URBAN INTEGRITY & SPACE:
The Relevance of the Spatial Geometry of 'Åstra Centrum'

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Abstract- Jane Jacobs was the first to identify the modern city as a valuable complex agglomeration where diversity and interaction through the street-space as a public space played the central role in our everyday life. The consolidation of local neighborhoods through the intelligibility of the street and the co-relation of use provided by the interaction of global movement. Besides, the local user-led to security and acceptance of natural boundaries of privacy and control. The recognition of the local in the global and the relation between them was established and has become the main problem in our cities. The contemporary town experiences the suburban model as a dispersal spread out of the whole with segregated trials of the imposed locality that hardly have a glance of neither diversity nor foreign interaction. Furthermore, scarceness has understood unsustainable integration and densification those are ideas we examine to link and find solutions against sprawl and fragmentation of Åstra Centrum in Stockholm.

Index Terms- *Means, Ends, System.*

1. INTRODUCTION

Fig. 1. Axonometric view of Årsta torg.

Åstra Centrum was opened in a 1953$_s$ building with varied forms and painted the geometrical figure, steps, street lamps, trees, and Bror Marklund's sculpture group. The Jester in front of Folkets Hus (the people's place) – everything combines to make an unusual square with a vibrant 1950$_s$ urban atmosphere. This public square expresses ideas of solidarity and democracy, which are entirely new in Swedish urban architecture. The architects who design Årsta Centrum are the brothers Erik and Tore Ahisen. The place gives an excellent sense of scale where natural force transformed into a physical location. The site surrounded by the community functions, beautiful
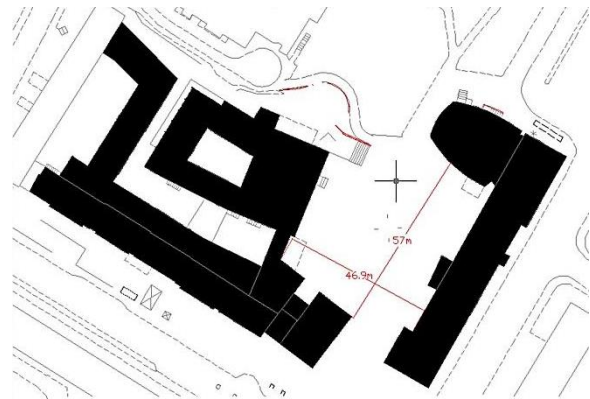

Fig. 2. Width 46.9m, length 57m.

sculpture and painting, which ultimately enhances its social activities and link with the neighborhood. By this way, it becomes one of the thriving public places in the Swedish urban fabric. Bill Hillier [1] in the chapter of "Cities as movement economies" of his book "Space is the machine" explains the cities as means-ends systems and canalize the problem of scale as a gap between means and ends, that is to say, between form and function, between urban designers and urban planners. A deficiency of ignorance that has already claimed by Jane Jacobs. Hillier follows then with a new solution to this gap by applying knowledge on the analysis of the configuration of space through movement. Hiller stresses that if we understand cities as "mechanisms for generating contact [1]," we should

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establish well-defined relationships between different levels of movements. However, this research paper investigates the morphological configuration of space and studies the relevance of space fragmentation.

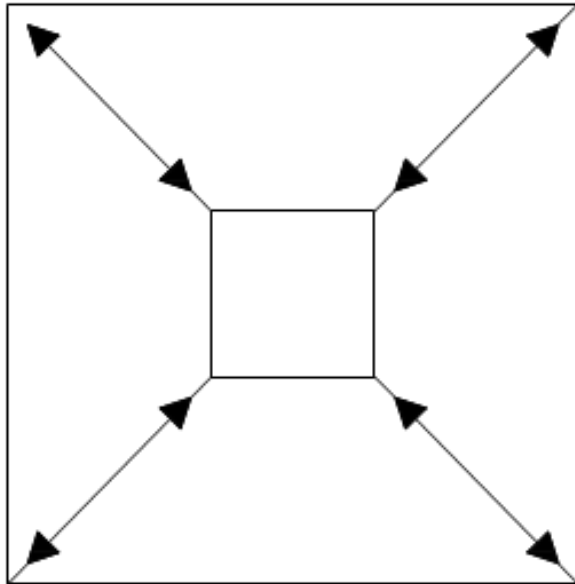## 2. SPACE ↔ MOVEMENT = X^n EFFECTS

Fig. 3. The Whole – Part Problem and the relevance of the "hidden geometry."

