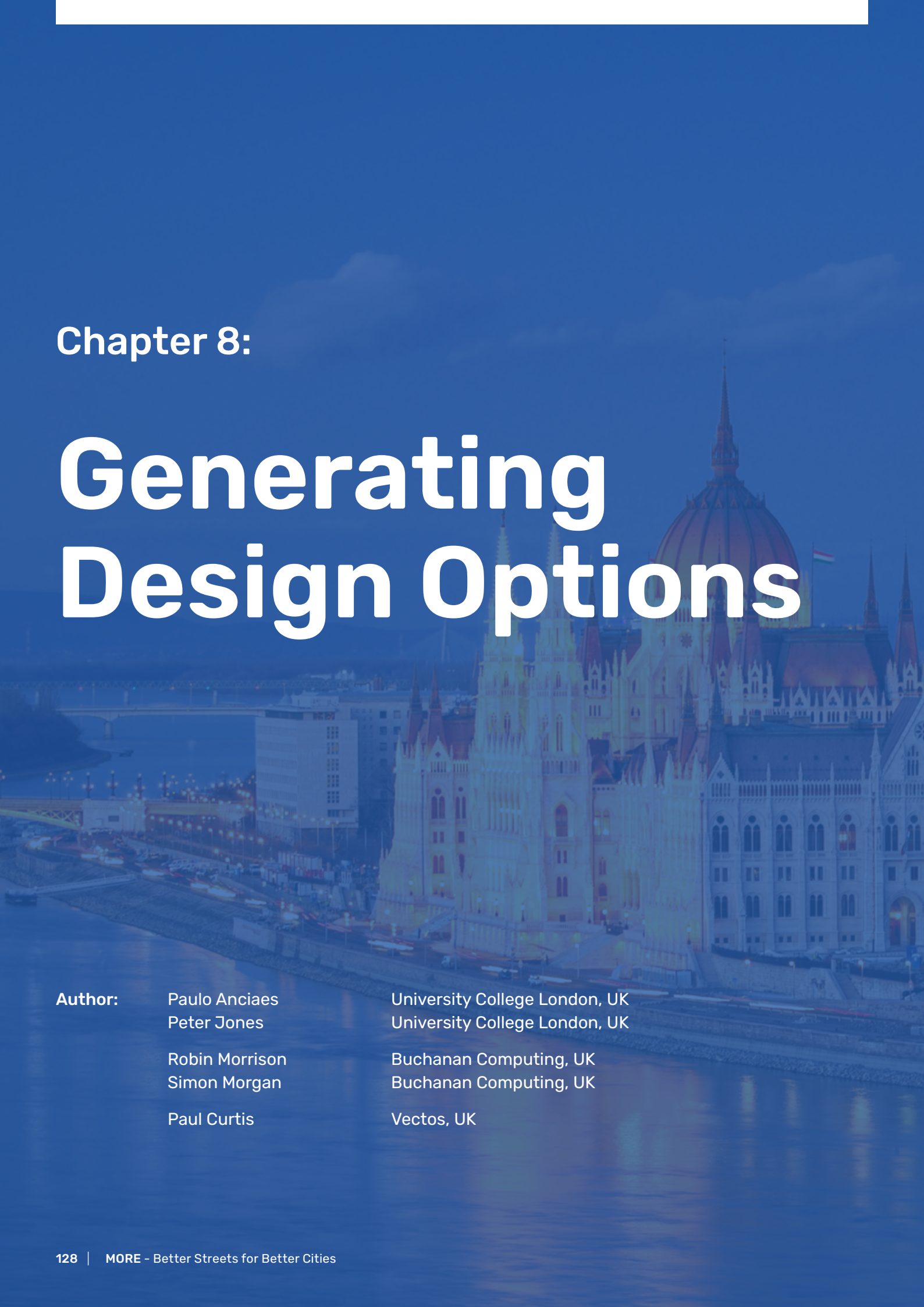
Better Streets for Better Cities:

A handbook for active street planning, design and management

MORE
Multimodal Optimisation of Roadspace in Europe



Chapter 8:

Generating Design Options

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8.1 Introduction

Using examples from the **MORE** cities, this chapter describes and illustrates the process of applying the **MORE** option generation and co-creation design tools (as introduced in Chapter 5) to develop design options. It also covers post-appraisal stakeholder engagement.

