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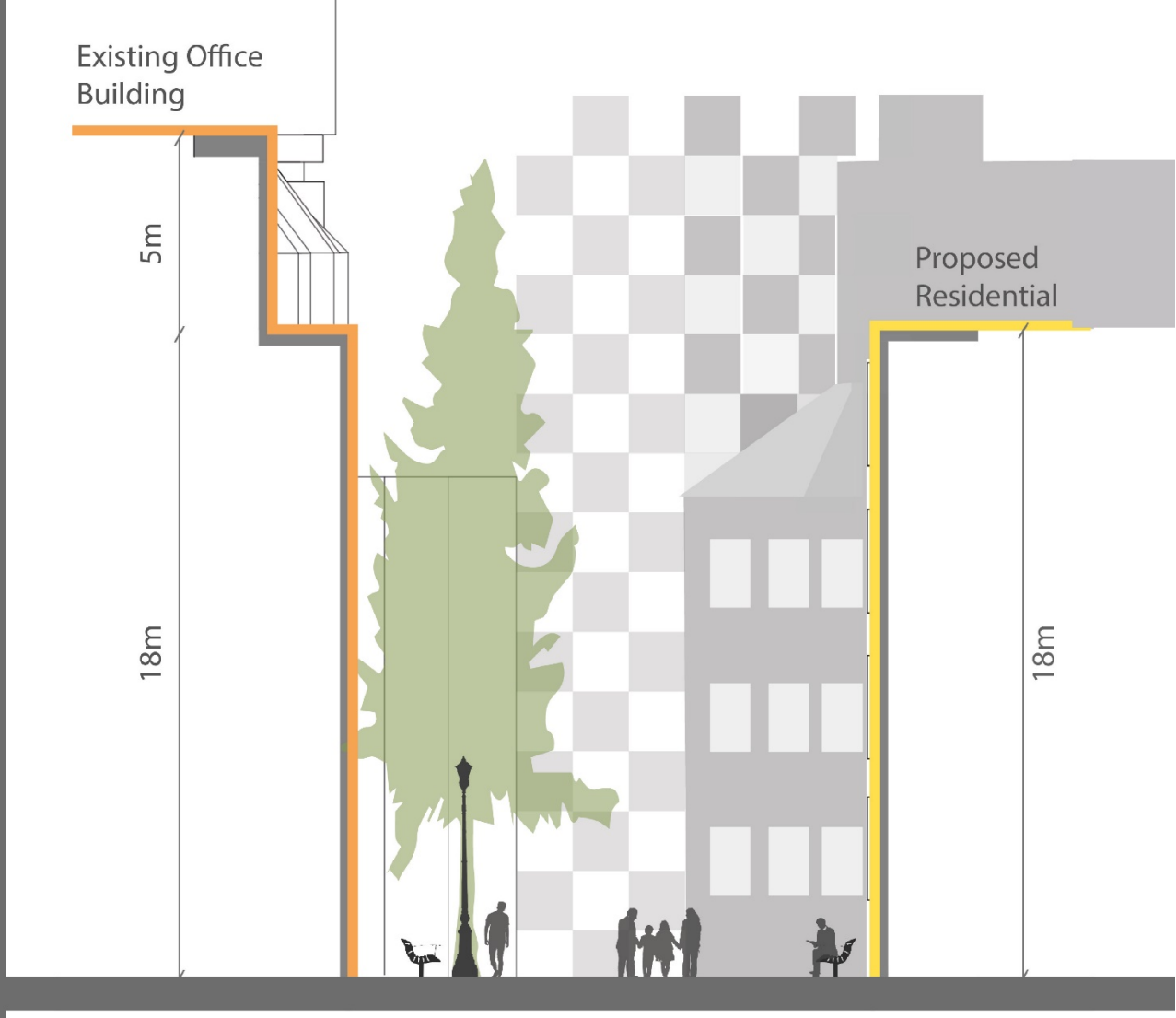

MANCHESTER | URBAN DESIGN | LAB

MUD-LAB Toolkit

Cross Sections

Cross sections are very effective tools to explore the 3D dimension in a 2D set -to-scale way. In this handout you will be introduced to urban cross sections. The handout aims to teach you how to do cross sections, why cross sections are important and how to present them. It finally gives a practical example to illustrate how the cross section may represent an essential element in the design process.

