DRAFT
AUSTIN
street design guide


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Introduction

The purpose of the City of Austin Street Design Guide is to assist City staff and private sector street design professionals in applying a consistent approach to street design particularly for right-of-way planning and new streets. The guide may also be useful for street design in constrained right-of-way. In the redesign of existing streets, additional engineering design work and public engagement may result in design features outside of the scope of this design guide. Within either of these contexts, this guide is a first step in the application of a consistent and predictable approach to street design. This approach can result in improved street design consistent with implementation of **Imagine Austin** and faster development application review times.

This guide was developed by the Austin Transportation Department in coordination with other City Departments and Capital Metro, and will be piloted throughout 2017. City staff, the development community, and neighborhood organizations are encouraged to use the guide as they work on street design as it may come up in development applications throughout the year.

Streets should be designed to complement current and future land uses.

CHALLENGES:

- **Different types of places require specific transportation strategies**
- **Competition for space**
- **Competition for resources**

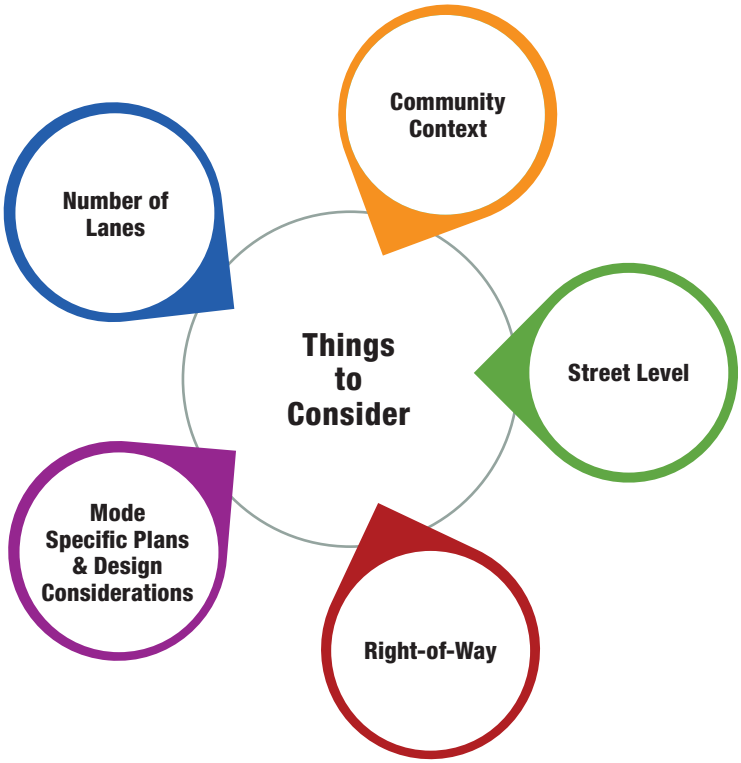
This guide is not a replacement for the Transportation Criteria Manual (TCM). It is meant to provide modern guidance on street design and provide a consistent platform to begin discussion and negotiations regarding street design. At the close of the Street Design Guide pilot, ATD staff will review feedback received and make final adjustments to the guide's approach and recommended cross sections. The final outcome will be to amend the TCM to include an updated approach to street design and new cross sections that were developed during the pilot phase.

Comments on the guide and its recommended street cross-sections will be accepted through December 31, 2017 through the following ATD website: http://austintexas.gov/page/street-design-guide/. The timeline for the Street Design Guide Pilot corresponds with the update to the City's transportation plan (Austin Strategic Mobility Plan) and the development of a new land development code (CodeNEXT). All three planning processes have technical and public engagement touch points to ensure the final outcome of all three regulatory documents are complementary and work in tandem toward implementation of **Imagine Austin**. The Austin Strategic Mobility Plan, CodeNEXT and the TCM update are expected to be complete in 2018.

Positioning the City for Successful Street Design

The new approach to multimodal street design presented in this Street Design Guide is consistent with City of Austin policies and considers the following key ingredients: community context, street level, right-of-way, mode specific plans, design considerations, and number of lanes.

Other considerations that are not discussed in detail in this guide, but are factors in street design include: utility placement/assignments, emergency response consideration, and placemaking. Examples of reference materials for these types of factors include, but are not limited to, the Transportation Criteria Manual, the Utilities Criteria Manual, and the Land Development Code.



Street Design Process

The process for developing a major update to the Transportation Plan for the City of Austin began with the existing Austin Metropolitan Area Transportation Plan (AMATP). The AMATP served Austin well, but was primarily an expression of the motor vehicle capacity needs of the community. The City has adopted mode-specific plans for bike and pedestrian, as well as a Complete Streets Policy. Capital Metro has also developed transit plans, including Connections 2025 which is an updated service plan. In 2015, the City initiated a modernization of the City's land development code (CodeNEXT) where it became clear that a more coordinated strategy was needed. Aligning transportation decisions and street design with the community's vision and expectations is the motivation behind the Austin Street Design Guide (ASDG) and Austin Strategic Mobility Plan (ASMP). The intent is to provide a common vocabulary regarding streets and an approach to consider the variety of influences on right-of-way and design.

Equally important is having a process to identify priority street design features when there simply isn't enough room to best accommodate all modes of travel. This process will offer guidance on mode accommodation based on street function and community context, a process that is supportive of our transportation goals from **Imagine Austin**. Priority of mode will be determined upon completing the ASMP and this guide will be updated accordingly.

The result of this effort is a strategy which will enhance the integration of a variety of community objectives for transportation and the processes which influence street design decision making. To accomplish this task, street design decisions should be influenced by the following:

Street Design Elements

1. Community Context is derived from urban planning principles and nomenclature used to describe places. During the pilot phase of this guide, context will be selected by designers using professional judgment. In the future, it will be determined by a map adopted in either CodeNEXT, ASMP, or both.

2. Street Level is a modernization of the street functional classification naming and indicates the role the street plays in the network.

3. Right-of-way (existing or future) for each segment of the street network determines the limitations of street design by defining the width of the street.

4. Mode Specific Plans & Design Considerations like the Bicycle Master Plan, Urban Trails Plan, Sidewalk Master Plan, Capital Metro Service Plan, Project Connect, and the CAMPO Regional Transportation Plan should be used to identify aspirational goals for each travel mode and allow for an integrated strategy of implementation.

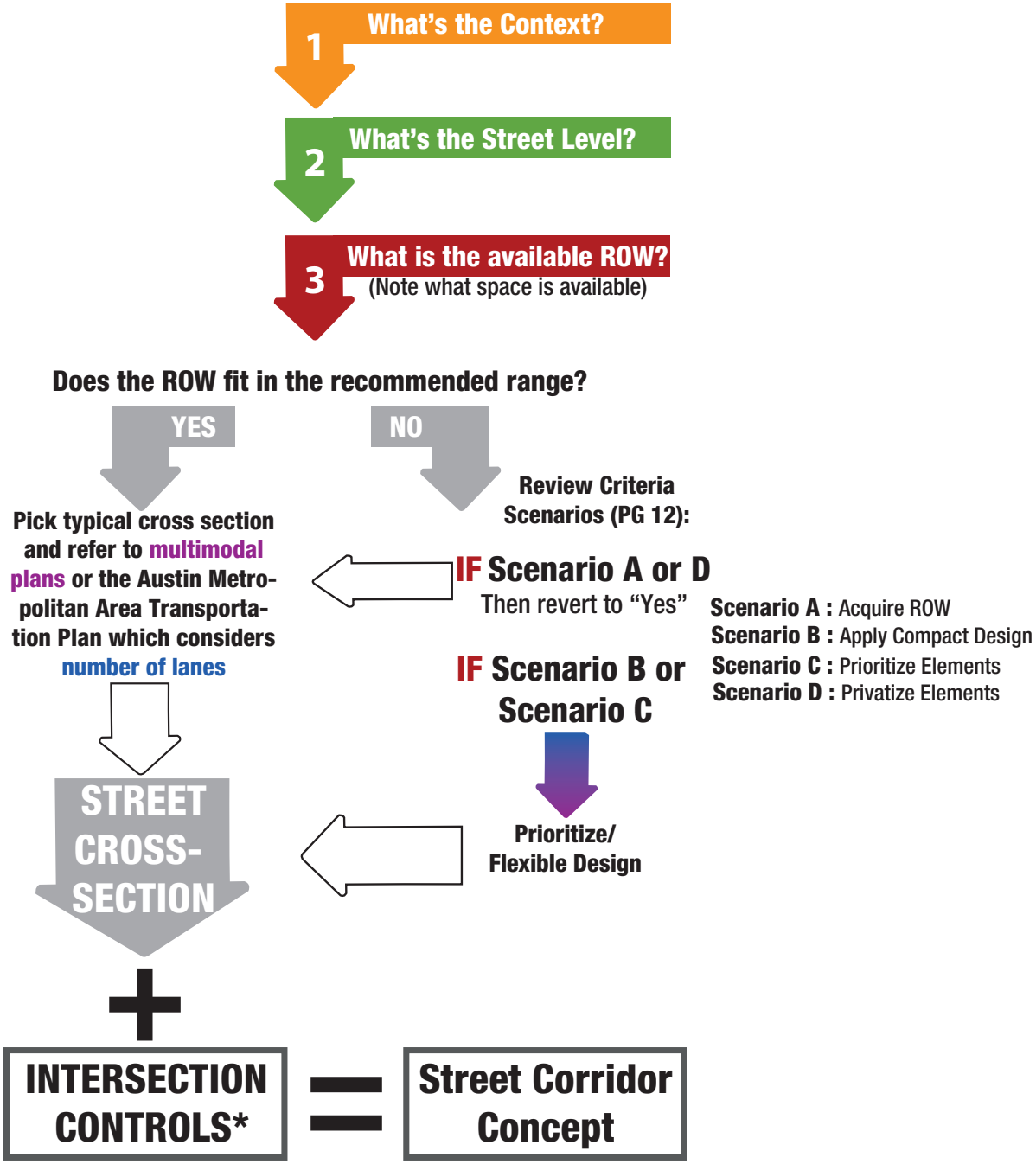
5. Number of lanes (either existing or planned) ensures that adequate capacity is accounted for vehicles, while balancing the need for other modes on streets.

6. Street Design is the culmination of these elements to determine the cross-sections of these roadways. The ultimate design of the corridor will also include an analysis of street operations at the intersections to determine appropriate traffic control based on performance measures and community context.

Street Design Decision Process

This guide provides significant detail regarding street cross-section design strategy for Austin. It recognizes that there is a need to be context sensitive while also understanding the unique purpose of each street in our overall transportation network. It also recognizes that there won't always be enough space to include all of the optimum design features and encourages users to reference existing mode plans to assist in prioritizing these features. Generally the process follows the street cross-section design decision process.

The ultimate corridor design will also include intersection improvements, which can have the largest impact on the operation of a street facility in terms of both capacity and context. Page 14 refers to additional ROW that may be necessary at intersections to provide adequate capacity. This document does not reflect choice of intersection improvements, but the choice of an all-way stop, traffic circle, roundabout, or signal can depend on both the capacity needs and intersection context."

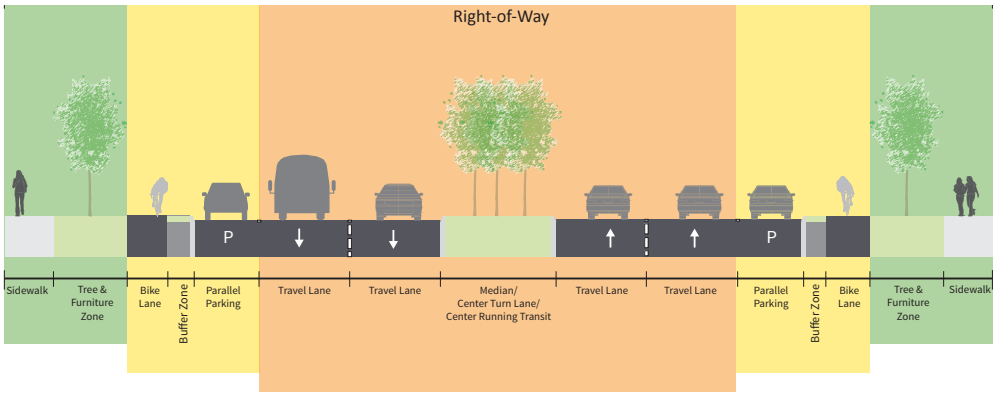


*To be determined based on a separate analysis process.

Street Zones

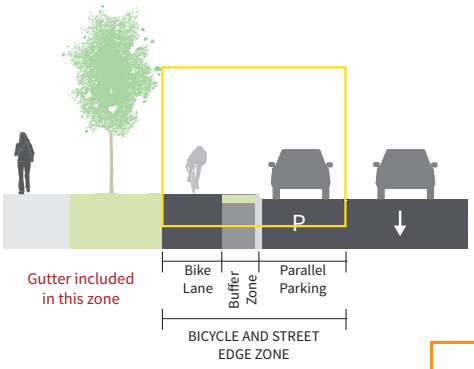
As we consider the creation of a street design strategy, it's important to understand the variety of elements that could comprise a street. These elements are organized in different portions of the street, referred to as street zones.

All Street Zones



Pedestrian Zone | Bicycle and Street Edge Zone | Motor Vehicle and Transit Zone | Bicycle and Street Edge Zone | Pedestrian Zone

Bicycle and Street Edge Zone

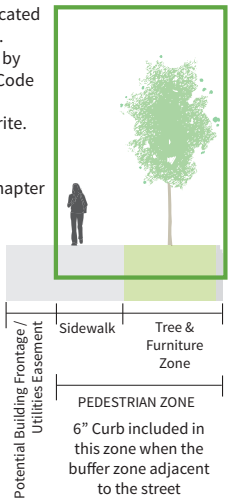


Note: Utilities may be found in all three street zones and are subject to local utility requirements, per City of Austin Code and technical criteria manuals. For mobility purposes, utility location is preferred in the pedestrian zone.

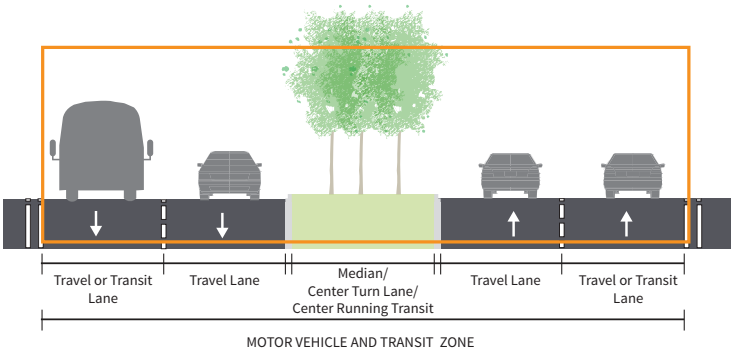
Pedestrian Zone

This Zone may be located in the Private Realm. Context determined by Land Development Code (LDC). The LDC is currently under rewrite.