8.2 Step 4 - Generate design options, using option generation tools

Of all the stages of the street design process, option generation is the one that traditionally has received the least attention.

The aim of the two **MORE** Option Generation Tools – developed by UCL - is to assist engineers and planners to explore feasible designs for streetspace allocation, taking into account the needs of all street users and the range of local policy objectives.

There are two option generation tools:

- **Streetspace Interventions Tool**, which provides a digital library of interventions that can address specific users' needs and support particular policy objectives
- **Street Design Tool**, that looks at street cross sections and the different permutations of layouts that would accommodate a given set of space requirements.

Streetspace Interventions Tool

The Streetspace Interventions Tool provides broad options for types of interventions to redesign, allocate, and regulate streetspace, to meet defined user needs and policy objectives. Figure 8.1 shows a selection of categories of possible interventions resulting from such a search.

Upon selecting one of these interventions, the user is provided with more detailed information, examples, and evidence on how the intervention affects the movement and place characteristics of the street and addresses wider policy objectives. The tool describes 210 possible interventions, in similar detail.

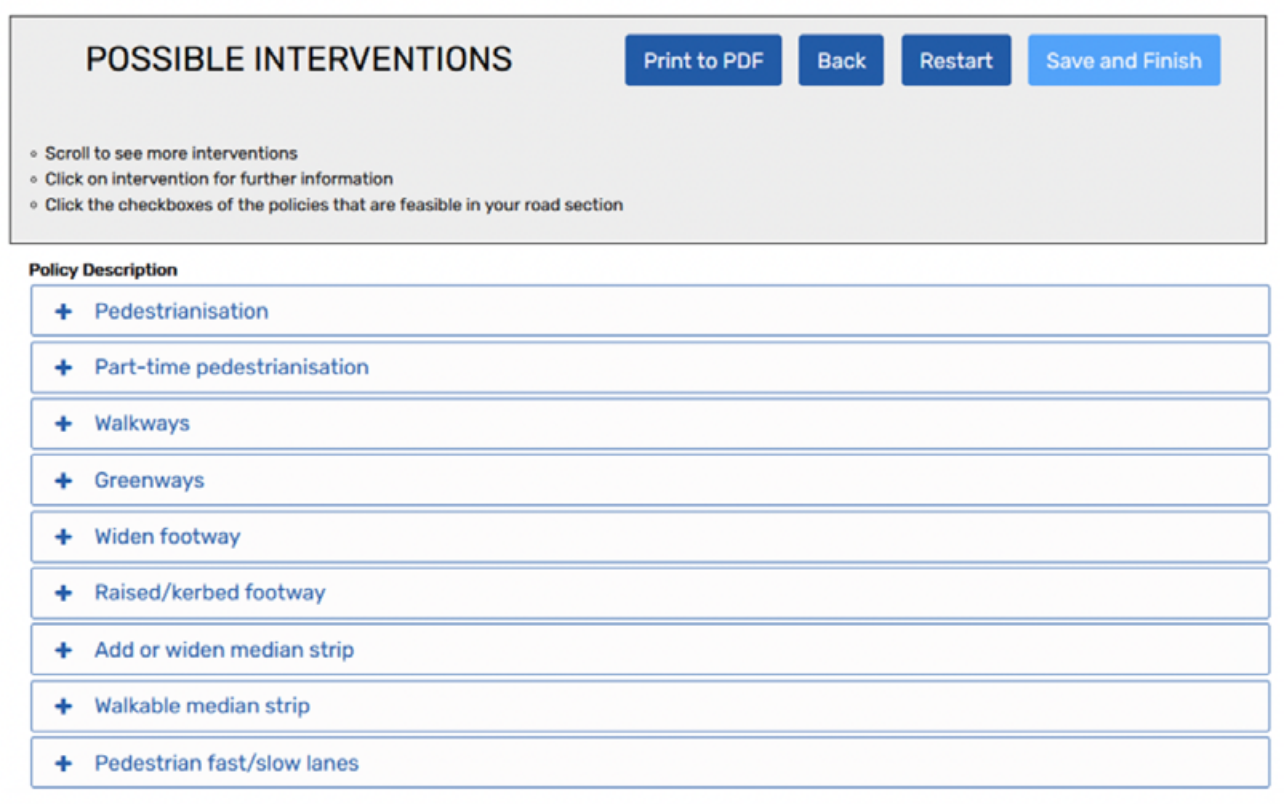

Figure 8.1. Example of output from Streetspace Interventions Tool

Step 4 in action: Streetspace Interventions Tool in Constanta

When this tool was used by the municipality of Constanta, a policy option to reduce the number of traffic lanes was deemed feasible and in line with city objectives for the area. When selected in the tool, additional information was provided about the option, as illustrated in Figure 8.2.