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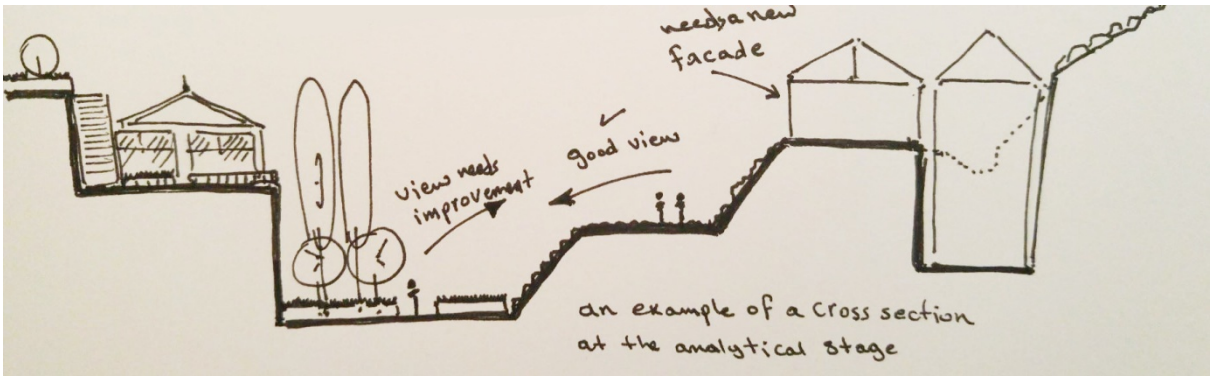
1- INTRODUCTION

Urban cross sections represent a vertical plane cut through the object. They are used to describe the relationship between different levels of buildings, spaces, topography, infrastructures and squares, especially when it is difficult to show it from the layout only. In the section view, everything cut by the section plane is often shown as a bold line with a solid fill to show objects that are cut through, and anything seen beyond generally shown in a thinner line.

Cross sections in urban design are usually used during the analysis stage, the design stage and the presentation stage.

In the analysis stage, the aim is to show how different levels might affect your design, especially building heights, vistas and how to connect different levels. It is basically a description of the existing condition of the space and how this might affect your design. The section here can be a hand drawn with rough and fast lines.



Have a look at the example above. This basic sketch cross section here describes the existing condition and identifies the good and the bad views. It suggests that the view from the bottom to the top of the hill needs improvement, which informs the design stage (changing facades, planting selected trees and flowers, adding steps to the slop...etc.). This particular cross section is not meant to be to scale, but it is a brain storming tool and a way to make sense of the space under study.

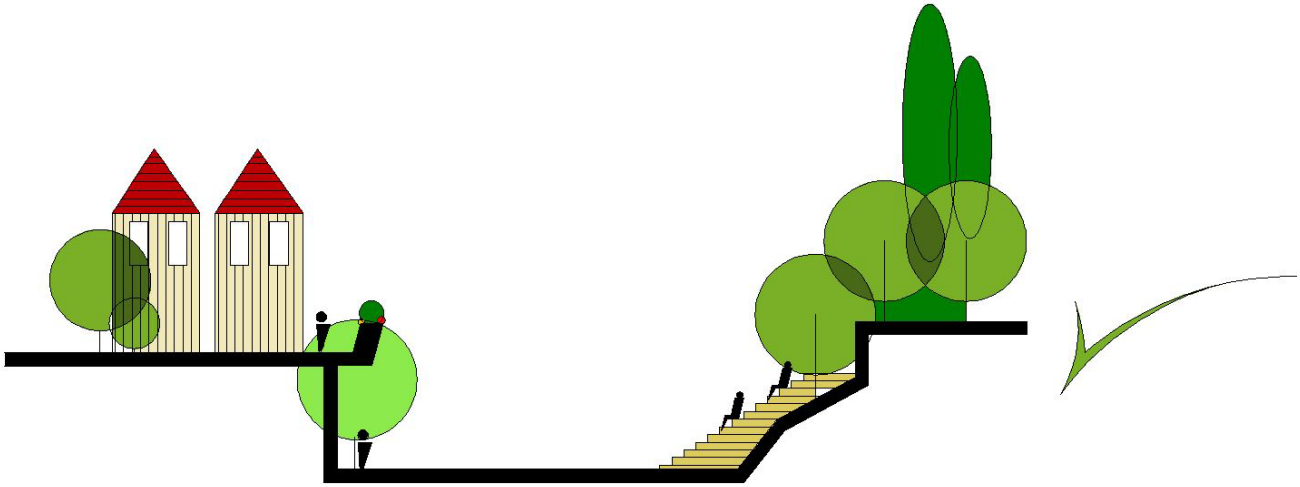
In the design stage (see below), the cross section is neater than the analysis stage and it should be more accurate. You might show more than one option of different arrangements of objects and the role the different levels can play in these options. It can be a neat sketch-like presentation with colours and details, and sometimes it can be used in the final presentation stage to show how the design developed.