This Zone already complies with Subchapter E of of the LDC.



Motor Vehicle and Transit Zone



Elements May Include:	
PEDESTRIAN ZONE	Building setbacks*; Utilities; Yards; Stoop Area; Sidewalk; Street Trees; Furniture; Driveways; Urban Trail; Signage; Transit Stops (*Setbacks defer to private frontages standards in the Land Development Code)
BICYCLE AND STREET EDGE ZONE	Bicycle Lanes; Parking/Other (Parallel or back-in angle parking); Buffered Bicycle Lanes; Loading Zones; Valet Curb Space uses instead of Parallel Parking: Parklets; Bicycle Corals; etc.
MOTOR VEHICLE AND TRANSIT ZONE	Travel Lanes; Median*; Center Turn Lane; Pedestrian Refuges; High Capacity Transit (*Median includes a 6 inch curb)

Typology Ingredients

Community Context

Context is a term used to describe the setting or surrounding of a particular area. The most prominent factors in determining context are the land uses and community characteristics. At a high level, communities are made up of urban, suburban, and transitional areas. Land uses such as residential, retail, commercial, industrial, etc., combine to create different community context types.

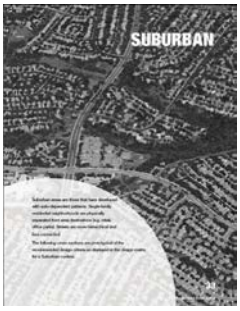
For the purpose of street design, the Community Contexts were grouped into the following categories:

(Context will be updated to correspond to the context categories established within CodeNEXT, once it is adopted)

Urban

Urban areas are higher intensity areas (outside of downtown) or Activity Centers with a compact form, well connected streets, and a mix of uses. These areas best support multiple modes of travel.

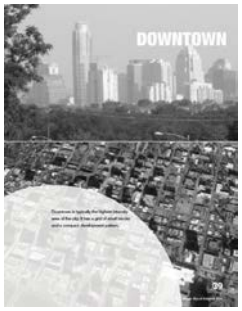
Characteristics	
BUILDING FORM	Mix of attached and detached buildings, shallow to no setbacks, balance between landscape and buildings.
LAND USE PATTERN	Mix of housing types (apartments, townhouses, small lot Single Family); mixed with retail and employment activities.
LOCAL EXAMPLES	University Area, Hyde Park, South Congress.



Suburban

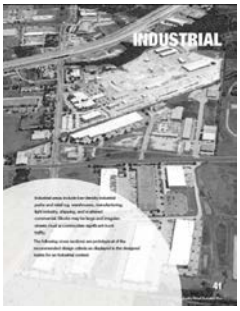
Suburban areas are those that have developed with auto-dependent patterns. Single-family residential neighborhoods are physically separated from area destinations (e.g. retail, office parks). Streets are more hierarchical and less connected.

Characteristics	
BUILDING FORM	Mostly detached buildings, medium to large lots and setbacks.
LAND USE PATTERN	Primarily medium to large single-family residential; blocks are large and irregular, with looping and curvilinear streets.
LOCAL EXAMPLES	Avery Ranch, Scofield Farms, Franklin Park



Special District - Downtown

Downtown is the highest intensity area of the city. It has a grid of small blocks and a compact development pattern. The modal hierarchy is pedestrian first, then bicycle and transit, then vehicles.



Special District - Industrial

Industrial areas include low-density industrial parks and retail e.g. warehouses, manufacturing, light industry, shipping, and scattered commercial. Blocks may be large and irregular; streets must accommodate significant truck traffic.

Special District - Alternatives

This special context describes areas primarily along and west of Hwy 360. They feature environmental protections and rolling terrain that dictates distinct street designs. Development patterns are most similar to Suburban. Other Alternatives are provided for bicycle design when a raised bicycle facility is not feasible.

2

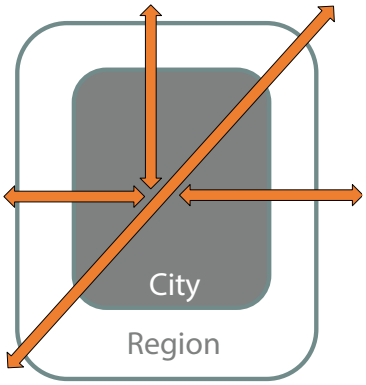
Street Level

The Austin Metropolitan Area Transportation Plan uses Thoroughfare Classifications to categorize and define street design. This design guide includes a description of all streets (not just thoroughfares) and organizes the designations into categories called Street Levels. Each Level considers the function of the street in two ways: how it operates within the larger network, and its local purpose to provide safe and effective mobility through multiple travel modes. Many factors play into defining each Street Level including desired speeds, access, trip-length, and parking. For Austin, the Street Levels were broken into six levels. Levels 1-5 are a hierarchy of streets based on the function of their Motor Vehicle and Transit Zone and their Bicycle and Street Edge Zone, while Level 0 refers to alleys. The different Street Levels shown on pages 10-11, provide a simple visual of how the different levels function. The streets range from more Regional uses (Level 5 - Level 4) to City uses (Level 4 - Level 2), and block level uses (Level 1 - Level 0).

Additionally, the purpose of a street can change when it passes through activity centers and special districts, resulting in corresponding changes in street design.

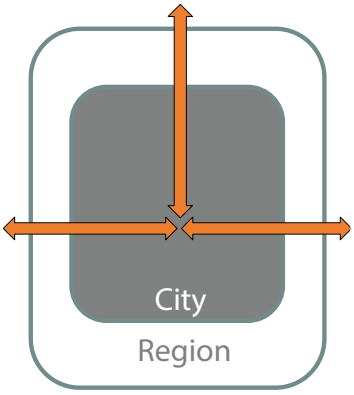
Characteristics for each Street level can be found in the following pages. A map will be developed as part of the Austin Strategic Mobility Plan, and will define current and future Street Level designations.

Level 5 streets are primarily controlled access streets (freeways and expressways). These streets are multi-lane roadways meant for higher speeds and longer distance travel. They carry traffic through the region and into the City of Austin. They're often managed by entities other than the City and can include tolled and non-tolled facilities.



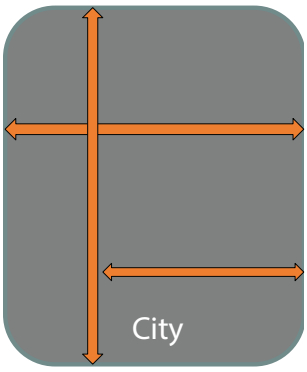
LEVEL 5 - Characteristics	
Functional Classification	Freeways & Interstates
Local Examples	IH-35, US Hwy 290, Loop 1 (Mopac)
Primary Characteristics	Higher speeds Longer trips Access management Limited access Inter-regional

Level 4 streets accommodate travel into and out of the City from the surrounding area. They are often multi-lane thoroughfares that sometimes include a landscaped median. These can also include freeway and interstate frontage roads. They provide strong commuter linkages and tend to prioritize vehicular capacity. As a result, they must provide a clearly defined pedestrian realm and separated bike facilities.



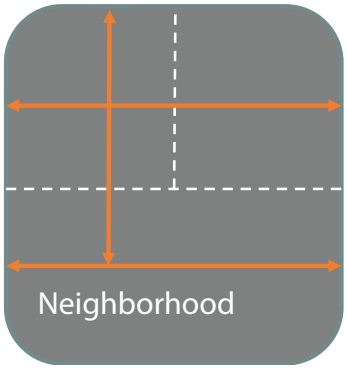
LEVEL 4 - Characteristics	
Functional Classification	Principle/Major Arterial
Local Examples	Parmer (FM 734), FM 973, Southwest Parkway
Primary Characteristics	Commuter linkages Vehicle priority Intra-regional Access management Separated bicycle facilities

Level 3 streets may look similar to Level 4 streets but have a greater role in balancing local land access with moving people and goods. Typically, they have lower travel speeds and traffic volumes than Level 4 streets. They also tend to be limited in width by the built environment that they serve and have the greatest need for accommodation of multiple modes.



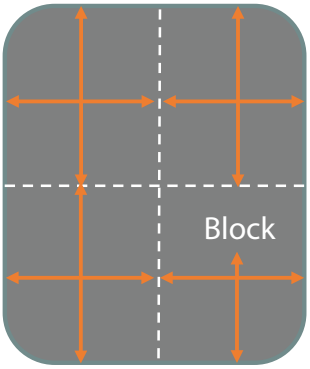
LEVEL 3 - Characteristics	
Functional Classification	Minor Arterial/Major Arterial
Local Examples	Lamar Blvd, S. Congress Ave, S. 1st Street
Primary Characteristics	Balance between mobility and access to the built environment Slower streets High levels of street activity

Level 2 streets connect neighborhoods to each other. They balance mobility with access by providing good access to neighborhood-serving business districts, retail, and services. They tend to connect to other Level 2, 3, and 4 streets.



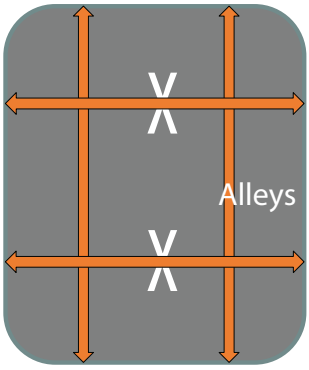
LEVEL 2 - Characteristics	
Functional Classification	Collector
Local Examples	Woodrow Ave, Kinney Ave, Amherst Drive
Primary Characteristics	Connects to citywide street network Connects to neighborhood-serving retail/ services Circulation function

Level 1 streets serve exclusively residential destinations, typically with no retail or mixed-use. In some examples, the street may be a shared street or operate with a yield condition. Their primary purpose is to provide block-level, local access and provide connectivity to higher level streets.



LEVEL 1 - Characteristics	
Functional Classification	Residential Collector, Local
Local Examples	Various
Primary Characteristics	Slow speeds Connects to higher order streets Frequent driveways

Level 0 is reserved for alleys. These streets typically provide access for service vehicles and/or residential access.



LEVEL 0 - Characteristics	
Functional Classification	Alleys
Local Examples	Various in Downtown, Hyde Park, and Mueller
Primary Characteristics	Narrow right-of-way Very low vehicle volume and speeds Vehicular use is only for property access

Right-of-Way

Right-of-way is a key deciding factor for the design of streets. The most recognizable use of the right-of-way is for transportation features like streets and trails; however, utilities above ground and below ground are equally important occupants of this public space.

The delineation of the public rights-of-way are not always visible, but are often assumed by the transition from public features (transportation and utilities) to private features like buildings and off-street parking. However, many street features can sometimes occur in both the private realm and public right-of-way.

In some areas of Austin, the ability to acquire additional right-of-way is possible because there are not as many features on private property immediately adjacent to the right-of-way corridor. Conversely, urban areas and established streets tend to have private property immediately adjacent to the existing right-of-way, making additional right-of-way difficult to acquire.

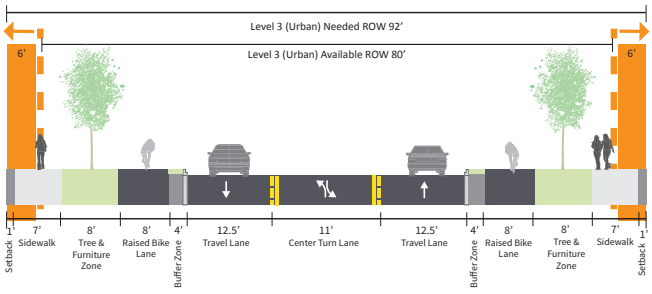
How does right-of-way affect street design?

When seeking to improve existing streets one simple question is of utmost importance: *"Is there enough room to accommodate all of the desired features within the existing right-of-way?"*

If the answer to this question is "yes" then the city's new street design guidelines will be applied and improvements can be carried forward. If the answer is "no" then street design will be driven by criteria under one of the following four scenarios.

Scenario A - Acquire/Dedicate ROW: There isn't enough existing right-of-way to accommodate the standard improvements BUT there is potential to acquire more. Under this scenario, a street evaluation or feasibility study would identify the space necessary to accommodate the desired improvements, compare it with existing right-of-way dimensions and determine the increment of space needed.

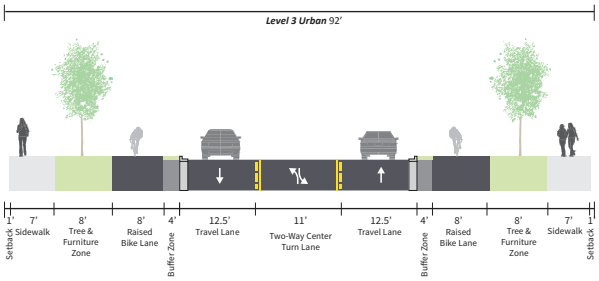
This scenario would often occur in places where building setbacks are sufficient to accommodate a street widening.



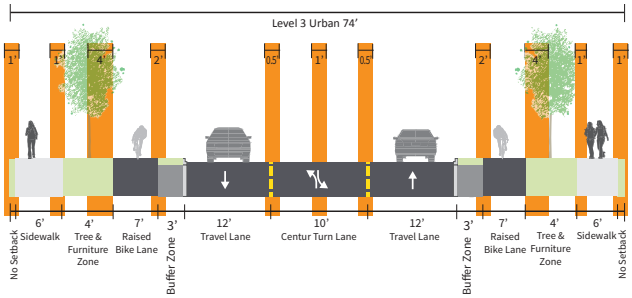
Improved corridor through widening (Able to obtain 12' of ROW)

Scenario B - Apply Compact Design:

There isn't enough existing right-of-way to accommodate the standard improvements BUT if we applied the compact set of design guidelines we can accomplish many of the same objectives. A simple example of this would be the application of compact dimensions as opposed to standard minimum dimensions for things like travel lane widths, sidewalks, parking, and bike lanes. Depending on the degree of constraints, this scenario can require detailed design and engineering that exceeds the scope of this guide.

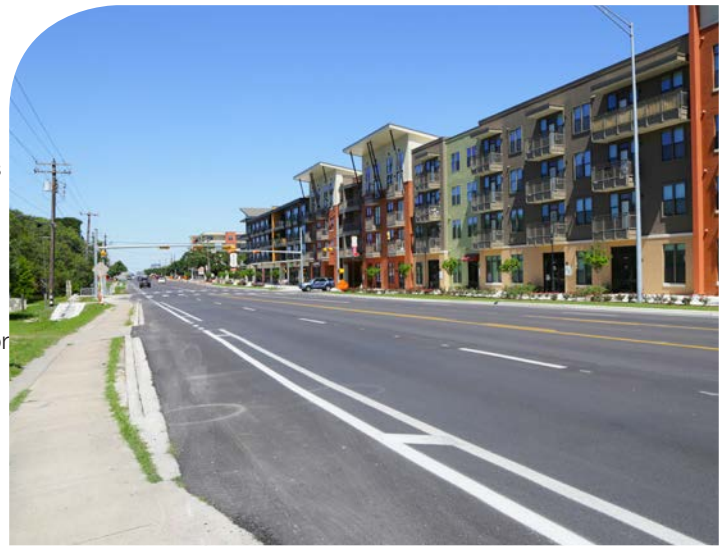


92' needed but only 74´ available



Compact Design within existing 74' (Using Urban Design Matrix to reduce 18')

Scenario C - Prioritize Elements: There isn't enough right-of-way to accommodate all of the desired improvements AND it is unlikely that additional right-of-way can be acquired/ dedicated. This situation will be more common in established corridors and within the urban context of our community. When this occurs, a process to determine the priority features for the street will be necessary AND a greater tolerance for more compact design details should be permitted beyond the scope of this guidance. This process allows for a consistent approach to decision making so that Austin's mobility objectives are achieved incrementally as street improvements are made. This process, which will be informed through the Austin Strategic Mobility Plan, and project-specific public processes, will allow for a consistent approach to the redesign of streets.