Jane Jacobs [2] intuitively speaks about the configuration of space through movement as she describes the street as the main public space: eyes watching out the streets (visibility control), short blocks creating various ways of connection (integration and depth), welcome strangers to pass by for more vibrant diversity and control (relation of co-presence). Jacobs [2] also called cities as "means-ends systems" and, as I explained before, claimed the gap of ignorance between means and ends, planners and urban designers, and ask for better knowledge to approach the development of the city. Bill Hillier can claim that all these social issues that Jacobs (and others: Kevin Lynch [3] and his mental maps relates strongly) talked about can be analyzed through geometry, or, as to say that cities have a hidden geometry that guides us to experience intelligibility through movement. We enter then in a 2D abstraction of our visual fields based on the ground level where we no longer measure distance but integration. We understand that a place or destination is close because it is easy to get there more than measuring real metric distances. The idea is to understand the relevance of geometry in movement as we move in lines. It establishes the grid as the main urban structure where

movement happens, and densities distribute according to the levels of integration of the geometrical order. The reciprocal feeding of space and movement creates multiplier effects not only of density also buy land use and value. We study different levels of integration in the geometrical order, and there we should distinguish different scales of movement to work. Segregation could be seen then as a disconnection of geometries within geometries. A clear relation between local and global integration should be archived to open the possibility of reciprocal feeding not only between space and movement but also between local and global. The local by-product effect can canalize the local advantage from the global movement. Levels of integration in the geometrical order, and there we should distinguish different scales of movement to work. Segregation could be seen then as a disconnection of geometries within geometries. A vibrant relation between local and global integration is achieved in this study to open the possibility of reciprocal feeding not only between space and movement but also between local and global integration. Also, the local by-product effect will canalize the local advantage from the global movement.

3. GLOBAL ↔ LOCAL = X^n EFFECTS

But how can we achieve the reciprocal relation of scales in complex areas as suburbs of dispersion where natural movement replaced by external decision makers imposing densities and land use? Dispersion segregates, as the line between origin and destination becomes independent of the scale relation (basically connects two generic points) and lose the ability to generate reciprocal feeding and the consequent by-product effect. The analysis of different scales of movement raises the question to which extent are we able to zoom out in subsequent scales thru a continuous reciprocal feeding approach and geometry as a tool for that. As we represent real visual fields in geometrical order, the contemporary city mechanism with some complex scales that no longer can achieve as we experience the city in a 3D configuration of movement, especially considering transportation nodes: train stations, subways, mechanical loops, and vertical urbanity. Or, just by thinking about highways as main connectors of suburbs. A dramatic need for densification could support the linear city as a possible model, but we come to the risk to fall again in a scale problem: are we creating "places" then? The inner and the outer in a continuous reciprocal feeding as a key generator of spatial configuration should prevent a

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break that leads to segregation. The middle scale appears as fundamental as global connectors and local neighborhoods or places. Here we arrive at Hillier's geometric principal of the extended "just about lines" and the two line logic. Interesting public spaces could be located not in the general integrator (or global) but just nearby to have a clear insight but making it local. The resizing of scale becomes the main integrator of everything: either allowing the local by-product effect and the global feeder that will raise land value and densities. So, the main question on the part-whole problem would be to clarify up to which extend the analysis of the geometrical order to validate the dynamics of movement through space for different types and scales of the cities we learn today: planned cities with a strong political decision- making, unplanned cities of informal economies, edge cities, megacities, megalopolis, world cities, global cities and so on. The different concepts that distinguish, one kind of city from another, is typically referred to as a distinction of scale or function or the way that it connects to a wider system. Is the plain (2D) geometrical order strong enough to state "the natural movement" as the main rule of configuration through a movement which diminishing the strong forces of power? And also shape and determine the fluctuations behavior in our cities fabric. However, the psychological impact of the hidden geometry is empirically strong to demonstrate by the idea of Bill Hiller. And this idea is used to evaluate the strength of local hidden social laws, and up to the extent of geometrical order for all the purposes and goals that referenced in this study.