In the example above (will be explained in more details later), the section is coloured, and details are added as they represent important elements of design. Although it is not 100% accurate, it takes dimensions into consideration and ratios are logical. Dimensions here are important as different elements (the tram, the landmark, the street...etc) are put together to structure the space. You don't want to discover later that the tram does not fit, or the street cannot be wide enough as you initially designed!

In the presentation stage the cross section should be accurate with precise dimensions. It shows your final design. It should be done by either software like CAD or by hand if you have good presentations skills. The example below is the CAD version of section above.

2-SELECTING CROSS SECTIONS:

To make it simple, your cross section should basically contribute to the design story you are telling. You may select an important space in your design (the main square, a landmark area, the main street...etc) to show the relationship between different objects in that space. The cross section should be informative and so you must select a sensible scale that shows details. Rather than simply doing a small scale cross section of the whole project that barely shows anything, you should present multiple selected cross sections of bigger scale.



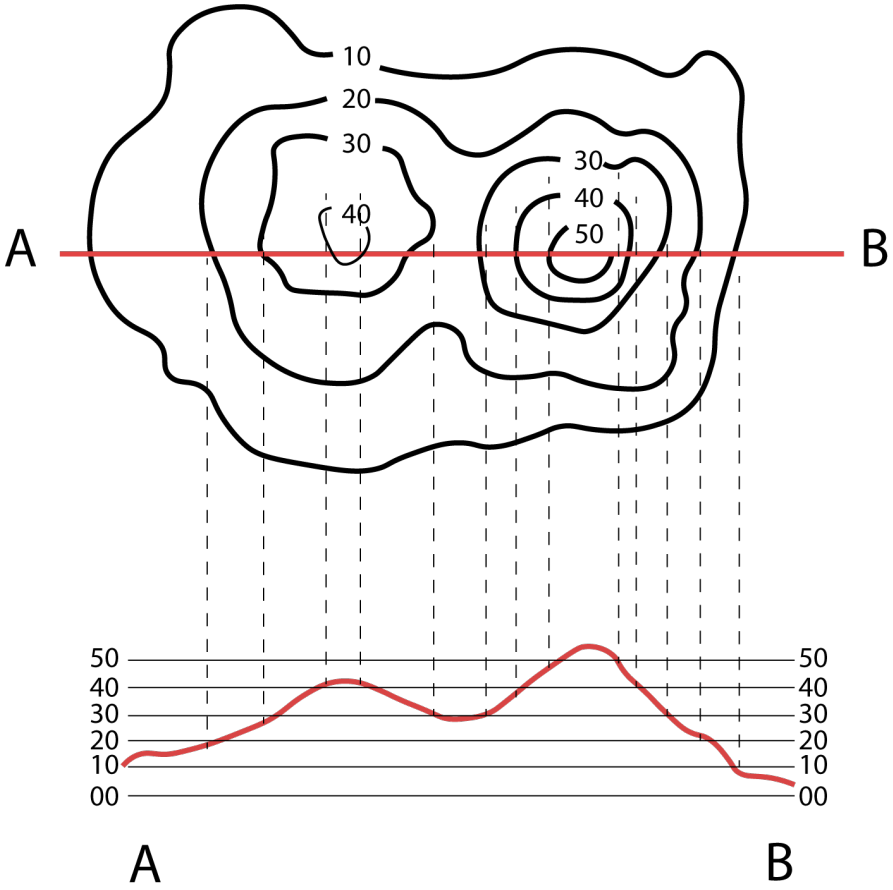
Zoomed in cross section to show a particular space.

