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**The influence of urban design practice in the transformation of the built environment of Montreal: the contribution of three recent projects associated with sustainable development**

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**Abstract**

*This article deals with the relationship between the field of urban morphology and the practice of urban design. The research develops a morphological method to analyze the basic cognitive operations required to design built environments and to reveal their relationship patterns in connection with existing urban form. The three building-centric urban design projects studied here in Montreal (Canada), aimed at defining more sustainable forms, are intended to make cities and human settlements more inclusive and resilient. In this context, our research question is at what level the projects developed by the teams of urban designers address the concepts of sustainability.*

**Keyword:** Urban morphology, urban design, sustainability, Montreal, Canada

**Introduction**

Developed during a period of over 60 years (Muratori, 1959; Conzen 1969; Lévy, 1988; Panerai, Demorgon, Depaule, 1999; Caniggia & Maffei, 2001; Whitehand and Carr, 2001; Allain 2004; Kropf, 2017), morphological methods have provided a systematic framework for distinguishing, characterizing, and explaining the structure of urban forms and their processes of development (Gu, 2020). In this context, there is evidence of greater interest in exploring the relationship between urban morphological research and urban design practice (Vernez-Moudon, 1992; Scheer, 2008; Samuels, 2014). To understand how planned built environments are structured and to study their relationship to urban form, research needs to bridge the gap between the discipline of urban morphology and the practice of urban design (Whitehand, 2017).

Urban designers are concerned with the observable urban forms that make up the built environment (streets, buildings, spaces, and many other features) as their creation and transformation have major economic, social, and environmental implications on city form (Gu, 2020). To study the product of urban design specifically at the scale of built environments, we need the proper tools to describe and explain the pattern of relationships contained in any urban form, a process that requires a set of conceptually specified categories (Mishler, 1990). Generally speaking, urban morphology research is aimed at studying the process of formation and transformation of the historical fabric of the city as a long duration vernacular process (result of spontaneous awareness). Our aim is to develop a strategy to study the creative approach of urban

design as a learned and specialized process (result of critical conscience). With this goal in mind, we have systematically put together an inclusive synthesis of the writings of urban morphologists of the French, Italian and English school to decompose and define the cognitive operations required to design built environments. The subject matter of this research is the morphological relationship system 'contained' in the material and spatial form of planned built environments.

## **Background**

The basic components investigated by urban morphologists usually include elements of the urban fabric: the road network (R); the plot subdivision system (P); the built framework (BF); and the network of open space (OS). The specific organization or "design" of the road network has an influence when defining any plot subdivision system that orients the layout of the built framework who forms the network of open space. These basic elements composing the fabric (planned or otherwise) are superimposed on physical geographical and natural landscape elements that define the essence of a specific site (S) (e.g., topographical, hydrological features, and vegetation) (Gu, 2010). The notion of site includes the natural environment as an important aspect related to urban form and eventually to sustainability and ecological considerations (Kropf, 2009). Figure 1 presents an interlacing diagram of the basic elements as materials of urban design. It symbolizes the relationship among the components that constitute the "infrastructure" of any planned built environment and shows how the components can influence one another (Figure 1).

The urban design operations associated with building implementation show a change of scale in the structuring of a planned fabric, passing from the general organization of the built framework to a certain category of building type integrated in the fabric, like Russian dolls. The group of buildings with their architectural characteristics are constitutive of specific built types integrated into the fabric (minor or specialized buildings). Figure 1 presents the importance of building implementation as a means of defining the quality and specificity of any built environment (planned or otherwise), i.e. how buildings in general or in certain groupings establish a relationship to the site (B/S), to the road (B/R), and to the plot (B/P), and give status to open spaces, whether private, semi-private, semi-public, or public (B/OS) (Lévy, 1988). Planned built environments usually fall within a larger context (C), which, by its very nature, comprises the components of an element on a larger scale, namely the form of the urban fabric and of the urban form as a whole (Figure 1). The hypothesis guiding this research is that the organizational concept of planned built environments is dependent on the influences of urban design theories and discourses. These schools of thought affect the relationship of planned fabrics to existing urban form and to the environment in general. The system is influenced by ideas that have shaped the practice of urban design throughout history: picturesque (Sitte, 1889); mode modernism (Le Corbusier, 1941); postmodernism (Ellin, 1999); new urbanism (Talen, 1999); and others.

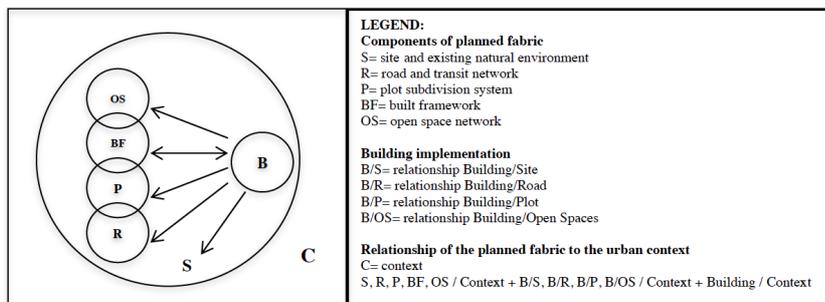


Figure 1. Diagram of the basic morphological operations of urban design (author, 2016)

## Methodology

The analytic structure of the case study stems from our organizational diagram (Figure 1) that highlights the basic elementary cognitive operations required to design any type of built environment. We can associate the sustainability concepts outlined by Jabareen (Jabareen, 2006) with the morphological operations required to design the basic elements and pattern of any urban built environment. Here are the design criteria and the associated urban morphology component used to analyze the level of integration of concepts of sustainable urban form at three scales:

At the scale of the planned built environment:

Site (S): Preservation and enhancement of site characteristics and the natural environment.

