



Abu Dhabi Urban Street Design Manual

Application for the 2013 ISOCARP Award for Excellence

Explanatory Report

July 2013



Abu Dhabi Urban Planning Council (UPC)

Abu Dhabi, United Arab Emirates (UAE)

1. Project Summary

The Abu Dhabi Urban Street Design Manual (USDM) represents excellence in the planning and design of urban streets. Aligned with Abu Dhabi Vision 2030's overarching principles, and the goals of Abu Dhabi Urban Planning Council's (UPC) urban structure framework plans to promote walkable neighbourhoods, enhance connectivity and create a sustainable urban environment, the USDM design priorities emphasise the need to create a pleasant, safe environment for pedestrians and cyclists, the most vulnerable users on urban streets, thereby improving walkability, sustainability and public health.

Great streets are those that can be described as markedly superior in character or quality and as streets where people enjoy the environment all year round. The USDM introduces a new holistic multi-modal design process to generate high-quality urban design outcomes. New concepts such as 'Context Sensitive Solutions' and 'Complete Streets', together with new design standards to reduce vehicular speeds to create a safer environment for the most vulnerable road users, are introduced. A new Online Design Tool has also been developed to provide a simplified, complimentary resource for designers to quickly make design decisions about the composition of typical street plans and cross sections.

The USDM will play a key role in developing Abu Dhabi's urban form; working hand-in-hand with land use and transport planning. The USDM is one of several tools created by the UPC to plan Complete Sustainable Communities (CSC) across the Emirate of Abu Dhabi; communities which meet the needs of today's residents, yet are flexible enough to meet the changing needs of future generations. The USDM, as part of the CSC initiative will, over time, improve the lifestyle and living standards of all residents; ensuring community developments and revitalisation plans are innovative and sustainable. The innovation within the USDM is applicable to all cities and has the potential to change how we look at the planning and design of urban streets.



2. Project Description

Background Information

The UPC originally launched the USDM v1.0 in January 2010 to address the needs of the growing population of Abu Dhabi Emirate, the capital of the United Arab Emirates, through the creation of more walkable, well-connected and liveable communities.

The USDM is part of the UPC's development regulations and is a key tool for continuing the implementation of the overarching principles and objectives of Vision 2030: Abu Dhabi Government's initiative to create the leading global 21st century Arab Capital, and the 2030 urban framework plans that were subsequently developed for all three Municipalities, along with the coastal and marine areas that the Emirate of Abu Dhabi is comprised of. Through a balanced approach to street design, the USDM is guiding the transition of Abu Dhabi's streets toward a more multi-modal, walkable, low-carbon future.

Following the launch of the USDM in 2010, the updated USDM v 1.1 was released in September 2012 to incorporate all suggestions and comments raised by stakeholders and technical experts during the first two years of the Manual's implementation. USDM Version 1.1 is a more user-friendly document that includes many new local examples of good practice, as well as design guidance for retrofitting existing streets and junctions.

Accompanying the new version of the Manual is an Online Design Tool which allows both experts and laypersons to quickly explore and design multimodal street plan views and cross sections for new or existing streets in communities both in Abu Dhabi and around the world.

The USDM was developed by the UPC as a collaborative effort involving key stakeholders such as the Abu Dhabi Department of Transport, the Department of Municipal Affairs, Abu Dhabi Municipality, Al Ain Municipality, Western Region Municipality, Abu Dhabi Police, Abu Dhabi Civil Defence and Health Authority Abu Dhabi.

To complement the USDM, the Utility Corridor Design Manual (UCDM) and the Public Realm Design Manual (PRDM) have also been developed by the UPC. The UCDM contains guidance on how to integrate different types of utilities into proposed USDM cross-sections and the PRDM complements the USDM through guidance on how to design public realm projects within the public right of way to ensure that each project meets the criteria for development in Abu Dhabi.

