodated though the lifespan of the process | | | | |
| | Steps 4.1 to 4.5 | | | | | Steps 5.1 to 5.7 | | | | | | | Steps 6.1 to 6.5 | | | | |
| CDOT Project Types | Communicate project objectives to staff and contractors | Consider design changes and impact on objectives & hierarchy | Address any MOT Issues | Public Outreach | Practice Sustainable Construction | Safety | Mode Share | Process Efficiency | Health | Transit Consistency | Economic | Sustainable Measures | Identify Maintenance Needs | Establish Program Maintenance and Replacement Cycle | Program Funding for Maintenance | Identify CS Improvements During Maintenance* | Best Practices for Sustainability |
| | 4.1 | 4.2 | 4.3 | 4.4 | 4.5 | 5.1 | 5.2 | 5.3 | 5.4 | 5.5 | 5.6 | 5.7 | 6.1 | 6.2 | 6.3 | 6.4 | 6.5 |
| Major Roadway Reconstruction Projects | x | o | x | x | x | x | x | x | x | x | | x | x | x | x | o | |
| New Bridge Replacement | x | o | x | x | x | x | x | x | x | x | | x | x | x | x | o | |
| Ped safety infrastructure improvements | | | x | o | x | x | x | x | x | | x | x | | | | x | |
| Placemaking Activities | | | | x | | | | | | | x | | x | | | | x |
| Red light running cameras/Speed Cameras | | | | x | | x | | | | | | | x | | | | |
| Riverwalk Projects | | | | o | | | | | | | x | | x | | | | x |
| Sidewalk and miscellaneous concrete projects | | | x | o | x | x | x | x | | | x | | | | | x | |
| Signage & pavement marking improvements | | | | o | | x | | | | | | | | | x | x | |
| Signal modernizations, new signals, signal interconnects | | | x | o | | x | | x | | x | | | x | x | x | | |
| Streetscaping projects | x | x | x | | x | | x | x | x | | x | x | | | | | |
| Traffic Calming | | x | | o | | x | | | | | | | x | | | o | |
| Transit projects | x | x | x | | x | x | x | x | | x | x | x | x | x | x | | |
| Tree planting | | | | | x | | | | x | | x | | | | | o | |

## 4.2 Measuring Success

In implementing these policies and procedures, CDOT will use safety and mode share performance measures to evaluate success over time.

### Safety Goals

- Eliminate all pedestrian, bicycle, and overall traffic crash fatalities within 10 years.
- Reduce pedestrian and bicycle crash injuries, each by 50 percent within 5 years.
- Reduce total roadway crashes and injuries from all roadway crashes, each by 10 percent every year.

### Mode Share Goals

- Increase the share of people bicycling, walking, and taking transit to work and working from home to 50 percent by 2040[42].
- Increase the share of all trips under five miles made by cycling to at least 5 percent.

These measures are tied to the *Chicago Forward: DOT Action Agenda (2012)* and have been reviewed by CDOT's performance measure working group. The working group will also investigate partnering with other departments, agencies, or organizations to identify measurement data on:

1. Process efficiency - streamlined project implementation, improved coordination with utilities and other city projects
2. Stakeholder satisfaction - resident and user feedback
3. Health and street life - activity levels on public way (including both sidewalks and crosswalks), more use of parks and plazas
4. Economic prosperity - increase in sales tax revenue and equalized assessed value
5. Security - decrease in crime rates
6. Sustainability[43]
    a. Trees - increase number, net circumference, and diversity of species of trees
    b. Stormwater – increase stormwater diverted from sewer shed.

In addition to establishing goals, the working group will establish performance measures with specific metrics. Items to consider include:

- When measures will apply to specific projects and programs, across CDOT, or citywide
- Identifying partners to lead evaluation efforts
- Education and outreach program evaluation protocols
- Data collection protocols, baselines, and methodologies for all modes and projects
- How to rate project managers and the department on the success at meeting CDOT goals

Finally, the working group will develop a training regimen to help staff understand and successfully incorporate performance measures.

[42]The 2008-2010 Chicago non-driving commute mode share was 38 percent (US Census Bureau, American Community Survey 2008-2010). The Cook County Complete Streets Ordinance has a goal of 50 percent walking, bicycling, and transit mode share by 2030.

[43]Please see Sustainable Infrastructure Guidelines and Policies for more on sustainability performance measures and commissioning metrics.

## 4.3 Arterial Resurfacing Program

The arterial resurfacing program currently uses a condition-based pavement assessment system to allot resurfacing equally among geographical zones and wards. This program is an excellent means for CDOT to make more streets "complete". Following are initial descriptions of measures to add to the assessment system, to be finalized by a working group.