Scenario D - Privatize Elements: In some cases, like in Scenario A, it becomes necessary to think outside the current right-of-way. Another tool the City can use is an easement. This requires a portion of the private realm to be dedicated to another use, such as a pedestrian realm (sidewalks, buffer, lighting, etc.). This option may be defined in the Land Development Code of the ASMP for known constrained corridors requires discussion with local developers and business owners.

How much right-of-way is needed?

Communicating the optimum amount of right-of-way can be accomplished by understanding the function of the street and the context of the area that it serves. In other words, the optimum right-of-way width is directly influenced by the anticipated capacity needs of the street (how many motor vehicular travel lanes and dedicated facilities for pedestrians, transit, and bicycles) and the presence of other safety and operational features assumed to be a part of the street design (medians, shoulders, dedicated turn-lanes, etc.).

While this simple approach will work in most situations, there will always be exceptions. Streets with exceptional situations and unique conditions may result in specific corridor plans with slightly different design features than those showcased in this brochure. However, these should be the exception and will always involve public input prior to specific design decisions being made.

How much right-of-way is needed at intersections?

Designing multimodal facilities requires trade-offs because often times not enough right-of-way is available to accommodate all modes of travel. The intersection is a pivotal point where the different street designs intersect – resulting in the most potential for conflicts between the trade-offs being considered. There are a variety of reasons for these conflicts:

- A corridor's vehicular level of service is often controlled by the capacity of an intersection. Increasing the capacity at an intersection through an additional right- or left-turn lane improves a vehicular travel, but can make it more difficult to continue to provide bicycle and pedestrian facilities and/or can make it more dangerous for a pedestrian or cyclist to cross an intersection.
- Intersections are typically transition areas for different street levels. The transitional area can be problematic in determining what design elements should be prioritized over another.
- Intersections play an important role in vehicular congestion relief, multi-modal travel, and economic vitality. The need to balance these three elements can create a strain on the capability of the transportation network to be symbiotic with adjacent land uses.

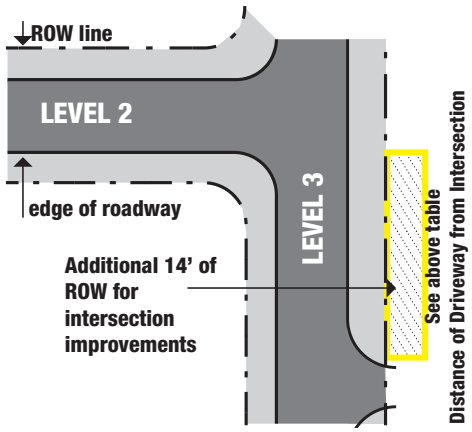
Designing intersections is a complicated balance between traffic engineering, urban planning, and land use. How well an intersection functions is determined by a combination of the driveway management functional area upstream of the intersection and the amount of right-of-way available.

Driveways should be minimized in the intersection influence area. *This area is defined as the distance of the left turn lanes from the intersection.* For each level, the influence area changes based on context as illustrated in the table below.

TURN LANE LENGTH (DISTANCE TO DRIVEWAY)		
LEVEL	URBAN	SUBURBAN
Level 2	205 ft	240 ft
Level 3	305 ft	360 ft
Level 4	365 ft	430 ft

Based on NCHRP 780 Design Guidance for Intersection Auxiliary Lanes which assumes 100' for storage of vehicle. Storage length can be modified.

The influence areas outlined above illustrate the importance of providing adequate spacing. Due to the spacing requirements, a driveway should only intersect with a Level 1 and Level 2, and should be minimal on Level 3 and Level 4.



Right-turn lanes are anticipated to be necessary at certain intersections. Below is a matrix of additional ROW needed to accommodate the right-turn contained within the influence areas listed above. A more detailed traffic study could be completed to shorten the influence area or to determine that a right-turn lane is not necessary. Innovative intersection treatments, such as roundabouts and continuous flow designs, are option that can improve safety and mobility for all modes. (http://safety.fhwa.dot.gov/intersection/innovative/roundabouts/).

	Level 1	Level 2	Level 3	Level 4
Level 1	0	0	0	0
Level 2	0	+14	+14	+14
Level 3	0	+14	+14	+14
Level 4	0	+14	+14	+14

Mode Specific, Regulatory & Other Design Considerations

Austin practices a planning approach which recognizes the quality of existing mode plans and strategies already in place for bicycles, pedestrian, and transit and the importance of incorporating them into the design process.

These plans offer information vital to the success of multimodal integration and prioritization. The information contained in each Mode Plan identifies existing plans for each travel mode that must be considered as incremental decisions are made. The plan for each mode contains strategic elements for creating a well-coordinated and integrated multimodal network.

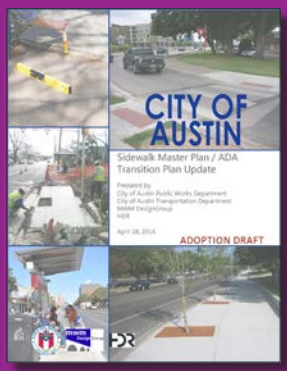
These plans remain freestanding strategies and should be periodically updated to reflect changing circumstances and emerging trends and best practices. Austin will benefit from these incremental enhancements over time by allowing them to inform the decision making process of street design (as opposed to ad hoc decisions). The Austin Strategic Mobility Plan will integrate all mode plans into one comprehensive strategy.

Additionally, Regulatory Plans will be considered. The cross-sections identified in Regulatory Plans supersede those in the ASDG.

In addition to these types of mobility considerations, there are other factors that affect street design and right-of-way needs. Green Street elements and stormwater management can have a significant impact on street design and function. There are additional resources on pages 16-21 of this document which describe how these considerations should be accounted for in designing streets.

MODE SPECIFIC PLANS

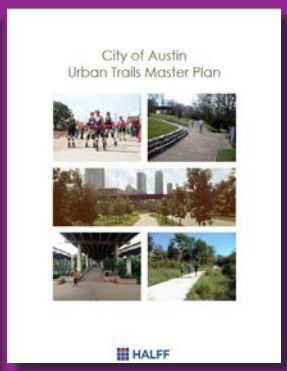
City of Austin
Bicycle Master Plan



Sidewalk Master Plan/ADA
Transition Plan Update

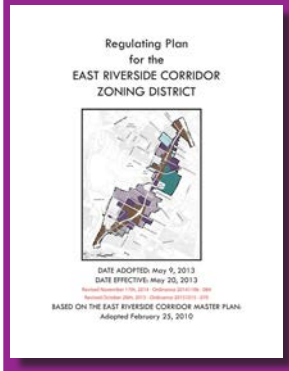
ProjectConnect

Connections 2025



Urban Trails Master Plan

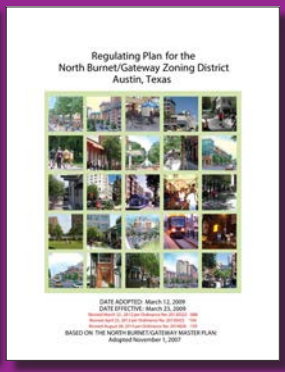
REGULATORY PLANS



ERC
Regulating Plan

Lamar - Justin
Regulating Plan

MLK
Regulating Plan



North Burnet - Gateway
Regulating Plan

Plaza - Saltillo
Regulating Plan

Bicycle Supportive Design Strategies

The vision of the Austin 2014 Bicycle Plan is to "help people in Austin of all ages and abilities bicycle comfortably and safely for transportation, fitness, and enjoyment." The type of facility implemented should be reflective of this vision.

A majority of the population is "interested, but concerned" when it comes to bicycling, and the biggest concern is safety. To accommodate the vast majority of the population, **protected facilities** should be a priority and **dedicated facilities** only as constrained retrofit.

When selecting appropriate bicycle treatment, the following should also be considered:

- Interaction with other modes of transportation
- **Safe crossings**
- **Protected Intersections**
- Appropriate signage for cyclists and motorist
- Maintenance
- Intersection Treatments

Dedicated Facility - Bike Lane (BL)

Protected Facility - Buffered BL

Protected Facility - Physical Barrier BL

Bike Box

Shared-Use Path/Urban Trail

Protected Intersection

Source: sfbike.org - protected intersection

Safe Crossings

For additional information and more detailed guidance for Bicycle design, please visit the following websites:

- City of Austin Bicycle Program https://austintexas.gov/page/bicycle
- NACTO Urban Bikeway Design Guide http://nacto.org/publication/urban-bikeway-design-guide/
- FHWA Bicycle and Pedestrian Facility Design Flexibility http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_flexibility.cfm
- AASHTO Guide for the Development of Bicycle Facilities https://bookstore.transportation.org/collection_detail.aspx?ID=116&gclid=CJHLoNCPj88CFUUcaQodANwO2g

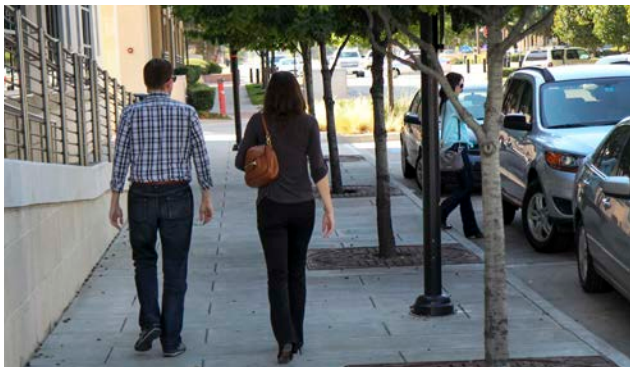
Pedestrian Supportive Design Strategies

Walking, as the basic form of transportation, must be prioritized to provide a safe environment for all users. Strategies vary for designing pedestrian elements depending on context.

Sidewalk treatments in urban areas should provide wide zones that allow for easy cross-access and movement in and out of store fronts. In suburban areas, sidewalks should be adequately sized, provide shading, and be buffered from the roadway.

At **intersections** or **mid-block,** strategies such as striped crosswalks, pedestrian refuge islands, curb extensions/ bulb-outs or raised crossings can be used to increase pedestrian visibility and safety.

Sidewalks -Urban



Sidewalks -Suburban

Intersections - Striped Crosswalks

Pedestrian Refuge Island

Curb Extensions/Bulb-outs

For additional information and more detailed guidance for Pedestrian design, please visit the following websites:

- City of Austin Pedestrian Program http://austintexas.gov/page/pedestrian
- CNU/ITE Manual Designing Walkable Urban Thoroughfares https://www.cnu.org/our-projects/cnu-ite-manual
- ITE Context Sensitive Solutions http://www.ite.org/css/

Transit Supportive Design Strategies

When right-of-way is limited, every square foot of roadway space has inherent value. Transit has the capacity to move more people, more quickly, using less space than other modes, and transit supportive design strategies use infrastructure, technology, and policy to help the service do just that.

Strategies for designing high-quality transit streets include providing dedicated lanes and transit supportive intersections; adding fine-grained improvements like bus bulbs and queue jumps; repurposing street space for transit; and designing efficient, comfortable stops with level boarding and off-board fare payment, all to increase transit speed, improve service reliability, and maximize the total person capacity of the street. Such investments attract new riders, reveal latent demand for better service, and demonstrate the value of dedicating space to transit.

In Austin, the frequent transit network provides service every 15-minutes or better; often enough that you can just show up and ride. The frequent transit network delivers the best quality service across the system, with the highest ridership and growth potential for corridors. With the best transit plan being a good land use plan, it is critical that land use context support transit for the system to be successful. The minimum density needed to support transit service is 16 residents per acre or 8 employees per acre along the entire transit corridor.

As population and congestion continue to increase, so will the need for more space-efficient use of public right-of-way. Transit-supportive design elements work together to enhance the appeal of mass transit. These treatments speed up service while improving reliability and capacity, resulting in higher transit ridership and better service within a fixed operating budget.

Transit Lanes & Pavement Markings

Bus Stop Placement & Spacing

Transit Queue Jumps

Source: Joshua Guerra - capmetro.org

Enhanced Boarding Environment


Source: downtown-h.org

Transit-Supportive Intersection Design

For additional information and more detailed guidance for Transit design, please visit the following websites:

- CapMETRO Connections 2025 http://connections2025.org/
- City of Austin Transit Priority Lanes https://www.austintexas.gov/prioritylanes
- NACTO Transit Street Design Guide http://nacto.org/publication/transit-street-design-guide/
- CapMETRO TOD Priority Tools https://www.capmetro.org/tod
- CapMETRO Service Guideline & Standards https://www.capmetro.org/servicechange

Green Streets Design Strategies

Austin is recognized as a “green” city, and our environmental ethos is reflected in the “green streets” elements within our Complete Streets policy. A Green Street is defined as a street that incorporates landscape, stormwater controls, and sustainability elements to improve ecological and human health.

More specifically, a Green Street is a public street right-of-way that is context-sensitive and that incorporates landscape features, engineered stormwater controls, and sustainability principles and practices to enhance street design, mitigate the Urban Heat Island effect, improve water and air quality, and conserve ecological resources.

The Green Streets City initiative has 6 principles:

1. Streets as Ecosystem
2. Streets as Climate Change Resiliency
3. Streets as Economic Benefit
4. Streets as Integrated Public Policy and Practice
5. Streets as Public Health
6. Streets as Materials and Resource Management

Street Tree

Porous Pavement

Mid-Street Vegetated Bump Out

Vegetated Tree Wells

Corner Vegetated Bump-Out

Vegetated Medians

Planter Zone

For additional information and more detailed guidance for Green Streets design, please visit the following websites:

- City of Austin Green Streets Introduction: https://austintexas.gov/sites/default/files/files/Transportation/Complete_Streets/GreenStreetsWeb092115.pdf
- EPA Green Streets: https://www.epa.gov/G3/learn-about-green-streets
- DDOT Green Infrastructure: http://ddot.dc.gov/GreenInfrastructure
- FHWA Sustainable Streets: https://www.fhwa.dot.gov/publications/publicroads/11marapr/02.cfm
- NACTO Green Infrastructure: https://nacto.org/publication/urban-bikeway-design-guide/bicycle-boulevards/green-infrastructure

Street Elements

TRANSIT:

The table below provides recommendations for incorporating Transit-Supportive Design Elements into street designs for different street levels. These recommendations do not take into consideration context or site-specific conditions. It provides an overview and best case scenario for incorporating transit lanes, bus stops, transit queue jumps and other innovative transit strategies into current and future street designs.