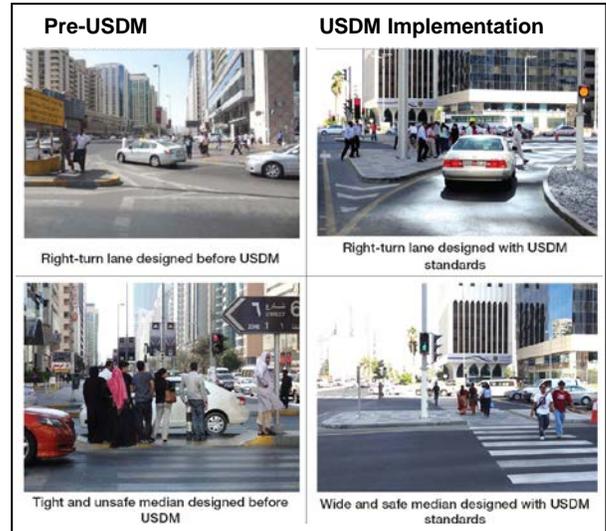
USDM Implementation and Monitoring

The USDM is designed to be implemented; its function as a manual for use by urban planners and designers, transport planners, traffic engineers, etc. necessitates clear presentation and organisation of the standards and guidelines, particularly because the Government of Abu Dhabi has mandated that all new urban streets and the redevelopment of existing streets in Abu Dhabi must be designed and constructed in line with USDM standards.

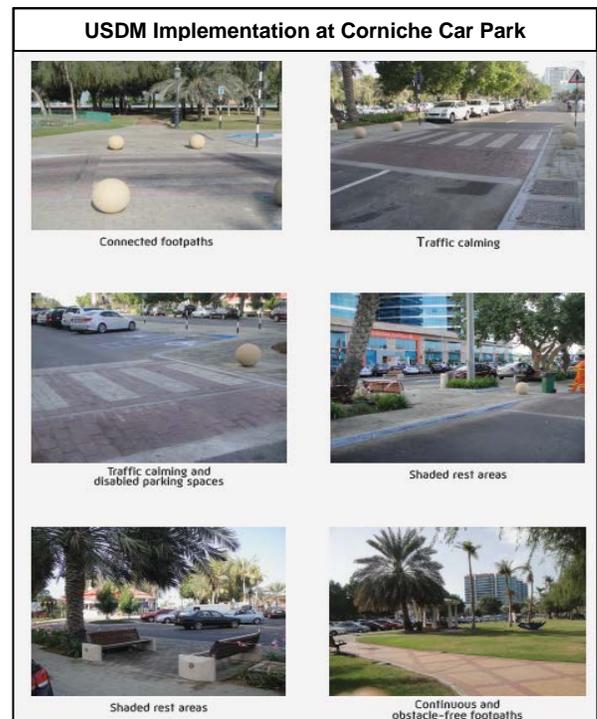
Since the USDM was launched in January 2010, there are several sites in Abu Dhabi where the USDM design standards and guidelines have been implemented.

One of the most remarkable examples is Sheikh Zayed Street, a major arterial on Abu Dhabi Island that was recently rebuilt by Abu Dhabi Municipality. All street elements and pedestrian facilities were designed as per USDM Standards. Narrower travel lanes, tighter layout for right-turn lanes, larger and safer pedestrian refuge islands, dropped curbs and traffic calming schemes have been built along Sheikh Zayed Street.

After the newly designed Sheikh Zayed Street opened in September 2012, a study was carried out by the UPC in collaboration with all major stakeholders to evaluate the performance of Sheikh Zayed Street. The study demonstrated that remarkable results have been achieved in terms of pedestrian safety as a result of the new standards. The study highlighted, for example, that with the new standards pedestrian waiting Level of Service (LOS) at refuge islands was improved from LOS E/F to LOS A/B¹ and that the probability of pedestrian fatalities at right turn lanes was reduced from 25% to 5%. Feedback from residents living in the area has been very positive; people feel that the new pedestrian facilities are much safer and it is now much easier to cross the road, especially for young people, parents with pushchairs and older people.



