

Block Length Limits*

Salem, OR	600 ft (180 m)
Portland, OR	530 ft
Davidson, NC	600 ft
Raleigh, NC	1,500 ft
Fort Collins, CO	Max block size (7-12 acres)
Boulder, CO	350 ft (by practice)

Abu Dhabi: Limited Connectivity



Vancouver: High Connectivity



Safety



Safety



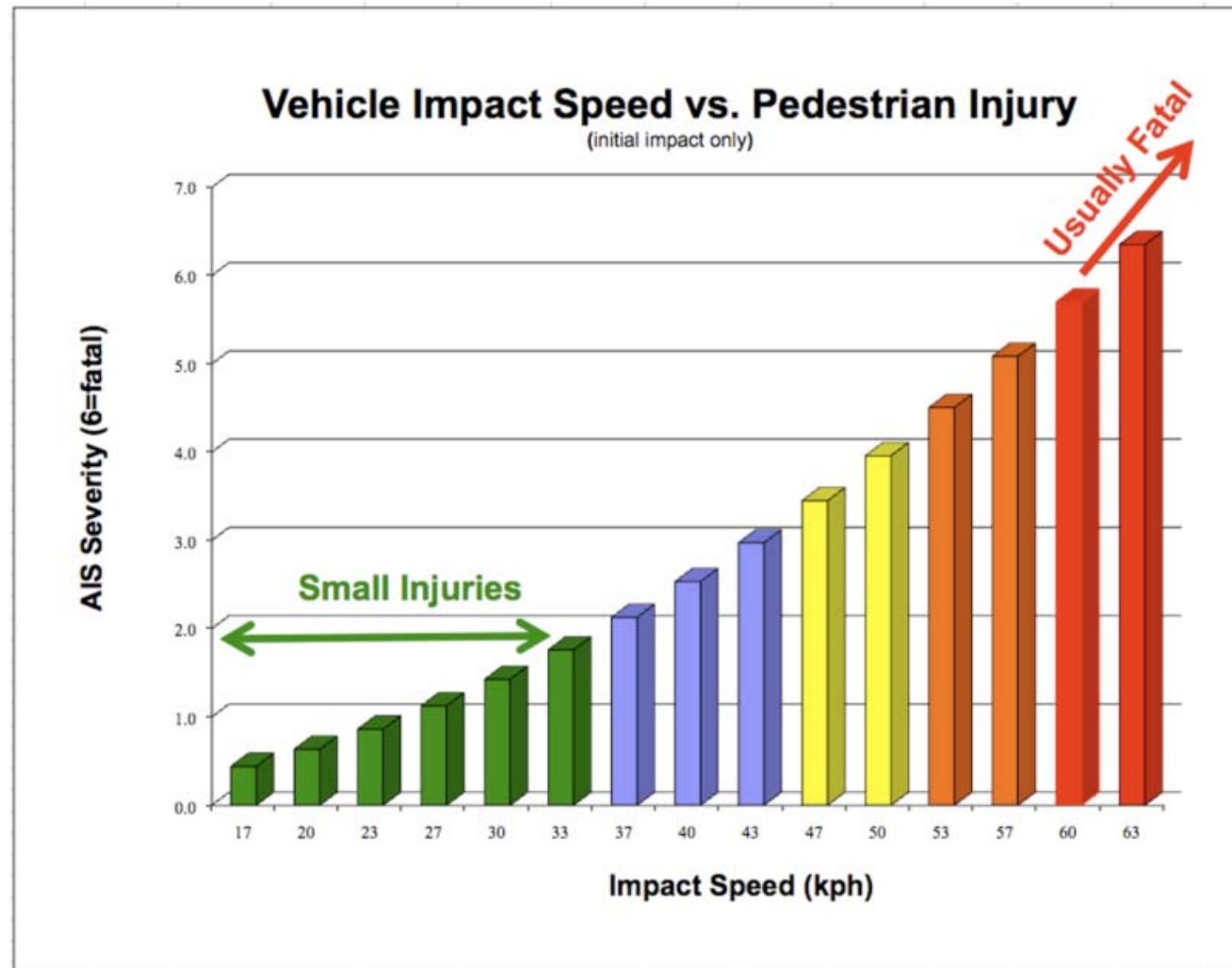
Safety



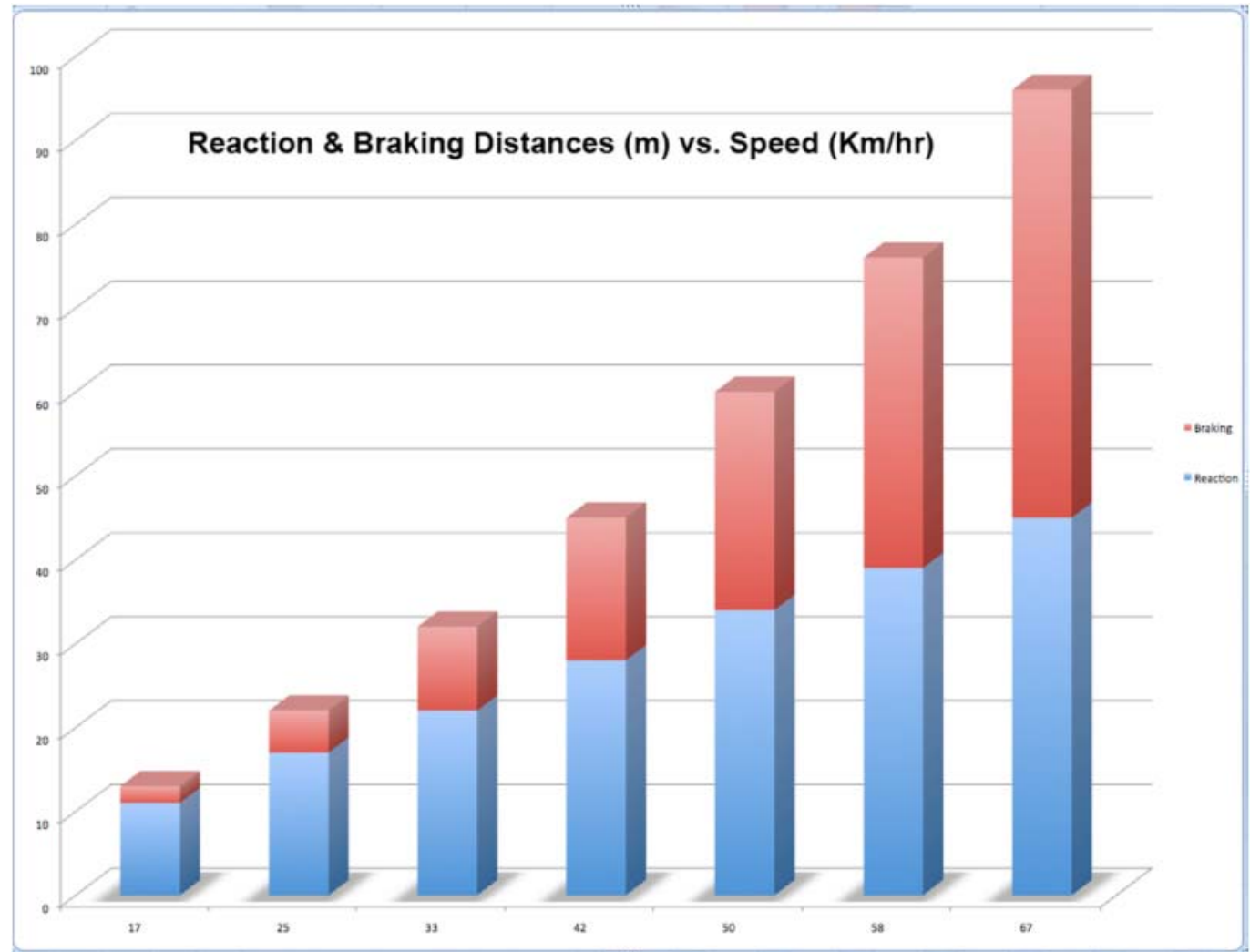
Safety



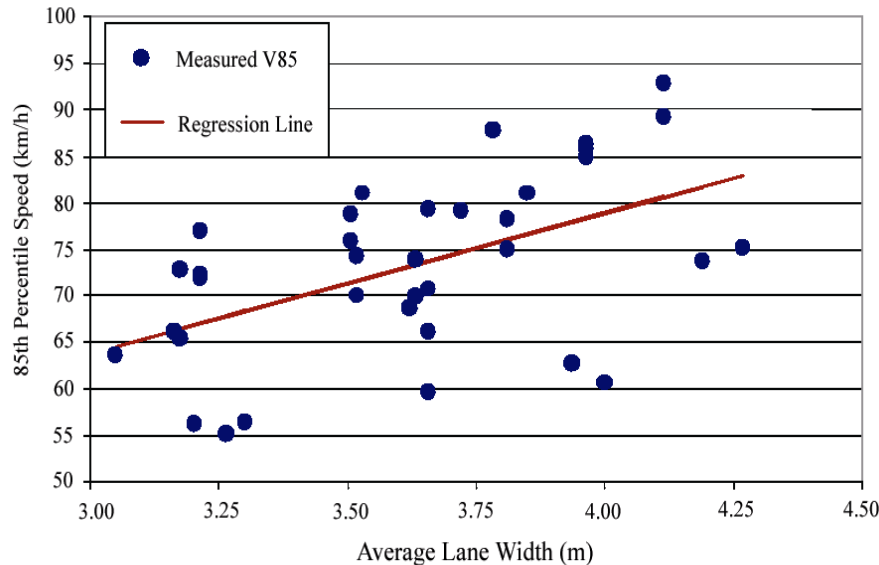
Strong Emphasis on Safety



Strong Emphasis on Safety



Lane Width



- Studies on lane widths report ***mixed results***, with some studies finding wider lanes are safer, and other finding wider lanes are more dangerous.

In general, lane widths appear to have a “U” shaped relationship with crash performance, with crashes decreasing until lane widths reach roughly 11.5 feet, and increasing thereafter.

Sources: Clark, 1985; Dumbaugh, 2005; Farouki and Nixon, 1976; Fitzpatrick et al., 2001; Gattis and Watts, 1999; Harwood, 1990; Hauer, 1999; Heimbach et al., 1983; Lee and Mannering, 1999; Noland and Oh, 2004; Zegeer, Deen and Mayes, 1981.

Number of Lanes

- Studies consistently find that adding lanes ***increases*** crashes, while eliminating lanes through “road diet” projects decreases crashes.



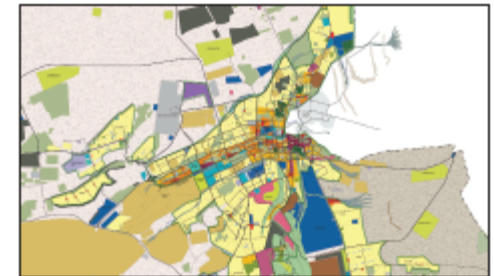
Sources: Dumbaugh, 2005; Harwood, 1986; Harwood,1990; Huang, Stewart, and Zegeer, 2001; Knapp and Giese, 2001; Milton and Mannering, 1998; Noland and Oh, 2004; Sawalha and Sayed (2001); Vitalano and Held 1991.

Key Design Principles

1. The best transport plan is a good land use plan
2. Good street design starts with pedestrians
3. A well-designed street network provides safety for all modes of transport
4. Street connectivity enhances capacity and allows smooth traffic flow
5. Street design reflects Plan 2030 goals for Abu Dhabi Emirate
6. Street design supports estidama principles



Abu Dhabi 2030 Transportation Framework



Al Ain 2030 Land Use Framework



Al Gharbia 2030 Settlement Areas

Design Principles – Good & Bad



Provide well designed public seating areas.



Provide a continuous pedestrian network and adequate accommodation to ensure pedestrian safety.



Manual Goals

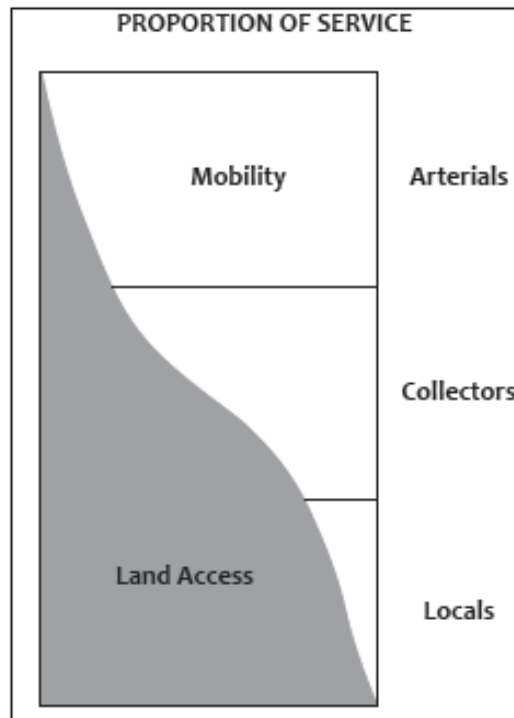
1. Land use context
2. Safety
3. Efficiency
4. Sustainability
5. Public Health
6. Public Enjoyment
7. Economic
Development and
Tourism
8. Culture and Image



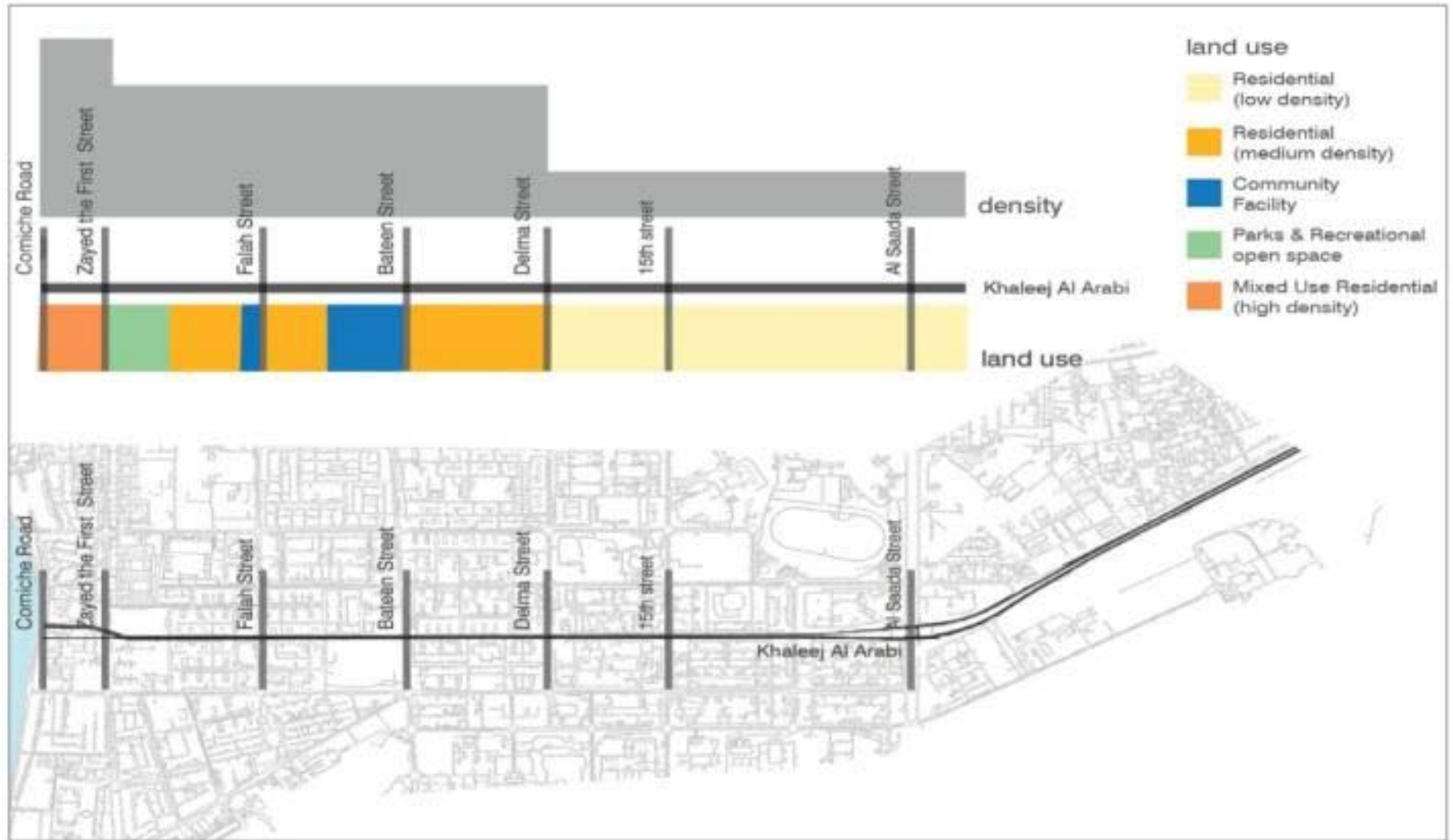
The design of the public realm should respect local culture & traditions