ELEMENT	Level 5	Level 4	Level 3	Level 2	Level 1
Transitways or Dedicated Transit Lanes with turn management	●	●	●	▲	▲
Dual Transit Lanes or Dedicated lanes with bus pull-out stops	●	●	●	▲	▲
Boarding Islands/bulbs	▲	●	●	●	▲
Peak-Only Transit Lanes	■	●	●	▲	▲
In-Lane Stops	▲	●	●	●	●
Transit Queue Jumps/Bypass Lanes	▲	●	●	■	▲
Shared bus-bike lanes	▲	■	■	■	▲

● Recommended
▲ Possibly
■ Not Recommended

GREEN STREETS:

The table below provides recommendations for incorporating Green Street elements into the different Street Levels. These recommendations do not take into consideration site specific conditions and maintenance regimes. Instead, it provides an overview and best case scenario for incorporating landscape, stormwater controls, and sustainability elements into current and future streets.

ELEMENT	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0
Street Tree	■	●	●	●	▲	▲
Pervious Paving	▲	▲	▲	●	●	●
Mid-Street Vegetated Bump Out	■	■	●	●	●	▲
Corner Vegetated Bump Out	■	■	●	●	●	▲
Buffer zone w/trees	■	●	●	●	▲	▲
Buffer zone w/out trees	●	■	■	■	●	▲
Vegetated Tree Wells	■	●	●	●	▲	■
Vegetated Medians w/trees	▲	●	●	N/A	N/A	N/A
Vegetated Medians w/out trees	●	▲	■	N/A	N/A	N/A

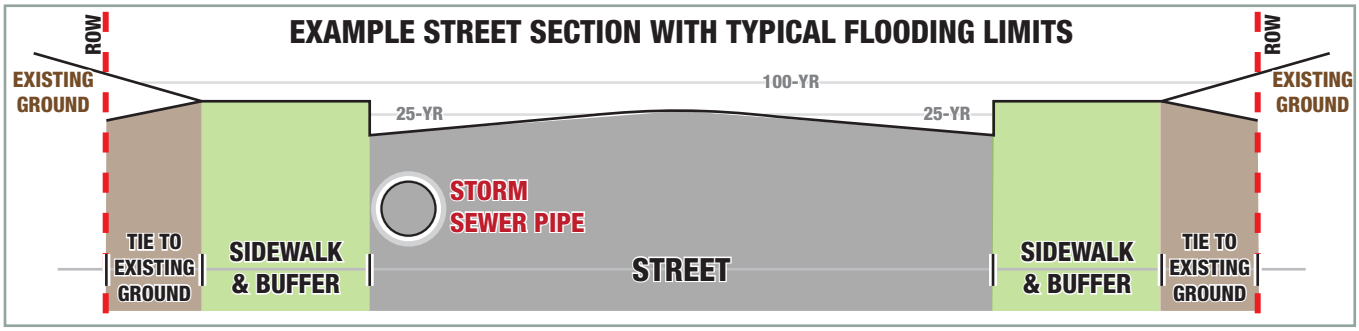
● Recommended
▲ Possibly
■ Not Recommended

Stormwater Management Design Strategies

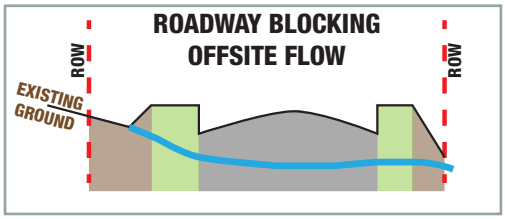
Austin has land development, drainage, and environmental regulations that govern flood, erosion and water quality controls when development occurs, including streets. Street designs should fully comply with current land development rules and design standards. Below are several stormwater management strategies to consider when designing streets.

Image of an inlet (foreground) exceeding its capacity and overflow in the gutter.

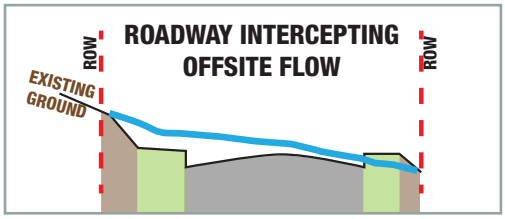
1. **Street is Part of the City's Drainage System** - The entire street ROW is designed to act as part of the City's drainage system. The street drainage system components, such as curbs, gutters, inlets, storm drains, manholes, and road ditches, are designed to maintain and safely convey the 25-year design storm. The entire ROW (and/or adjacent drainage easements) are designed to contain and convey the 100-year design storm and potentially handle overflow if inlets are blocked.



2. **No Adverse Impact** – City regulations require the designer to demonstrate no adverse flooding impact on other properties. In addition to mitigating for added impervious cover in the ROW, designers should consider minimizing stormwater concentration, decreasing surface runoff depth and velocity, improving water quality, providing a safe path for emergency vehicles, and designing an easy to maintain drainage system.



3. **Manage Existing Flow Patterns** - Design should consider existing drainage flow patterns, see figures. If the roadway is higher than the existing terrain, then flow coming from the upstream side will be blocked and likely requires a ditch or inlets on the upstream side. If the roadway is lower than the existing terrain, then flow coming from the upstream side will drop into the street drainage system. In addition, design should minimize or eliminate stormwater crossing a street or intersection.



4. **Water Quality** – City regulations require that new and redeveloped streets exceeding more than 8,000 square feet of impervious cover install water quality treatment devices for runoff. Some Green Street Design Strategies can be used to meet water quality requirements.

For additional information on the Land Development Code and Criteria Manuals, please visit the following websites:

- City of Austin Land Development Code: http://www.austintexas.gov/department/austin-city-code-land-development-code
- City of Austin Drainage Criteria Manual: https://www.municode.com/library/tx/austin/codes/drainage_criteria_manual
- City of Austin Environmental Criteria manual: https://www.municode.com/library/tx/austin/codes/environmental_criteria_manual

Number of Lanes

The number of motor vehicle lanes needed impacts the multimodal decisions for the street. Within this document are examples of working within different amounts of right-of-way to create a more complete street.

Motor vehicle travel lanes carry more than just the personal automobile. They can also provide a mixed-flow or designated lane for transit priority. These different purposes impact the design of a street (treatments, lane width), especially at transit stops and intersections.

When we think about travel in Austin, the focus cannot be solely on cars, but on moving people and goods. Including other more space efficient modes is a major part of our **Imagine Austin** implementation strategy. However, when analyzing streets, one of the main input factors is motor vehicle trips as they typically take up the most space.

Guide for Use of the Multimodal Design Table

The Multimodal Design Table provides more detailed recommendations for multimodal and parking facilities based on the context, level, and Average Daily Traffic Counts (ADTs) for a given street in the transportation network. Generally, ADTs for a given street should help guide the decision for number of lanes and target speed. Some overlap in ADT ranges are provided to allow for flexibility in choice of lanes and design speed. Additional guidance on mode priority will be provided through the Austin Strategic Mobility Plan.

The Multimodal Design Table is intended to be an overview of the various characteristics of the Cross Sections and the following matrices should be referenced for decision making when there is not enough space to accommodate the recommended bicycle, transit, or parking facilities. Generally, the Matrix clarifies what elements to use in the “Bicycle and Street Edge” realm for bicycle and parking facilities, and it clarifies what facilities are to be used in the “Pedestrian Zone” for transit facilities and also sidewalks.

The following is the Multimodal Design Table which can be used to develop the elements of the street.

Multimodal Design Table

Context	Level	Typical ADT Range (vpd)[1]	Number of Lanes[1]	Target Speed (mph)[1]	Bus Frequency	Bike Facility*	Pedestrian Facilities		Transit Facility*	Parking Facility***
						Type[2]	Sidewalks	Safe Crossing Density***	Type[3]	Type[3]
All (Except Alternatives)	1	< 2,000	2	20	Very Low	Quiet Street	Sidewalk and Buffer	Every Block	None	Parallel
Urban	2	2,000 - 5,000	2	25	Low	Conventional, Buffered, or Raised Bicycle Lane		1/8 Mile	Boarding islands/bulbs	Parallel
		5,000 - 10,000	2	25	Medium	Buffered or Raised Bicycle Lane			Peak-only dedicated lanes	Parallel
	3	10,000 - 20,000	3	35	High	Raised Bicycle Lane			Dedicated to Peak-only lanes	Parallel
		15,000 - 40,000	4 (Divided)	35	Very High	Raised Bicycle Lane			Dedicated Transit Lanes	
	4	35,000 - 45,000	4 (Divided)	40	High	Raised Bicycle Lane		1/4 Mile	Dedicated or Peak-only lanes	Access Lanes
		40,000 +	6 (Divided)	40	Very High	Raised Bicycle Lane			Dedicated Transit Lanes	
Suburban	2	2,000 - 5,000	2	25	Very Low	Conventional, Buffered, or Raised Bicycle Lane		1/4 Mile	None	Parallel
		5,000 - 10,000	2	30	Low	Buffered or Raised Bicycle Lane			Boarding islands/bulbs	Parallel
	3	10,000 - 20,000	3	35	Medium	Raised Bicycle Lane			Peak-Only dedicated lanes	Curb Extensions
		20,000 - 40,000	4 (Divided)	40	High	Raised Bicycle Lane			Dedicated or Peak-Only lanes	None
	4	35,000 - 45,000	4 (Divided)	40	Medium	Raised Bicycle Lane OR Shared Use Path	Sidewalk OR Shared Use Paths and Buffer Zone	1/2 Mile	Peak-Only dedicated lanes	None
		40,000 +	6 (Divided)	45	High	Raised Bicycle Lane OR Shared Use Path			Dedicated or Peak-only lanes	None
Industrial	2	< 20,000	3	25	N/A	Buffered Bicycle Lane	Sidewalk and Buffer Zone	1/2 Mile	None	Parallel
	3	10,000 - 30,000	5	30	N/A	Raised Bicycle Lane			None	None
Alternative	1	< 3,000	2	25	N/A	Wide Outside Lane	Sidewalk and Buffer Zone	1/2 Mile	None	Shared Space
	2	3,000 - 10,000	2	35-40	N/A	8' Shoulder OR Share Use Path	Sidewalk OR Shared Use Paths and Buffer Zone		None	None
	3	8,000 - 20,000	3	45-55	N/A	8' Shoulder OR Shared Use Path			None	None
	4	20,000 +	5	50-65	N/A	(8+)' Wide Shoulder OR Shared Use Path			None	None

*** Denotes preferred facility if ROW allows. Alternatives can be found in the Design Matrix.**
****Denotes that these will not be included except by ROW/easement dedication for expanded pavement width of additional 8' per side of parking.**
*****For Crossing Facilities, reference TCRP Report 112/NCHRP Report 562 "Improving Pedestrian Safety at Unsignalized Crossings".**

[1] Based in part on *Designing Walkable Urban Thoroughfares, 2010*, but modified to accommodate street levels.
[2] Types are taken from 2014 Bike Plan (except Access Lanes - *Urban Walkable Thoroughfares, 2010*)
[3] Types are interpreted from NACTO Transit Street Design Guide

Cross Sections

Cross sections are developed to provide a visual understanding of the balance between the different uses of a street. They identify what portion of the right-of-way is dedicated to certain elements.

The following cross sections are broken up by Context and Level as discussed previously. A street "Level" is a modernization of the nomenclature of the typical street functional classification nomenclature. The Level of the street indicates the function of the street in the transportation network and gives options on how to achieve the functionality within different rights-of-way. Within each context/level, this chapter will visually display options for the cross sections. At the end of each section is a specific Design Matrix with minimum and constrained dimensions. The minimum dimensions should be utilized when right-of-way is available whereas the constrained dimensions should be used when right-of-way is not available.

The Design Matrix is an additional tool to be used during scenarios where the right-of-way does not comply with availability, or in a retrofit situation where there is a need to work within a historically sized street. Some additional consideration may also be needed regarding local utility requirements which may vary depending on location or be site-specific.

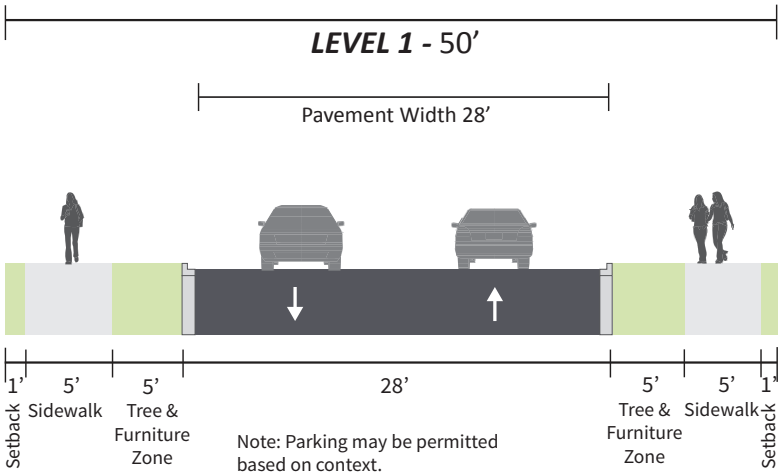
Note: Level 5 streets tend to be freeway type facilities that are governed not by the City code, but by a separate set of guidelines. Therefore the remainder of this brochure focuses on the design of level 1-4 streets. Facilities not governed by City Code are governed by either State or County guidelines/code.

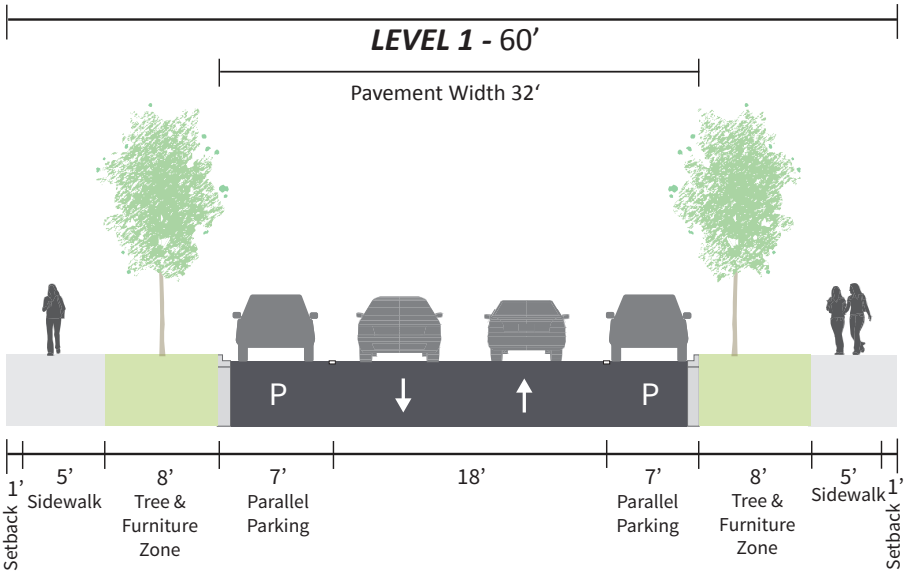
Note: All measurements are from face of curb to center of stripe.