Another page in the tool then provided additional detail on the potential impact on street uses resulting from such a policy intervention, in comparison to the status quo. These impacts are shown in Figure 8.3 and categorised as positive, neutral or negative.

Finally, the tool provides details of the positive and negative impacts from reducing traffic lanes on the overall policy objectives of the city, such as lower speeds, more active travel, improved air quality. These are shown in Figure 8.4.

Overall, this tool gave Constanta municipality a high-level overview of the likely impacts of a potential range of policy intervention changes that were cross-referenced with the local SUMP objectives, to assess which were suitable for taking forward into the street design process.

Figure 8.2. Reduced number of traffic lanes – general description

— Reduce number of traffic lanes

Description | Examples and evidence | Effect on street uses | Effect on policy objectives

Likely impact of intervention on street uses

Compared to: Keep same number of lanes

Street user	Street use	Impact	Reason
Pedestrians	Walk	+	Released space to widen footway or walkable median
	Cross the street	+	Shorter crossing distance, slower traffic speed
	Stroll	+	Released space to widen footway or walkable median
	Sit (street furniture)	+	Released space to widen footway or median
	Sit (outdoor cafe)	+	Released space to widen footway or median
Pedestrians with restricted mobility	Walk	+	Released space to widen footway or walkable median
	Cross the street	+	Shorter crossing distance, slower traffic speed
Cyclists	Move	+	Released space can be used for cycle lanes or tracks
	Park	+	Released space can accommodate cycle parking
	Rent (dock)	+	Released space can accommodate docks
	Rent (dockless)	+	Released space can accommodate rental bicycles
Micromobility users (scooters, skates, etc.)	Move	+	Released space can be used by micromobility vehicles
Bus drivers	Move	o	Removed lane may be general traffic one. Bus lanes unchanged
	Stop	o	No impact
Bus Passengers	Interchange	o	Removed lane may be general traffic one. Bus lanes unchanged
	Wait	+	Exposed to vehicles at slower speeds
Rail/metro/bus passengers	Interchange	+	Easier to cross to access bus stops
Car drivers	Move	-	Less space
	Park	o	No impact
	Stop	o	No impact
Car share users	Move	o	No impact
Motorcyclists	Move	-	Less space
Taxi drivers (inc. ride-hailing)	Wait	o	No impact
Taxi passengers (inc. ride-hailing)	Wait	o	No impact
Goods vehicles	Move	-	Less space
	Stop	o	No impact
Emergency vehicles	Move	-	Cannot easily pass traffic queues
Service vehicles	Move	o	No impact

Figure 8.3. Impact of reduced traffic lanes on street uses

— Reduce number of traffic lanes

Description | Examples and evidence | Effect on street uses | Effect on policy objectives