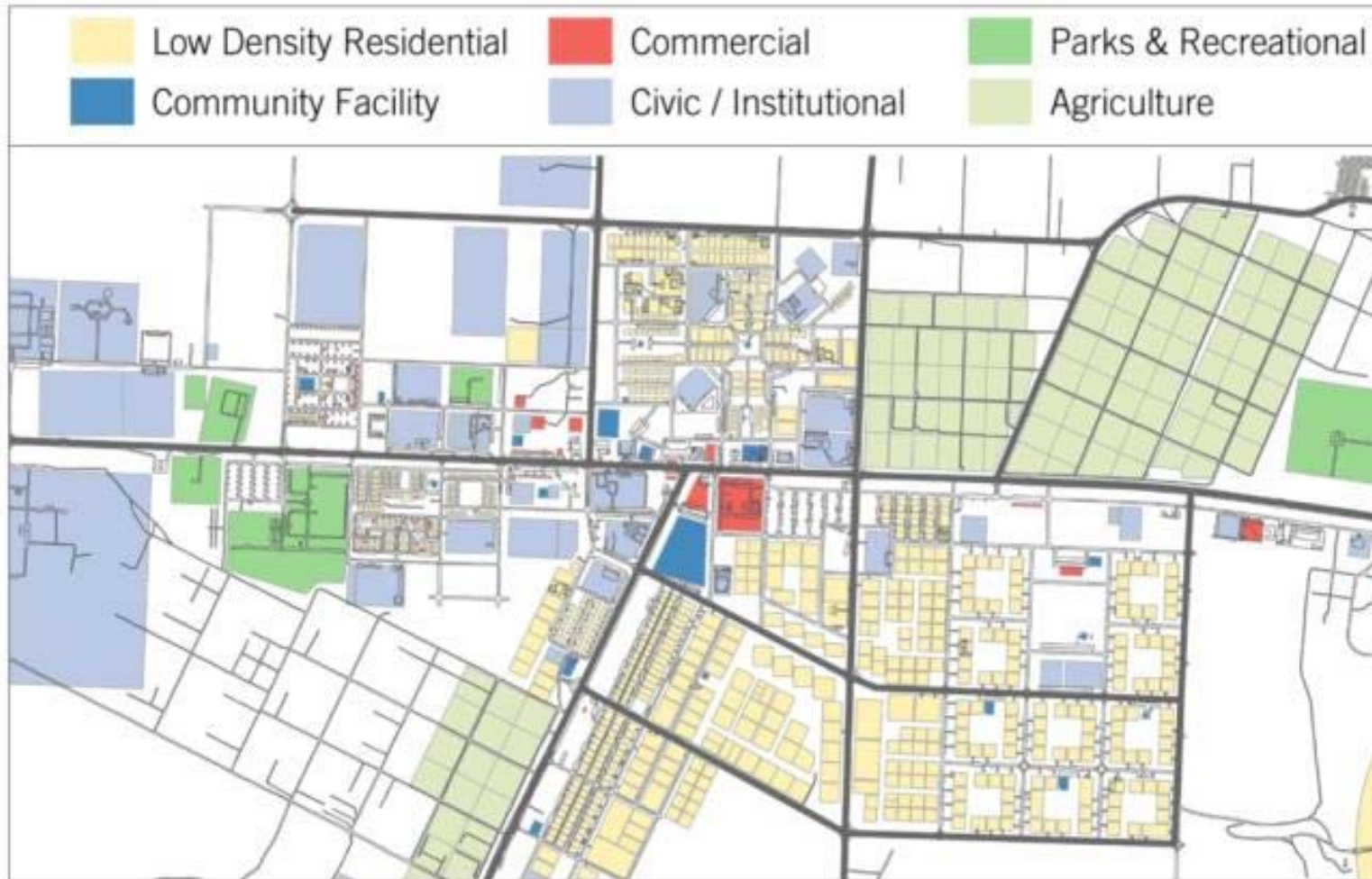
Conventional Approach



Changing Land Use Context

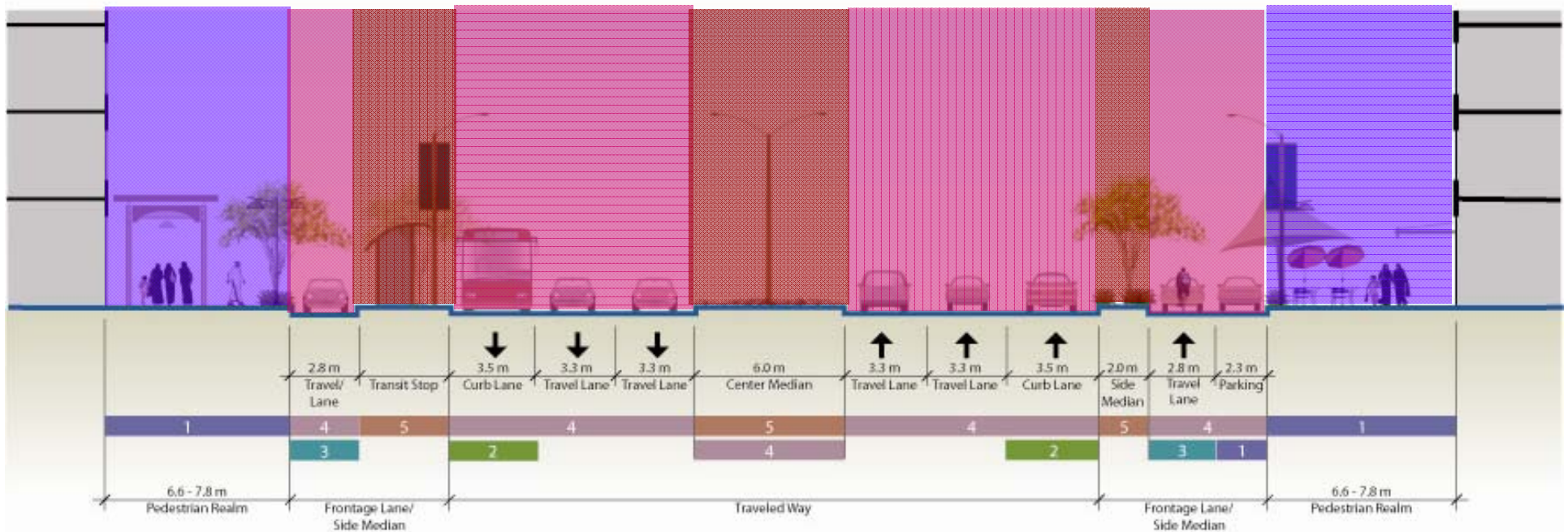


Changing Land Use Context



Liwa Road in Madinat Zayed

NEW STREET TYPOLOGIES: BOULEVARD WITH FRONTAGE LANE (CITY CONTEXT)



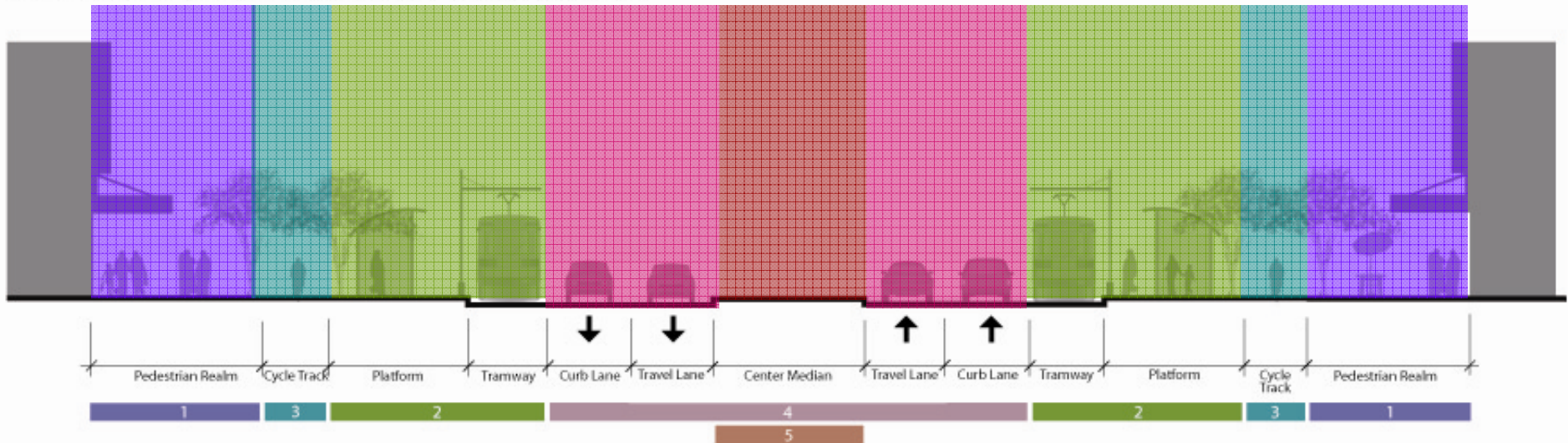
SIDEWALKS

TRAVEL LANES

MEDIANS

NEW STREET TYPOLOGIES

Boulevard with Transit Medians: Variant A - Side-Running Tram



- SIDEWALKS**
- CYCLE TRACK**
- PUBLIC TRANSIT**
- TRAVEL LANES**
- MEDIANS**





















COMPLETE STREETS: BALANCE BETWEEN MOBILITY, PEDESTRIAN COMFORT & VISUAL ATTRACTIVENESS



Naming Combinations

Street Family	Transport Capacity		Land Use Context					
	Vehicle Priority	Travel Lanes	City (7stories +)	Town (3-6 stories)	Commercial (1-3 stories)	Residential (1-3 stories)	Industrial	No Active Frontage
Boulevard	High	3+3	City Boulevard	Town Boulevard	Commercial Boulevard	Residential Boulevard	Industrial Boulevard	General Boulevard
Avenue	Medium	2+2	City Avenue	Town Avenue	Commercial Avenue	Residential Avenue	Industrial Avenue	General Avenue
Street	Low	1+1	City Street	Town Street	Commercial Street	Residential Street	Industrial Street	General Street
Access Lane	Very Low	1+1 1 shared	City Access	Town Access	Commercial Access	Residential Access	Industrial Access	General Access

Street Typology Examples

Street Family	Land Use Context				
	City (7 stories +)	Town (3-6 stories)	Commercial (1-3 stories)	Residential (1-3 stories)	Industrial
Boulevard					
Avenue					
Street					
Access Lane					

COMPLETE STREETS: BETWEEN MOBILITY, PEDESTRIAN COMFORT & VISUAL ATTRACTIVENESS

BALAN



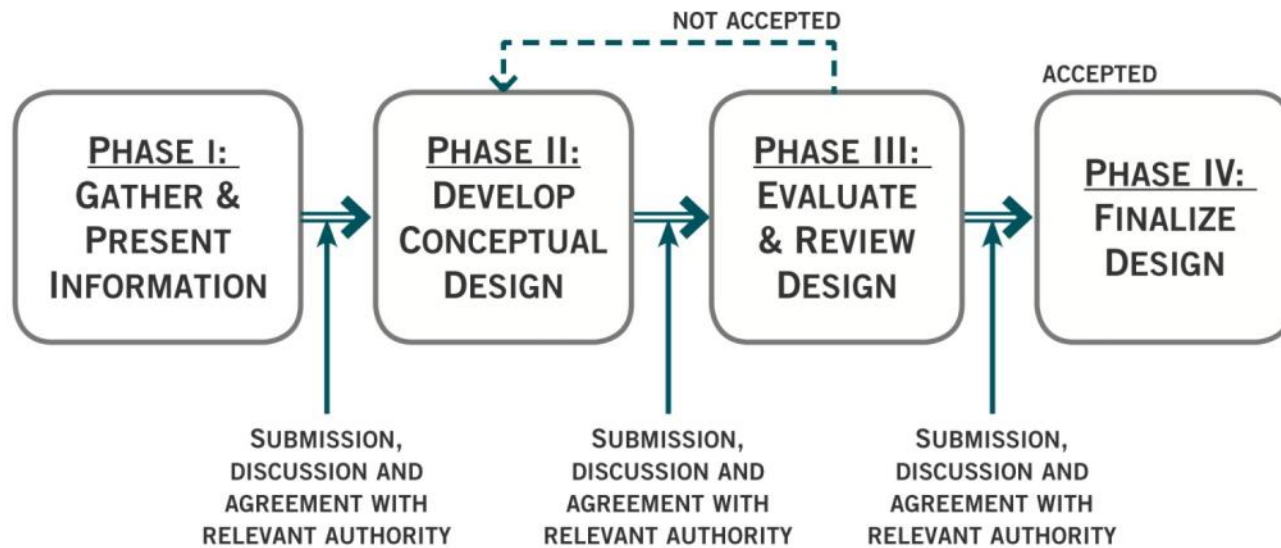
URBAN DESIGN – FUNCTION AND AESTHETIC CONSIDERATIONS



Vehicle Speeds

Street Family	Land Use Context				
	City (7 stories +)	Town (3-6 stories)	Commercial (1-3 stories)	Residential (1-3 stories)	Industrial
Boulevard	40 km/h	40 km/h	60 km/h	40 km/h	60 km/h
Avenue	40 km/h	40 km/h	60 km/h	40 km/h	60 km/h
Street	30 km/h	30 km/h	30 km/h	30 km/h	30 km/h
Access Lane	20 km/h	20 km/h	20 km/h	20 km/h	20 km/h