LEVEL 1

The following cross sections represent Level 1 streets for all contexts (except Alternatives). These streets do not impact design as much as the other street levels (categorized by context in the following pages). Due to this, the cross sections do not vary greatly. The two cross-sections below represent the standard design of the Level 1 streets.

Level 1





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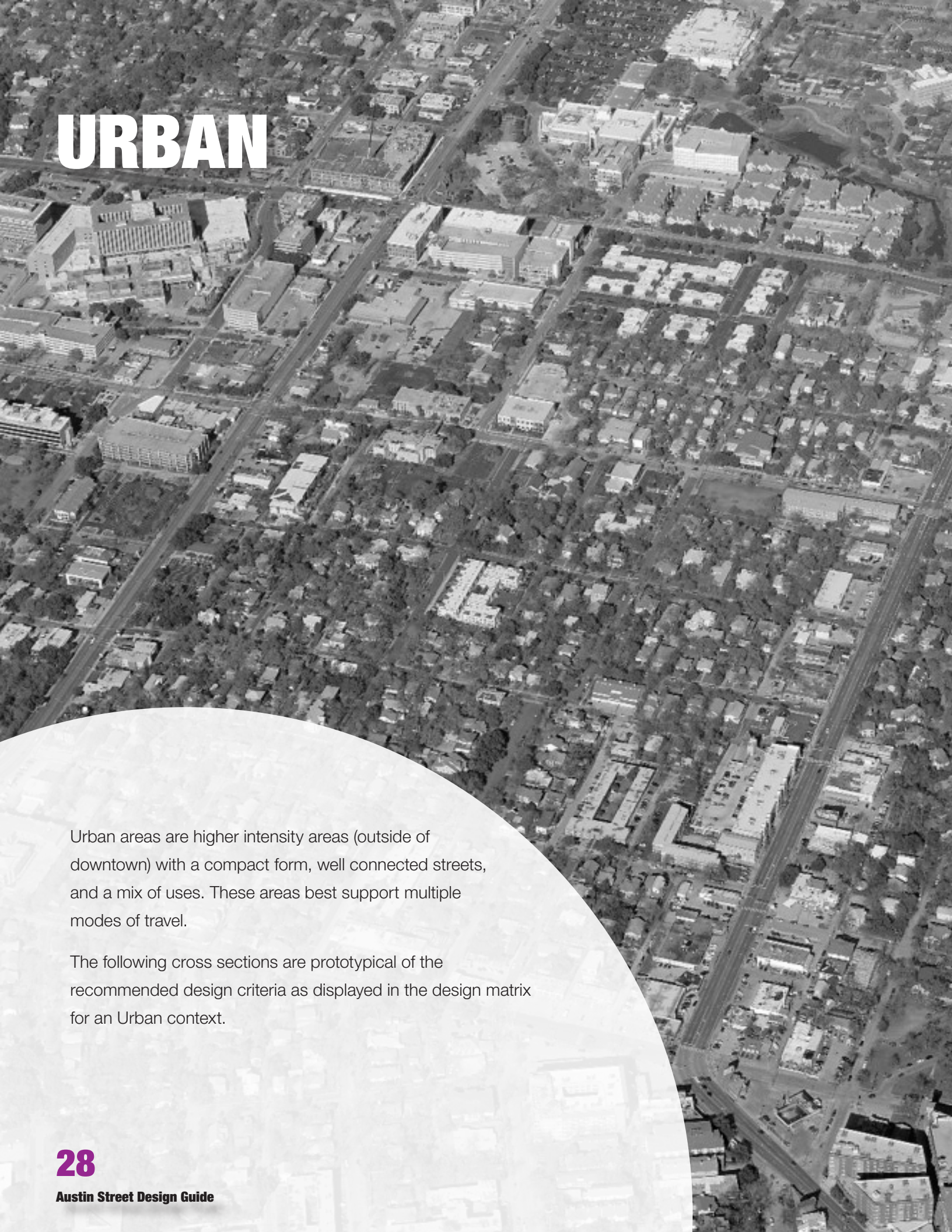
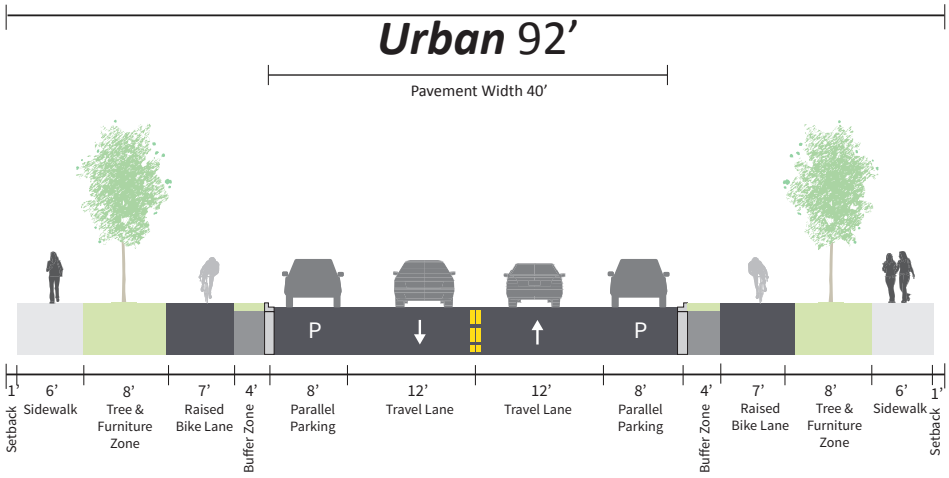
URBAN



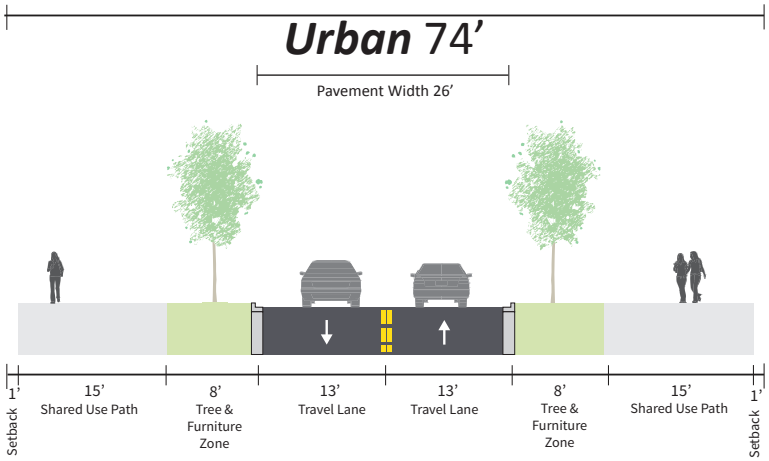
Urban areas are higher intensity areas (outside of downtown) with a compact form, well connected streets, and a mix of uses. These areas best support multiple modes of travel.

The following cross sections are prototypical of the recommended design criteria as displayed in the design matrix for an Urban context.

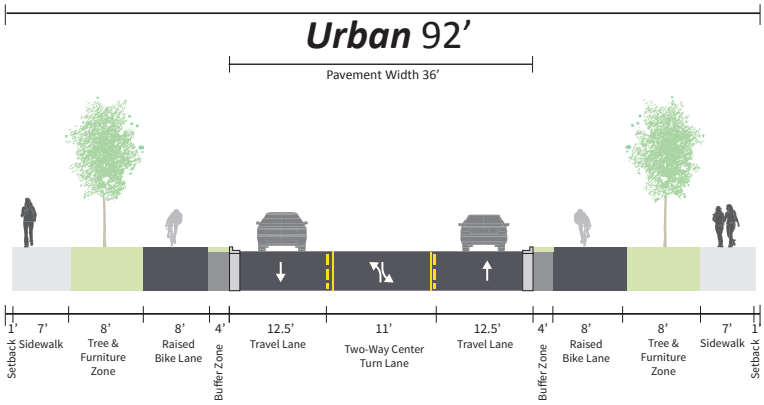
Level 2

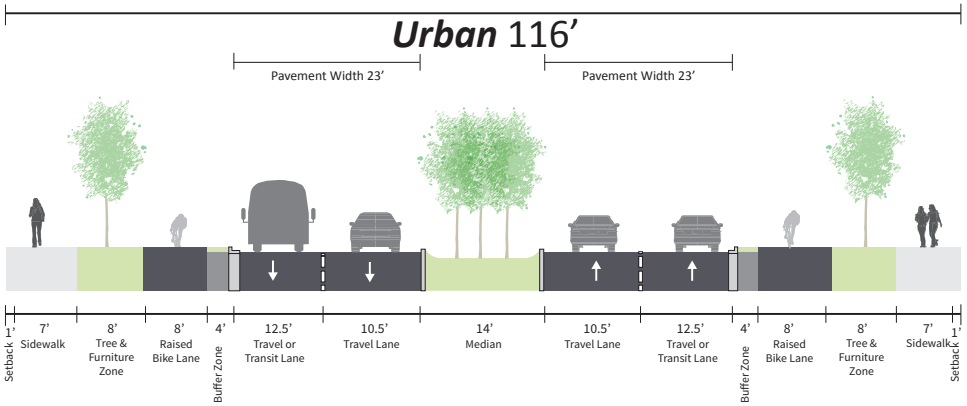


Note: Turn pockets will be required at intersecting Level 2, 3, and 4 streets.

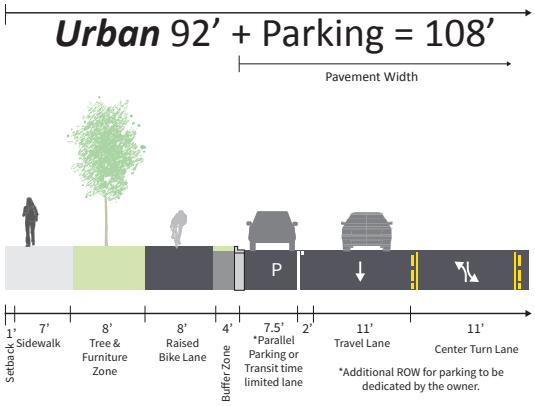


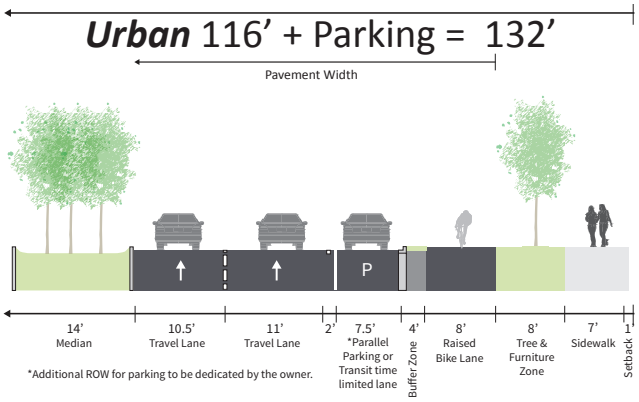
Level 3





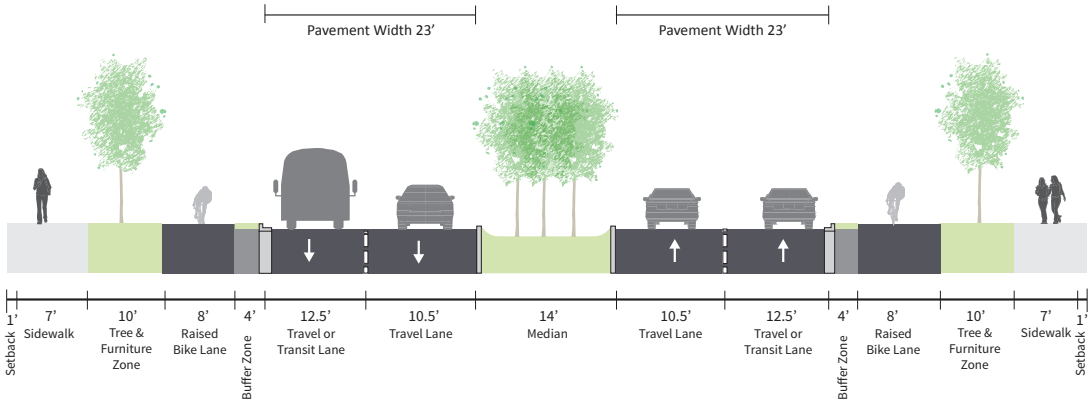
OPTIONS:



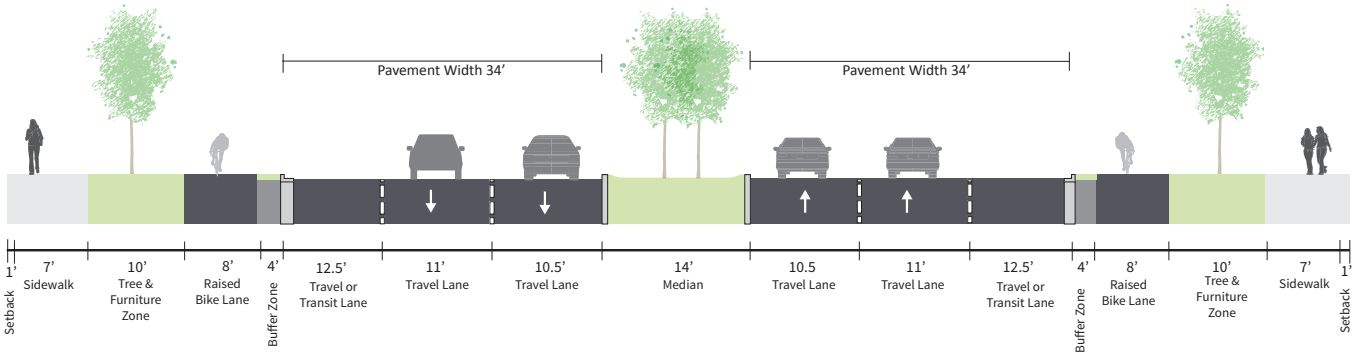


Level 4

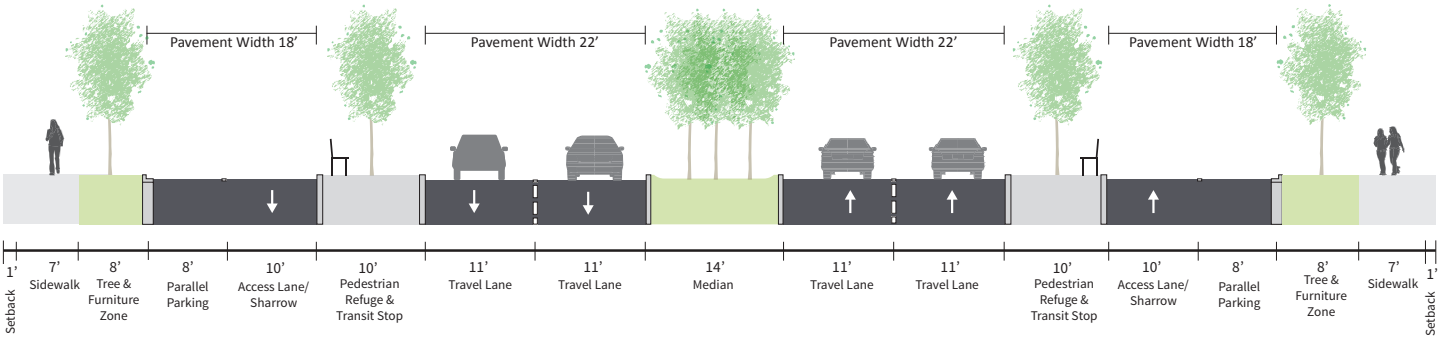
Urban 120’