One of the first USDM implementation projects in 2010 was to convert a busy parking area into a safer environment for residents and visitors. The main purpose of the project was to take into consideration the needs of pedestrians; improvements included the introduction of narrower streets, raised zebra crossings with clearer markings, more restrictive entrances to car parks, one-way circulation patterns inside parking areas and Braille tiles with smooth elevations so people with special needs have easier access. Wider, shaded footpaths, more greenery and children’s play areas were also implemented. The upgrading of this area has prioritised pedestrian comfort and safety and has reduced vehicle speeds, cut-through traffic and general traffic noise. Feedback from residents and visitors on the revised layout of the area has been very encouraging and the UPC is currently



¹ This is a measure of the average space available to each pedestrian when they are waiting at pedestrian refuge islands; there is direct relationship between average space and safety/comfort. An LOS of A means comfortable and safe waiting at pedestrian refuge islands; an LOS of F means the density of people waiting at pedestrian refuge islands is extremely uncomfortable and very unsafe.

implementing a similar project in Al Ain.

In line with its mission to work collaboratively with all stakeholders, the UPC is also carrying out several USDM training sessions for representatives from other Government agencies, developers and all major technical consultants in Abu Dhabi. The USDM training sessions are part of the UPC's consultation approach designed to respond to customer and general public demand for in-depth information. More training sessions will be organised by the UPC in the next few months, including site visits to a number of developments currently under construction that have been planned and designed following the Complete Sustainable Communities and USDM design principles. Furthermore, from September 2013, the USDM will be used as part of the official curriculum for civil engineering and urban planning courses in Abu Dhabi Emirate's major universities.

Creativity

The innovation of the USDM lies in its holistic approach to the planning and design of urban streets. In line with the goals of the 2030 Plans to promote walking, enhance connectivity and create a sustainable urban environment, the USDM design priorities are:

- 1st Priority - Pedestrians
- 2nd Priority – Transit Users
- 3rd Priority – Cyclists
- 4th Priority – Motor Vehicles

The USDM design priorities emphasise the need to provide a safe environment for pedestrians and cyclists, the most vulnerable users on urban streets, thereby improving walkability, which in turn will enhance public health and overall sustainability.

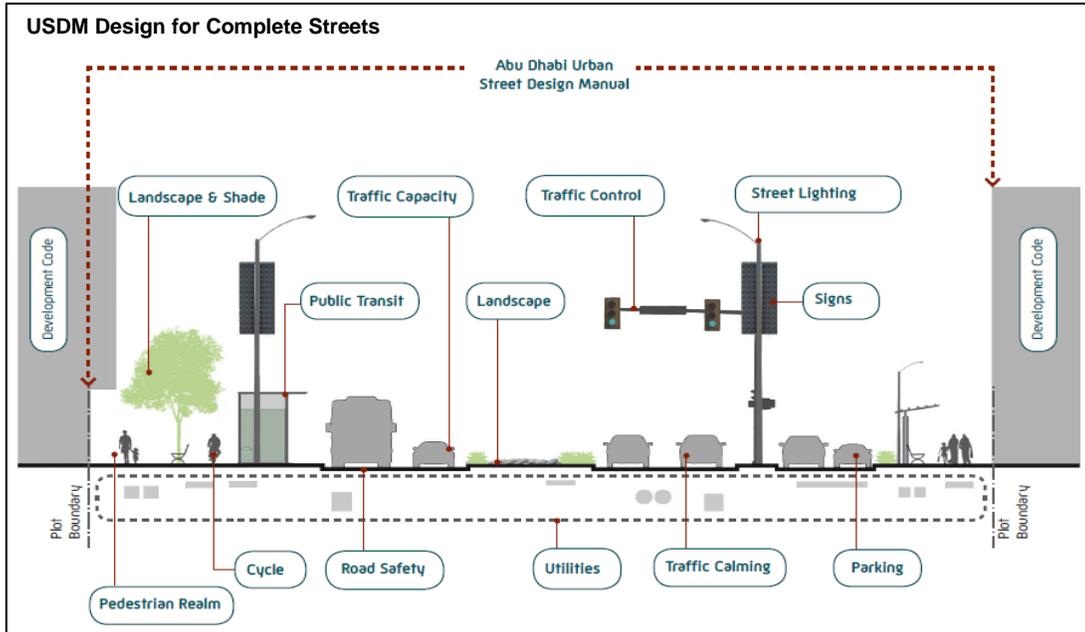
The different sections of the USDM provide tools to Manual users to properly accommodate all road users (pedestrians, transit users, cyclists and motor vehicles) and to properly consider all relevant components during the planning and design of urban streets.