4. FORM ↔ FUNCTION = CONFIGURATION

The study of this analysis, trying to follow space syntax [4] steps into the process of mapping the public spaces, and creating an axial map. As we are mapping a suburb with an isolated building typology, the first issue we achieve is that we must consider green space and built space to validate an eventual axial map. It relates quite much to reality as the green spaces we find in Årsta are hills and forest that hardly allows visibility. The process is clear: elaborate negative black and white maps to exalt ate the public space and then transform it into axial lines that correspond to the visibility fields of the streets and open spaces. Årsta
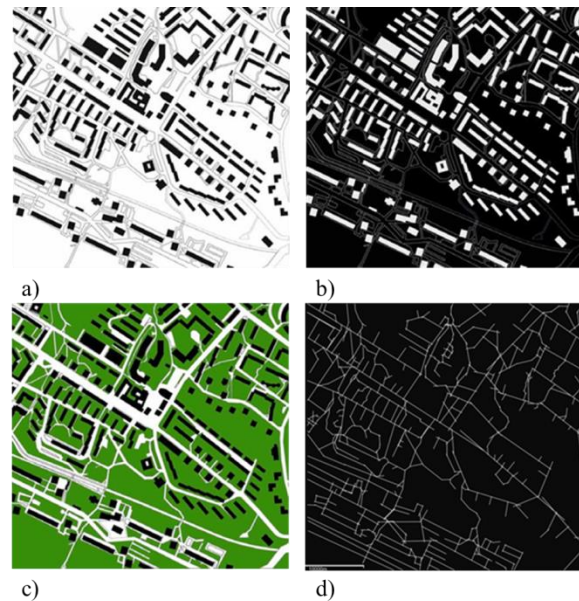

Fig. 4. a) Built space, b) Open space, c) Green space and built space, and d) Axial map.

has a double layer of movement: streets for cars and pedestrian walkways through the forest. It allows us to clarify a two-scale analysis: the global scale of Integration, or the vehicle movement, and a local scale of integration, or the pedestrian movement. We then process the information of these two axial maps by
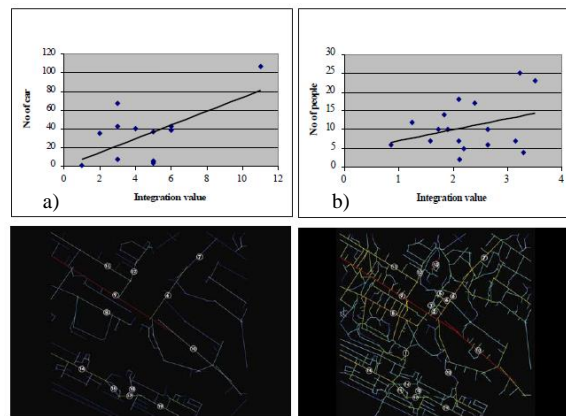

Fig. 5. Scatter diagram and integration value:

a) flow of vehicle, b) flow of people, c) vehicle movement, and d) pedestrian movement.

Depth map with two different layers of integration: n radii for global and three radii for local. To prove up to which level the Integration values processed by space syntax is reliable; we selected different key axis and went to the site to count the flow of cars and people in this street. The scattergram plotting shows the result of a connection between the integration values and the flows.