Design Process



1. Determine and arrange land uses

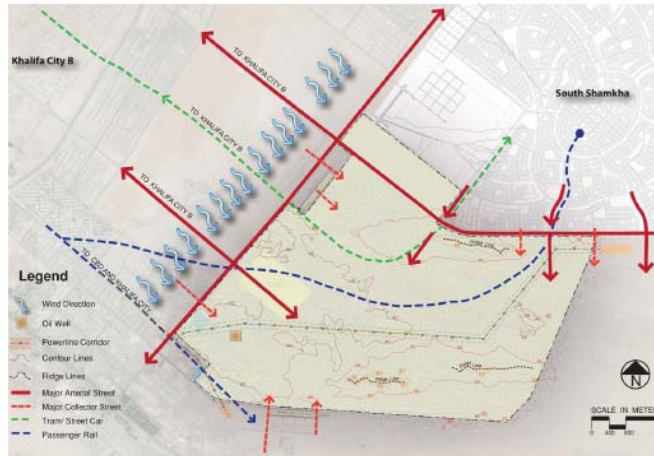


Figure 7.2 Context Plan



Figure 7.3 Land Use Requirements

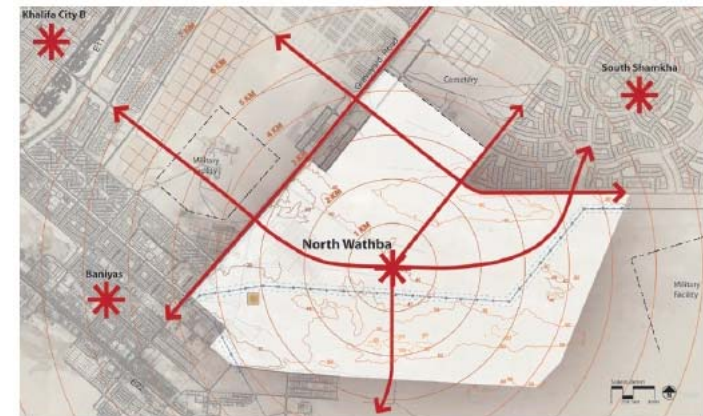


Figure 7.4 Transport Requirements

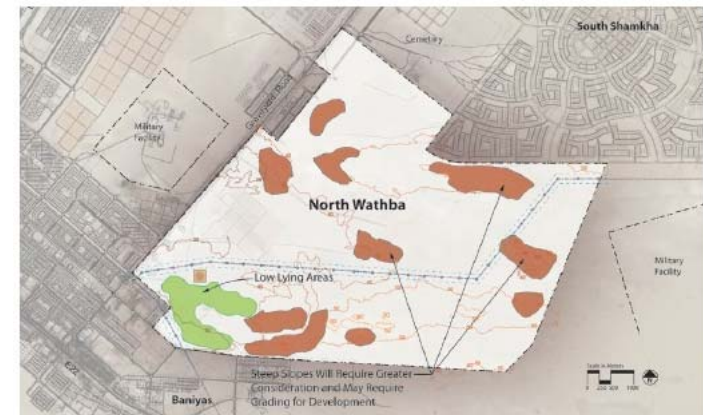
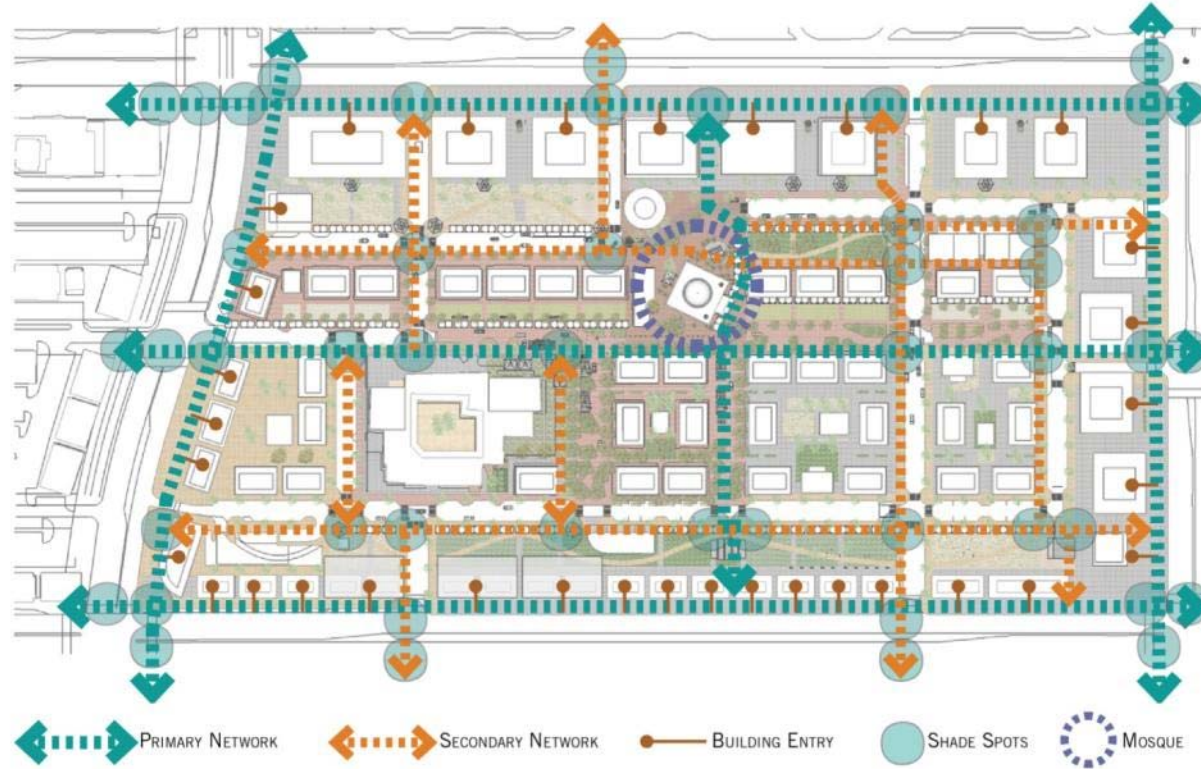
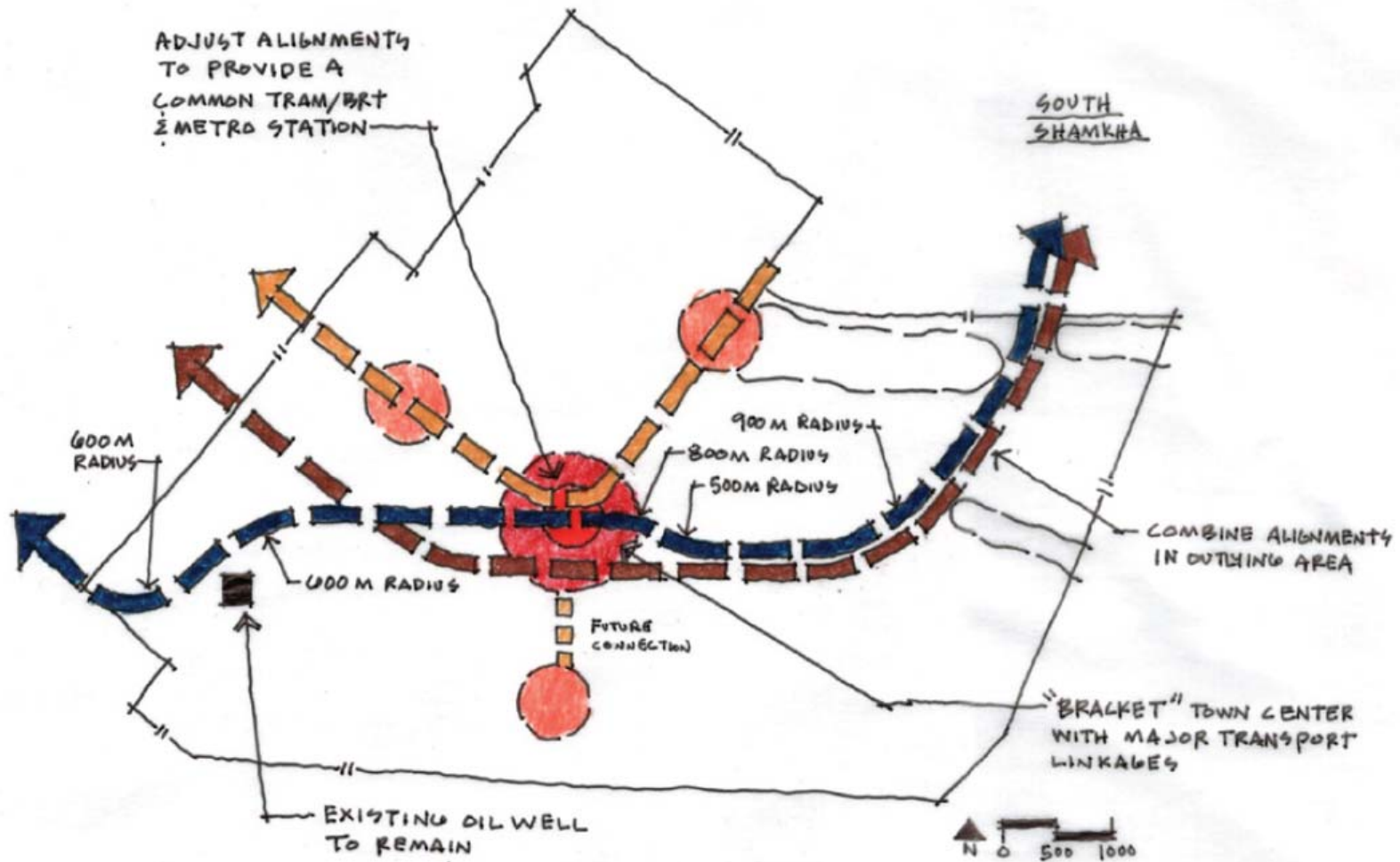


Figure 7.5 Low land and Desert Ridges

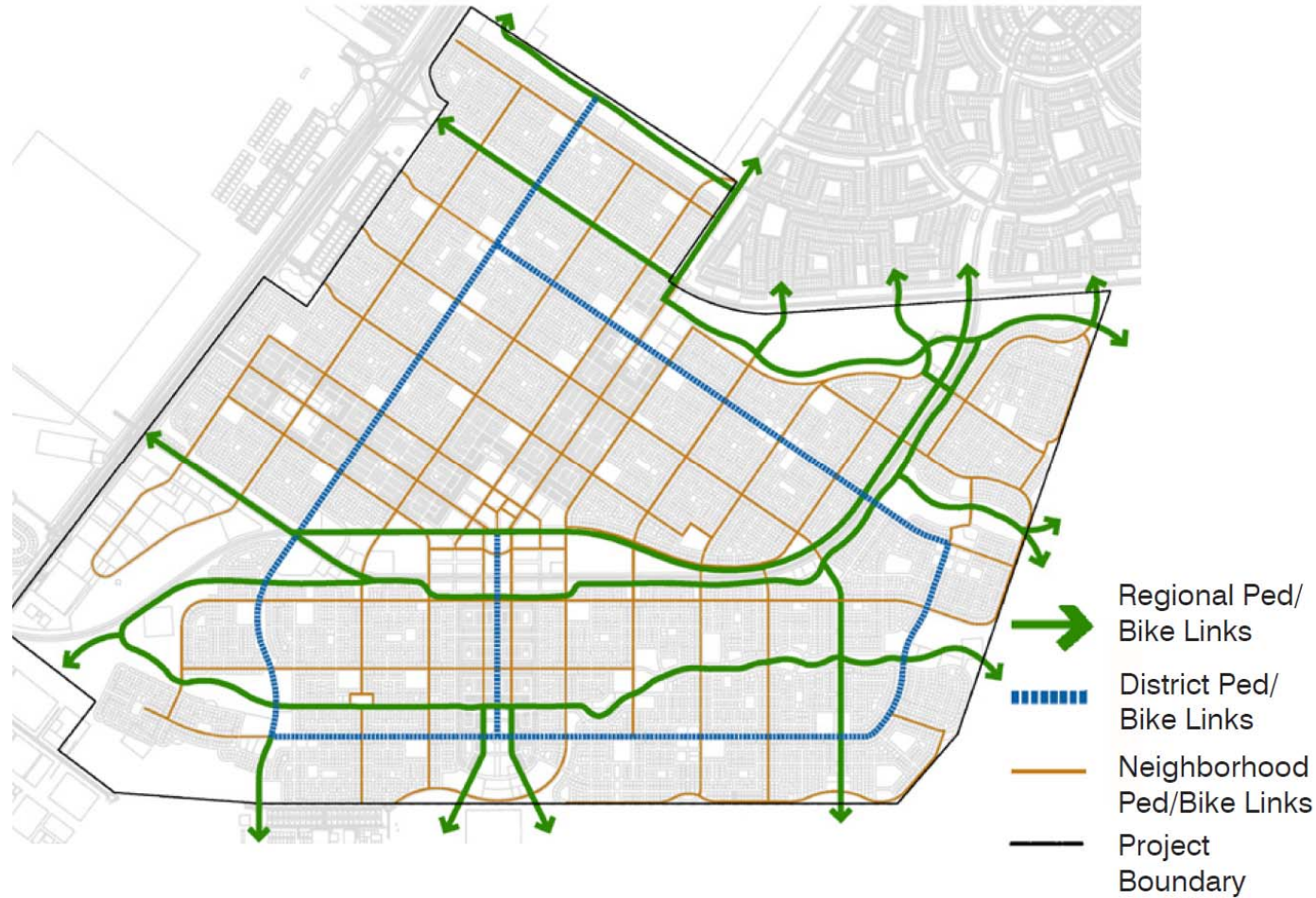
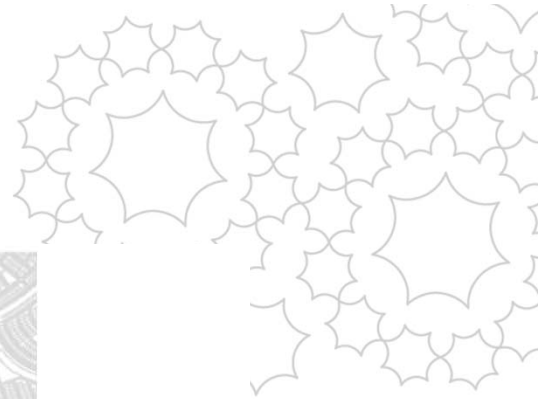
2. Identify Pedestrian Networks



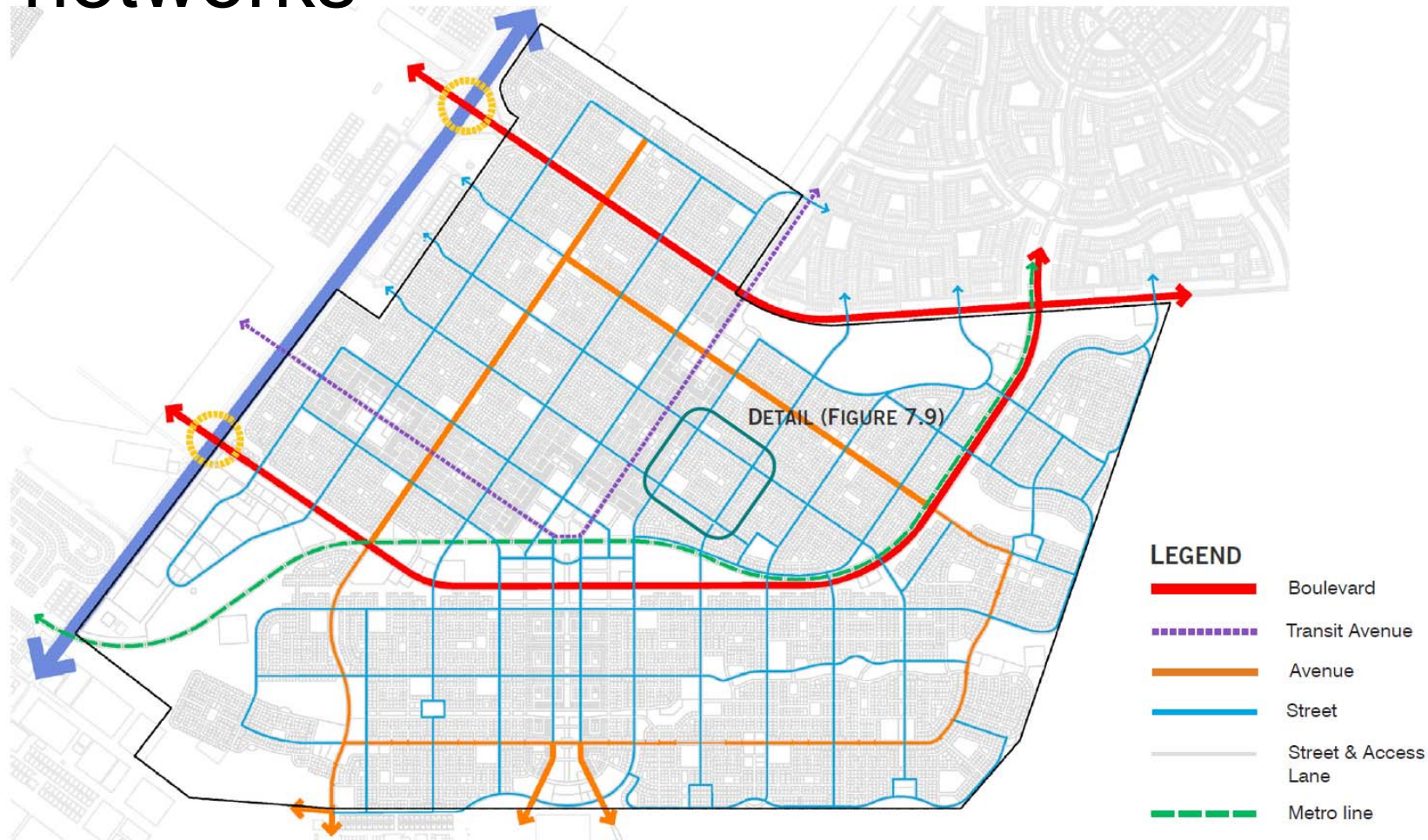
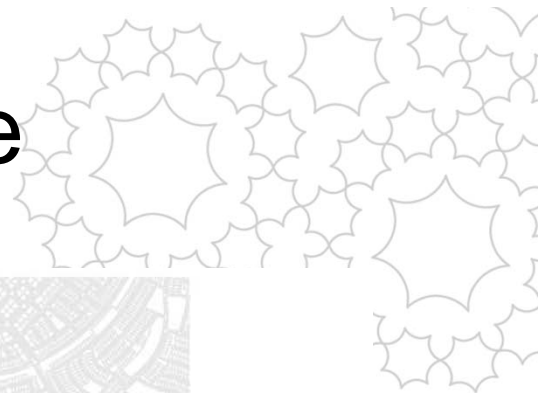
3. Identify Transit Networks