Multiple cross sections on one graphic to show area profiles along the path. Source: Cone and Partners. https://www.coenpartners.com/movement_on_main.html

3-HOW TO DRAW A CROSS SECTION

Cross section principles are simple. The first thing you need to do is obviously selecting your cross section, based on the criteria mentioned above, and drawing the section line AB on the master plan. The section line should be named and arrows should be added to show the direction we are looking at.

What you need to do to draw the land line is basically identifying the points of known levels on the layout and pulling them on the section.

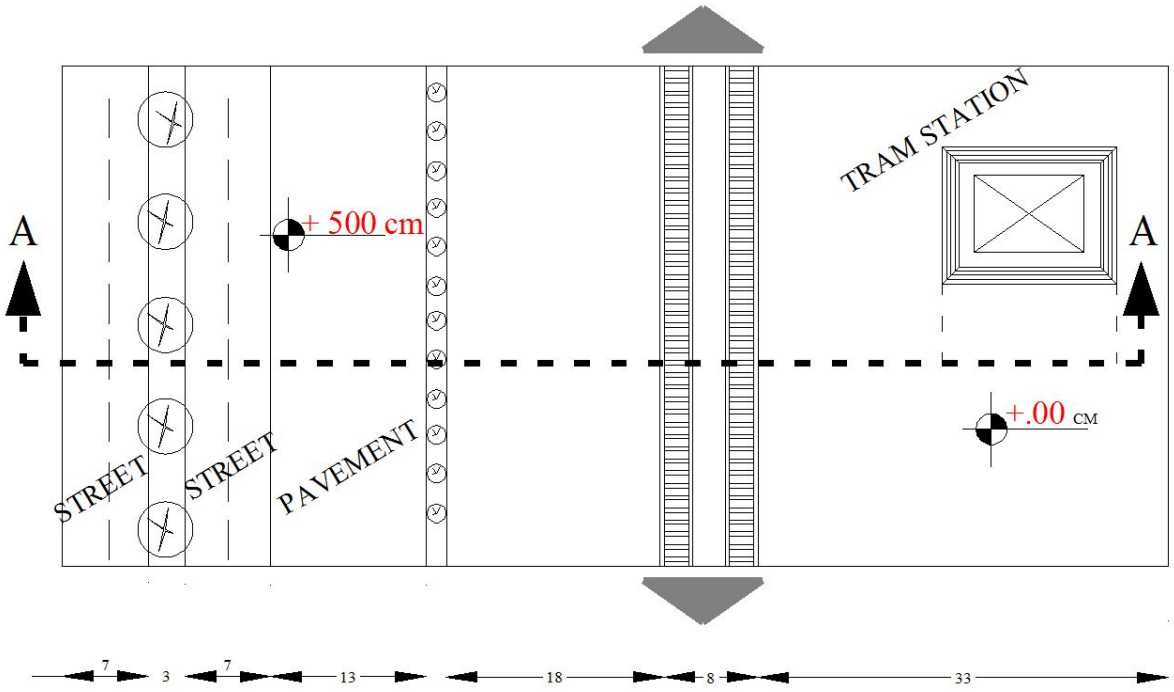


In the example above, the contour lines show the different levels of the hill on the layout (10,20,30,40,50). A cross section line AB is drawn. The points of known levels are pulled to the cross section profile below. Then every point was assigned to its value in which the 50m points are at the top of the hill, whereas the 10m points are at the bottom of the hill.