Urban 142’



Urban 146’



Urban Context - Design Matrix

	Level 2		Level 3		Level 4	
	Desired Range		Desired Range		Desired Range	
ROW	**74'-92'**		**92'-132'**		**120'-146'**	
Additional ROW/ Easement Dedication for Parking (by Owner Request)	**Parking Desired (Included in pavement)**		**0'-16'**		**n/a**	
Pedestrian Zone						
Subsection Width	**8'-15'**		**10'-16'**		**13'-18'**	
Toolbox:	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED
Sidewalk	6'	5'	7'	6'	7'	6'
Tree & Furniture Zone	8'	3'	8'	4'	10'	7'
Shared Use Path (instead of sidewalks)[1]	n/a	n/a	n/a	n/a	n/a	n/a
1' Setback[2]	1'	0'	1'	0'	1'	0'
Bicycle and Street Edge Zone						
Subsection Width (Excludes Parking)	**8'-11'**		**8'-12'**		**10'-18'**	
Toolbox:	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED
Bicycle Facility						
Protected Bike Lanes (One of Two-Sided) ***Preferred***	7' Clear 4' Buffer	7' Clear 3' Buffer	8' Clear 4' Buffer	7' Clear 3' Buffer	8' Clear 4' Buffer	7' Clear 3' Buffer
On-Street Separated Bike Lanes ***Alternative***	n/a	6' Clear 2' Separation	n/a	6' Clear 2' Separation	n/a	n/a
Other Facilities						
Parallel Parking†	8'	7'	9.5'	7'	n/a	n/a
Access Lanes	n/a	n/a	n/a	n/a	18' (10' refuge)	16' (8' refuge)
Motor Vehicle and Transit Zone						
Subsection Width[3]	**24'-40' (Includes Parking)**		**34'-60'**		**55'-82'**	
Travel Lanes (# of Lanes)	**2-3**[6]		**3 - 4 (Divided)**		**4 - 6 (Divided)**	
Transit Only Lanes	**n/a**	**n/a**	**12.5'**	**12'**	**12.5'**	**12'**
	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED
Outside Travel Lane Width[4]	13'	12'	12.5'	12'	12.5'	12'
Interior Travel Lanes Width[5]	n/a	n/a	11'	10'	11'	10'
Center Turn Lane Width	10'	10'	11'	10'	n/a	n/a
Median Width	11'	n/a	14'	10'	14'	11'

NOTES:
All dimensions from FOC and center of stripe (including center of double yellow set)
†Parking to be dedicated by developer as an extra 8' of pavement.
[1] Shared use path not desirable in urban context.
[2] The setback in an urban environment may be an extension of the development sidewalk.
[3] On-Street Bike Lane as opposed to Raised Bike Lanes may require more pavement.
[4] Defined as against physical obstruction. Outside Travel Lanes can be reduced if next to bike lane.
[5] Defined as adjacent to stripe only.
[6] Left turn pockets required at intersection of Level 2, 3, and 4 streets.

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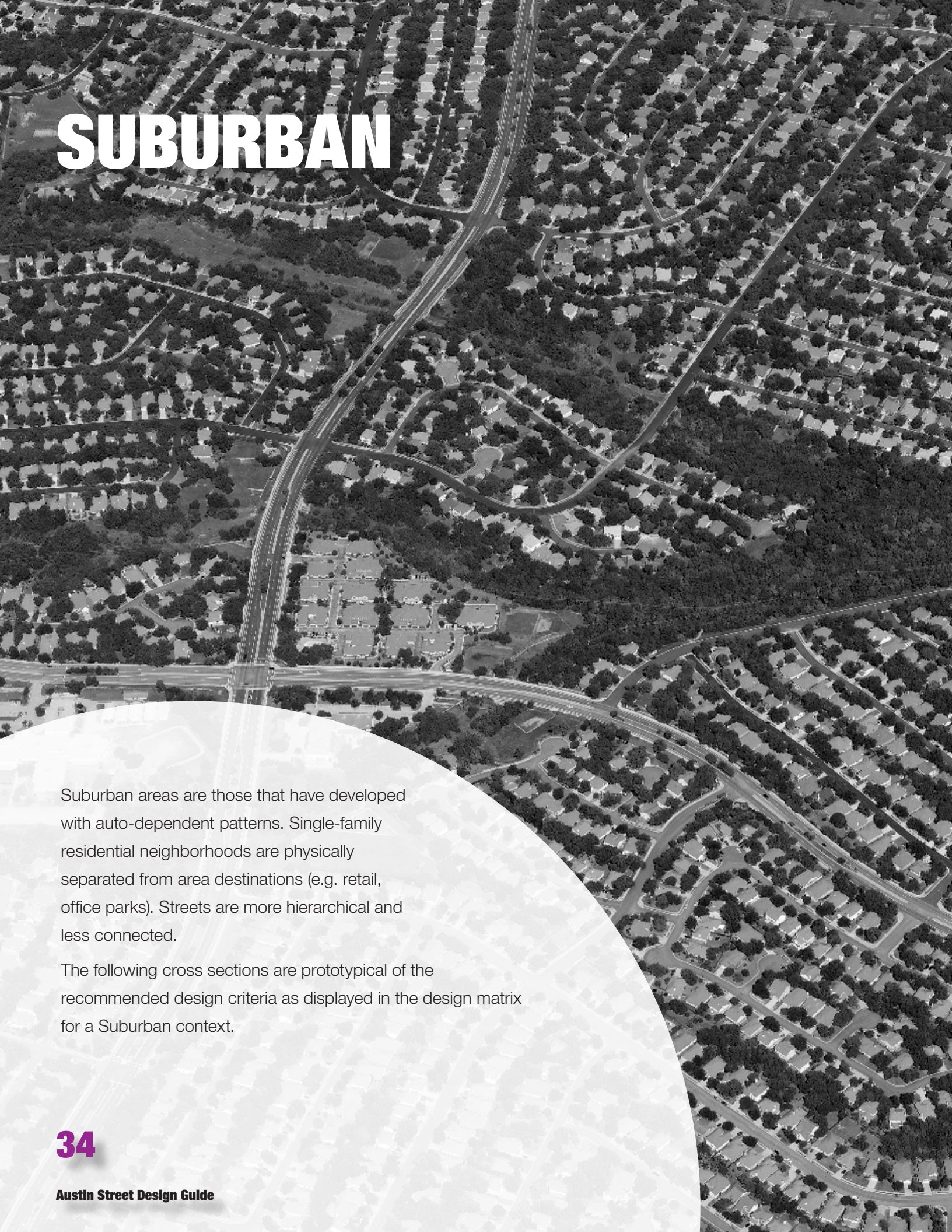
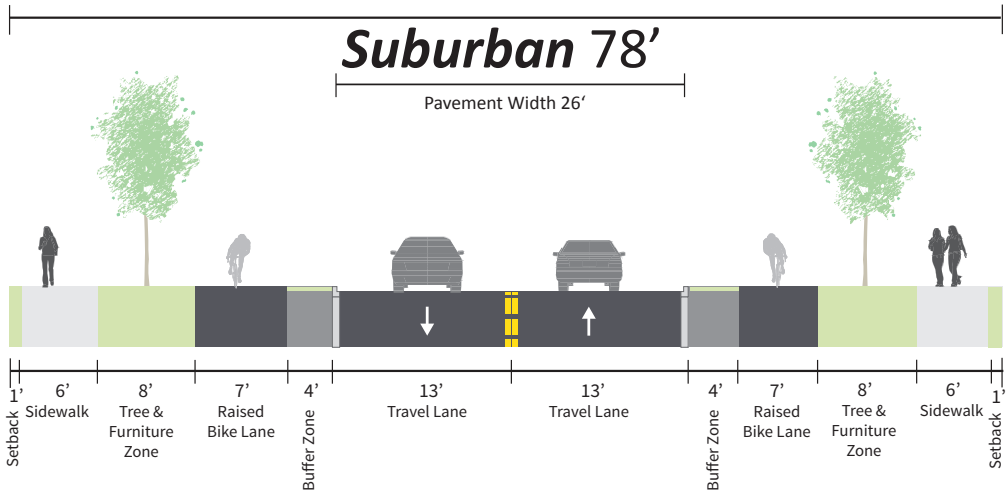
SUBURBAN



Suburban areas are those that have developed with auto-dependent patterns. Single-family residential neighborhoods are physically separated from area destinations (e.g. retail, office parks). Streets are more hierarchical and less connected.

The following cross sections are prototypical of the recommended design criteria as displayed in the design matrix for a Suburban context.

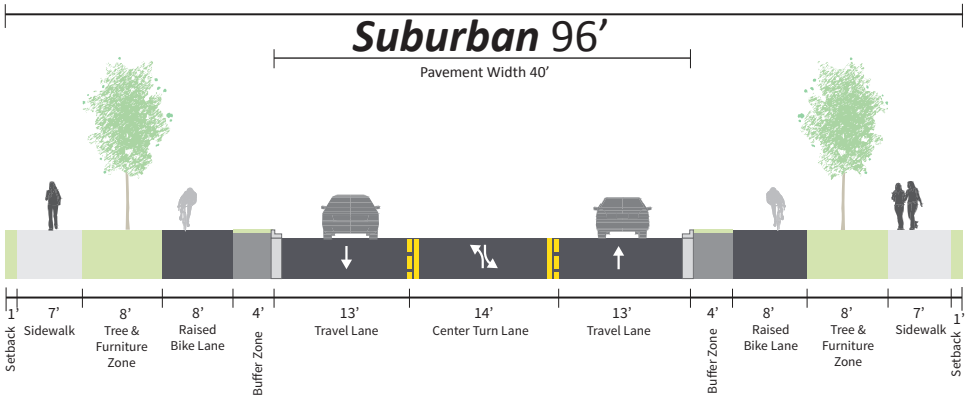
Level 2



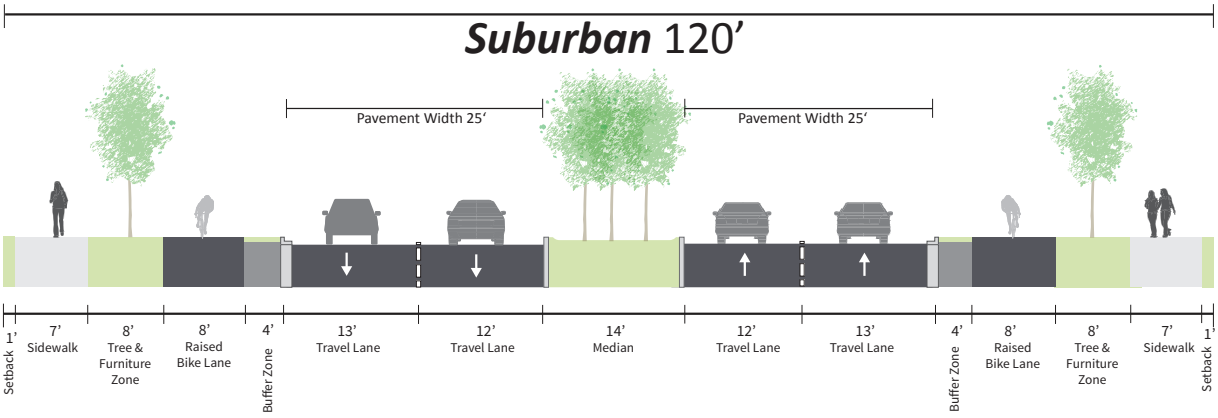
Note: For Level 2 facilities, additional right-of-way and pavement will be required to accommodate left-turn pockets required at intersecting Level 2, 3, and 4 streets.

Level 3

Suburban 96’

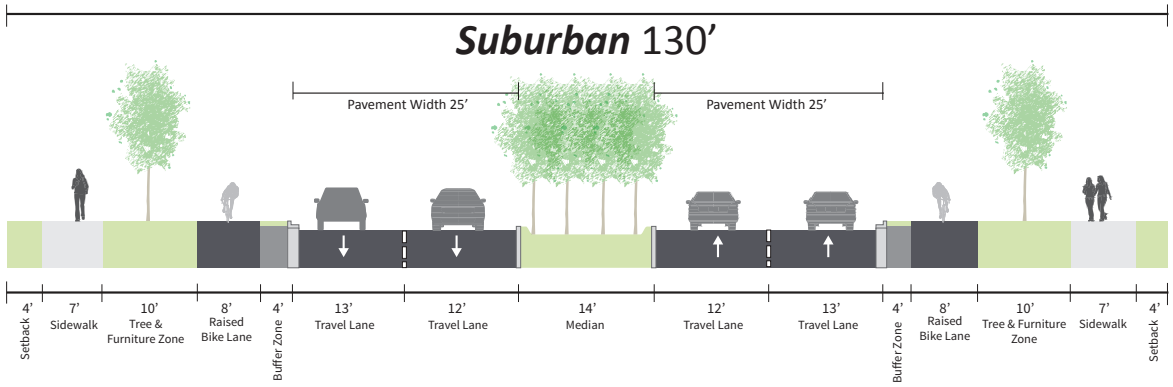


Suburban 120’