In order to cater for the adjacent land use context and the anticipated travel demand, the USDM defines urban streets with a two name convention. The first name is the 'context' name, which is based on adjacent land use and community character (City, Town, Commercial, Residential and Industrial) and the second name is the 'Street Family' name, which describes the transport capacity of the street (Boulevard, Avenue, Street and Access Lane).

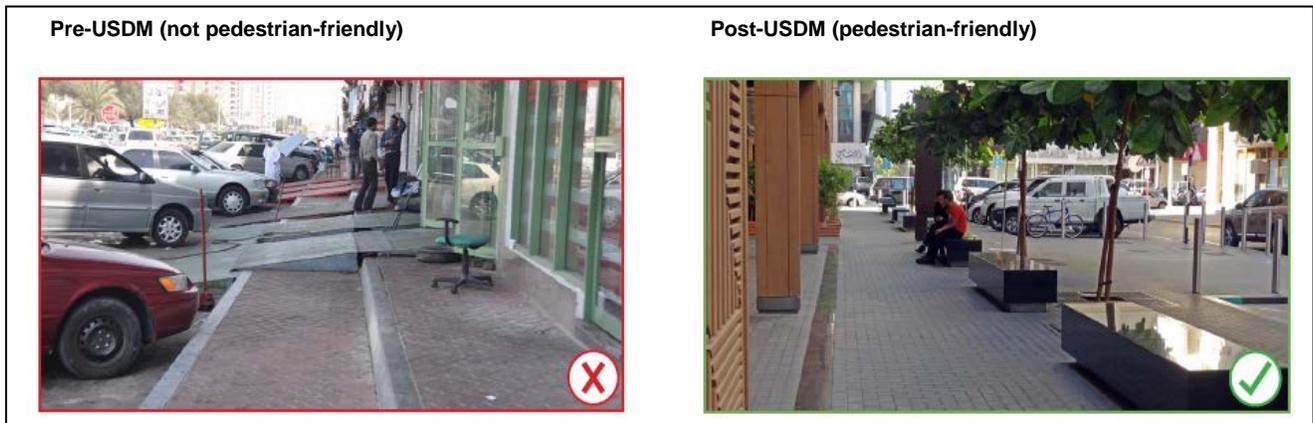
Street Family	Land Use Context				
	City (5 stores +)	Town (3-5 stores)	Commercial (1-5 stores)	Residential / Emirat Neighbourhood (1-3 stores)	Industrial
USDM Street Typologies					
Avenue					
Street					
Access Lane					

All cross-sections in the USDM are considered from plot boundary to plot boundary, so that all the different users and elements of Complete Streets are properly planned designed and coordinated.

The USDM guides designers to design 'Complete Streets' and to ensure that all the street elements from plot to plot are in the right place and are the right size for the context. Unobstructed pedestrian walkways are required and the proper placement of street lights, traffic sign poles, utility boxes, benches and plantings will now be mandatory for new or redesigned streets.