Likely impact of policy intervention on objectives

Compared to: Keep same number of lanes

Objective	Impact	Reason
Movement		
Increase number of trips	o	More trips by non-motorised modes, less by motorised
Reduce travel time	-	Delays for motorised modes
Increase travel time reliability	-	More probability of queues
Reduce congestion	-	More probability of recurrent congestion, less space
Improve trip quality	o	Better trips by non-motorised modes, worse by motorised
Achieve a more sustainable modal split	+	Discourages car travel, better conditions for walking
Place		
Facilitate place activities (e.g. people sitting)	+	Space released for place activities
Facilitate kerbside activities	o	No impact
Improve access to local buildings	o	No impact
Street operation		
Improve resilience (to weather conditions)	+	Fewer motorised vehicles. Scope to add greenery
Increase flexibility (to different road uses)	+	Narrowing can be achieved using movable structures
Wider objectives: economic		
Reduce costs of transport	o	Can be achieved with cheap movable structures
Promote local economy	+	Encourages more walking/cycling trips to shopping areas
Wider objectives: social		
Improve traffic safety	+	Lower speeds, less inter-lane movements
Reduce community severance	+	Shorter crossing distance, slower traffic speed
Increase personal security	+	Encourages more people on street, more passive surveillance
Promote physical activity/health	+	Encourages more walking and cycling trips
Promote social interaction	+	More space for social interactions
Promote social inclusion	+	Reduces car dominance. Streets better for children and elderly
Increase wellbeing	+	Reduces car dominance and encourages walking/cycling
Wider objectives: environmental		
Increase green space	+	Released space can accommodate green spaces
Improve air quality	+	May lead to less motorised traffic
Reduce noise	+	May lead to less motorised traffic
Improve visual environment	+	Less vehicle-dominance, more space can be for greenery
Protect soil/water and reduce flood risk	o	Less vehicle-dominance, more space can be for greenery
Improve local climate	o	Less vehicle-dominance, more space can be for greenery
Reduce energy consumption	+	May lead to less motorised traffic
Improve regional/global environment	+	May lead to less motorised traffic

Figure 8.4. Impact of reduced traffic lanes on meeting different policy objectives

Street Design Option Generation Tool

The Street Design Option Generation Tool generates streetspace allocation designs in cross section, combining different design elements. This is a very useful way of visualising how the width of the streets can be reorganised to accommodate types of street users and to provoke reaction from internal and external stakeholders in subsequent design workshops.

Step 4 in action: Road Design Option Generation Tool in Constanta

In the case of Constanta, the tool was used by the local implementation team to each arm of a major street junction, surrounded by a mix of land uses. The main objectives of the street redesign were to improve pedestrian movement and safety, and to create room for place activities and cycling, including some provisions for public transport service improvements.

The team identified the types of street uses that would be given space and tool then illustrates different permutations of how the street could be laid out, in cross section. Figure 8.5 shows the result of one of these exercises.

The tool was seen as a flexible way for municipal officers to work through different options for how the streetspace could be reorganised, in order to serve strategic objectives and tackle current challenges.

The results produced by the tools were considered in the design exercises and were further discussed in the co-creation design days and internal focus group meetings. This tool had a direct impact in the decision making process, with one design being slightly modified before being taken forward for modelling and further analysis.

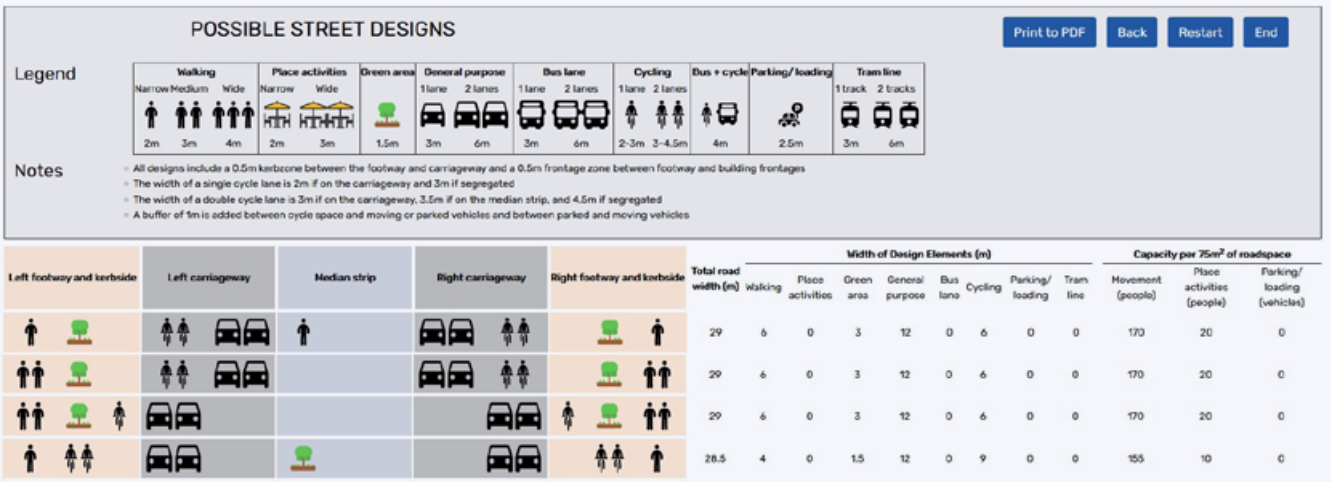

Figure 8.5 Constanta street design tool results for the left arm of the junction (I. C. BRATIANU BOULEVARD direction to A2 motorway)