1. Deficits
    a. Prioritize streets with crash records in the top 25th percentile. Require 25 percent of resources to projects so selected.
    b. Prioritize streets that lack basic non-motorized and/or transit facilities such as:
        i. Sidewalks
        ii. Crossing opportunities (see 3.4.5)
        iii. Bicycle routes identified in *Streets for Cycling 2020 Plan*
        iv. Transit shelters or crossings at every bus stop
2. Opportunities
    a. Prioritize streets identified in a CTA or City plan as a bicycle, pedestrian, or transit-priority; urban heat island hot spot; or sewer sensitivity zone.
    b. Prioritize streets with four or more lanes and less than 30,000 average daily traffic for their potential for lane narrowing and road diets.
    c. Prioritize streets with vehicle lanes that exceed 10 feet in width. They will be targeted for lane narrowing, additional bicycle facilities and/or sidewalk expansions.
    d. Capitalize on opportunities to include high visibility crosswalks, bike lanes, narrower lanes, curb extensions, pilot projects, and so on. In other words, do not simply restripe the existing conditions. This likely will require programming funds and allowing time in the project schedule for more extensive design engineering services, possibly including efforts to secure Categorical Exclusion – Group 2 (CE-2) environmental processing for federally-funded arterial resurfacing.

## 4.4 Pilot Projects

In implementing these policies and procedures, CDOT encourages the use of pilot projects to evaluate street design and traffic operation changes. To facilitate design innovations, the Compliance Committee may determine that pilot projects are exempt from the project delivery process when the projects are intended to advance the department's understanding of complete streets and inform future projects. Pilot projects offer the advantage of real world simulation, which is especially useful for assessing traffic diversion, bus, truck and EMS operations, and pedestrian walking patterns. In some cases pilot projects may be better indicators than Traffic Impact Studies and Intersection Design Studies, which are costly and may not account for the latest innovations in street designs.

**FIGURE 41**

Humboldt Boulevard Road Diet Pilot Project

Photo Credits: CDOT

# MOVING FORWARD

*Complete Streets Chicago* provides the tools and strategies to design the City's streets and transportation infrastructure for all users and modes, and to maximize their social and environmental benefits. It is the culmination of a year-long effort by CDOT to find the best route to complete streets. The release of this document is yet another milestone in the agency's efforts to rethink how streets are designed and delivered in Chicago. However, the work is ongoing. Cognizant of the fact that complete streets will require the best efforts of all throughout the agency, *Complete Streets Chicago* establishes working groups to further implement the policies and procedures contained herein.

It is expected that the work will begin immediately and that their contributions will further these policies and procedures by the end of 2012. Leading the effort will be the Complete Streets Compliance Committee. In addition, CDOT's *Sustainable Urban Infrastructure Guidelines and Policies* are expected to be released in 2013, which has been developed in conjunction with this document. It is expected that these new standards will ensure that every project CDOT undertakes delivers the best possible product to the residents and visitors of Chicago.

# APPENDIX

AVAILABLE BY REQUEST:

A. CITYWIDE TYPOLOGY STUDY

B. DESIGN TREES

C. CROSS SECTIONS

D. COMPLETE STREETS NOTEBOOK

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This document was the result of more than a year-long collaborative process from August 2011 through 2012. It involved four design and process workshops, numerous stakeholder interviews, and coordination with concurrent efforts. The authors wish to thank CLOCC and CDOT for the opportunity to work on such an innovative and progressive project.

**Rahm Emanuel**, Mayor

CHICAGO DEPARTMENT OF TRANSPORTATION

**Chicago Department of Transportation**:
Commissioner Gabe Klein
Deputy Commissioner Luann Hamilton
Complete Streets Director Janet Attarian
Chris Wuellner (Project Director)
Suzanne Carlson
Kiersten Grove

**Consortium to Lower Obesity in Chicago Children**:
Michael Alvino (Project Manager)

**Nelson\Nygaard Consulting Associates**:
Michael King (Consultant Manager, Primary Author)
Rick Chellman
Michael Moule
Karina Ricks
Jason Schrieber
Paul Supawanich

**Active Transportation Alliance**:
Paul Lippens (Secondary Author)
Marissa Dolin
Patrick Knapp
Dan Persky
Amanda Woodall
Lu Gan (Intern)
Eric Hanss (Intern)
Brandon Whyte (Intern)