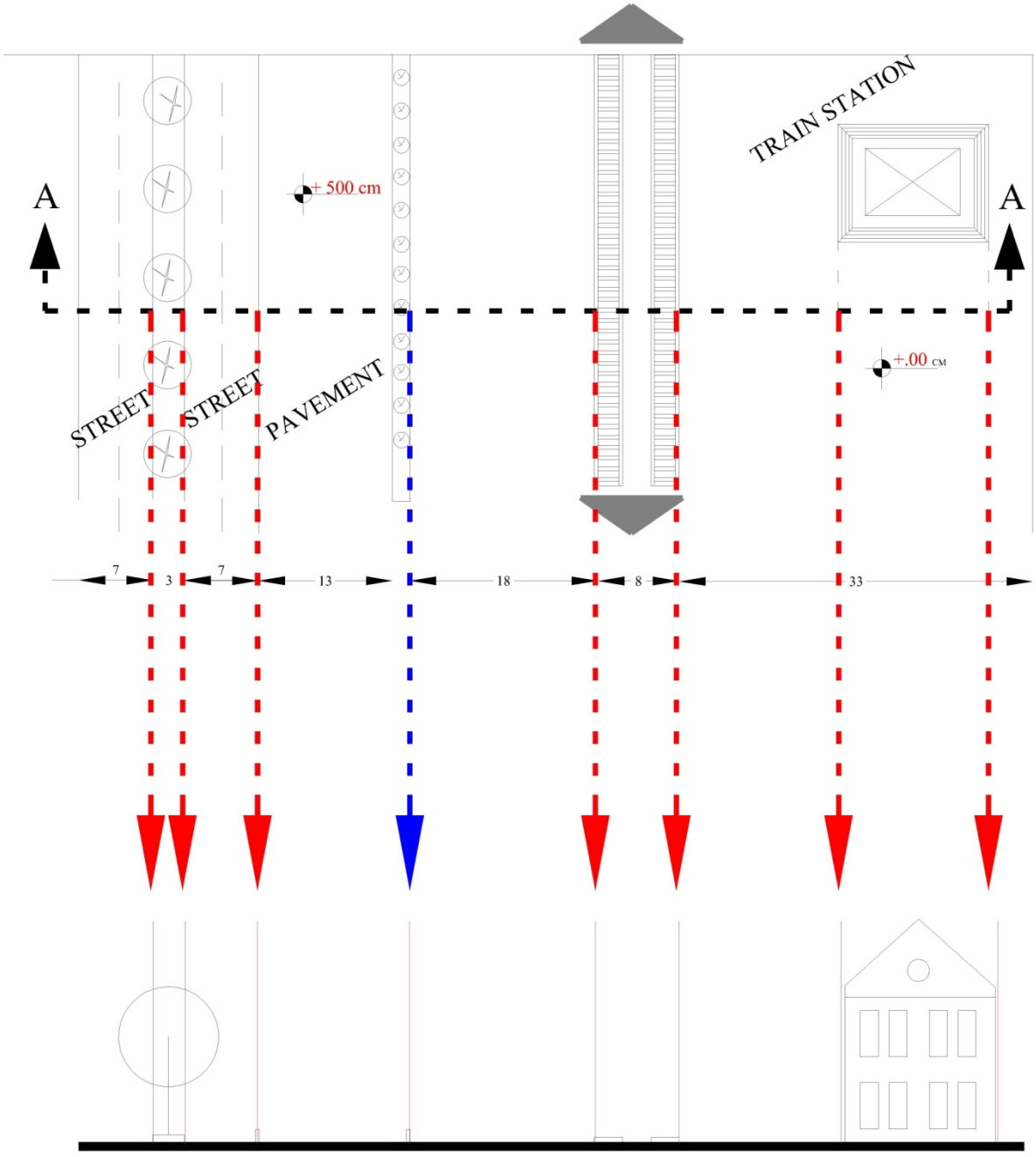
4- EXAMPLE OF USING CROSS SECTIONS IN THE DESIGN PROCESS

The purpose of this section is to make you think about the cross section as an essential part of your design process. It is not unusual for designers to start the design from the cross section. In this section, we will do a simple tram station design starting from the cross section. We will then show how the ''analytical'' cross sections become informative and how it develops from the analysis stage, to the design stage and finally the presentation stage. Please remember that cross sections work hand in hand with you other analysis, however, we are showing them as stand alone tools for the purpose of simplifying the tool.