8.3 Step 5: Co-creating comprehensive designs for your streets: Physical Design Toolkit and Linemap

Physical Design Toolkit – Blocks and Acetates

A physical design toolkit, composed of a set of block and acetates, was used to complement the **MORE** Option Generation Tools, enhancing the stakeholder engagement process. The blocks and acetates represent different street design elements that could be introduced on the street, to scale. This allowed groups of participants to try out different combinations of street design elements, layering over a street plan at a scale of 1:200 that showed the existing street layout and kerbside buildings.

It was used in a series of design days in several **MORE** cities (some were not able to trial this tool, due to COVID restrictions). Figure 8.6 illustrates a design day exercise in Malmö.

The physical toolkit includes:

- Coloured plastic blocks representing different fixed size street design elements, such as loading or parking bays
- Coloured acetates, representing longer, variable width, or non-linear items, such as bus and cycle lanes
- Coloured pens used to mark points of detail and add comments to the plan
- Coloured stickers that replace the blocks once a design has been agreed, in order to retail a record of the design created by the blocks; acetates could be glued to the plan.

Figure 8.7 shows the set of blocks, of varying size and colour.

This approach enables stakeholders (e.g. municipal experts, residents, business owners) to collaborate in the design process, via co-creation 'Design Day' workshops. Stakeholders are invited to these workshops to receive a briefing on current issues, traffic regulations, and legal scope for changes. They then produce designs using the blocks, acetates and maps, discussing how changes would mean trade-offs with other modes. This package was developed by UCL, who had previously applied a preliminary version in a public engagement exercise in the UK.

Once agreement is reached, the design is fixed using stickers and annotations, as shown in Figure 8.8.

These completed designs were then transposed by the next **MORE** tool, **Linemap**, to digitally represent the designs, cross-check them for technical feasibility and discuss suitability with transport planning experts and other stakeholders, in further workshops.

Figure 8.6. Design Day workshops using Blocks and Acetates

Figure 8.7: Physical Design Toolkit – Blocks

Figure 8.8. Fixing the agreed design to the street plan

Our approach enables stakeholders (e.g. municipal experts, residents, business owners) to collaborate in the design process, via co-creation 'Design Day' workshops.

LineMap

LineMap is an application for creating and managing road marking designs. Using a library of national standard road markings developed for each of the **MORE** cities, **LineMap** can create CAD (computer aided design) level detailed representations of markings. A high-level view of any design can be created using blocks of colour, as shown in Figure 8.9.

The **LineMap** application is hosted in the Buchanan Computing Cloud and provided as 'software as a service'. The application can be accessed via any modern browser. Once logged in, all LineMap functionality is accessed via a single Ribbon and Map based interface.

An interactive map displays background maps of the streets and roads, together with a layer for each design created. The **LineMap** Road Marking Explorer (Figure 8.10) allows designers to choose the street use block or marking to add to their design. The library of possible road markings is show in the left margin.

Designs can be created as blocks matching the decisions developed using the physical **Street Layout Toolkit**. They can then be converted into accurate road markings where further detail can be added such as direction arrows and text as shown in Figure 8.11.

The digital blocks and markings designs can also then be published back onto **Traffweb** for design feedback with broader stakeholders and the public.