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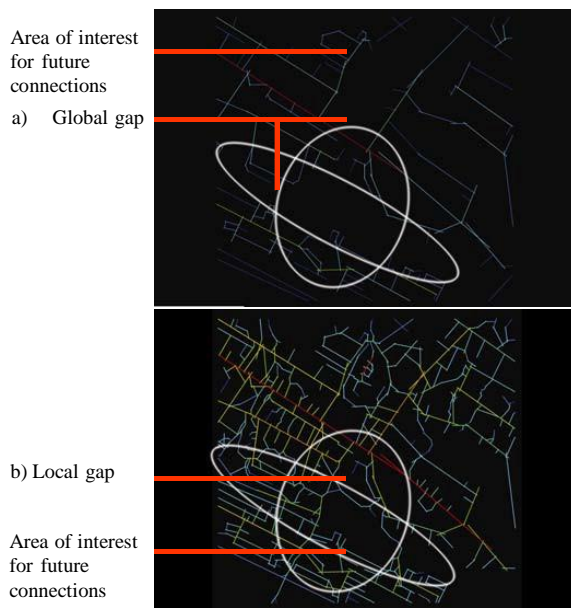*Available online at www.ijrat.org*

Fig. 6. Area of interest for future connections
a) Global gap and b) Local gap.

The r value for the car is 0.3615, moderately good as a suburban area. The pedestrian result was worst, with r=0.107, what could be explained by many factors that should be due to the following step of learning how to apply this analysis. Even though the r values are not so strong, we can still work with what the integration maps shows us, as they relate quite much too current problems and potential solutions that are not so hard to find. The global integration map is clearly showing a disconnection between the north and the south neighborhoods, with the central axis connector east-west and a secondary axis north-south that could be quickly reinforced by its extension. It also shows a 'folding into themselves' east and west neighborhoods with secure isolation. The local integration map is telling how the main global street is the better used and how local gaps relate to the global ones. It also articulates that the main public squares works and links in a very local scale, a quality that, to our opinion is to maintain as long as we connect them as 'just beside places' of the leading integrators. We can then arrive at a general proposal, always based on the two different levels of integration. One of the main

discoveries is to achieve an intermediate scale of integration, which will feed both the proposed integrations at a global and local level and should, therefore, generate local by-products such as densification, land use, and high rise values.
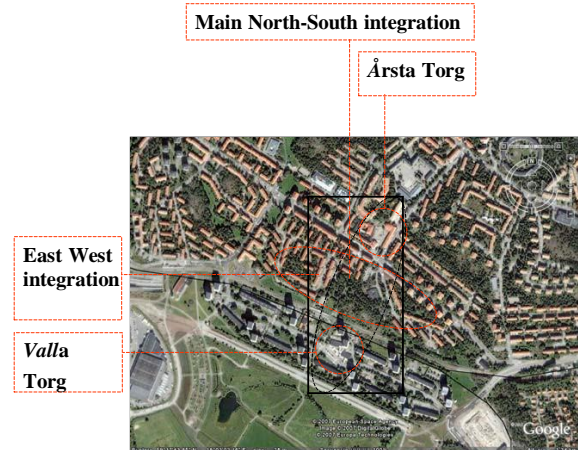

Fig. 7. Spatial gap between Arsta torg and valla torg.

The global integration will be executed by the extension of the north-south central axis for cars and pedestrian movement. The intermediate integration will be generated by the east-west extensions of the existing streets to the new central axis — the local integration achieved by the relation of the existing pedestrian paths to the new layout. As a result, we will connect the two main public squares in all different scales of movement. The next step will be then to have a visual presence analysis of the sequences of public spaces in the area of interest and elaborate a more specific proposal.