The land is shown below. It has two levels. The upper level (+500cm) contains a wide pavement and a dual carriageway. The lower level to the right (+-0.00) contains an old building and the tram line as shown below.

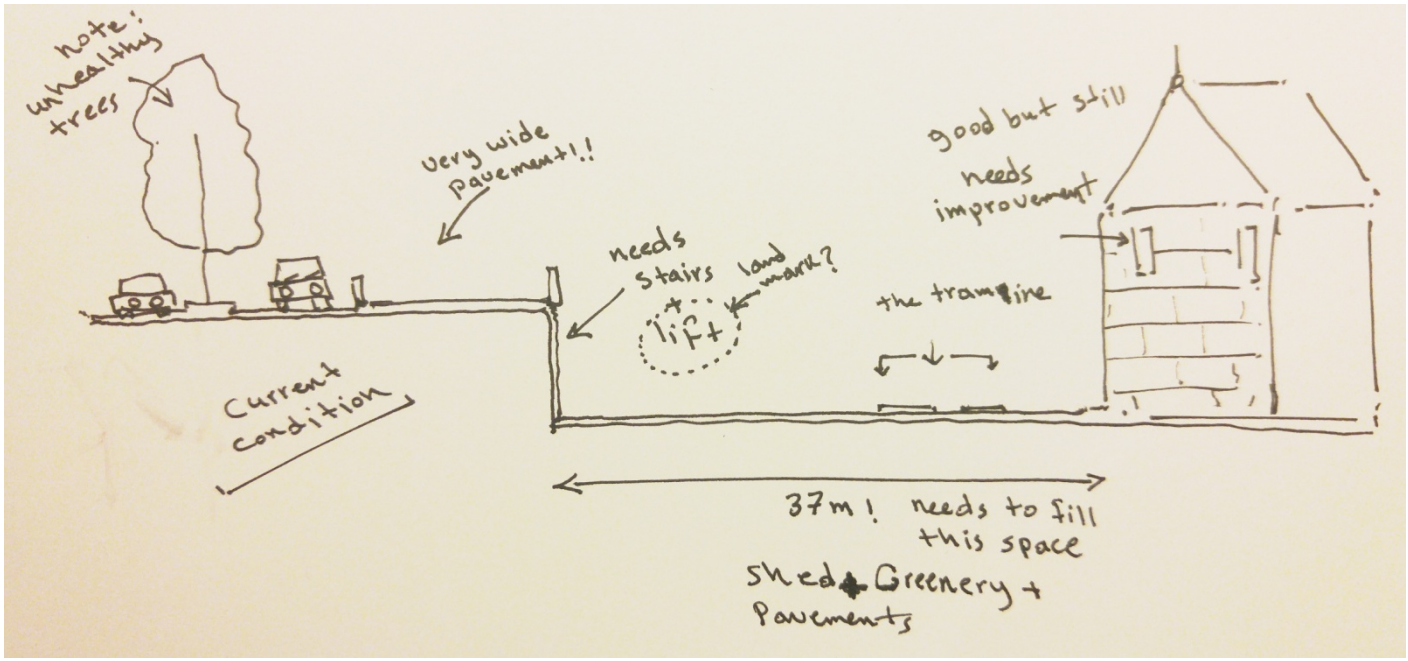


The land topography (the existence of two levels) encourages us to do a cross section to start analysis. The first thing to do is drawing the land profile. You can do this by hand or by CAD. First, draw a strait land line .All the objects on the layout (the borders of the building, the tram lines, the edge of the upper level, the street...etc) should be pulled down to the land line. They should appear as vertical lines on the cross section.