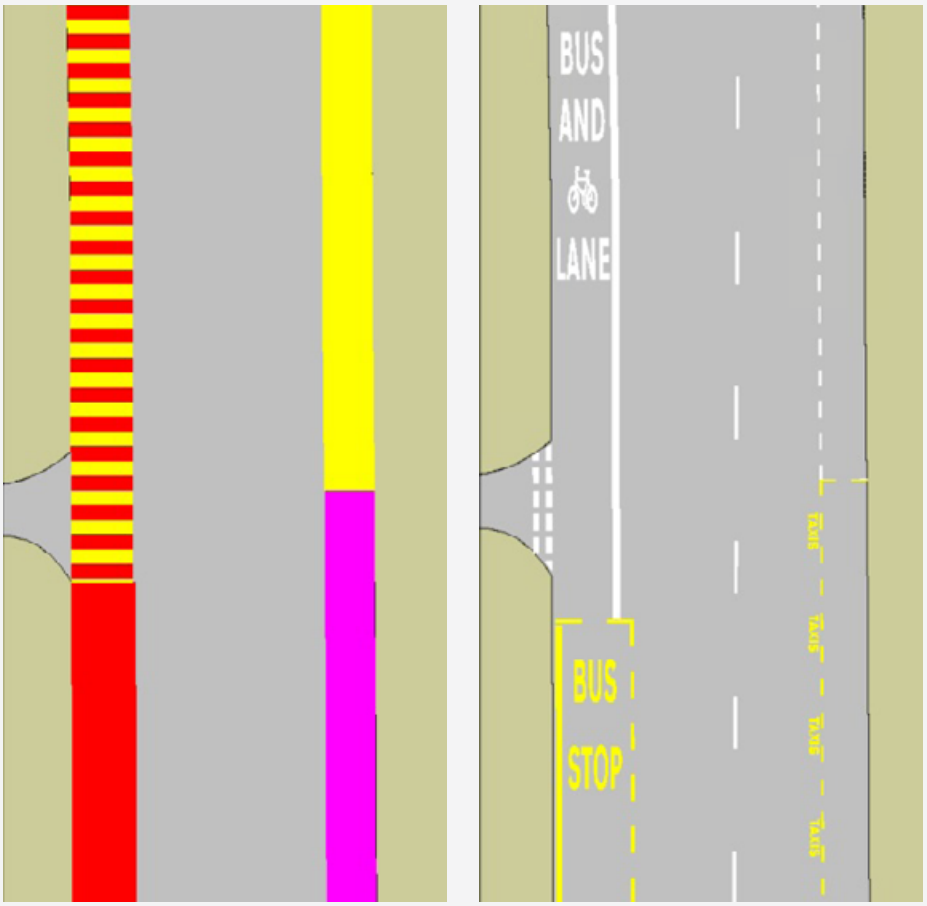

Figure 8.9. LineMap showing high level road marking design

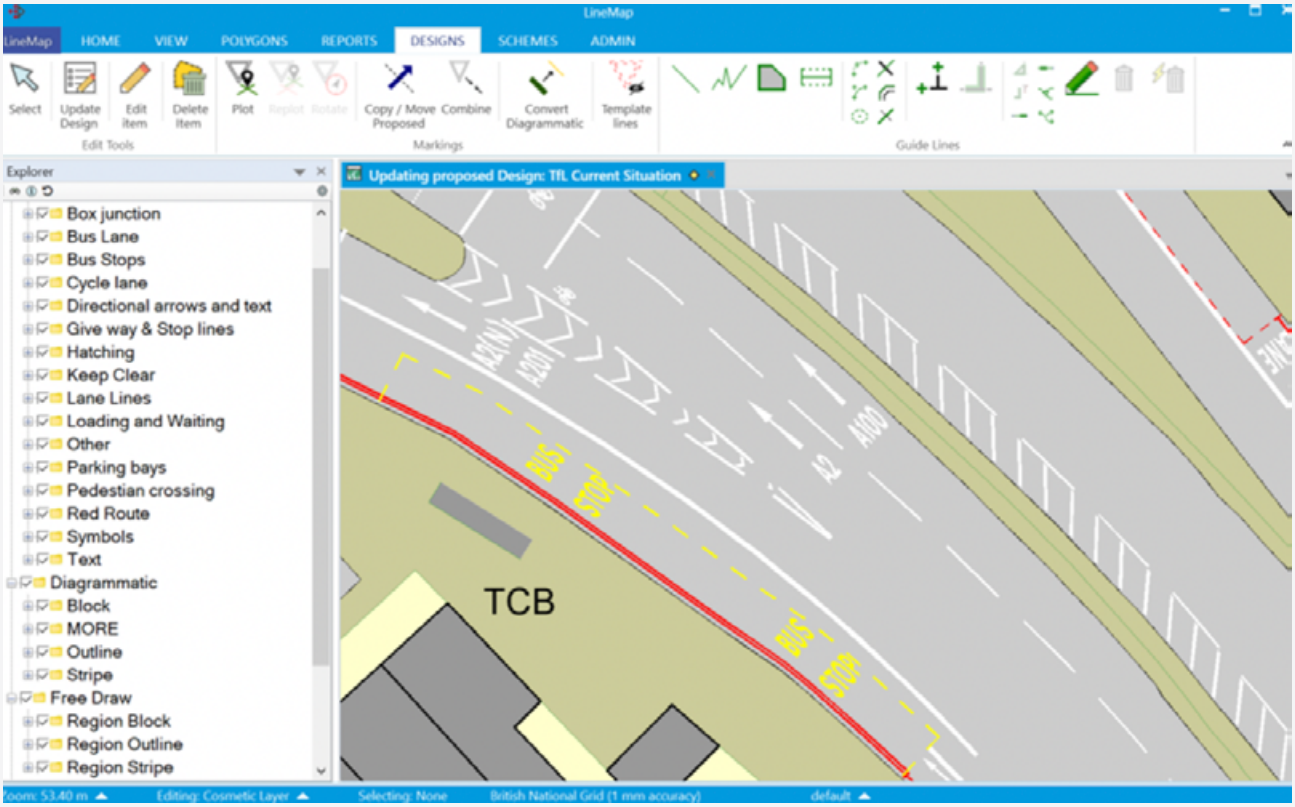

Figure 8.10. LineMap Road Marking Explorer – library of possible road markings

Figure 8.11. LineMap Road Marking Explorer - accurate road markings

Step 5 in action: Applying designs to streets in Malmö: Physical Design Toolkit

The process of using blocks and acetates, supported by **LineMap**, was carried in most **MORE** cities, including Malmö. In addition to the extensive dialogue conducted inside the municipality, the city also engaged with its citizens.

While COVID-19 made it difficult to gather citizens in indoor activities, it was possible to use the tool in an outside environment. Daily activities took place in selected reference areas of the city. To make the blocks, acetates and maps easy to use and move between selected 'reference areas', a cargo bike was adapted into a "station" as shown in Figure 8.12.