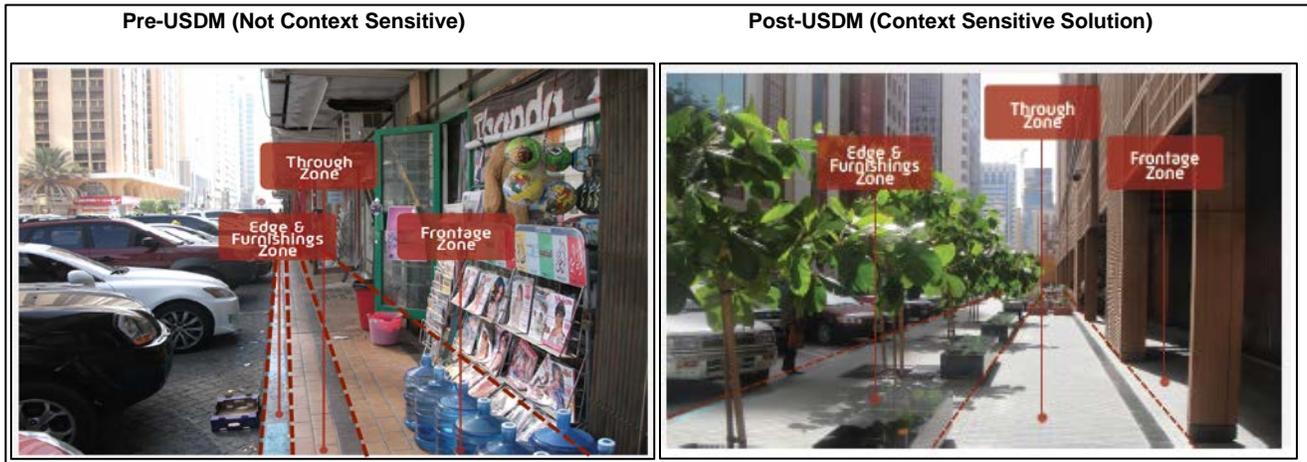


Following the guidance contained in the Manual will ensure that all urban streets are Context Sensitive, i.e. they are designed appropriately for their surroundings. For instance, streets that are lined with popular retail shops will feature wider sidewalks with more shade, buffering of sidewalks from traffic lanes, and possibilities for sidewalk cafes and street trees. Similarly, streets that serve lower density residential neighbourhoods will be designed for low traffic speeds with safe pedestrian crossings to encourage walking to local services and to provide quiet environments for the families that live within them.

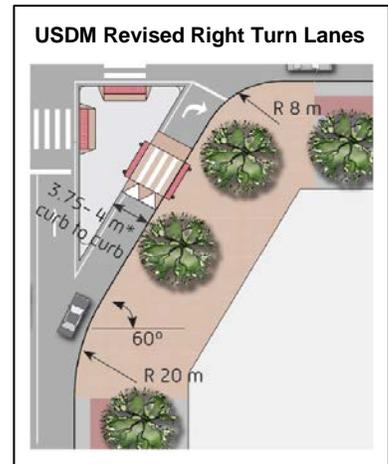


Within the Manual, a particular emphasis has been placed on pedestrian realm zones as an integral part of the street design. Four zones (Frontage, Through, Furnishings and Edge) have

been defined to develop a cohesive design for the pedestrian realm and to take into account the interactions that occur between these zones.



New design standards (e.g. narrower travel lanes, revised layout for right-turn lanes, tighter curb radii, more compact junctions, larger and safer pedestrian refuge islands, dropped curbs and traffic calming schemes) are introduced for the planning and design of all existing and new streets within urban areas, with the primary objective to reduce vehicular speeds and create a safer environment for the most vulnerable road users.



An Online Design Tool has been developed to complement the new version of the USDAM. The Tool is a free simple web-based application to implement the principle and guidance of the Manual and to provide a simplified resource for designers to quickly make basic design decisions about the composition of typical street plans and cross sections. Using this new tool will significantly reduce the time required to design and review street plans and cross-sections.

The Tool provides guidance for the design of new streets, for the redesign of existing streets and for special cases (e.g. when street design might be restricted with a limited right-of-way or where utility requirements or existing conditions specify a wider right of way). All the different elements of cross-sections and plan views (e.g. travel lanes, pedestrian realm zones, medians, transit provision, cycle provision, on-street parking, trees, lighting, furnishing, shelters, building heights and setbacks, etc.) can be quickly added and edited. Important optional important features such as

USDAM Online Design Tool

STREET DESIGN INFORMATION		
Total width of right-of-way	46.4 m	
Length of street	20.0 m	
Average height / width ratio	0.58	
Distance between buildings	44.8 m	

Street Design Element	Width	Level
Frontage	0.8 m	0.15 m
Through Zone	3.4 m	0.15 m
Furnishings Zone	1.5 m	0.15 m
Cycle Track	2.0 m	0.15 m
Edge	1.5 m	0.15 m
Parking	2.5 m	0.0 m
Curb Lane	3.5 m	0.0 m
Travel Lane	3.3 m	0.0 m
Transit Median	9.4 m	0.15 m
Travel Lane	3.3 m	0.0 m
Curb Lane	3.5 m	0.0 m
Parking	2.5 m	0.0 m
Edge	1.5 m	0.15 m
Cycle Track	2.0 m	0.15 m
Furnishings Zone	1.5 m	0.15 m
Through Zone	3.4 m	0.15 m
Frontage	0.8 m	0.15 m

animation, shadows from the buildings, etc. are also available. Cross-sections and plan views created with the Tool can be saved and exported to some of the most common platforms used by street designers.