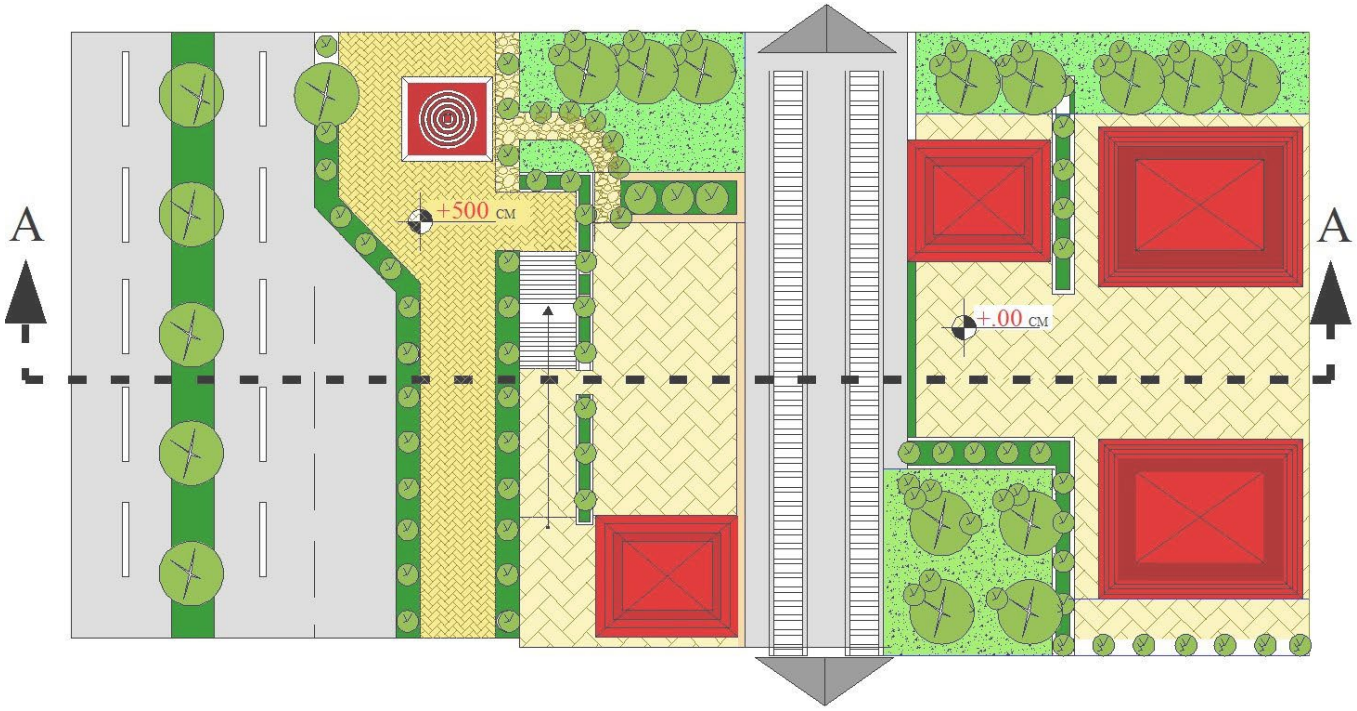
Now we need to identify the height of the objects. The first thing in this stage is drawing the correct land line with the correct levels. The blue arrow above shows the point where the land level changes from +-0.00cm to +500cm. As shown on the figure below, measure 500cm (i.e. 5cm in the 1/100 scale if you are drawing by hand) on this vertical line and draw a point. From this point draw a horizontal line heading left. This is the +500cm ground level.

Now let us draw a sketch cross section for the purpose of analysis. A quick cross section sketch is capable to help us to think about the two levels, the relationship between them and the height of the building. At a first look we can see that the existing condition is full of ''lost spaces''. As explained on the sketch below, the cross section shows that there is no relationship between the two levels and so stairs and a lift are suggested to overcome the barrier. Trees are unhealthy and they need replacement. The building is fine but needs improvement. It is noticeable from the cross section that the pavement is way too wide and it does not give a sense of enclosure. This needs attention. The station area to the right is also very wide and we need to think about functional and aesthetic objects to fill the space. In summary the space is dull, wide and not functional.