4. Identify bicycle networks



5. Identify and develop vehicle networks



6. Determine street cross sections

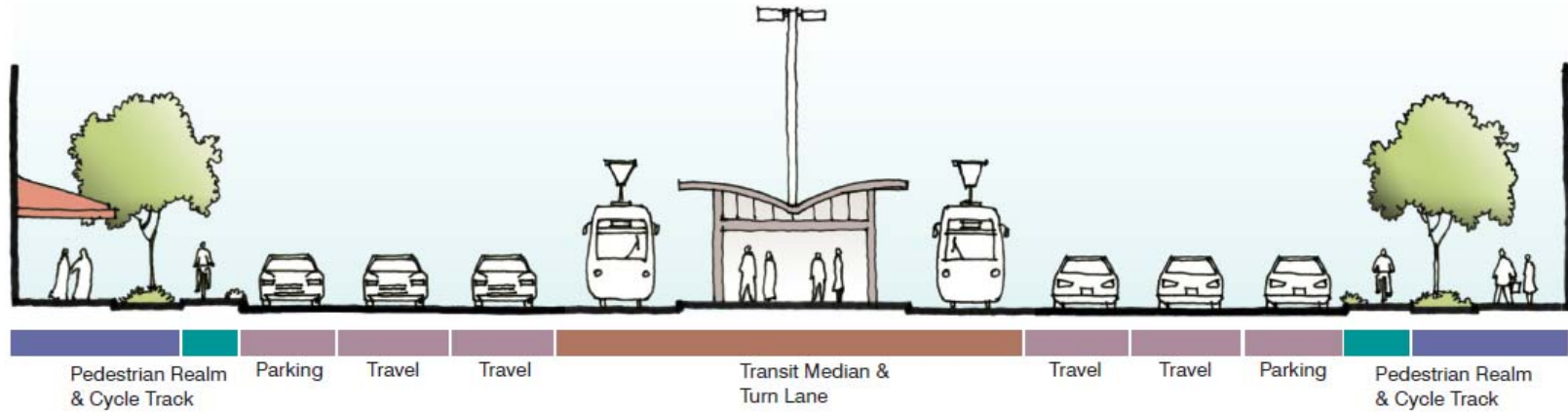
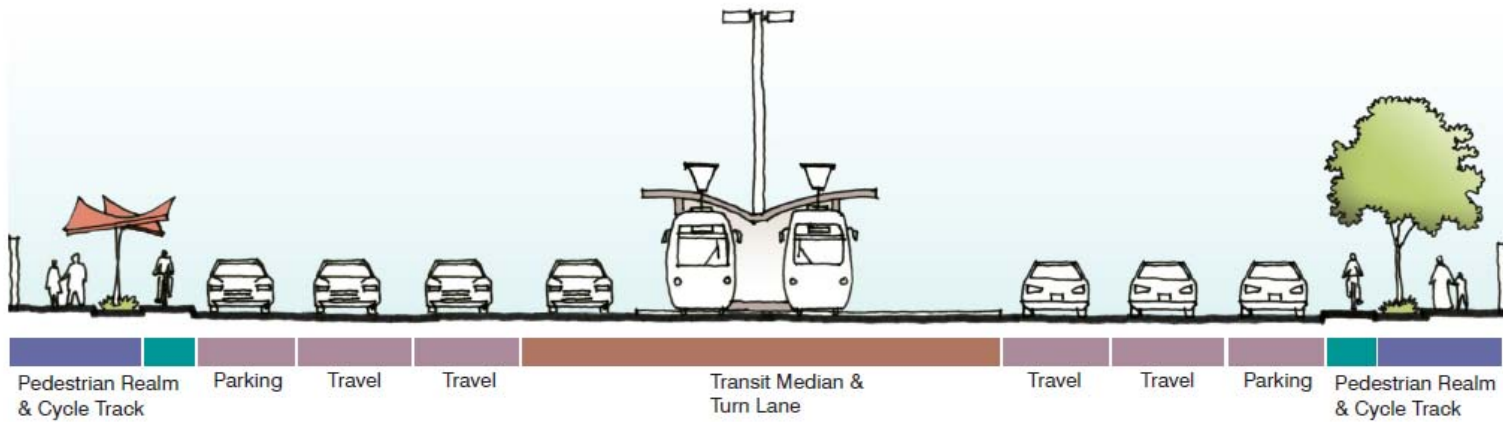


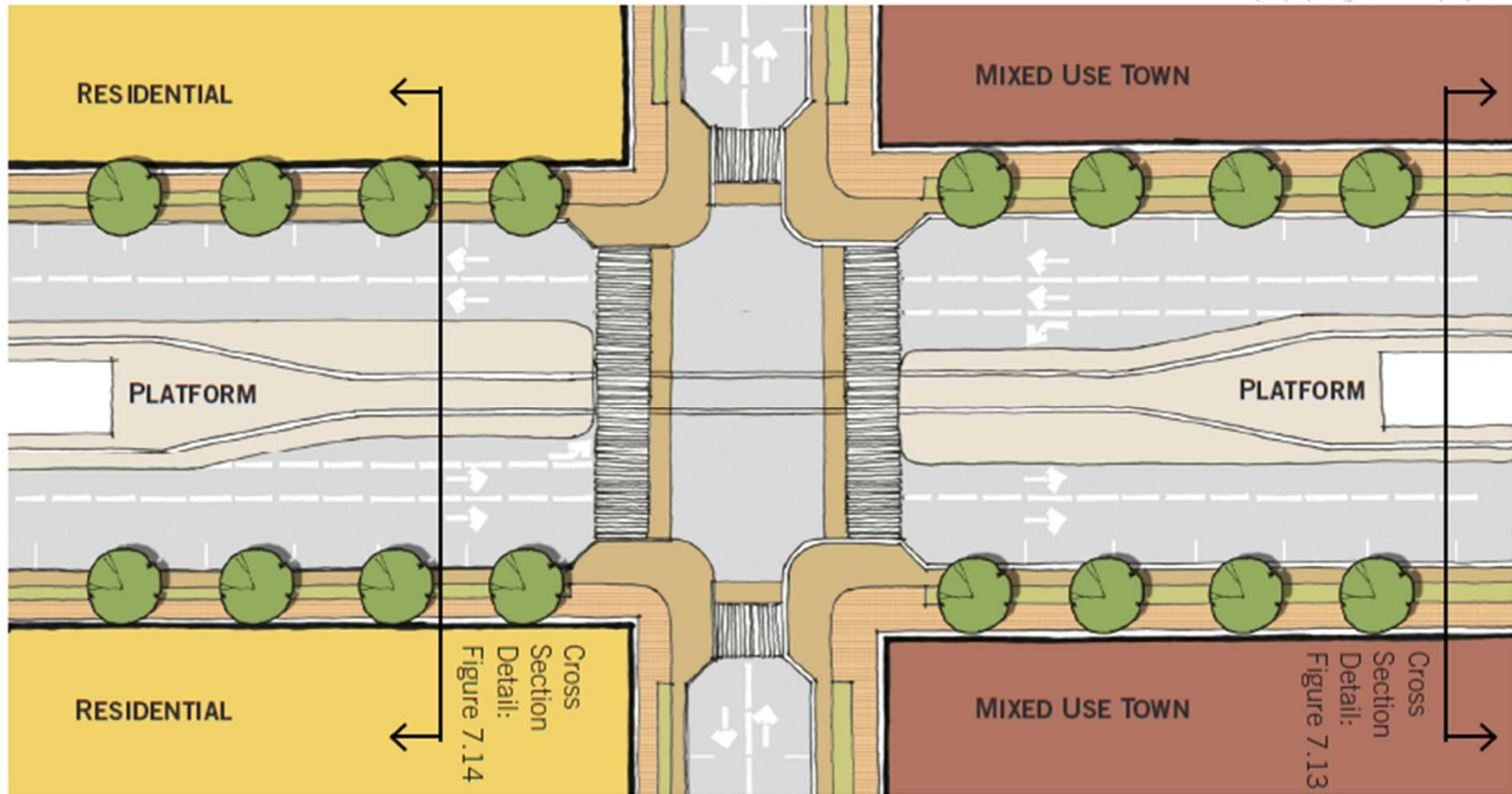
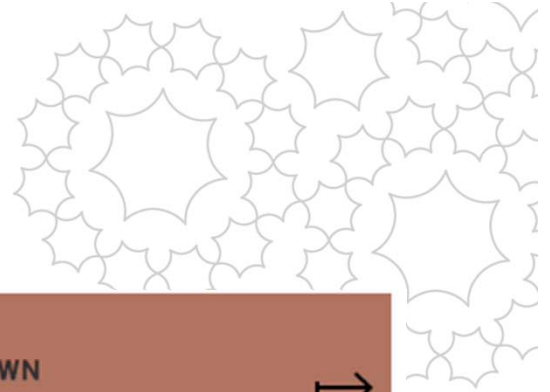
Figure 7.15 Town Transit Avenue



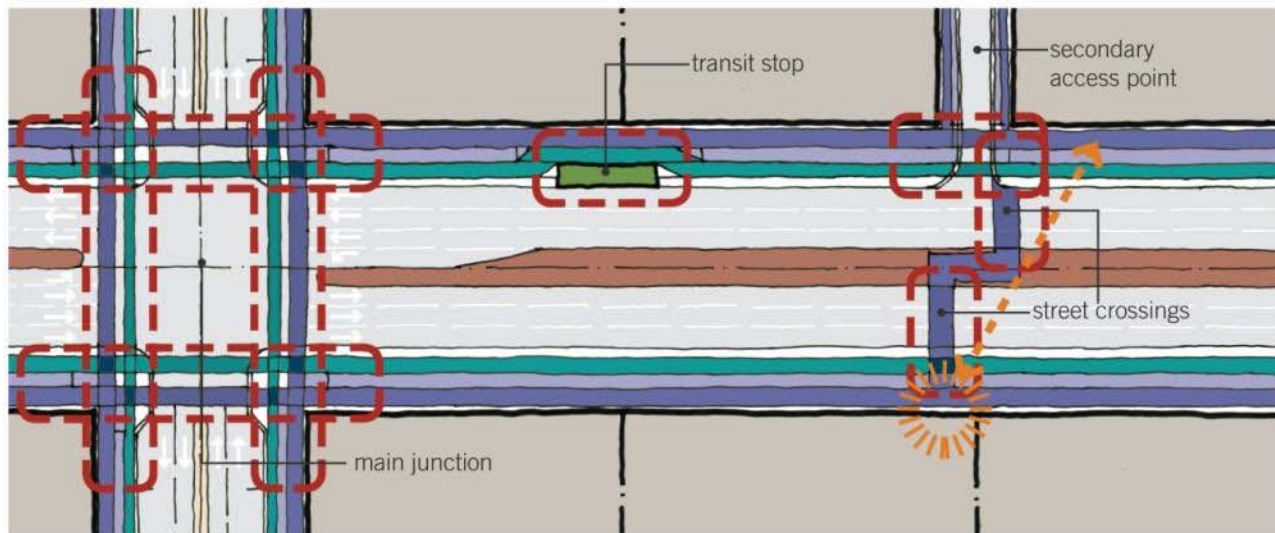
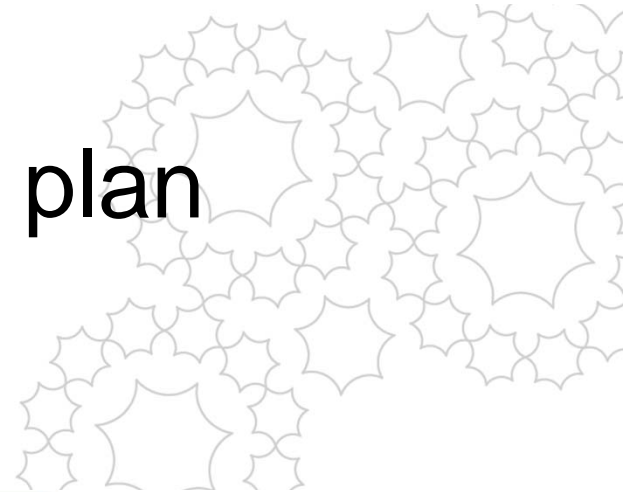
7. Transfer into plan