Even though the Tool has been designed for Abu Dhabi Emirate to be used in parallel with the USDM, a complimentary ‘Free Design Mode’ has been included to allow all users around the world to create street plan views and cross-sections according to different standards and regulations. Different street cross-sections and plan views can easily be created with the Tool to adapt and reflect standards for any city in the world. This highlights the relevance and scope of this project at a local, regional and international scale

In the updated version of USDM a new chapter has been added which provides design guidance for retrofitting existing streets. Through a three-step approach (from simple de-cluttering, through to more complex pedestrian realm improvements and the total recreation of the street) a range of options is provided to meet specific project characteristics such as budget, schedule, constraints, etc.

Examples of design solutions for typical situations in different land use contexts have been provided with a clear step-by-step explanation of the existing issues and proposed solutions, in line with the proposed three step approach.



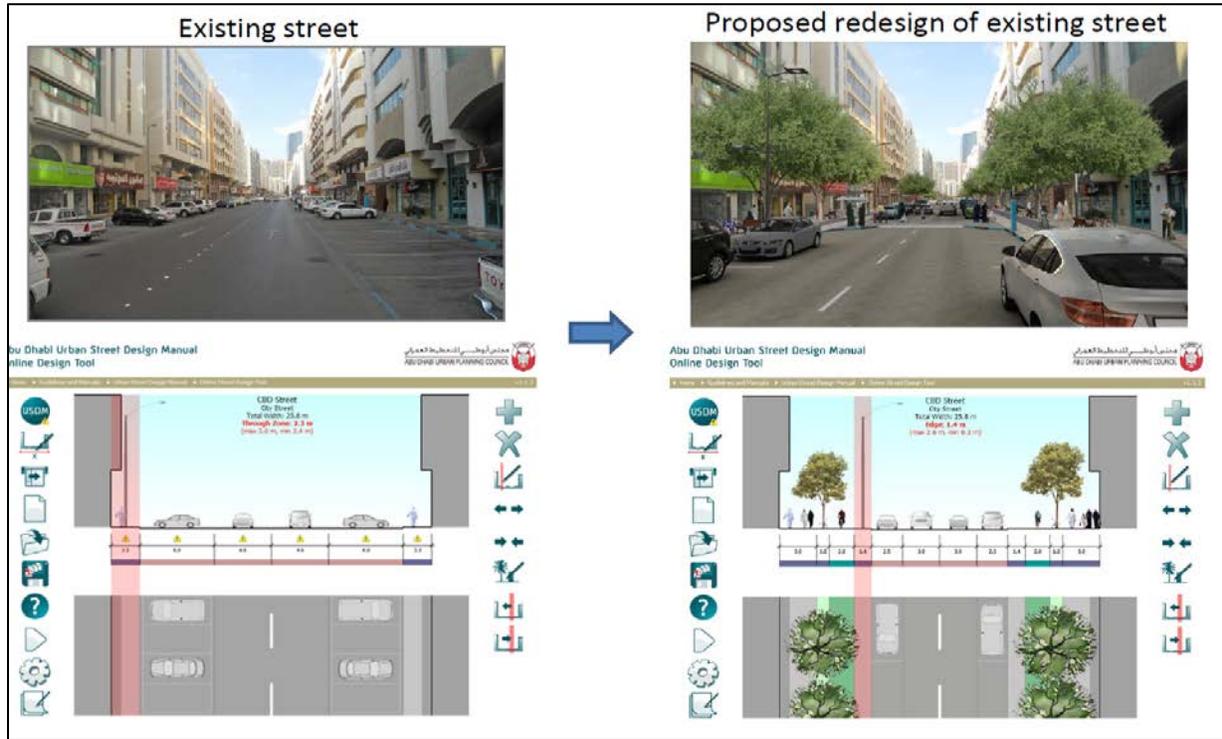
Replicability

Most USDM standards and guidelines can be transferred to other cities, as they fall within the range of guidelines or recommended practices of recognised organisations such as the American Association of State Highway and Transportation Officials (AASHTO) and the American Institute of Transportation Engineers (ITE). The USDM follows the context sensitive approach and design principles highlighted in many international documents.