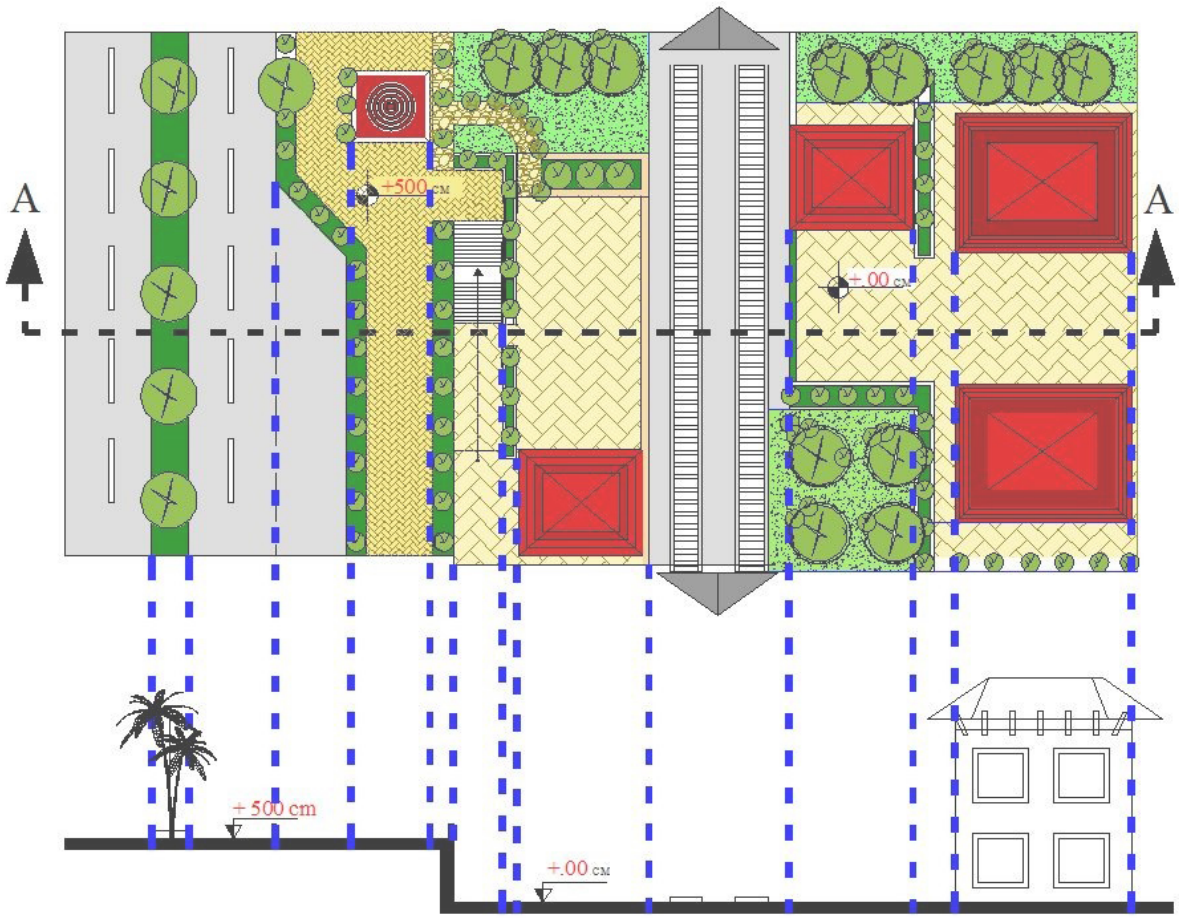
The sketch below is informed by the analytical cross section. It tries to overcome the barrier between the two levels by adding starts and a lift. It adds a landmark (functions as the lift house and a clock) to emphasize the higher level. In addition it adds trees of different heights to make the connection between the two levels more gradual, to fill the space, make it more attractive and to add colours. It also adds a large shed with a roof that is close in its design to the landmark's and the building's roofs. On the street side, it is suggested divide the wide pavement into three sections, a parking area for loading, green area to create a path and a pedestrian path. This shall make the existing wide pavement more organized, more functional and more appealing as it gives a sense of enclosure.

Techinaclly, the skecthc was done by hand using a Pilot Eye Ball pen and pencil colours. Refere to the sketching handout for more sketching techniques.



The cross section represents a design concept in this example. The suggested design elements should be organized and applied on the layout as shown above.

The next step is creating an accurate cross section with the new added elements. Follow the same previous steps explained before.



This cross section has accurate dimensions and realistic details. The trees, bushes, cars and people give a sense of an active environment and a sense of scale to the cross section.

After finishing the detailed cross section, you can add colours using Photoshop, Illustrator or CAD as illustrated below.