8. Locate street elements



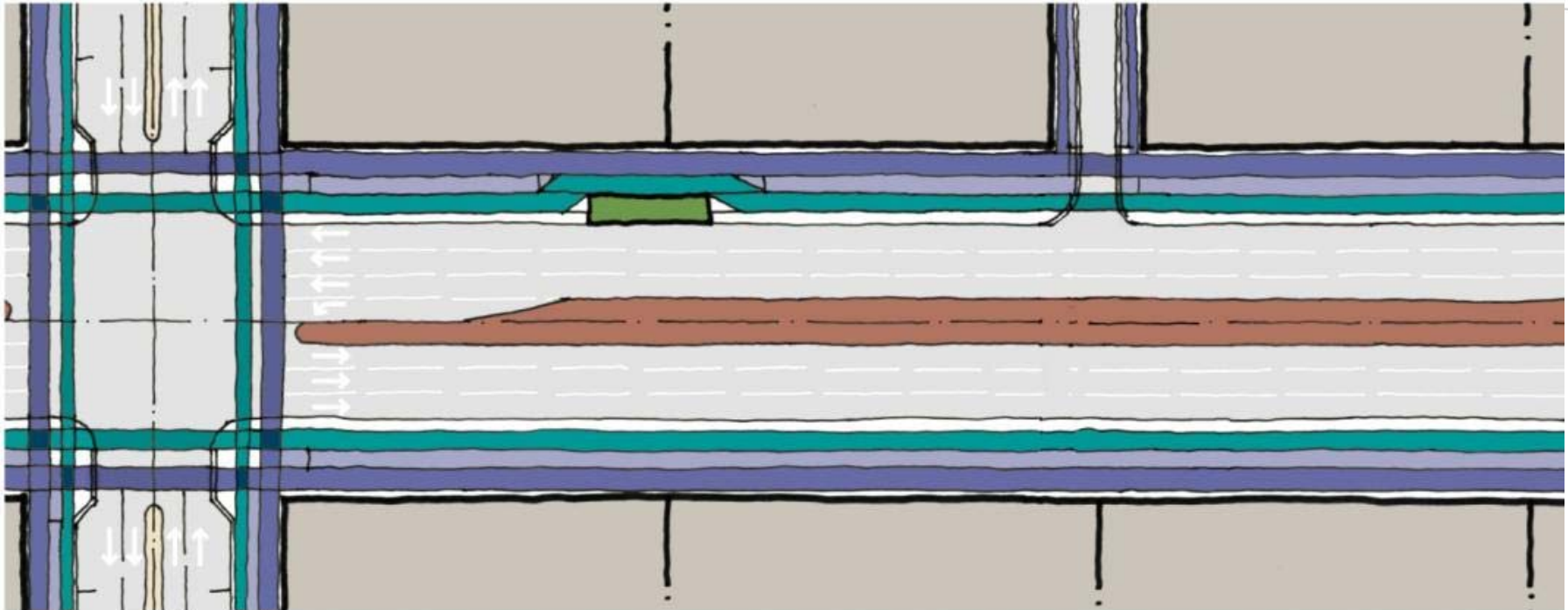
9. Note interaction areas on plan



-  INTERACTION ZONE
-  ACTIVE LAND USE ENTRANCE
-  FURNISHINGS ZONE
-  THROUGH ZONE
-  BICYCLE
-  BUS STOP

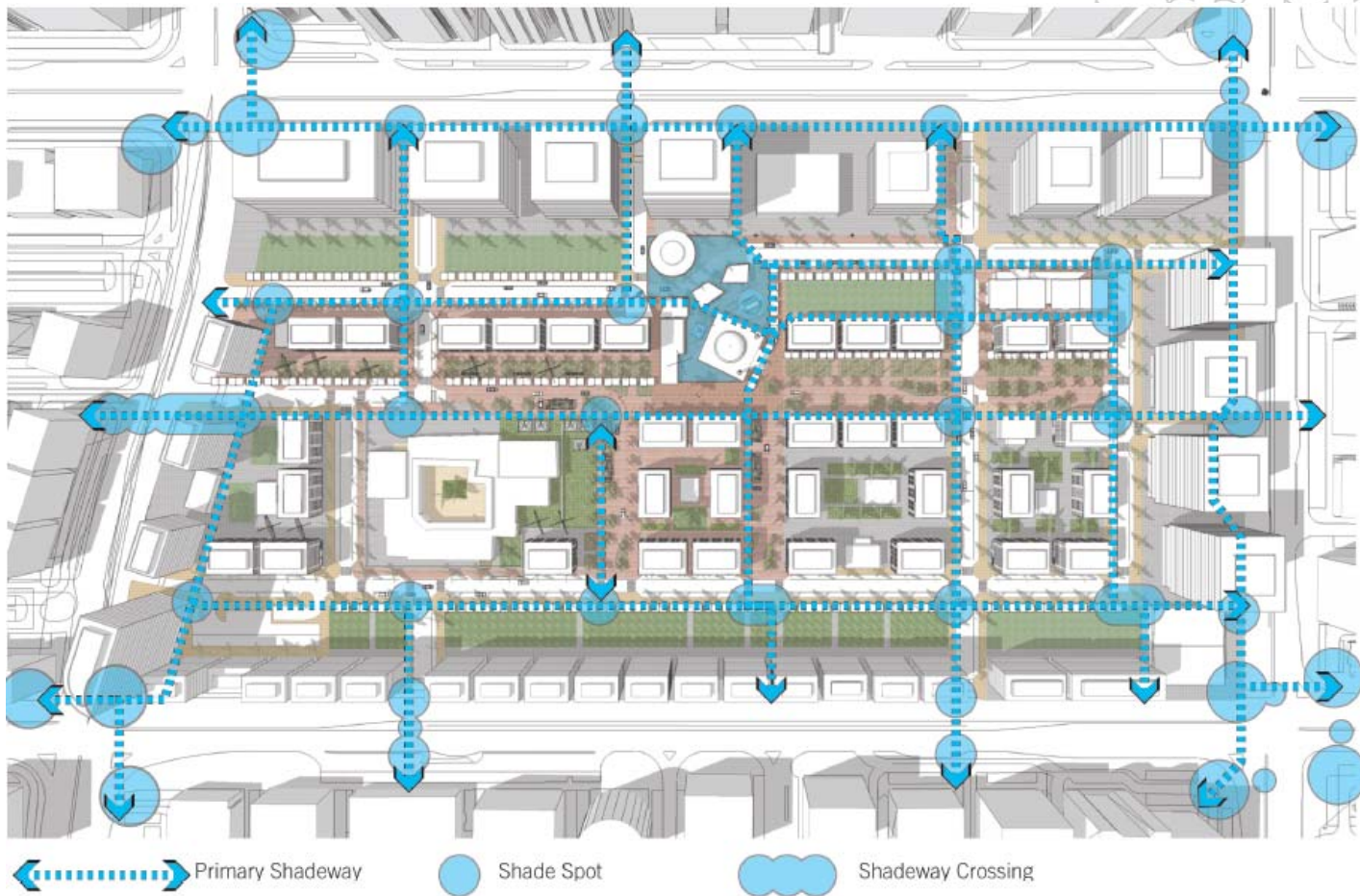


10. Rationalize solutions



■ FURNISHING ZONE ■ THROUGH ZONE ■ BICYCLE ■ BUS STOP

11. Begin urban design and landscape planning



Apply performance measures

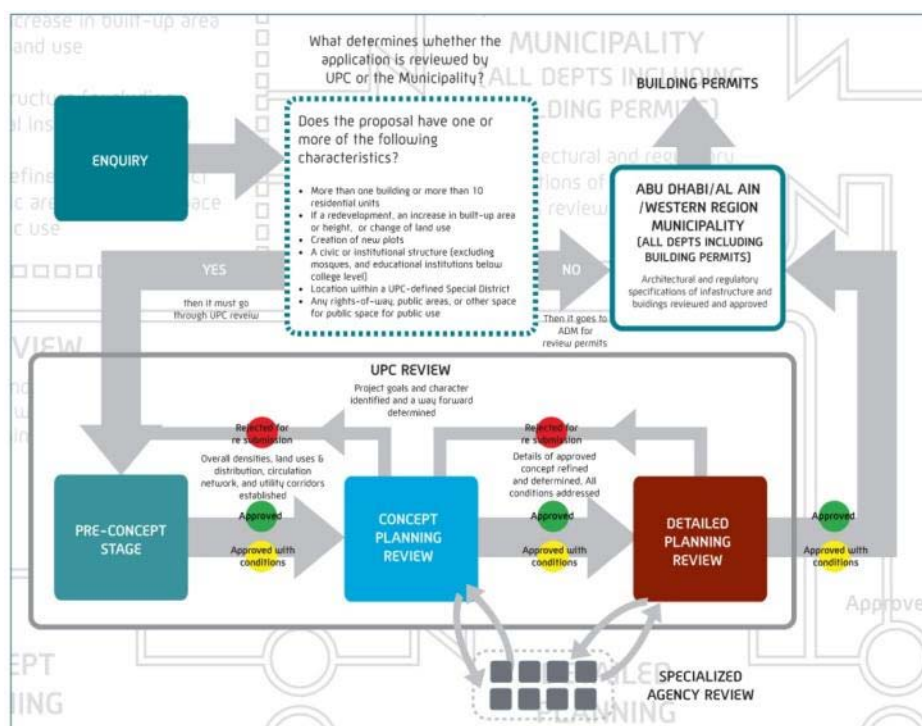


MODE	PERFORMANCE MEASURES
Pedestrian	<ul style="list-style-type: none"> Sidewalk crowding (at rail stations or other major destinations) Average crossing delay including average distance to crossing Frequency of protected crossings Percentage active building edge along sidewalk. Percent sidewalk shaded Average block perimeter
Transit Users	<ul style="list-style-type: none"> Intersection delay Corridor travel time as percentage of speed limit. Passenger crowding Reliability Frequency Service hours Cool waiting areas at stops
Bicyclists	<ul style="list-style-type: none"> Presence of bicycle lane or cycletrack Bicycle Level of Service, as defined in Chapter 5
Motor Vehicles	<ul style="list-style-type: none"> Roadway segment and intersection performance using urban corridor analysis techniques from the Highway Capacity Manual 2000 for Urban conditions Corridor travel time. Standard deviation of average speed

Exceptions

- Category 1 Exception
- Category 2 Exception

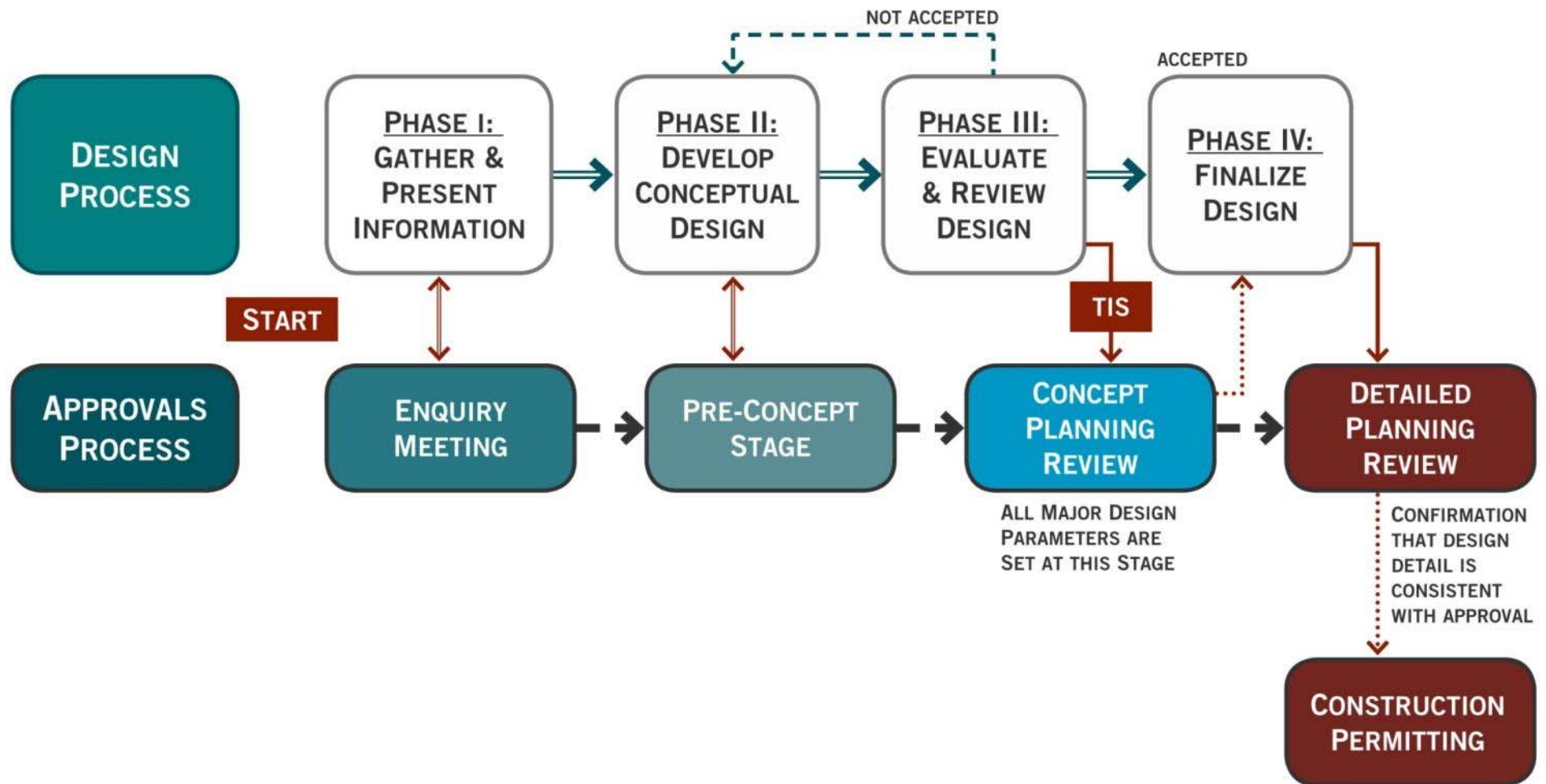
Integration with the approvals process













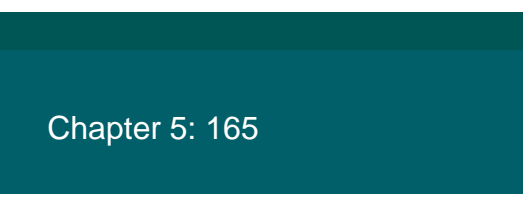
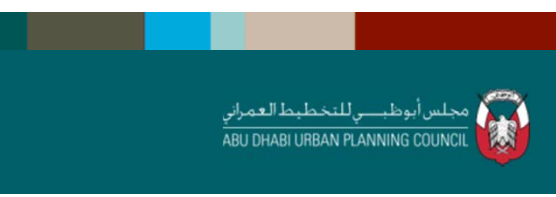


Extract from UPC's Development Review Process



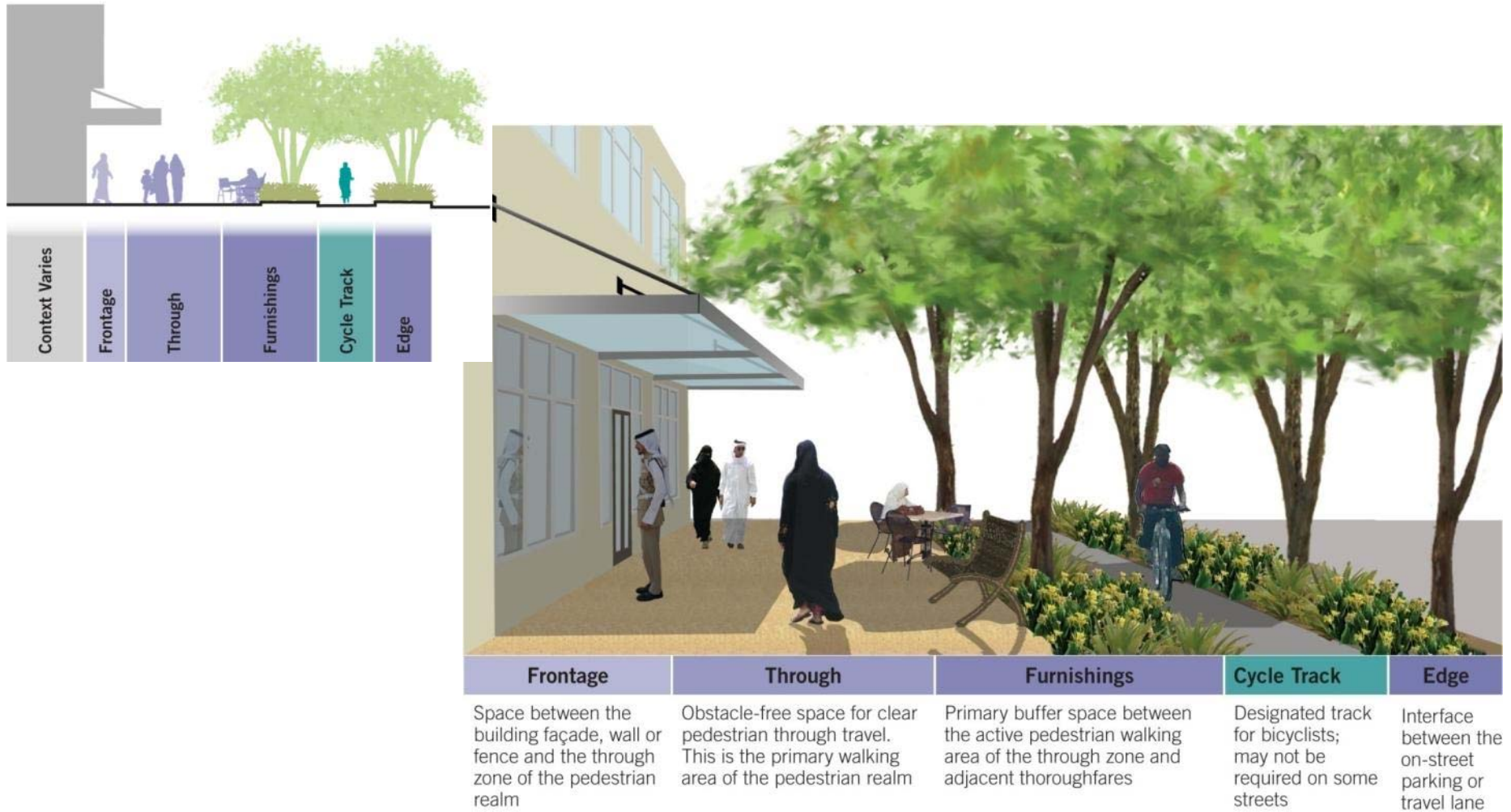
Integrating the Design Process with the UPC's Approval Process



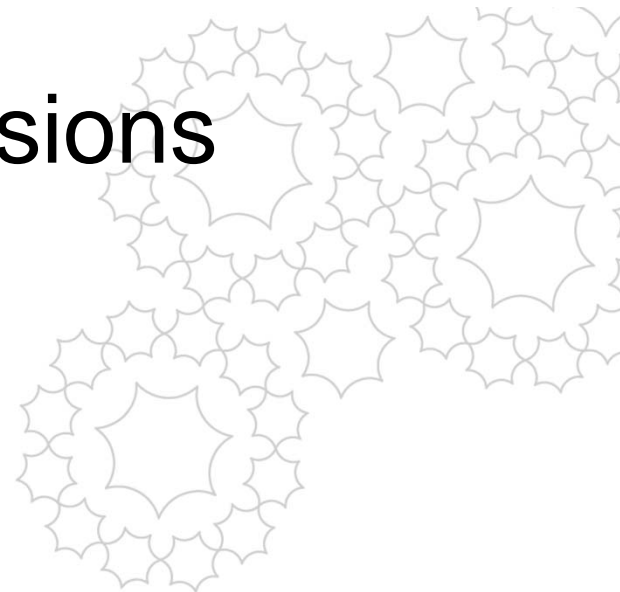
Street Design Elements Prioritization

1	Pedestrians		5.6		
2	Transit Users	Side Bus / Tram	5.7		
		Center Bus / Tram			
3	Bicyclists	Cycle Track	5.8		
		Frontage Lane			
		Bicycle Lane			
		Yield Lane			
4	Motor Vehicles	Travel Lanes	5.9		
		On-Street Parking			
		Frontage Lane			
5	Median	Center Median	5.9.8		
		Side Median			
		Transit Median			