**Farr Associates:**
Courtney Kashima (Lead Graphics)
Doug Farr
Leslie Oberholtzer
Brianna Ceglia (Intern)

**Designing Streets for People**:
Michael Ronkin


CDOT
CHICAGO DEPARTMENT OF TRANSPORTATION

BUILDING A NEW CHICAGO

**FIGURE 40 - COMPLETE STREETS AND SUSTAINABILITY PROJECT DELIVERY: Steps by Project Type, Updated 2014**

| | Stage 1: Project | | Stage 2: Scoping | | | | | | | | | | | | | | | | | | | | | | | | | | Stage 3: Design | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Goal: Identify/ promote Complete Streets in projects | | Goal: Address all needs identified during scoping | | | | | | | | | | | | | | | | | | | | | | | | | | Goal: Address all objectives identified during scoping | | | | | | | | |
| **CDOT PROJECT TYPES (select one)** | 1.1 Identify Project Initiation | 1.2 Identify Project Budget | 2.1 Establish Project Goals & Requirements | 2.2 Research | 2.2.1 Examine Crash Report Summaries | 2.2.2 Examine Relevant Planned/Programmed Roadway Projects | 2.2.3 Examine Neighborhood and Modal Plans | 2.2.4 Examine Notable Developments In or Near Project Ar | 2.2.5 Review Prior Transportation & Traffic Studies | 2.2.6 Examine Existing Sustainability Data Sets | 2.2.7 Summarize Prior Public Engagement | 2.2.8 Update Budget | 2.3 Site Visits | 2.3.1 Initial Observation | 2.3.2 Observation checklist | 2.3.3 Building Form and Function | 2.3.4 Roadway Form and Function | 2.3.5 Typical Sections | 2.3.6 Intersection and Mid-block Crossing Worksheets | 2.4 Mapping and Analysis | 2.4.1 Generate and Analyze Typology Maps | 2.4.2 Generate and Analyze Activity Maps | 2.4.3 Generate and Analyze Volume Maps | 2.4.4 Generate and Analyze Crash Maps | 2.4.5 Identify Preliminary Sustainability Strategies | 2.4.6 Create Outreach Plan | 2.5 Modal Deficiencies & Hierarchy | 2.6 Revisit Project Goals and Envionmental Requirements; Formalize Strategies | 3.1 Create Design Alternatives | 3.1.1 Summarize Project Information from Scoping | 3.1.2 Cross Section Development | 3.1.3 Perform Sustainability Calculations | 3.1.4 Identify Sustainable Features | 3.1.5 Initial Public Engagement | 3.2 Schematic Design | 3.2.1 Analyze Crashes and Design for Safer Streets | 3.2.2 Apply Street and Intersection Designs and Policies |
| ADA ramp improvements | x | x | x | | | x | | | | | | x | | x | | | | | | | | | | | x | | x | x | | o | | | x | | | | |
| Alley improvements | x | x | x | | | x | | o | o | x | | x | | x | x | | | | | | | o | | | x | | x | x | | x | | x | x | | | | |
| Arterial resurfacing | x | x | x | | x | x | o | x | x | x | | x | | x | x | x | x | x | x | | o | | o | o | x | x | x | x | | x | x | x | x | x | | x | x |
| Bike facility projects | x | x | x | | x | x | x | x | x | x | x | x | | x | x | x | x | x | x | | o | o | o | x | x | x | x | x | | x | x | x | x | x | | x | x |
| Bike Stations | x | x | x | | | x | x | x | | x | | x | | x | | x | | | | | x | o | | | x | x | x | x | | o | | x | x | x | | | |
| Bridge repair | x | x | x | | | x | | x | x | x | | x | | x | x | | | | | | | | x | | x | | x | x | | | | x | x | | | | |
| Bridge Replacement/New | x | x | x | | x | x | x | x | x | x | x | x | | x | x | x | x | x | x | | x | o | x | x | x | x | x | x | | x | x | x | x | x | | x | x |
| Child Safety Zones | x | x | x | | x | x | o | x | x | | | x | | x | x | o | o | o | x | | | o | | x | x | x | x | x | | o | o | x | x | x | | x | x |
| CREATE/rail projects | x | x | x | | | x | x | x | x | x | x | x | | x | x | x | x | | | | | | | | x | x | x | x | | x | x | x | x | x | | x | |
| Landscaped median imprvs | x | x | x | | x | x | x | x | x | x | x | x | | x | x | x | x | x | x | | x | o | x | x | x | x | x | x | | x | x | x | x | x | | x | x |
| Lighting projects | x | x | x | | | | x | | | x | | x | | x | | | | | | | | o | o | o | x | | | | | | | x | x | | | | o |
| Major Roadway Reconstruction/ Realignment Project | x | x | x | | x | x | x | x | x | x | x | x | | x | x | x | x | x | x | | x | o | o | x | x | x | x | x | | x | x | x | x | x | | x | x |
| Ped safety infrastructure improvements | x | x | x | | x | x | x | x | x | | x | x | | x | x | x | x | x | x | | x | o | x | x | x | | x | x | | x | o | x | x | o | | x | x |
| Placemaking Activities | x | x | x | | | x | x | x | x | | x | x | | x | | | | | | | | x | | | x | | x | x | | o | o | x | x | o | | | x |
| Red light/Speed cameras | x | x | x | | x | x | | x | x | | x | x | | x | x | | | | | | | | x | x | x | | x | x | | | | | x | | | x | |
| Riverwalk Projects | x | x | x | | | x | x | x | x | x | x | x | | x | | x | | | | | | | | | x | x | x | x | | | | x | x | x | | | x |
| Sidewalk and miscellaneous concrete projects | x | x | x | | | | x | | | | | x | | x | | | | | | | | o | | | x | | x | x | | | | x | x | | | | x |
| Signage & pavement marking improvements | x | x | x | | x | x | | | | | | x | | x | x | | x | | x | | o | | | x | x | x | x | x | | x | x | | x | x | | o | x |
| Signal modernizations, new signals, signal interconnects | x | x | x | | x | x | x | x | x | | x | x | | x | x | x | x | x | x | | x | | x | x | x | | x | x | | | | | x | | | o | o |
| Streetscaping projects | x | x | x | | x | x | x | x | x | x | x | x | | x | x | x | x | x | x | | x | o | x | x | x | x | x | x | | x | x | x | x | x | | o | x |
| Traffic Calming | x | x | x | | x | x | x | x | x | | x | x | | x | x | x | x | x | x | | o | o | x | x | x | x | x | x | | x | | x | x | x | | o | x |
| Transit projects | x | x | x | | x | x | x | x | x | | x | x | | x | x | x | x | x | x | | x | o | o | | x | x | x | x | | x | o | x | x | x | | | x |
| Tree planting and landscape | x | x | x | | | | | | | | | x | | x | | | | | | | | | | | x | | | | | | | x | x | | | | |
| WPA/industrial streets | x | x | x | | x | x | x | x | x | | x | | | x | x | | | | | | x | | | | x | x | x | x | | x | x | x | x | x | | | x |