The below images with the outlines shows the process that leads to design determination. The present church appears as a new strategic location for a new public space that also relates to Årsta Torg and Valla Torg. The new structure, relating this three squares by a global axis to a local axis and the secondary connections between the different scales of movement create a vibrant layout of intelligibility of the area [5] and, at the same time, offer a diverse place for choosing various alternatives of movement.
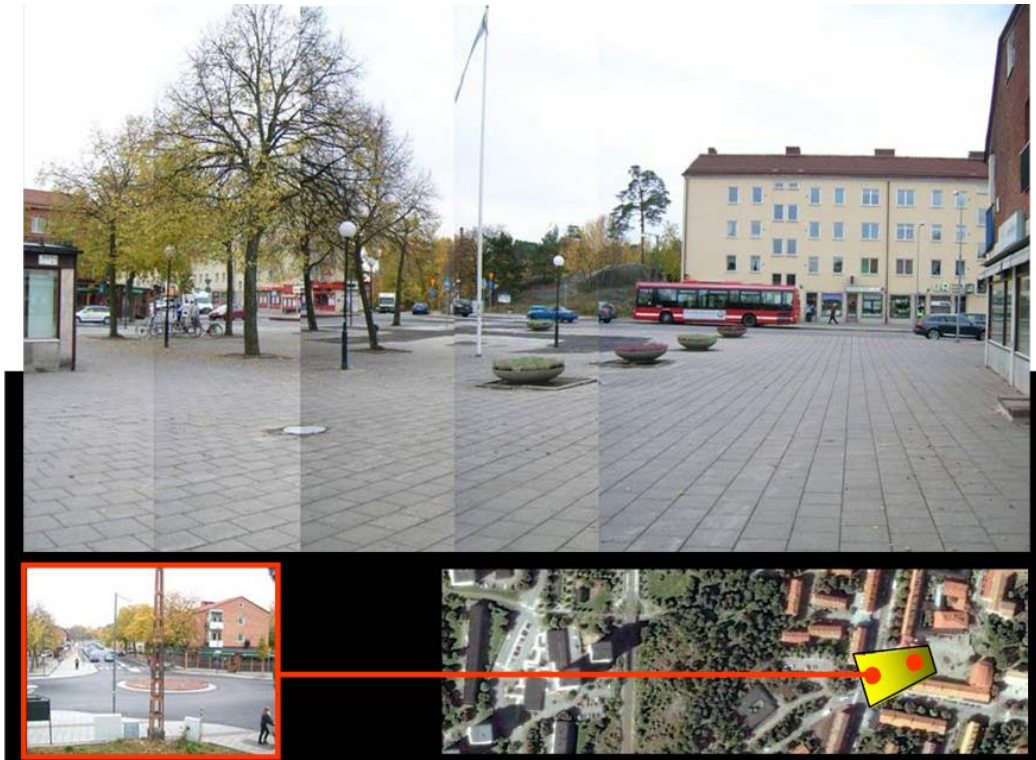
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Fig. 8. From the entrance of Årsta Torg to the node
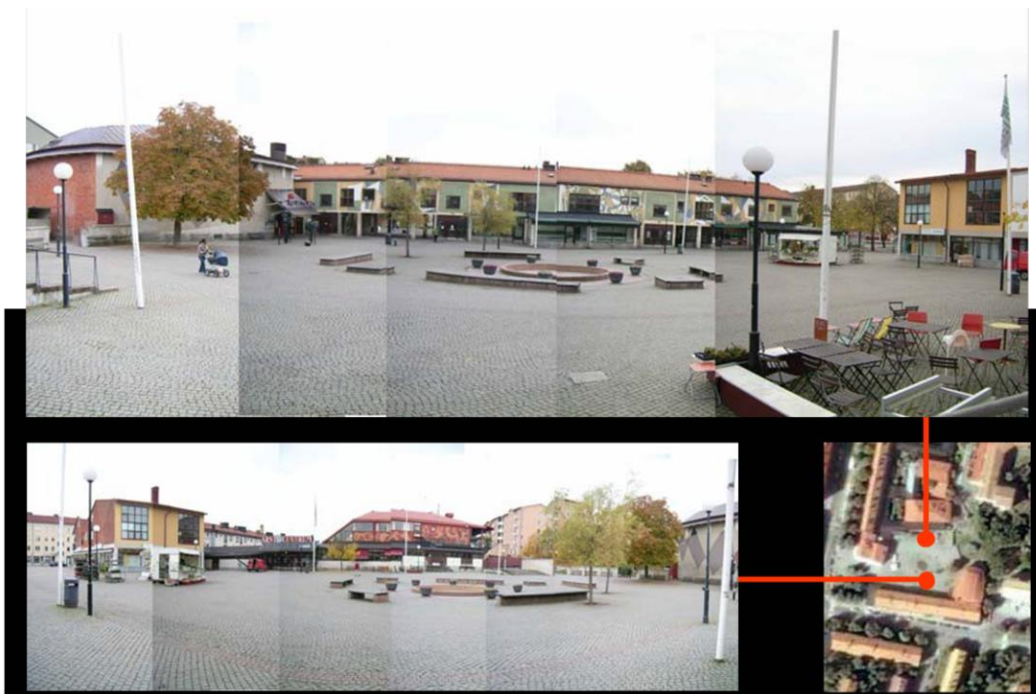
Fig. 9. The square of Årsta Torg.