Pedestrian Realm Zones



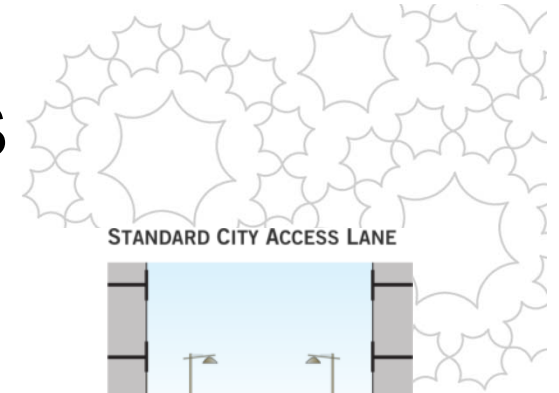
Standard City Dimensions



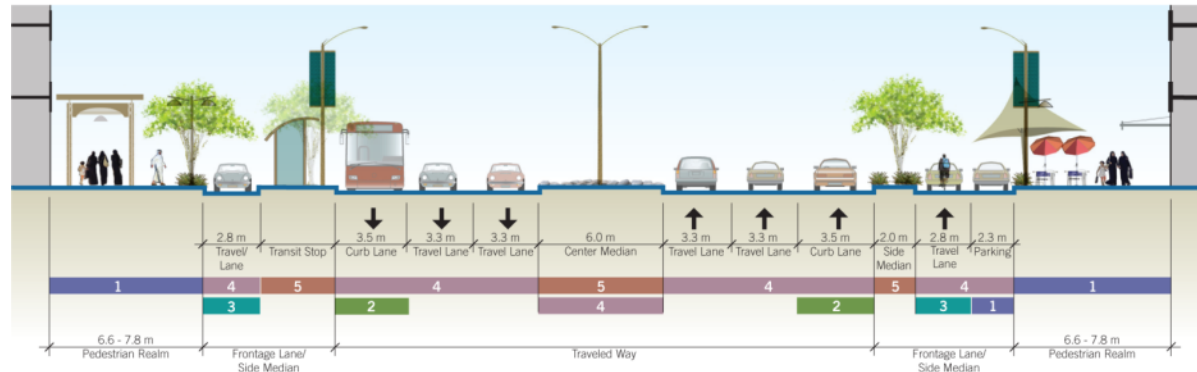
Street Family	Pedestrian Realm					Frontage Lane			Traveled Way				
	Frontage	Through	Furnishings	Cycle Track ²	Edge ²	Parking ¹	Travel	Side Median	Parking	Bicycle Lane ²	Curb Lane	Travel Lanes(s)	Center Median ⁴
						Curb Extension	Bicycle		Curb Extension		Bus ³		
Boulevard	0.8	3.5	1.5 - 3.0	2.0	0.5 - 1.5	n/a	n/a	n/a	n/a	n/a	3.5	3.3	6.0
with Frontage Lane	0.8	3.5	1.8 - 3.0	n/a	0.5	2.3	2.8	2.0	n/a	n/a	3.5	3.3	6.0
Avenue	0.8	3.0	1.5 - 2.0	2.0	0.5 - 1.5	n/a	n/a	n/a	2.5	2.0	3.5	3.3	6.0
with Frontage Lane	0.8	3.0	1.5 - 2.0	n/a	0.5	2.3	2.8	2.0	2.5	2.0	3.5	3.3	6.0
Street	0.5	2.8	1.2 - 1.8	n/a	0.5	n/a	n/a	n/a	2.3	2.0	3.0	n/a	n/a
Access Lane	n/a	1.8	n/a	n/a	0.5	n/a	n/a	n/a	n/a	n/a	3.0	n/a	n/a



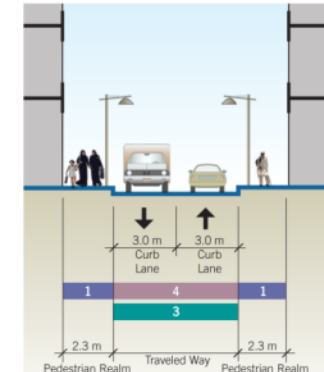
City Cross-Sections



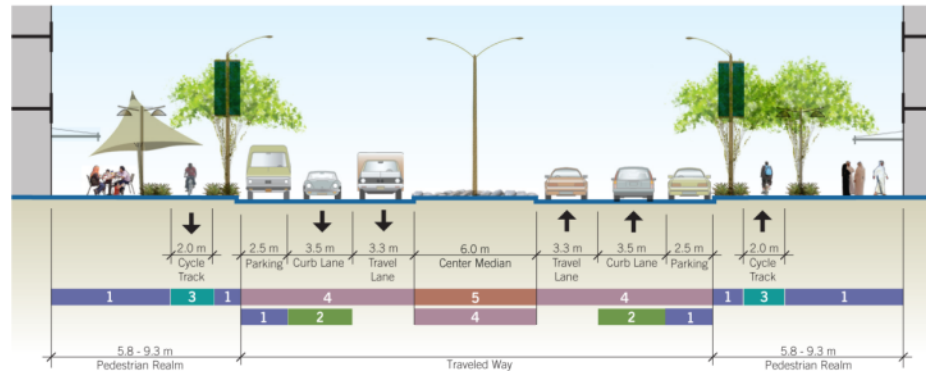
STANDARD CITY BOULEVARD (WITH FRONTAGE LANE)



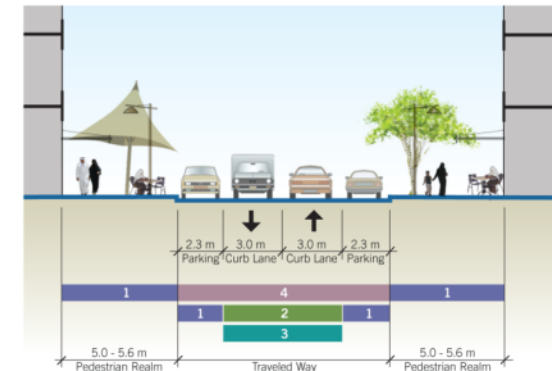
STANDARD CITY ACCESS LANE



STANDARD CITY AVENUE



STANDARD CITY STREET



STREET DESIGN ELEMENTS

1 PEDESTRIANS
Section 5.6

2 TRANSIT USERS
Section 5.7

3 BICYCLISTS
Section 5.8

4 MOTOR VEHICLES
Section 5.9

5 MEDIANS
Section 5.8.9

Standard Town Dimensions

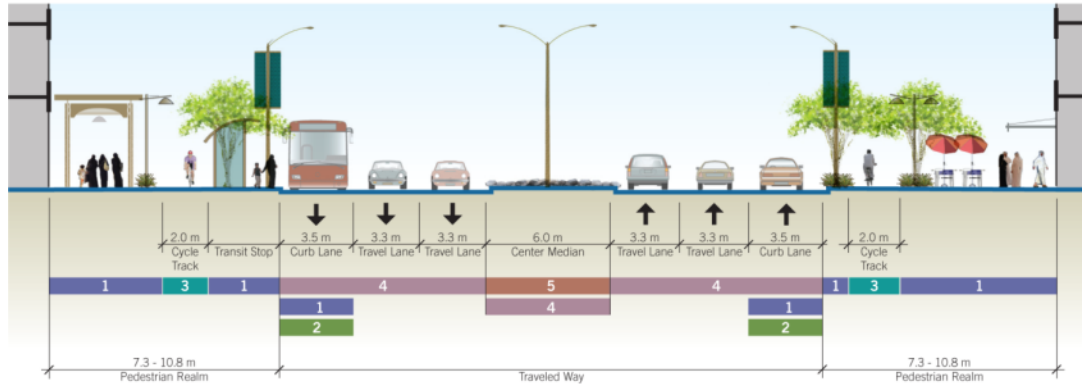


Street Family	Pedestrian Realm					Frontage Lane			Traveled Way				
	Frontage	Through	Furnishings	Cycle Track ²	Edge ²	Parking ¹	Travel	Side Median	Parking	Bicycle Lane ²	Curb Lane	Travel Lanes(s)	Center Median ⁴
						Curb Extension	Bicycle		Curb Extension		Bus ³		
Boulevard	0.8	3.5	1.5 - 3.0	2.0	0.5 - 1.5	n/a	n/a	n/a	n/a	n/a	3.5	3.3	6.0
with Frontage Lane	0.8	3.5	1.8 - 3.0	n/a	0.5	2.3	2.8	2.0	n/a	n/a	3.5	3.3	6.0
Avenue	0.8	3.0	1.5 - 2.0	2.0	0.5 - 1.5	n/a	n/a	n/a	2.5	2.0	3.5	3.3	6.0
with Frontage Lane	0.8	3.0	1.5 - 2.0	n/a	0.5	2.3	2.8	2.0	2.5	2.0	3.5	3.3	6.0
Street	0.5	2.4	1.2 - 1.8	n/a	0.5	n/a	n/a	n/a	2.3	2.0	3.0	n/a	n/a
Access Lane	n/a	1.8	n/a	n/a	0.5	n/a	n/a	n/a	n/a	n/a	3.0	n/a	n/a

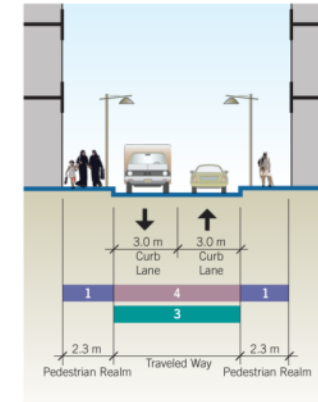


Town Cross-Sections

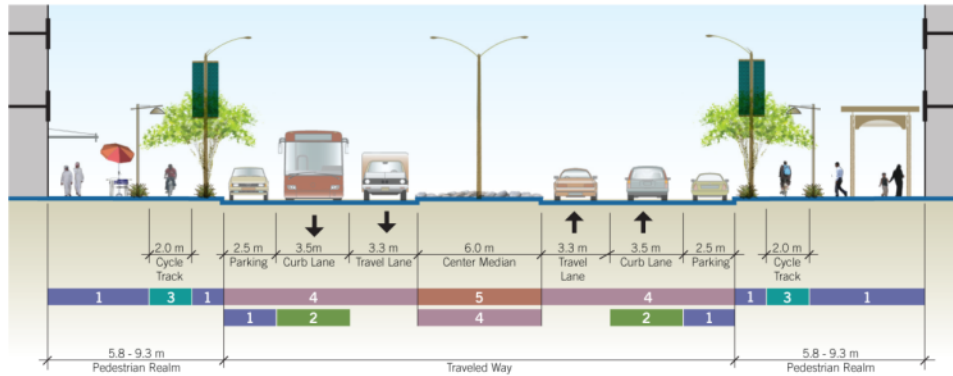
STANDARD TOWN BOULEVARD



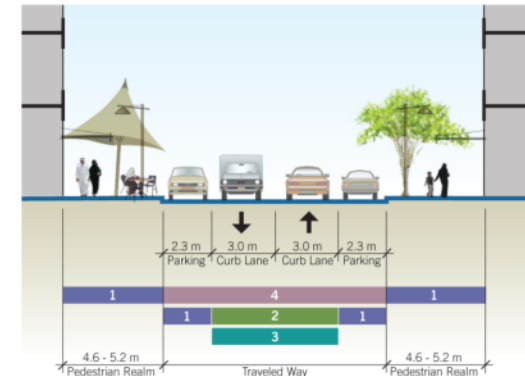
STANDARD TOWN ACCESS LANE



STANDARD TOWN AVENUE



STANDARD TOWN STREET



STREET DESIGN ELEMENTS

1 PEDESTRIANS
Section 5.6

2 TRANSIT USERS
Section 5.7

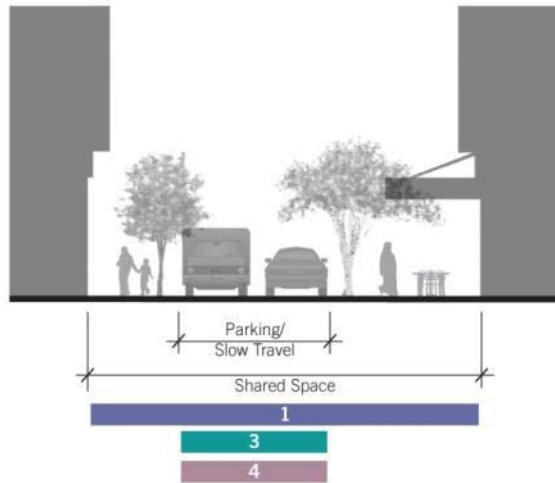
3 BICYCLISTS
Section 5.8

4 MOTOR VEHICLES
Section 5.9

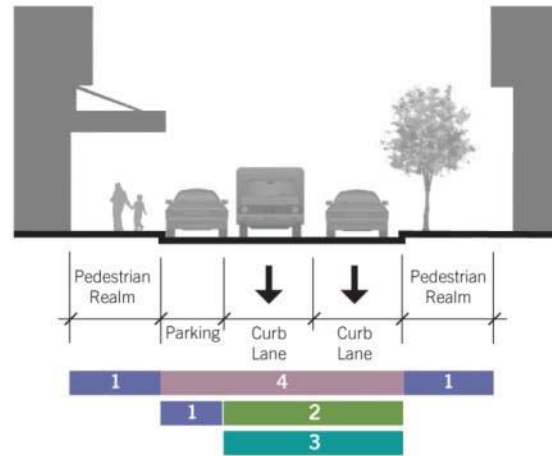
5 MEDIANS
Section 5.8.9

Cross-Sections & Examples

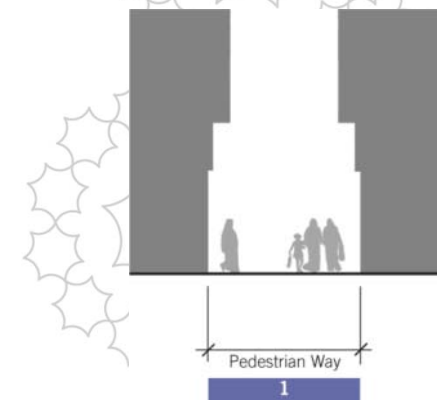
Mushtarak



One-way Street

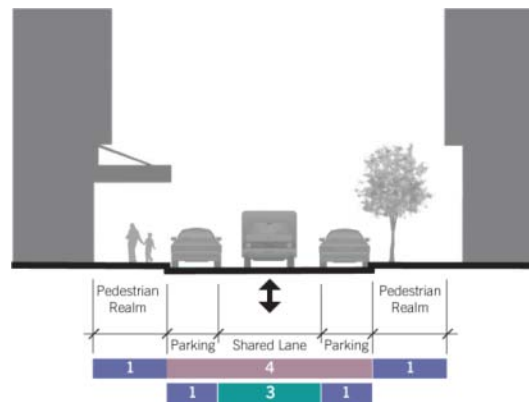


Sikka



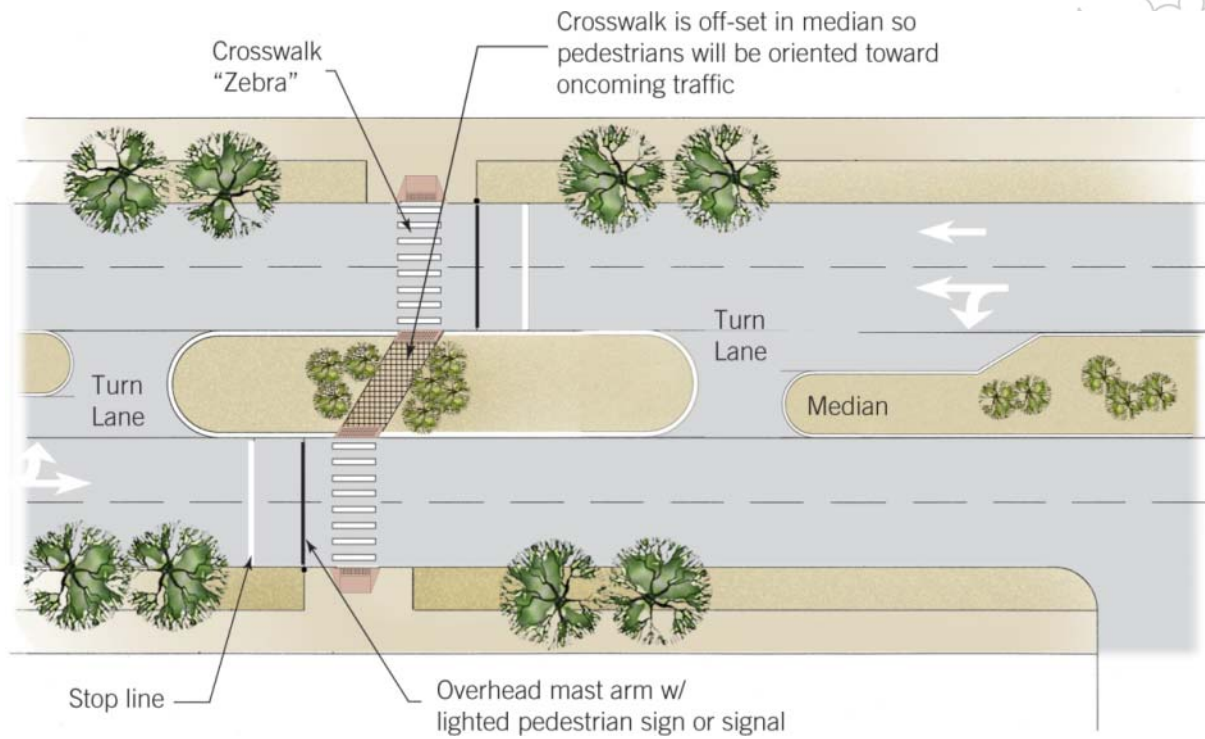
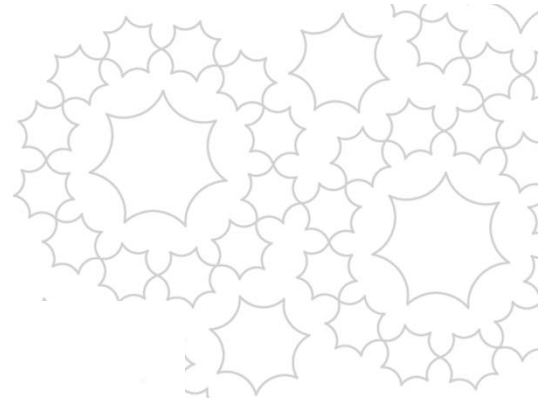
Mushtarak in Abu Dhabi