KEY: x = required, o = optional, blank = not required

**FIGURE 40 - COMPLETE STREETS AND SUSTAINABILITY PROJECT DELIVERY: Steps by Project Type, Updated 2014**

| CDOT PROJECT TYPES (select one) | 3.2.3 Create Geometric Layout | 3.2.4 Conduct Signal Timing Analysis | 3.2.5 Conduct Traffic Impact Studies | 3.2.6 Review Intersection Design | 3.2.7 Verify sustainable requirements or request variance | 3.3 Obtain Feedback and Approvals | 3.3.1 Engage Internal Partners | 3.3.2 Engage External Agencies | 3.3.3 Engage Public Stakeholders | 3.4 Design Impact Evaluation | 3.4.1 Calculate Projected MMLOS | 3.4.2 Conduct Stormwater Modeling | 3.4.3 Perform Sustainability Valuation | 3.5 Prepare Prefered Alternative | 3.6 Record Design Outputs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADA ramp improvements | x | | | | x | | | | | | | | | x | x |
| Alley improvements | | | | | x | | | | | | | | | x | x |
| Arterial resurfacing | x | x | x | x | x | | x | x | x | | o | | | x | x |
| Bike facility projects | x | x | x | x | x | | x | x | x | | o | | | x | x |
| Bike Stations | x | | | | x | | x | x | x | | | | | x | x |
| Bridge repair | x | | | | x | | x | x | | | | | | x | x |
| Bridge Replacement/New | x | x | x | x | x | | x | x | x | | o | | x | x | x |
| Child Safety Zones | x | | o | | x | | o | o | x | | o | | | x | x |
| CREATE/rail projects | x | x | x | x | x | | x | x | x | | o | | | x | x |
| Landscaped median imprvs | x | | | | x | | x | x | x | | | | | x | x |
| Lighting projects | | | | | x | | x | x | | | | | x | x | x |
| Major Roadway Reconstruction/ Realignment Project | x | x | x | x | x | | x | x | x | | o | x | x | x | x |
| Ped safety infrastructure improvements | x | x | | x | x | | x | x | o | | o | | | x | x |
| Placemaking Activities | x | | o | | x | | o | o | o | | o | | | x | x |
| Red light/Speed cameras | | x | | | x | | | | | | | | | | x |
| Riverwalk Projects | x | | | | x | | x | x | x | | | x | x | x | x |
| Sidewalk and miscellaneous concrete projects | x | | | | x | | x | x | | | | | | x | x |
| Signage & pavement marking improvements | x | x | o | | x | | x | x | | | o | | | x | x |
| Signal modernizations, new signals, signal interconnects | x | x | x | x | x | | | | | | o | | | x | x |
| Streetscaping projects | x | x | | x | x | | x | x | x | | o | | x | x | x |
| Traffic Calming | x | x | | | x | | x | x | x | | | | | x | x |
| Transit projects | x | x | x | x | x | | x | x | x | | o | | | x | x |
| Tree planting and landscape | | | | | x | | | | | | | | | | x |
| WPA/industrial streets | x | | | | x | | x | x | x | | | | | x | x |