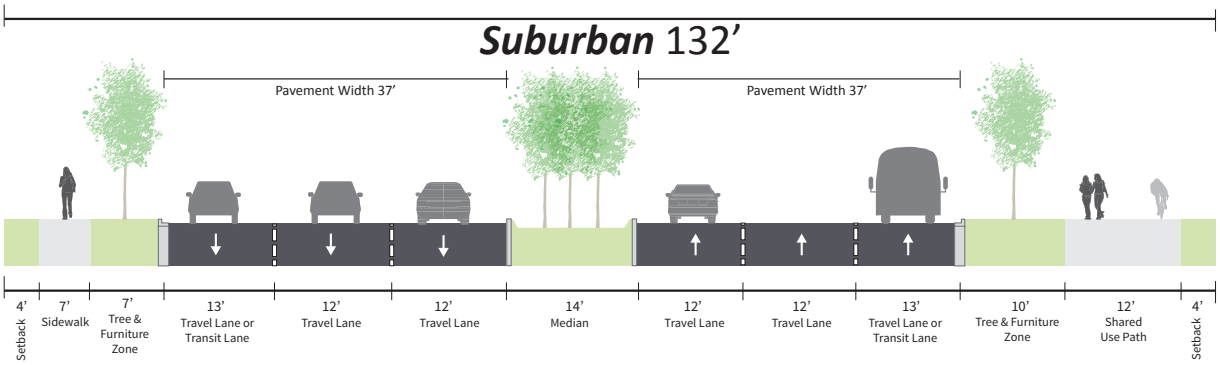


Level 4

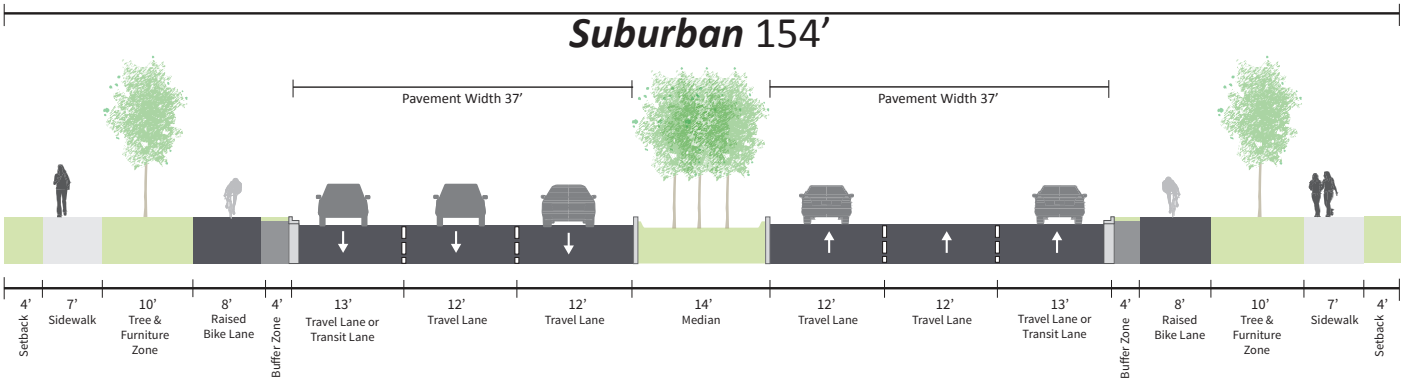
Suburban 130’



Suburban 132’



Suburban 154’



Suburban Context - Design Matrix

	Level 2		Level 3		Level 4	
	Desired Range		Desired Range		Desired Range	
ROW	**78'**		**96'-120'**		**130'-154'**	
Additional ROW/Easement Dedication for Parking (By Owner)	**0'-16'**		**n/a**		**n/a**	
Pedestrian Zone						
Subsection Width	**10'-15'**		**10'-16'**		**14'-21'**	
Toolbox:	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED
Sidewalk/Shared Use Path (SUP)	6'	5'	7'	5'	7' (12')	5' (8')
Tree & Furniture Zone	8'	5'	8'	5'	10'	7'
Setback	1'	0	1'	0	4'	2'
Bicycle and Street Edge Zone						
Subsection Width (Excludes Parking)	**8'-11'**		**8'-12'**		**8'-12'**	
Toolbox:	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED
Bicycle Facility						
Protected Bike Lanes (One of Two-Sided) ***Preferred***	7' Clear 4' Buffer	7' Clear 3' Buffer	8' Clear 4' Buffer	7' Clear 3' Buffer	8' Clear 4' Buffer	7' Clear 3' Buffer
On-Street Separated Bike Lanes ***Alternative***	n/a	6' Clear 2' Separation	n/a	6' Clear 2' Separation	n/a	6' Clear 2' Separation
Other Facilities						
Parking†	8'	7'	n/a	n/a	n/a	n/a
Motor Vehicle and Transit Zone						
Subsection Width (Excludes Parking)[3]	**25'-37'**		**34'-64'**		**58'-88'**	
Travel Lanes (# of Lanes)	**2-3[2]**		**3-5 (Divided)**		**4 (Divided) - 6 (Divided)**	
Transit Only Lanes	**n/a**	**n/a**	**13'**	**12'**	**13'**	**12'**
	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED
Outside Travel Lane Width[1]	13'	12.5'	13'	12'	13'	12'
Travel Lanes Width	11'	10'	12'	10'	12'	10'
Center Turn Lane Width	n/a	n/a	14'	12'	n/a	n/a
Median	n/a	n/a	14'	12'	14' [4]	14'

NOTES:
† Parking to be dedicated by developer as extra pavement

[1] Defined as against physical obstruction or edge line. Outside Travel Lanes can be reduced if next to bike lane.
[2] Left-turn pockets required at intersection with Level 2, 3, and 4 streets. Additional right-of-way and pavement will be required.
[3] On-Street Bike Lane as opposed to Raised Bike Lanes may require more pavement.
[4] Consideration for dual lefts on all Suburban Level 4 facilities when intersecting a four-lane roadway. Additional right-of-way required.

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SPECIAL DISTRICTS

In addition to Urban and Suburban, special districts were identified that play a major role in the context of the City. These special districts are Downtown, Industrial, and Alternatives. Downtown is a unique and special place that requires a more detailed strategy.

For this reason, the *Street Design Guide* defers to the *Downtown Great Streets Master Plan* and the overall design concepts depicted in the *Downtown Master Plan*. Over time, additional detail may be provided for other special districts. In areas governed by codified regulating plans, such as North Burnet/Gateway and East Riverside Corridor, refer to cross-sections in those regulating plans.

DOWNTOWN

Downtown is typically the highest intensity area of the city. It has a grid of small blocks and a compact development pattern.

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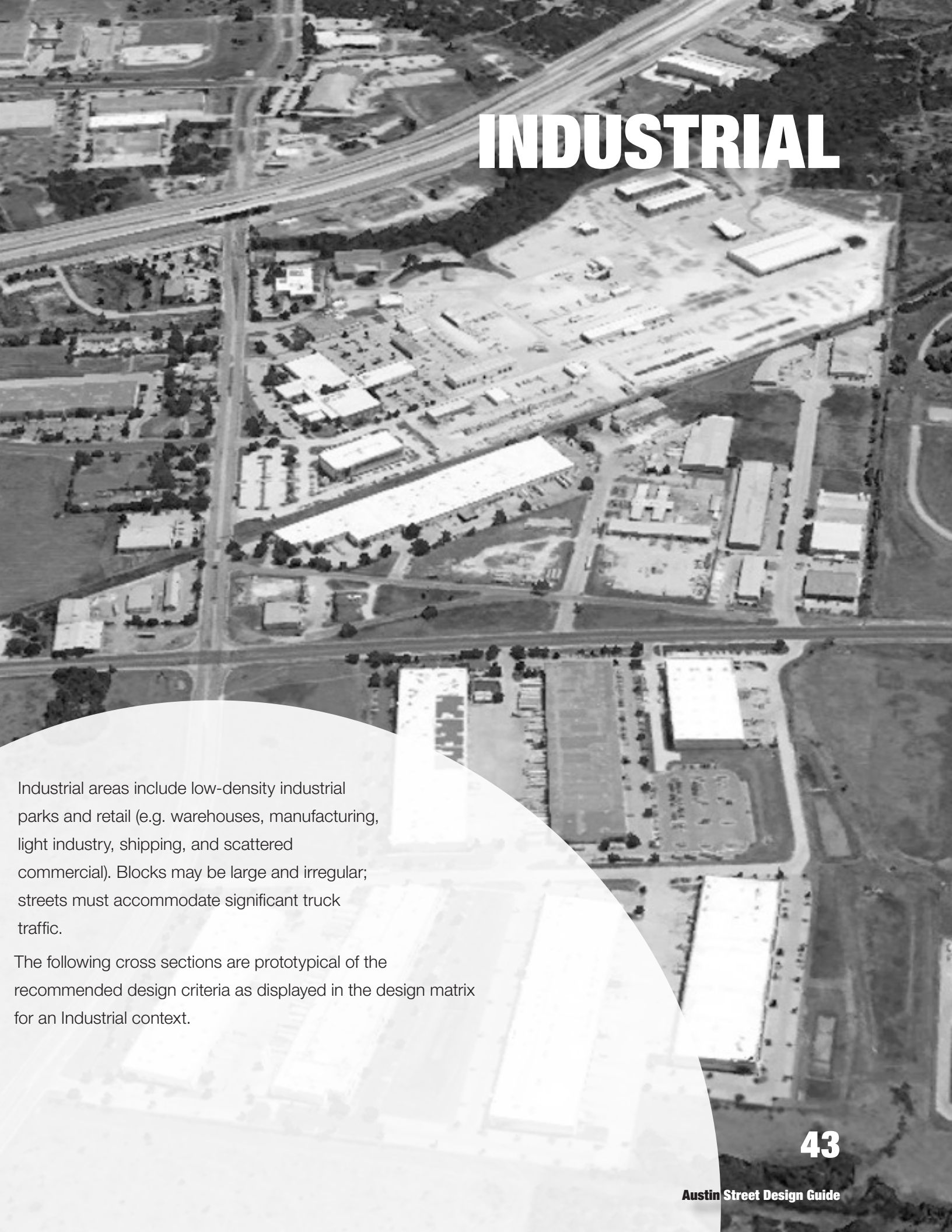
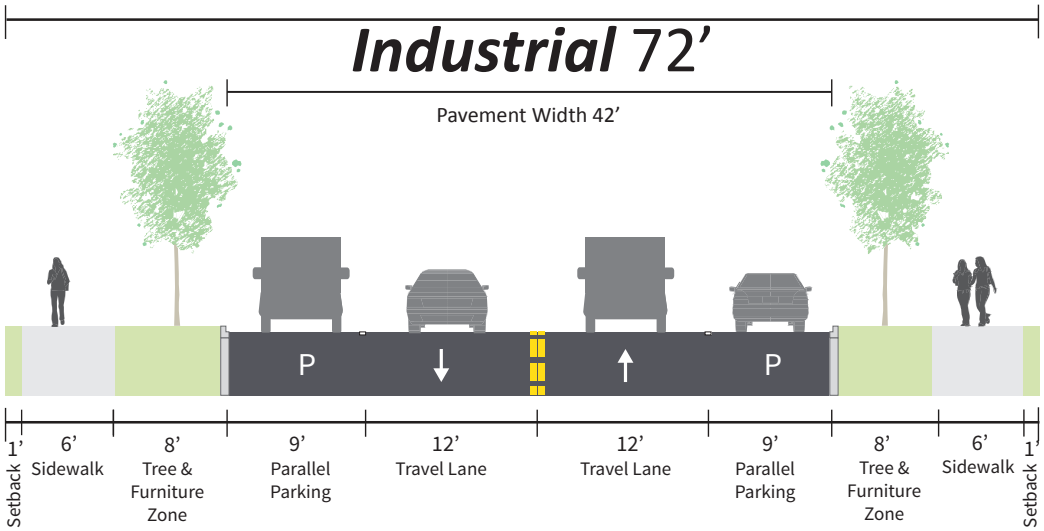
INDUSTRIAL



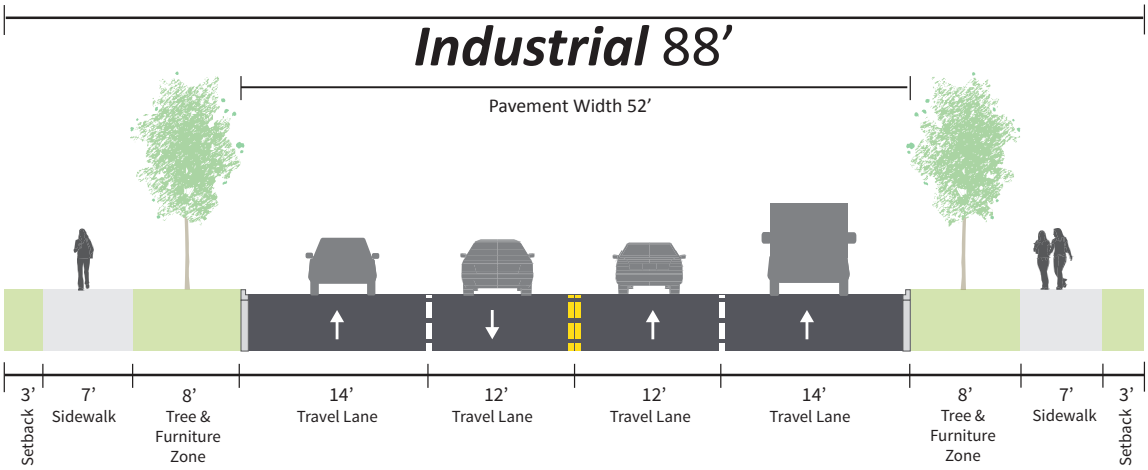
Industrial areas include low-density industrial parks and retail (e.g. warehouses, manufacturing, light industry, shipping, and scattered commercial). Blocks may be large and irregular; streets must accommodate significant truck traffic.

The following cross sections are prototypical of the recommended design criteria as displayed in the design matrix for an Industrial context.

Level 2



Level 3



Industrial Context - Design Matrix

	Level 2		Level 3	
	Desired		Desired	
ROW	**72'**		**88'**	
	Pedestrian Zone			
Subsection Width	**9'-15'**		**11'-18'**	
Toolbox:	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED
Sidewalk	6'	5'	7'	5'
Tree & Furniture Zone	8'	4'	8'	5'
Setback	1'	1'	3'	1'
	Bicycle and Street Edge Zone			
Target Width	**7'-9'**		**n/a**	
Toolbox:	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED
Bicycle Facilities				
Protected Bike Lanes (One of Two-Sided) ***Preferred***	**n/a**	**n/a**	**n/a**	**n/a**
On-Street Separated Bike Lanes ***Alternative***	**n/a**	**n/a**	**n/a**	**n/a**
Other Facilities				
Parking †	**9'**	**7'**	**n/a**	**n/a**
	Motor Vehicle and Transit Zone			
Subsection Width	**36'-42' (Includes Parking)**		**46'-52'**	
Travel Lanes (# of Lanes)	**2**		**4**	
Median	**0'**		**0'**	
	RECOMMENDED	CONSTRAINED	RECOMMENDED	CONSTRAINED
Outside Travel Lane Width[1]	**12'**	**11'**	**14'**	**12'**
Interior Travel Lanes Width [2]	**n/a**	**n/a**	**12'**	**11'**

NOTES:

† Parking to be dedicated by developer as extra pavement
[1] Defined as against physical obstruction.
[2] Defined as adjacent to stripe only. Outside Travel Lanes can be reduced if next to bike lane.