The Online Design Tool, with its ‘Free Design Mode’ option, can be used by designers internationally to quickly create cross sections and plan views for existing and proposed streets. Since its launch in September 2012, the software has been used by more than 5,000 people - with 50% of these users being outside of the UAE.

In particular, the section on retrofitting existing street and junctions can be used by other agencies in in other places by agencies.

Below is an example of how the design guidance on retrofitting of existing streets could be used, in conjunction with the Online Design Tool, in other cities. The example chosen below is typical, and therefore could represent an existing urban street in many cities outside the UAE.



Sustainability

Implementation of the USDM standards, as part of the CSC initiative, will improve the lifestyle and living standards of all residents, ensuring community development plans and revitalisation plans are sustainable.

USDM implementation will create safer streets and encourage a more active lifestyle. This is particularly important for Abu Dhabi, which has some of the world's highest rates of road deaths with a significant percentage (29%) of road accidents involving pedestrians. The Emirate also has some of the world's highest rates of cardiovascular diseases, obesity and diabetes. Therefore, safer and more walkable streets would generate significant cost savings in the order of billions of USD per year for Abu Dhabi Government in terms of health-related expenditure.



Streets designed according to USDM standards shall comply with the sustainability principles of the UPC's 'Estidama' programme, which means sustainability in Arabic and its Public Realm Design Manual (PRDM). In particular:

- Streets will promote walking, cycling and transit use to steadily reduce per capita carbon emissions relating to transport;
- There will be an increase in efficiency of the transport network through a decrease in vehicle idling and vehicle kilometres travelled to reduce Abu Dhabi's carbon footprint and protect natural resources;
- There will be shade provisions in the public realm to reduce ambient temperatures and increase pedestrian comfort;
- Street design will encourage targeted use of shade, landscaping and efficient irrigation to reduce the urban heat gain effect and water consumption;
- Streetscape shall be designed to use irrigation water efficiently. Use of water conserving native trees and plants and xeriscaping shall be applied; and
- There will be a reduction in water requirements for irrigation and water features and in the use of groundwater and desalinated water along streets, through the use of more sustainable sources such as treated wastewater;



A study carried by the UPC, in collaboration with all major stakeholders, has highlighted that significant cost savings that can be achieved through the use of the USDM standards when compared to the previous practice. Narrower cross-sections advocated by the USDM will generate lower construction costs, significant land savings, lower maintenance costs and a series of non-quantifiable benefits (for example more liveable and walkable communities, potential increase in land use value as a result of higher business turn-over, economic development and tourism, decrease in traffic-related injuries, health benefits and less emissions as a result of increased rates of walking and cycling, etc.)

Summary

In conclusion, the USDM embodies the principles of evolving models of planning practice. It offers a flexible approach that can be scaled to the size and context of the project. It is inherently sustainable, as a result of the Estidama principles the Manual is based on, and approaches street design in a holistic manner through its design guidance for all areas from 'plot to plot'. The USDM fits seamlessly with all other UPC policies, standards and guidelines to ensure a comprehensive, complementary and holistic approach to street design. Ultimately, the USDM and Online Tool are incredibly practical, yet powerful tools that work together to support a paradigm shift across the Emirate's urban areas from networks of car-dominated streets to context-sensitive, multi-modal urban streets.

3. Meeting the Selection Criteria

Content

The USDM guides the transition of Abu Dhabi's streets towards a more multi-modal, walkable, low-carbon future. By integrating all components of planning and design of urban streets into one all-encompassing Manual, Abu Dhabi has developed a clear direction for urban development.

The USDM is one of several tools created by the UPC to implement the 2030 Vision for Abu Dhabi and to realise Complete Sustainable Communities (communities which meet the needs of today's residents, yet are flexible enough to meet the changing needs of future generations). The UPC has created a suite of tools comprising complementary regulatory requirements, policies and manuals - including the USDM - which all focus on specific components of the community, yet work together to plan safe, secure, well-connected and culturally sensitive communities that seamlessly integrate sustainable homes, streets and public spaces.