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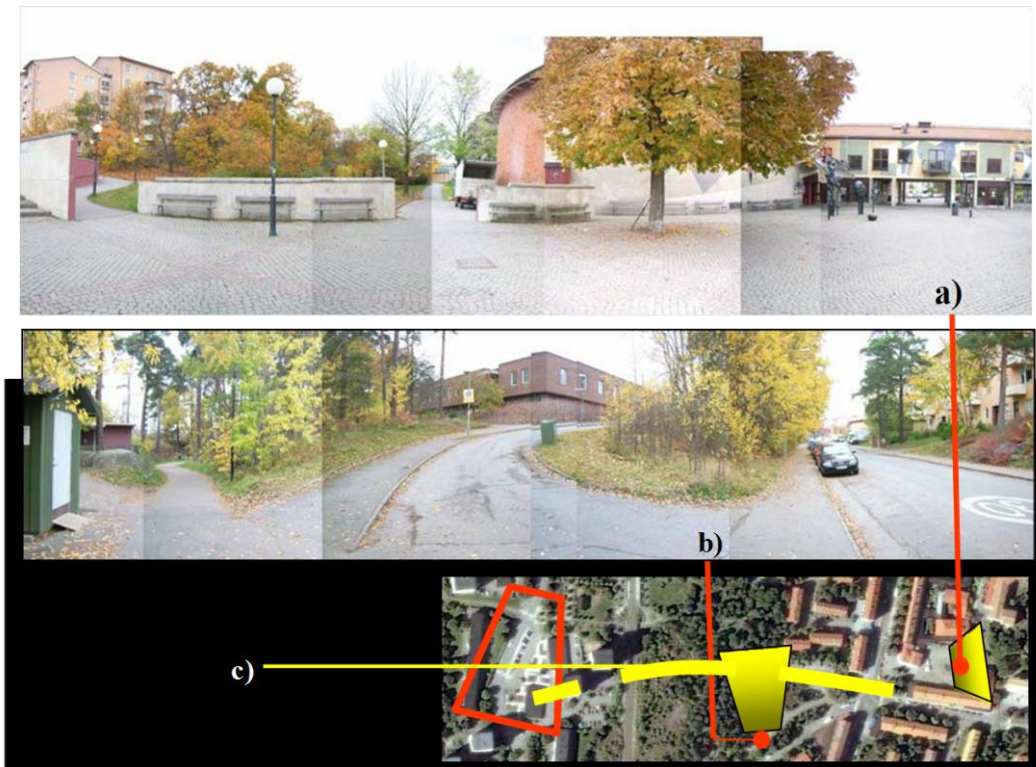
Fig. 10. a)Arsta torg, b)The church, c) Main future connection.

Fig. 11. The square of Valla Torg

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Fig. 12. The existing pedestrian connections.

5. DESIGN RESOLUTION
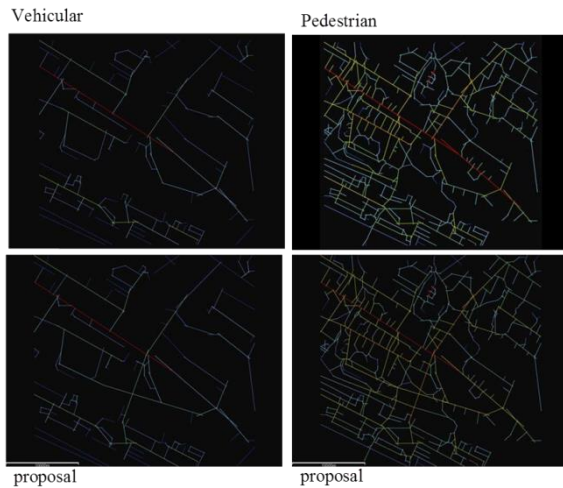
Fig. 13. proposed axial map of vehicular and pedestrian movements.