In preparation for the street redesign activities, maps showing the street in the local area were printed and also laminated to withstand rain. During the activities, 2-3 persons with experience with citizen dialogue and/or traffic and urban planning were present from the city administration.

Comments regarding changing the street and surrounding areas were recorded, although it was clear that there was not a tradition towards creative citizen participation. Rather that the public was used to being engaged only to present the results already determined by planners and politicians. Nevertheless, the blocks and acetates worked well and demonstrated how much progress is still needed for true co-creational street design.

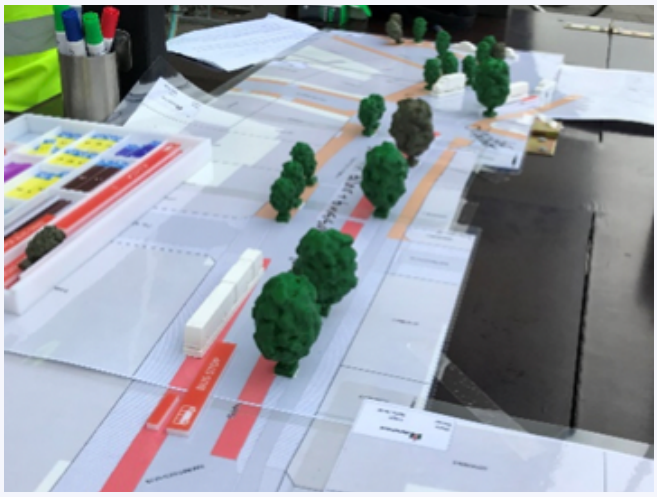

Figure 8.12. Physical toolkit public engagement, used together with a cargo bike

Step 5 in action: Applying designs to your streets in Lisbon: LineMap

In Lisbon, **LineMap** was used to test the solutions proposed in the Design Days, where blocks and acetates were used, by importing them in digital format for professional analysis.