At the heart of the CSC initiative lies 'Estidama', the UPC's sustainability programme, which is based on four equal pillars: environment, society, culture and economy. This ensures a truly balanced approach to sustainable planning, bringing long-term benefits to residents and visitors without sacrificing the Emirate's natural environment.

The CSC initiative highlights the UPC's holistic and strategic approach to community planning. It is an excellent tool to engage with communities to explain how the UPC intends to improve the quality of life for residents, at a policy level, to enhance the way that they live and work, the way they move around and improve their overall health and wellbeing. As part of a suite of policy, standards and guidance documents, the USDM and the Online Design Tool are excellent tools to engage, inform and educate all stakeholders on best practice street design.

In time, the USDM and the CSC initiative will improve the lifestyle and living standards of all residents, ensuring community developments and revitalisation plans are innovative and sustainable.

Process

The USDM was developed by the UPC as a collaborative effort involving key stakeholders including the Department of Transport, the Department of Municipal Affairs, Abu Dhabi Municipality, Al Ain Municipality, Western Region Municipality, Abu Dhabi Police, Abu Dhabi Civil Defence and Health Authority Abu Dhabi. Through regular meetings and coordination, the UPC worked to build consensus between the various government agencies and stakeholders.

The updated version of the USDM incorporates over 300 suggestions and official comments that were raised by stakeholders during the first two years of the Manual's implementation. Many examples in the USDM v1.1, including the 'standard' details, are taken from places that successfully implemented the USDM standards since January 2010 onwards.

Over the following years, one of the most important applications of the USDM will be the regeneration of existing streets in the Emirate, especially in areas with significant pedestrian activity, such as downtown areas and residential neighbourhoods. For this reason and as explicitly requested from stakeholders, a new detailed section has been added in the USDM 1.1 on the retrofit of existing streets and junctions.

Monitoring and post-evaluation studies are regularly carried out by the UPC in collaboration with all major stakeholders including, for example, the performance evaluation of the redesigned Sheikh Zayed Street in Abu Dhabi and the financial evaluation of building new streets or retrofitting existing ones using the USDM standards. The statistics from the studies will be incorporated into the UPC's CitySense initiative; a series of quality of life indicators currently under development.

Innovation

The innovation of the USDM lies in its new holistic approach to the planning and design of all urban streets in Abu Dhabi. A new multi-modal integrated design process, new concepts such as 'Context Sensitive Solutions' and 'Complete Streets', new design standards to reduce vehicular speeds and create a safer environment for the most vulnerable road users have been introduced in the USDM.

The USDM gives designers the tools to ensure that that all urban streets are designed appropriately for their surroundings and that all the street elements from plot to plot are in the right place and are the right size for the context.

The Online Design Tool complements the new version of the USDM and provides a simplified resource for designers to quickly make basic design decisions about the composition of typical street plans and cross sections. The Free Design allows all users around the world to create street plan views and cross-sections according to different standards and regulations.

Sustainability

The USDM is not a standalone project; it is part of a continuous programme implemented by the UPC, in collaboration with other Government agencies, to ensure the sustainable evolution of the Emirate in order to achieve Vision 2030.

Since its first version in 2010, the Manual has been updated in 2012 and the USDM is complemented by continuous implementation, monitoring, evaluation studies, training, etc.

Over the following years, the USDM will be used in the regeneration of existing streets in the Emirate, especially in the areas where the planned Metro, tram, railway and bus routes will be implemented and in all revitalisation programmes in downtown areas and residential neighbourhoods. For this reason the USDM is a truly sustainable on-going programme that can be updated and revised as needed.

About the UPC

Created by Emiri Decree in 2007, the UPC is the agency responsible for planning Abu Dhabi Emirate's urban environments. The UPC is chaired by His Highness General Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi, Deputy Supreme Commander of the Armed Forces and Chairman of the Abu Dhabi Executive Council. The UPC's website is www.upc.gov.ae/en and the USDM can be downloaded from <http://www.upc.gov.ae/template/upc/pdf/USDM-Manual-English-v1.1.pdf>. The free USDM Online Street Design Tool can be accessed from http://usdm.upc.gov.ae/usdm_online_tool/USDM_Online_Tool.html

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