| | Stage 4: Construction | | | | | | Stage 5: Measurement | | | | | | | | | Stage 6: Maintenance | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Goal: Ensure project is built as designed for Complete Streets | | | | | | Goal: Measure the effectiveness of the Complete Street | | | | | | | | | Goal: Ensure all users are accommodated for lifespan | | | | |
| CDOT PROJECT TYPES (select one) | 4 Construction | 4.1 Communicate project objectives to staff and contracto | 4.2 Consider design changes and impact on Sustainable objectives & hierarchy | 4.3 Address any MOT Issues | 4.4 Public Outreach | 4.5 Practice Sustainable Construction per Volume II | 5 Measurement | 5.1 Safety | 5.2 Modeshare | 5.3 Process Efficiency | 5.4 Stakeholder satisfaction | 5.5 Health | 5.6 Economic prosperity | Security | 5.7 Ensure Commissioning & Monitoring plan is being implemented | 6 Maintenance | 6.1 Identify Maintenance Needs | 6.2 Establish Program Maintenance and Replacement Cy | 6.3 Program Funding for Maintenance | 6.4 Identify CS Improvements During Maintenance* |
| ADA ramp improvements | | x | | x | o | x | | | | o | | | | | x | | | | | x |
| Alley improvements | | x | | x | x | x | | | | x | | | | | x | | x | | | o |
| Arterial resurfacing | | x | x | x | o | x | | x | x | x | | | | | x | | | | | o |
| Bike facility projects | | x | x | | x | x | | x | x | x | x | | x | | x | | | | | o |
| Bike Stations | | x | | | o | | | x | x | | o | | x | | x | | x | | | o |
| Bridge repair | | x | | x | o | x | | | | x | | | x | | x | | x | x | x | o |
| Bridge Replacement/New | | x | o | x | x | x | | x | x | x | x | x | | | x | | x | x | x | o |
| Child Safety Zones | | x | | | x | | | x | x | | o | | | | x | | | | | |
| CREATE/rail projects | | x | o | x | x | x | | | x | x | | x | x | | x | | | | | o |
| Landscaped median imprvs | | x | | | o | x | | x | x | x | | | x | | x | | x | | x | o |
| Lighting projects | | x | | | o | x | | x | | x | | | x | | x | | x | x | x | o |
| Major Roadway Reconstruction/ Realignment Project | | x | o | x | x | x | | x | x | x | x | x | | | x | | x | x | x | o |
| Ped safety infrastructure improvements | | x | | x | o | x | | x | x | x | x | | x | | x | | | | | x |
| Placemaking Activities | | | | | x | | | | | | | | x | | x | | x | | | |
| Red light/Speed cameras | | x | | | x | | | x | | | | | | | x | | x | | | |
| Riverwalk Projects | | x | | | o | | | | | | | | x | | x | | x | | | |
| Sidewalk and miscellaneous concrete projects | | | | x | o | x | | x | x | x | | | x | | x | | | | | x |
| Signage & pavement marking improvements | | | | | o | | | x | | | | | | | x | | | | x | x |
| Signal modernizations, new signals, signal interconnects | | | | x | o | | | x | | x | | x | | | x | | x | x | x | |
| Streetscaping projects | | x | x | x | | x | | | x | x | x | | x | | x | | | | | |
| Traffic Calming | | | x | | o | | | x | | | | | | | x | | x | | | o |
| Transit projects | | x | x | x | | x | | x | x | x | | x | x | | x | | x | x | x | |
| Tree planting and landscape | | | | | | x | | | | | x | | x | | x | | | | | o |
| WPA/industrial streets | | x | x | x | | x | | | | x | | | x | | x | | | | | o |

KEY: x = required, o = optional, blank = not required