Shared Access Lane



Sikka example in Abu Dhabi

Pedestrian Crossing Location



Metro – Tram – Bus Rapid Transit



High quality Metro station entrance
Paris, France



High quality tram station
Minneapolis, USA

Advantages and Disadvantages Of Center, Side, and Sidewalk- Running Tram

	Center	Side	Sidewalk Plaza
Conflicts with Other Traffic	●	■	○
Tram Speed	●	○	■
Pedestrian Waiting Comfort	■	●	●
Pedestrian/Cyclist Interference	●	○	■
Right Turn Interference	●	■	○
Driveway Interference	●	■	■
Left Turn Interference	■	●	●
Pedestrian Realm Vitality	■	○	●
More Right-of-Way Required for Platforms	■	●	●

● Advantage ○ Neutral ■ Disadvantage

Bus – Taxis – Private Transit



Bus Rapid Transit on boulevard
Mexico City, Mexico

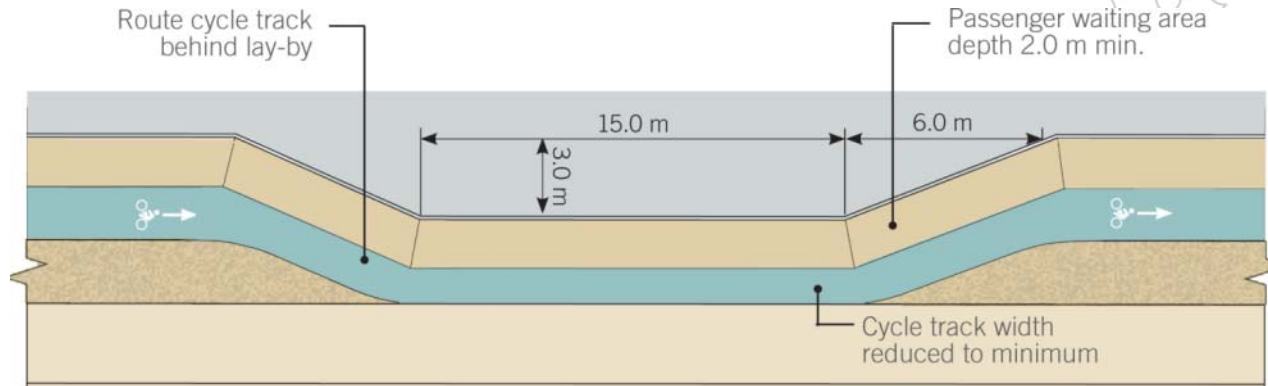
Comparison of Near, Far, and Midblock Bus Stops

	Near-side	Far-side	Midblock
Walk Time to Junction	●	●	■
Pedestrian Sight Distance	■	■	●
Junction Capacity	■	■	●
Right Turn Conflicts	■	●	●
Approach Sight Distance	■	●	●
Cross Traffic Sight Distance	■	■	●
Increase Chance of Rear-End Collisions	○	■	●
Congested Waiting Area	■	■	●
Right Turn Capacity	■	●	●
Traffic May Block Junction	●	■	●

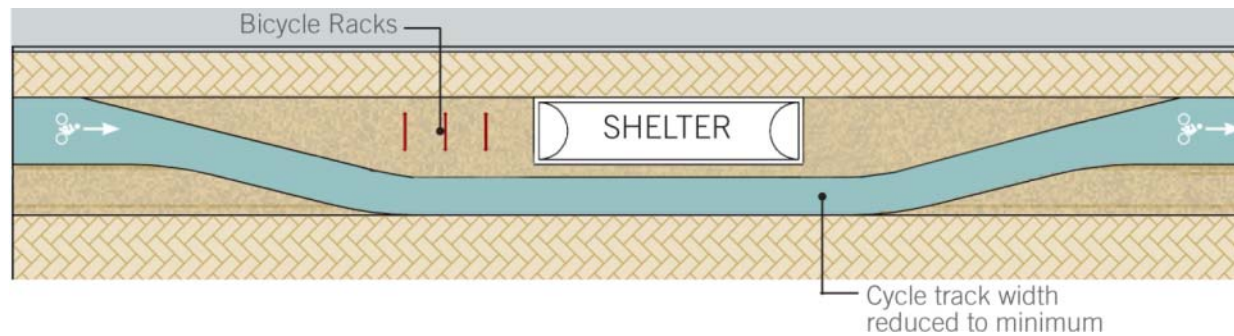
● Preferred ○ Acceptable ■ Not Preferred

Bicycle Facility Type

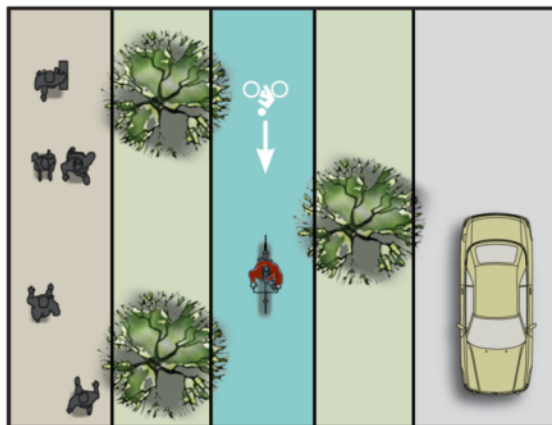
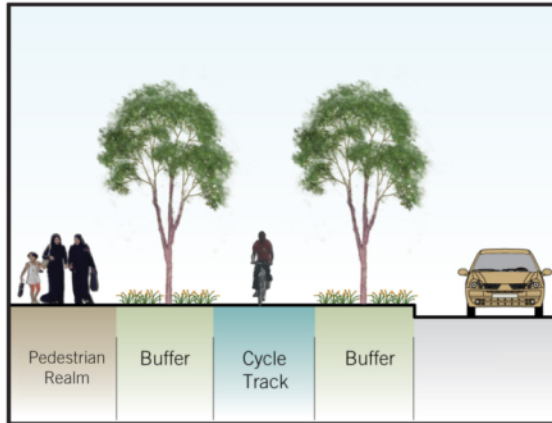
Cycle Track along Taxi and Private Bus Lay-By



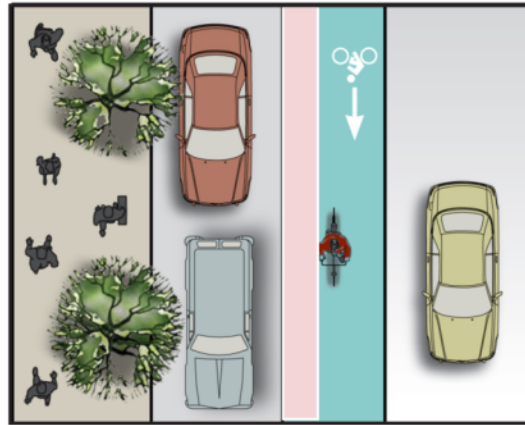
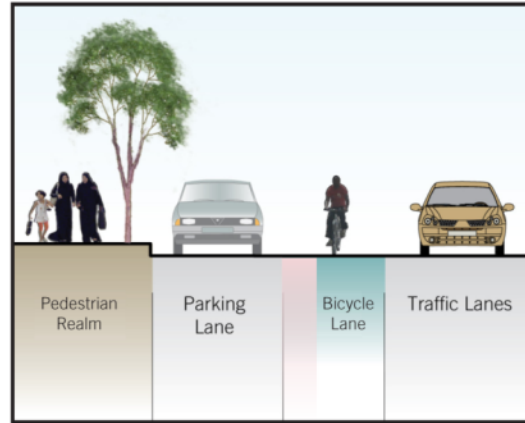
Cycle Track along Bus Stop



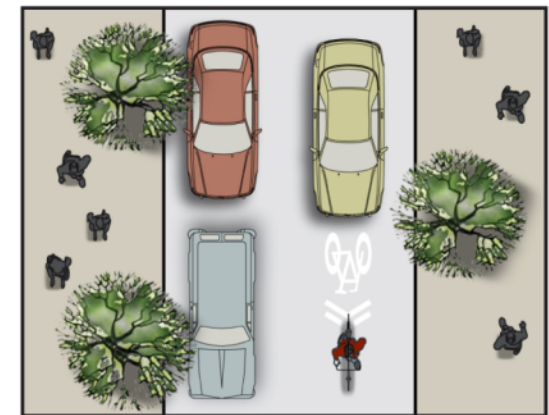
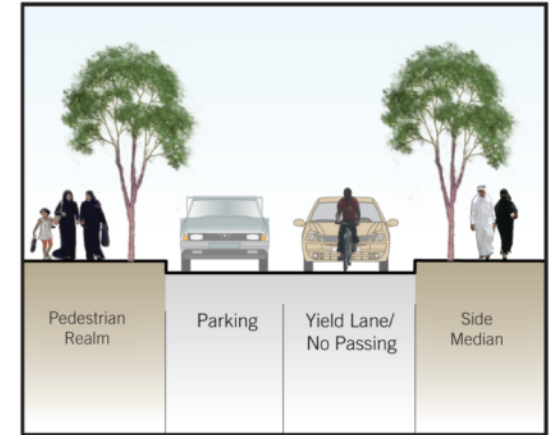
Examples of Bicycle Facilities



Typical Cycle Track



Typical Bicycle Lane with Parking and Door Zone



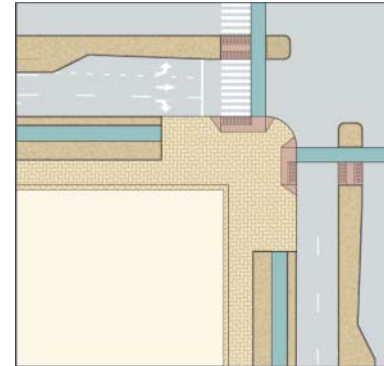
Typical Yield Lane with “Sharrow” Marking for Shared Lane

Bicycle Facilities at Junctions

Cycle Track through Minor Junction



Bicycle box, surfaced in the same color as the bicycle lane



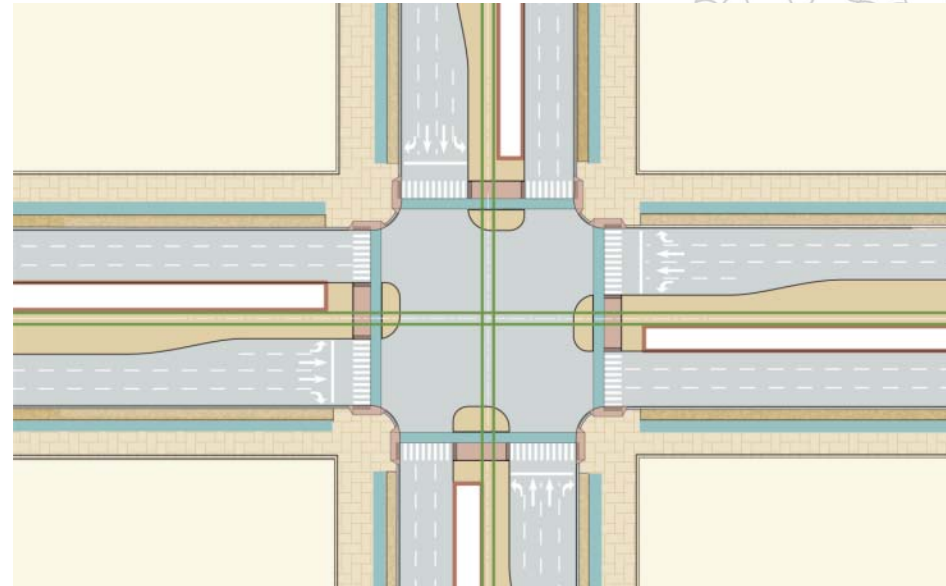
Shared Waiting Space for Cyclists and Pedestrians at Junction

Junction Design

Junction Types

Type	Notes
	Rectilinear Junction 75-90° angle
	T-junction 75-90° angle
	Offset Junction bend minor streets to create junction max 15° angle, otherwise separate into two junctions (possibly with one signal control)
	Y-junction bend minor street max 15° angle
	Angle Junction treat as two Y-junctions
	Rectilinear Junction with Extra Legs separate extra legs into right-in, right-out junctions
	Roundabout multi-arm, yield to circulating traffic

Junction Layout



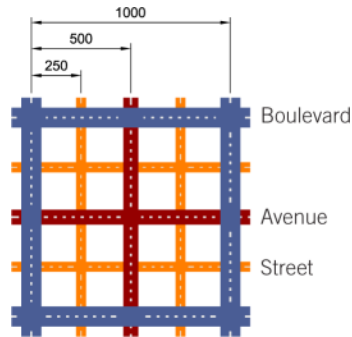
Typical Boulevard Junction with Tram



Make urban junctions as compact as possible.

Junction Spacing

Maximum Town Junction Spacing



Through Street Spacing Criteria (meters)

CONTEXT		BOULEVARD	AVENUE	STREET
City	Min	400	200	100
	Max	750	375	175
Town	Min	600	300	140
	Max	1000	500	250
Commercial	Min	1000	400	125
	Max	1500	750	375
Residential	Min	1000	400	125
	Max	1500	750	375
Industrial	Min	800	400	-
	Max	1500	750	300

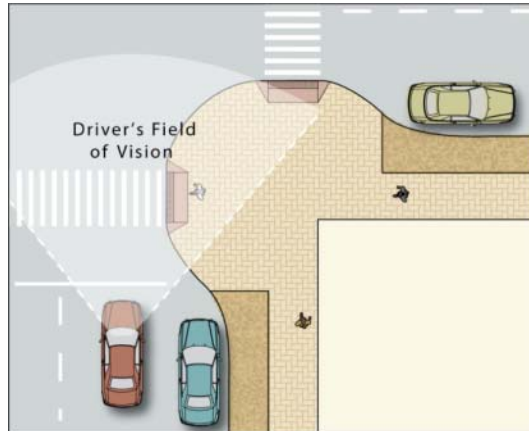
Control Measures

	Boulevard-Boulevard	Boulevard- Avenue	Boulevard-Street	Boulevard-Access	Avenue-Avenue	Avenue-Street	Avenue-Access	Street-Street	Street-Access	Access-Access
Signal	●	●	●	○	●	●	○	○		
Signalized Roundabout	●	●			●	○				
1-Lane Roundabout					○	○		●		
2-Lane Roundabout					○	○				
Mini Roundabout								●	●	○
All-Way Stop					○	○		●	○	○
2-Way Stop or Yield			●	●		●	●	○	●	○
All-Way Yield								●	○	●

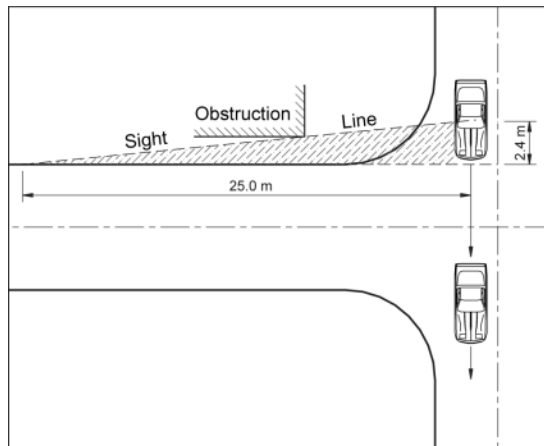
● Preferred ○ Acceptable ■ Not Preferred