Figure 8.13 shows an example of transposing a design created in the workshops into **LineMap**, with larger footways than current and a cycle lane on each side. It shows that the design implies a hard trade-off with available space for car traffic lanes.

As such, tweaks could be made digitally in **LineMap** to restrict the increase in footway width slightly as a compromise.

Following the Design Days and translation into **LineMap** and further refinement work by the municipality, Lisbon decided to take forward four street designs for modelling.

One such design is summarised in Figure 8.14 and reflects a scenario that prioritises pedestrians, bus and greenery.

Figure 8.13: Example of analysis using LineMap

Scenario 4: Precedence to pedestrians, bus and greenery

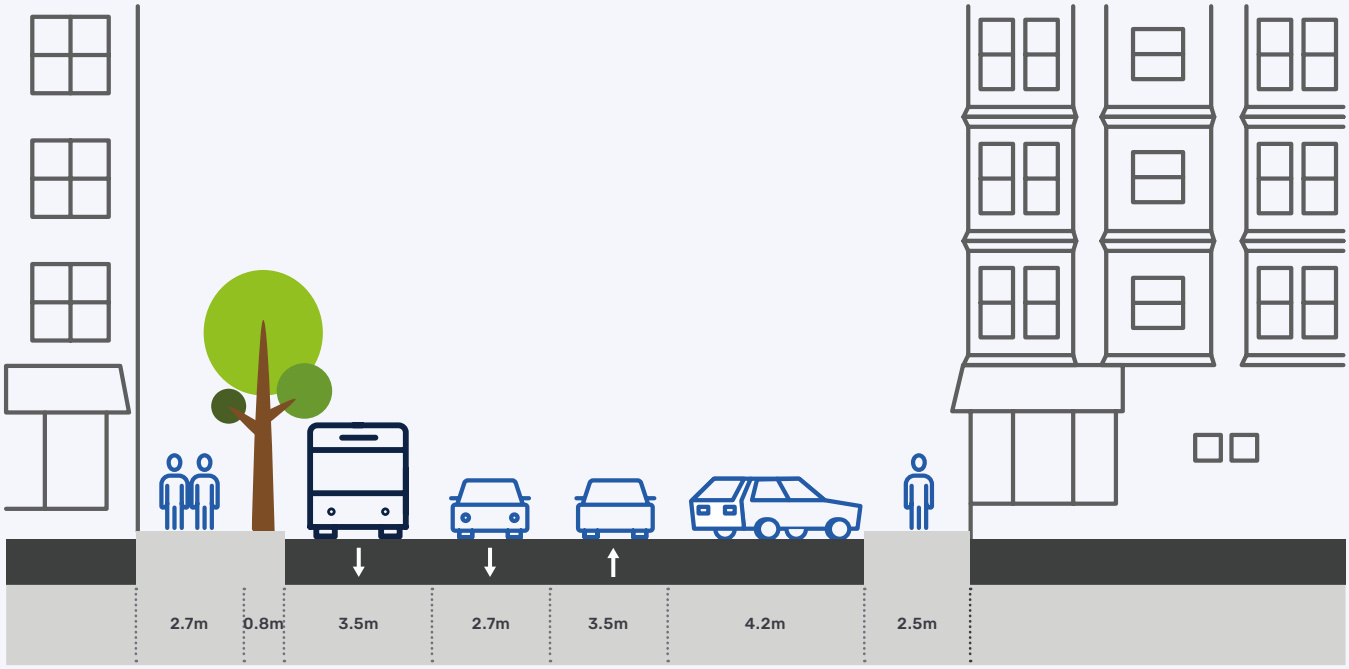

Figure 8.14. Selected Lisbon street design for modelling

Proposals:

- Transform right lane in the east to west side in a bus lane.
- Remove one lane in the west to east side
- Significant sidewalk enlargement and plantation of trees in one side
- Remove parking from one side and transform parallel parking in diagonal parking in the other side

Expected negative impacts:

- Road capacity should be enough for efficient traffic flow in both ways in the morning peak, but maybe is not enough at afternoon peak.
- Parking would remain in the side with lower traffic volume, which may induce traffic volume in neighbouring streets.
- Diagonal parking may lead to some accidents initially
- The buses will have a positive impact, although there are several right turns, so those spaces may be occupied by other vehicles.