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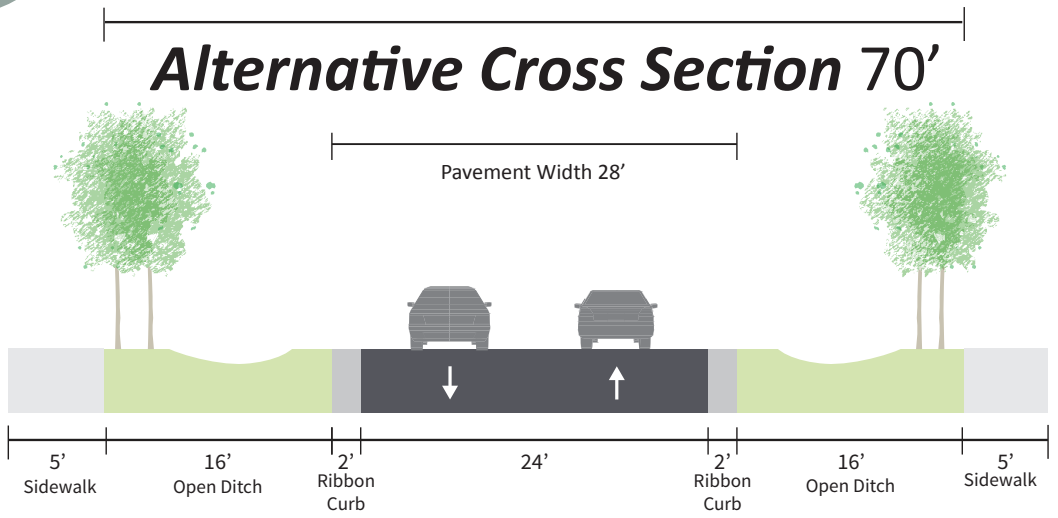
ALTERNATIVES

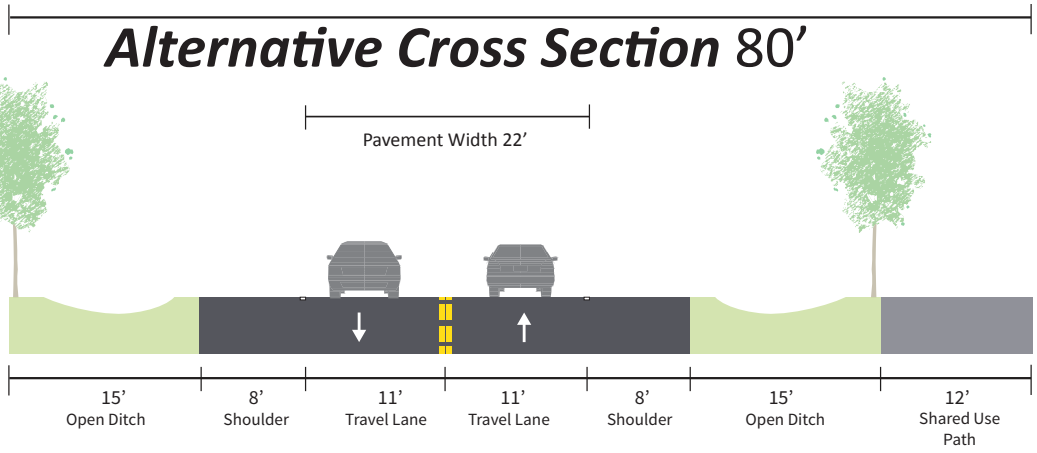
This section provides alternative cross-sections to address contexts with environmental protections, rolling terrain, and other contexts that do not fit into the previously discussed context categories.

The following cross sections are prototypical of the recommended design criteria as displayed in the design matrix for Alternative Cross Sections.

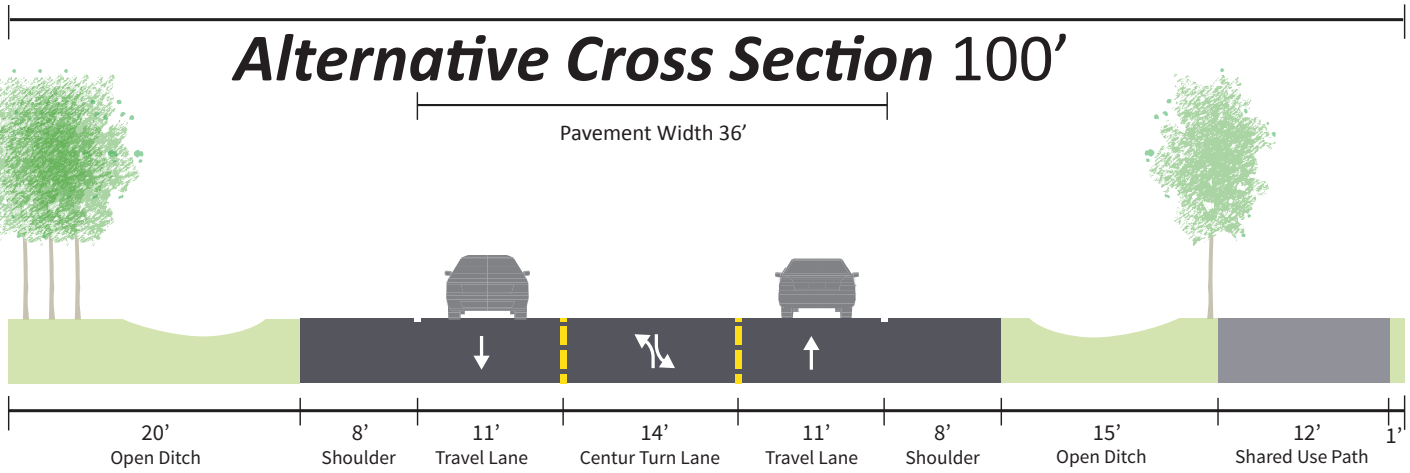
Level 1



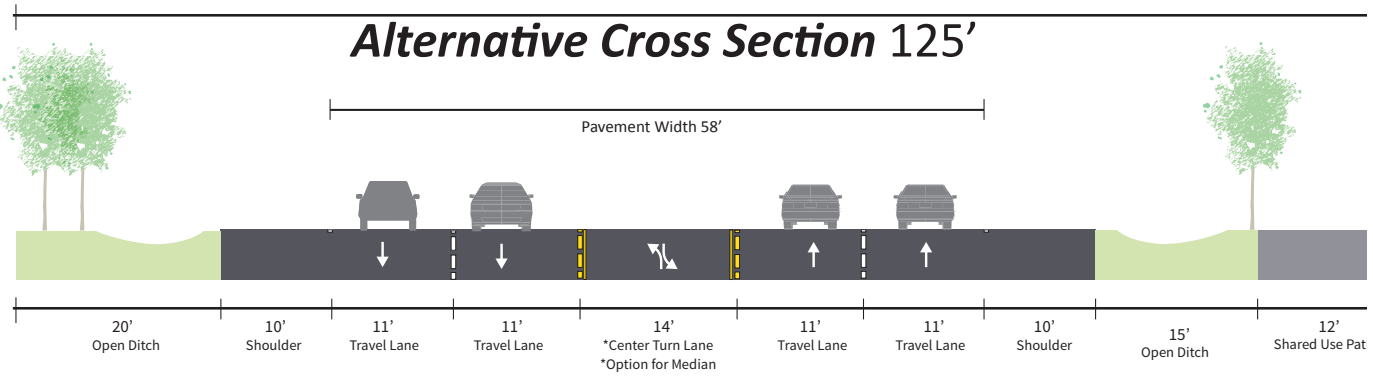
Level 2



Level 3



Level 4

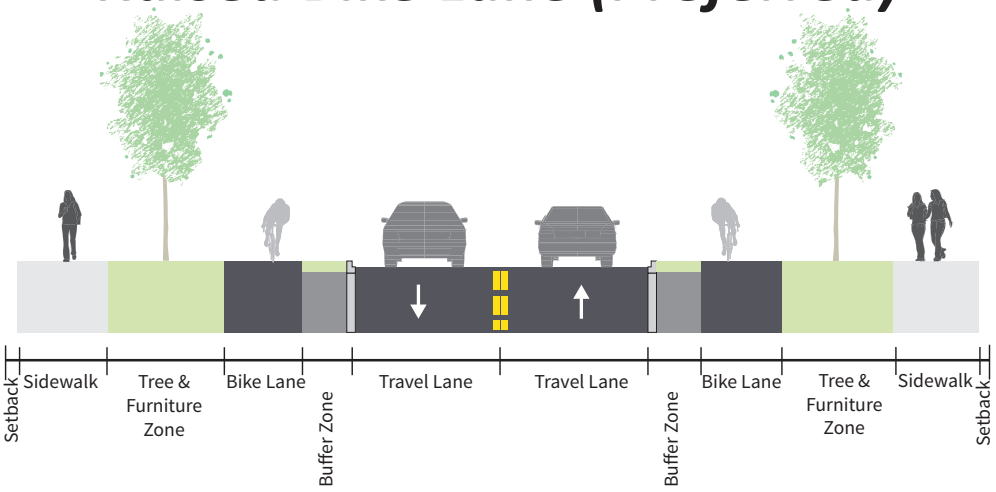


Bicycle

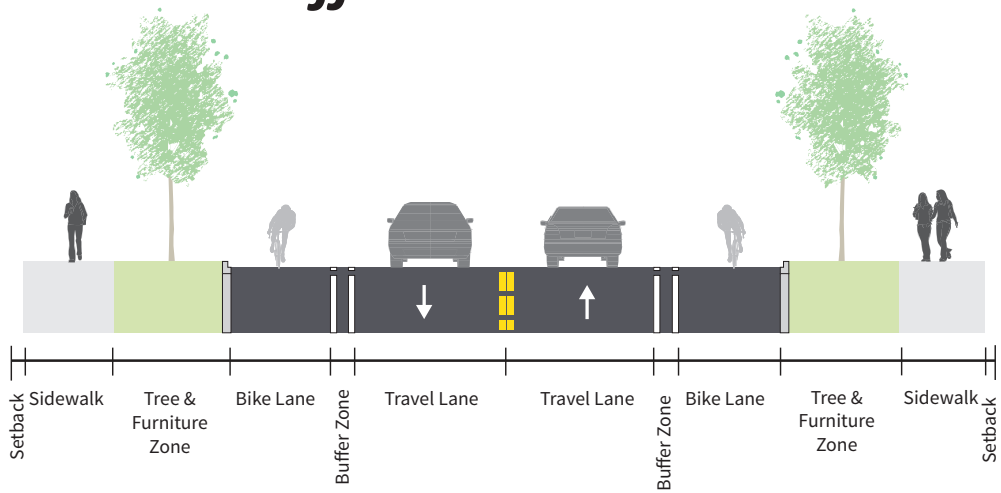
Options for bicycle facility design can vary depending on the existing and potential ROW, design speed, context, and potential users. The following cross sections are representations of the design options.

- A **raised bike lane** is at the same level as the adjoining sidewalk and not the travel lanes, and separated by a planting strip.
- A **buffered bike lane** is separated from traffic via a painted stripe, or physical barrier (see next page).

Raised Bike Lane (Preferred)



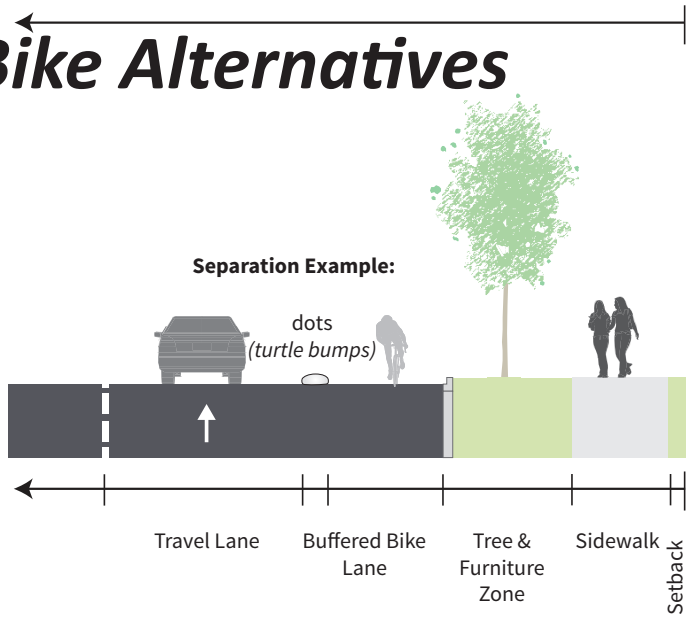
Buffered Bike Lane



Bicycle

In retrofit situations, where space is constrained and vehicle travel is at appropriate speed/volumes, the below cross-section alternative of a bicycle facility with at-grade "turtle bumps" (physical barrier) may be appropriate. Other physical barrier alternatives to the "turtle bumps" could be used as well. Footballs (oblong low bumps), flower pots/planters, bollards, delineator posts are some examples of other physical barriers. The following website provides a high level overview of these options: http://www.peopleforbikes.org/blog/entry/14-ways-to-make-bike-lanes-better-the-infographic

Buffered Bike Alternatives



Alternative Context - Design Matrix

	Level 1		Level 2		Level 3		Level 4	
	Desired		Desired		Desired		Desired Range	
ROW	**70'**		**80'**		**100'**		**125'**	
Pedestrian Zone								
Subsection Width	**13'-21'**		**12'-27'**		**15'-27'**		**15'-27'**	
Toolbox:	MIN	CONSTRAINED	MIN	CONSTRAINED	MIN	CONSTRAINED	MIN	CONSTRAINED
Open Ditch/Swale	16'	8'	15'	12'	20'	15'	20'	15'
Shared Use Path	n/a	n/a	12'	10'	12'	10'	12'	10'
Sidewalk	5'	5'	n/a	n/a	n/a	n/a	n/a	n/a
Bicycle and Street Edge Zone								
Subsection Width	**n/a**		**4'-8'**		**4'-8'**		**8'-10'**	
Toolbox:	MIN	CONSTRAINED	MIN	CONSTRAINED	MIN	CONSTRAINED	MIN	MIN
Shoulder	n/a	n/a	8'	4'	8'	4'	10'	8'
Motor Vehicle and Transit Zone								
Subsection Width (Excludes Shoulder)	**24'-28' (Includes 2' Ribbon Curb)**		**20'-22'**		**32'-36'**		**54'-58'**	
Travel Lanes (# of Lanes)	**2**		**2**		**3**		**5**	
Median	n/a	n/a	n/a	n/a	n/a	n/a	14'	
	MIN	CONSTRAINED	MIN	CONSTRAINED	MIN	CONSTRAINED	MIN	CONSTRAINED
Outside Travel Lane Width[1]	12'	10'	11'	10'	11'	10'	11'	11'
Interior Travel Lanes Width[2]	n/a	n/a	n/a	n/a	11'	10'	11'	10'
Center Turn Lane Width	n/a	n/a	n/a	n/a	14'	12'	14' [3]	12'

NOTES:

All roads are paved shoulder edge treatment
[1] Defined as against edge line for shoulder.
[2] Defined as adjacent to yellow stripe only. Outside Travel Lanes can be reduced if next to bike lane.
[3] Can substitute raised median.

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