Fig. 14. Convex isovist of existing to proposed situations.

We applied our ideas with proposed axial map in both scales: extension of north-south street and connection of east-west existing streets in the global map and, besides that, the small link of the pedestrian walkways to the central new axis in the local scale. The integration values change dramatically, as we can see in the comparison of both current and proposed maps; the proposed connections play principal roles of connectivity. We then conclude with the axial outline of analysis, 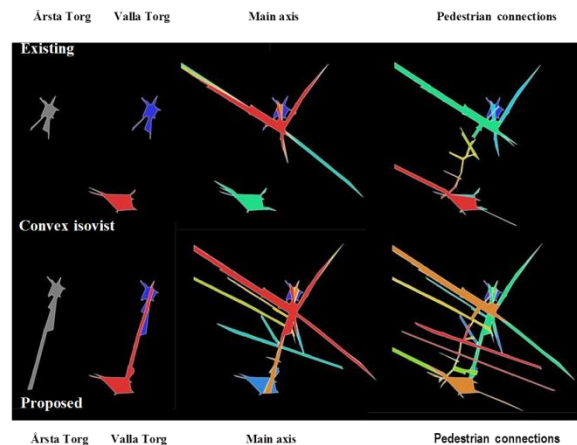as it supports the axial proposal map to a great extent. The following study of the convex isovist shows the different degree of connectivity that we get from the existing situation to our proposal. The new square of the church receives a clear relation with Årsta Torg, and Årsta Torg can reach almost to Valla Torg. Valla Torg relates with the north quite strongly, and the new north-south axis is integrating the east and west neighborhoods. The existing pedestrian connection is optimized in much diverse development.

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The final visibility map shows the strength of the whole new layout; as we stop understand the area as "a two neighborhood" site divided by a forest, or by the tram. The visibility map shows the possibility of new visual fields and brings parts to a whole.
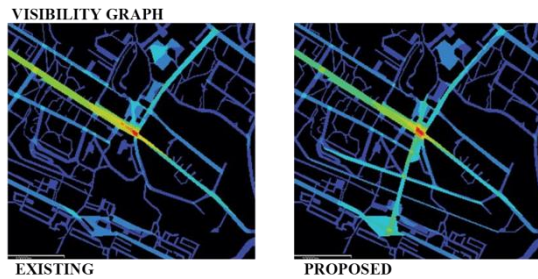

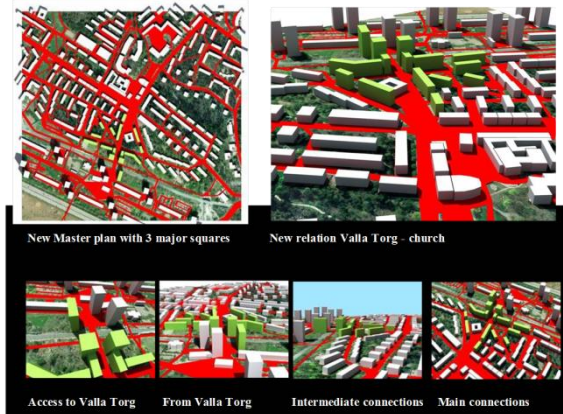Fig. 15. Visibility graph of existing and proposed situation.

Fig. 16. Proposed master plan with three major squares.

6. CONCLUSION

The comprehensive design with an emphasis on a unified system in the embedded pattern circulation is interpreted as a vibrant center for upgrading the urban fabric in action. The concerns of the movement environment are made the notion of urban design synthesis which connects and accept more people in an existing grid system. In the analysis, the aesthetic qualities of places are the measure of the cultural values of the surrounding neighborhood, values identified with the elevation of mind, morals, taste of society [6]. However, movement circulation about the integrated place (proposed future connections) in the urban design process implies a twofold purpose: The direct and natural connections between strategic points, and clear direction for people.

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