Sight Distance

Curb Extension Increases Visibility



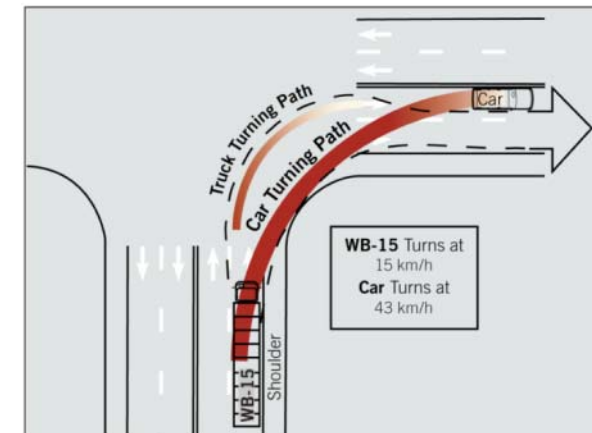
Sight Distance Requirements



Design Vehicle

Junction Control Matrix

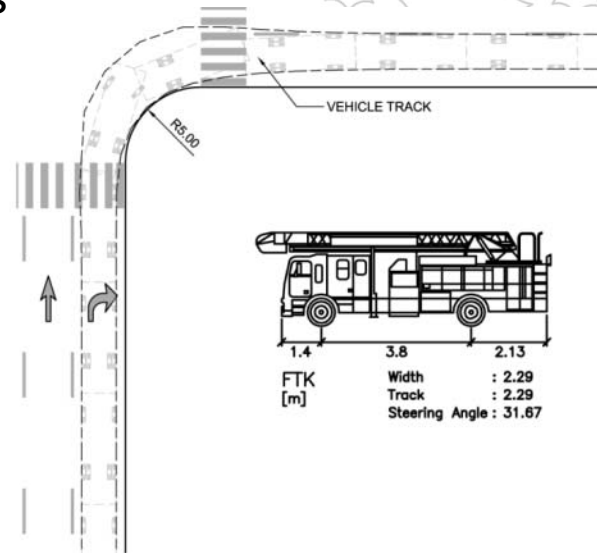
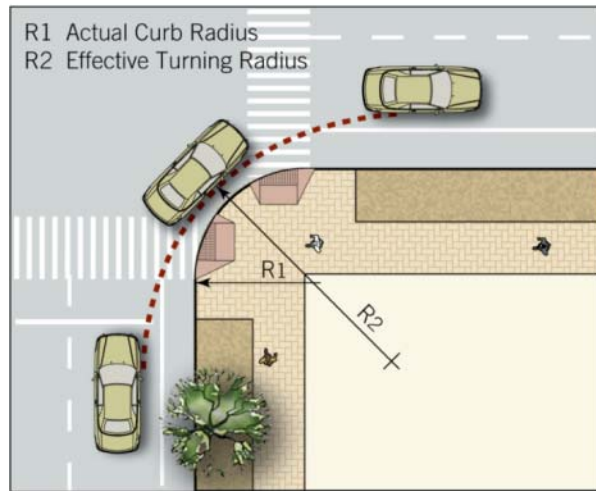
STREET FAMILY	DESIGN VEHICLE	CONTROL VEHICLE
Boulevard Avenue	WB-15M (Semitrailer CB)	WB-33DM (Double Trailer)
Street	City-Bus M	Smeal Aerial RM 100 Fire Truck
Access Lane	SUM (Medium Truck)	SUM (Medium Truck)



Corners Designed for Trucks Allow High Car Speeds

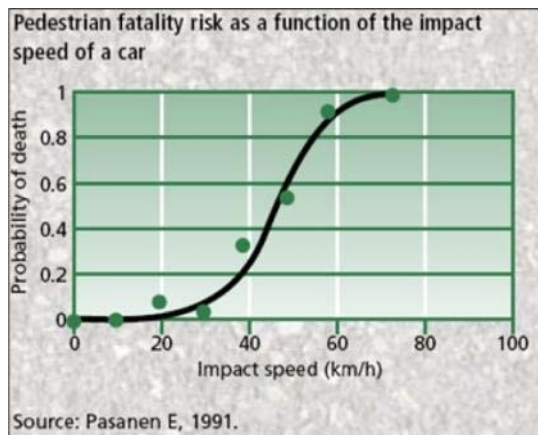
Corner Radii

Actual Versus Effective Turning Radius

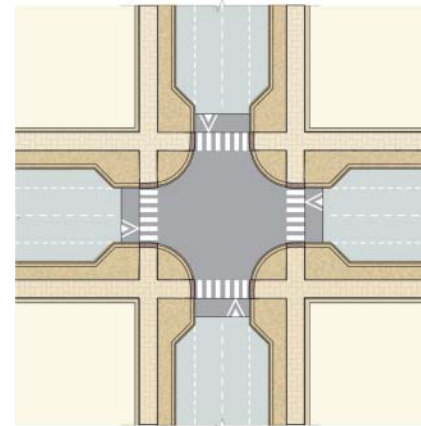


Example of Swept Path Simulation

Traffic Calming Principles & Approaches

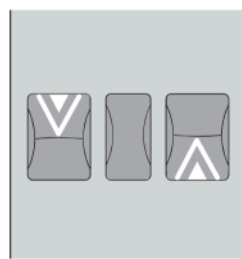
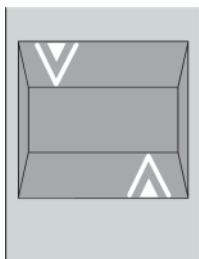


Relationship between speed and pedestrian fatality

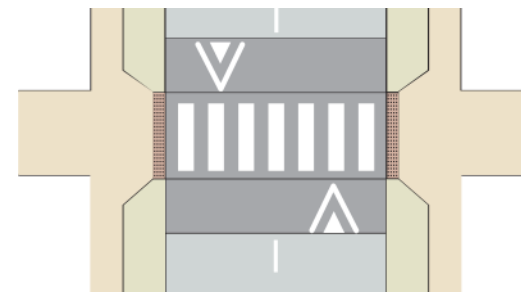


Typical Raised Intersection

Typical Speed Table

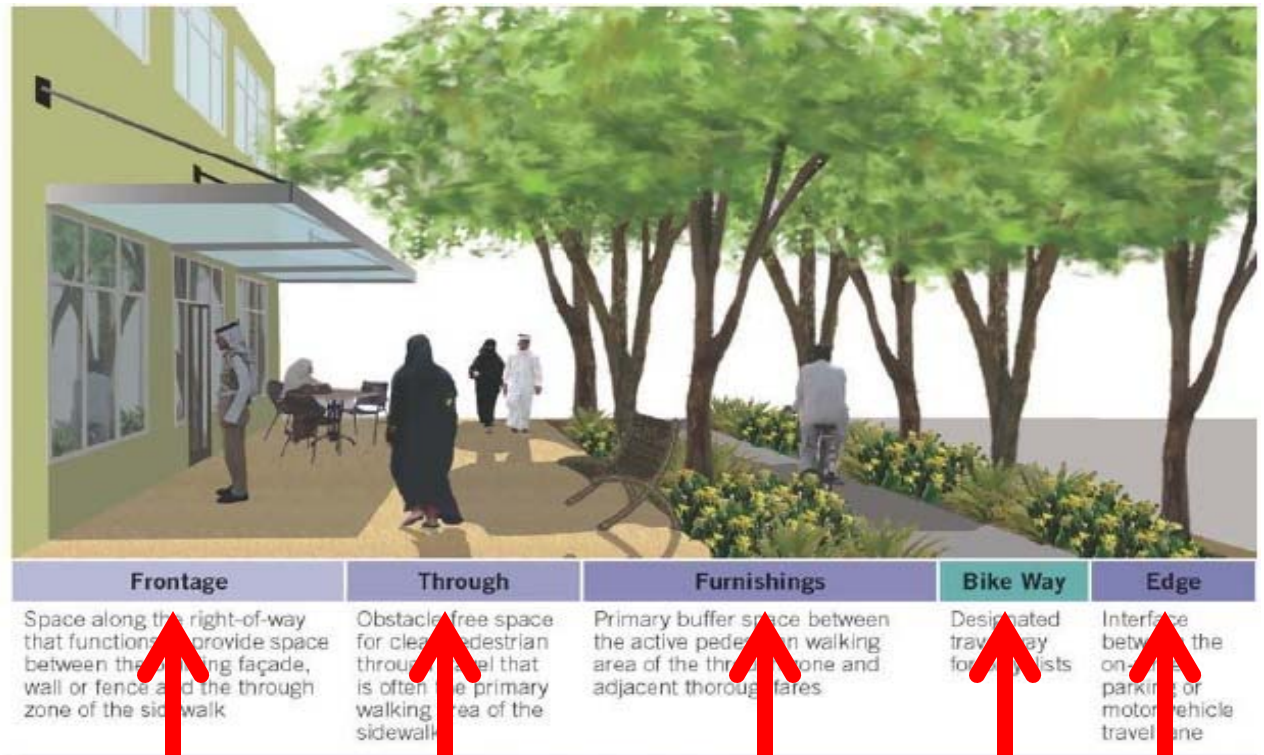
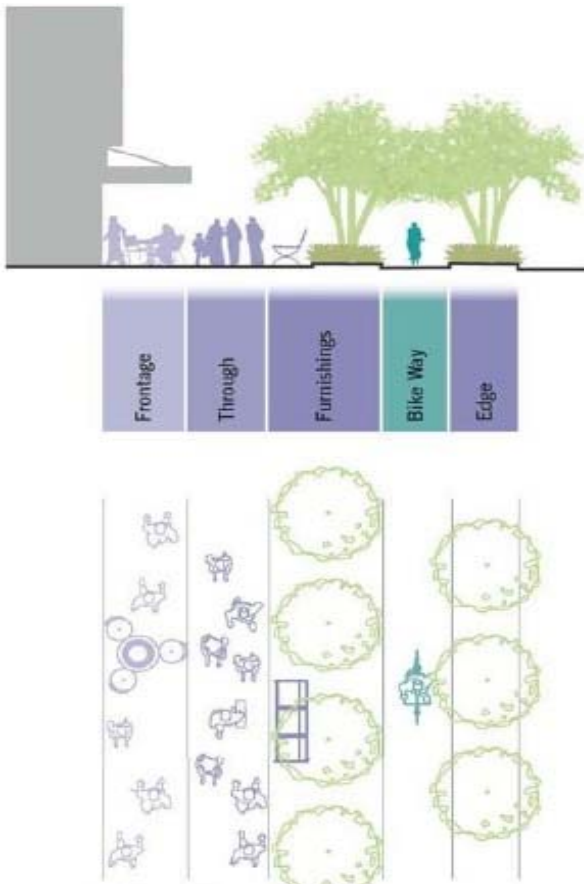


Typical Speed Cushions



Typical Raised Crossing

PEDESTRIAN REALM ZONES



Pedestrian Realm Zones

The Frontage, Through, Furnishings, and Edge zones of the pedestrian realm shall be designed to fit the district and neighborhood context and adjacent land uses along the street. Refer to page 5-X for design guidelines related to these zones of the pedestrian realm.



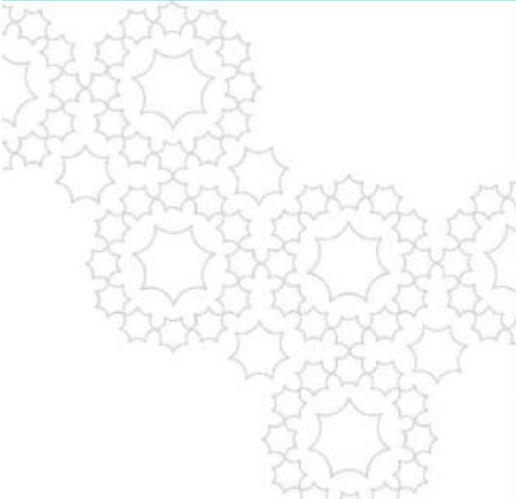
Abu Dhabi
2030 رؤية
Vision

مجلس أبوظبي للتخطيط العمراني
ABU DHABI URBAN PLANNING COUNCIL

Urban Street Design Manual

Release 01
August 2009

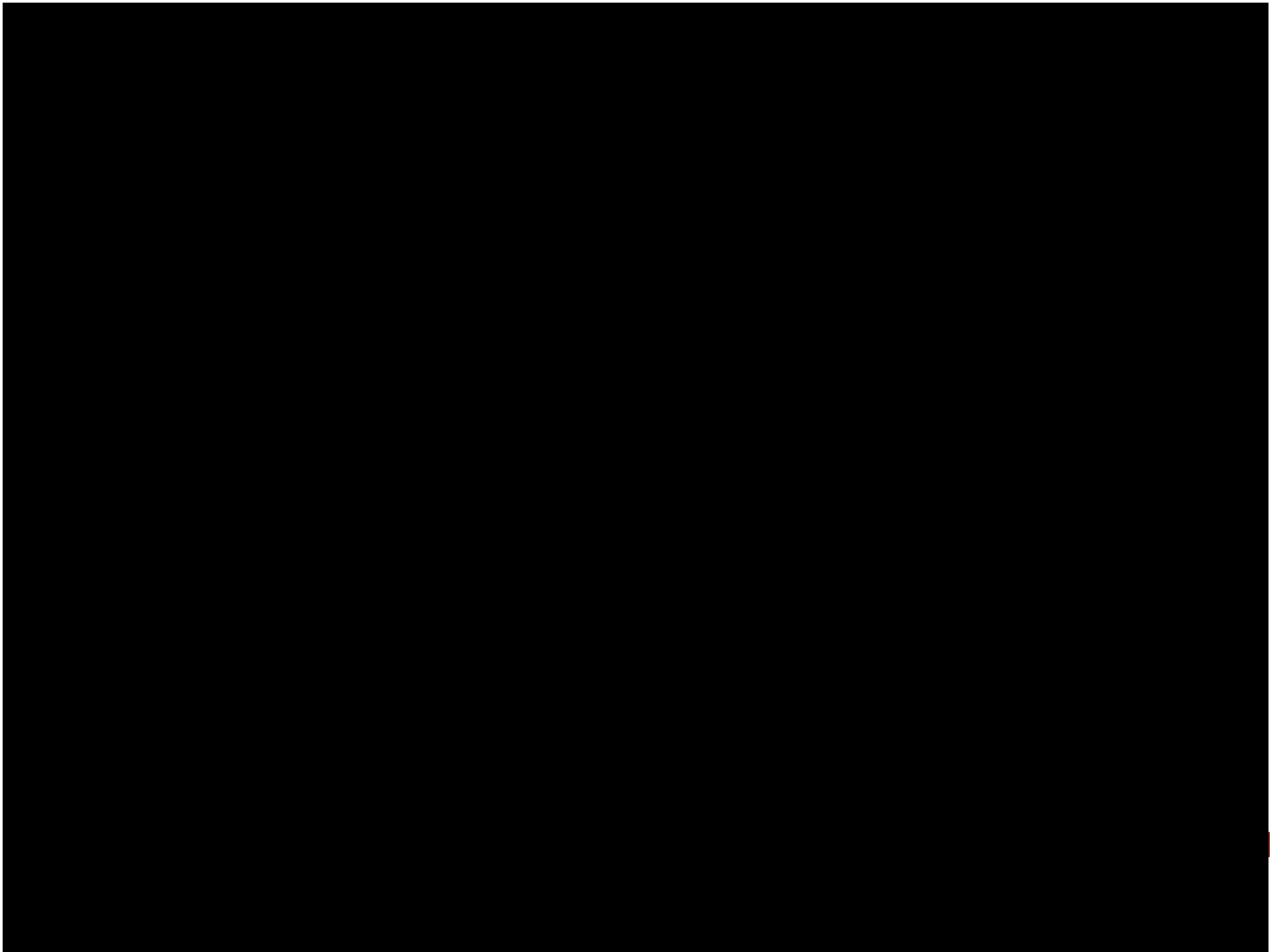
Plan Abu Dhabi 2030
Next Generation Planning

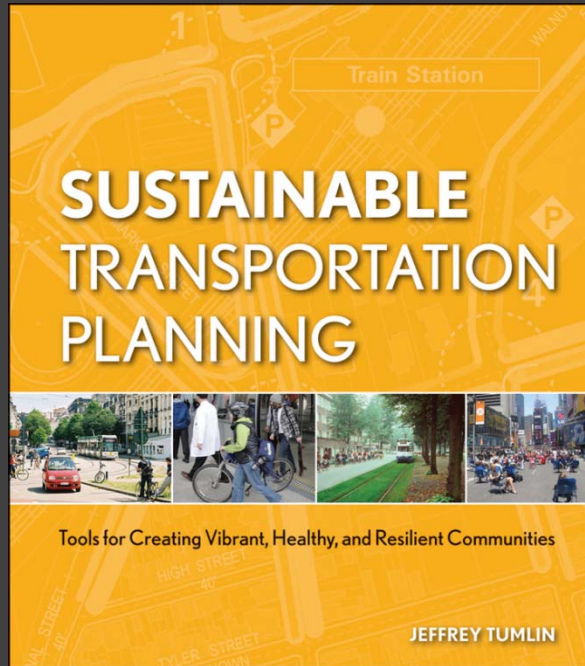


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STREET DESIGN MANUAL

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