Road network (R): Connectivity of urban form to the existing fabric and to public transit.

Plot subdivision (P): Compactness of the module of urban form.

Built framework (BF): Diversity of types and uses present in the built framework.

Open space (OS): Ecological benefits of the open space network.

At the scale of building implementation:

Relationship of buildings to site (B/S): Energy consumption, resources (sun, wind, etc.).

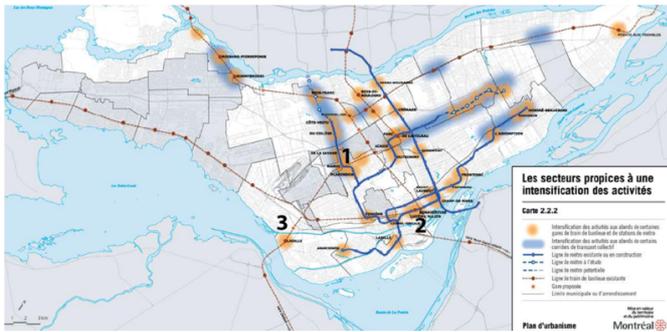
Relationship of building to road network (B/R): Quality for walking and cycling.

Relationship of building to plot (B/P): Density and livability of habitat.

Relationship of building to open space (B/OS): Ease of active mobility in open spaces.

At the building scale: Use of green materials, structure, etc.

To evaluate the level of sustainability of urban form in recent projects in Montreal, three projects that have been define as sectors near transit stations conducive to an intensification are selected (Figure 2). We will evaluate their compacity and their connectivity to their neighbourhood (C) and to the whole urban form of Montreal. The three projects, their location, and their total area are indicated in Figure 2.



**Figure 2:** Sectors near transit stations conducive to an intensification of activities  
(Source: Montreal's urban plan (adopted in 2004))

Project location and total area indication (in hectares):

- 1- Triangle - Namur – De la Savane Sector (2011-2020) (5 ha)
- 2- District Griffin - Griffintown Sector (2007-ongoing) (6 ha)
- 3- Jenkins Project - Lachine East Sector (2015-2020) (4 ha)

## Results and Discussions

### Triangle - Namur – De la Savane Sector (2011-2020)



**Figure 3:** Triangle - Namur – De la Savane Sector (2011-2020) (5 ha)

The designers have preserved and enhanced the site characteristics and its natural environment (Figure 3). Generally, the industrial grid has been transformed through a greening strategy, and the urban design concept makes use of the large open spaces east of the site (cemetery) (S). Overall, analysis shows that the project connects to its immediate environment by consolidating the existing road network and is linked to nearby public transit (R). The Namur and De la Savane metro stations are reachable by foot within a radius of 250 metres, a less than five-minute walk away. A new green pathway opening up the heart of the sector provides new residents with easier access to the metro by foot. The re-subdividing of large and underused lots has ensured a solid compactness of the built framework (P). Large one-story industrial buildings and mineral surface parking lots (heat islands) have been transformed into a grid of smaller and more regular residential and planted lots opening onto new avenues. The housing types are rather homogeneous and do not favor a great deal of diversity in terms of household sizes, age groups, cultures, or incomes (BF). A few services occupy the group floor of certain collective housing projects established on major streets. The neighbourhood is marked by a lack of variety of services for its new residents. The designers have created an active new public space network, with the central park providing added value, and these elements favouring mobility and walkability within the open space network (OS) are likely to be used and appreciated by

residents of the sector and its adjacent neighbourhoods. However, this park will not be as expansive as originally planned in the competition project. The buildings do not have any specific energy consumption diminution system, but the large court defined by the diverse volumes developed in a linear, “T,” or “U” shape, or around a yard, provide for a good degree of sunlight illumination (B/S). The semi-open courts can also act as barriers for the dominant northwester winds. The analysis shows that the composition of the building facades give form to the quality of streets conducive to walking and cycling (B/S). The footprint of buildings allows for a reasonable degree of density (B/P) and the possible extension of habitat by the creation of appropriable semi-public spaces between the different built areas (B/OS).

The Triangle - Namur Sector – De la Savane project has profoundly transformed a declining semi-industrial sector into a neighbourhood unit structured by a network of public spaces that will bring ecological benefits and greening to this part of the urban fabric of Montreal. In a nutshell, the morphological analysis shows that the project has “recycled” an old, declining, semi-industrial sector into a neighbourhood unit by incorporating medium- to high-density housing. However, the central park development has not yet been completed because the land that needs to be purchased by the City as part of the planning process has become prohibitively expensive. The City is thereby failing to deliver one of the central elements of the envisioned urban design to residents of the new neighbourhood. Finally, due to a lack of businesses and collective facilities in close proximity (a school for example), the project cannot on the whole be considered to be a complete and sustainable urban form. As regards social and generational diversity, collective dwellings target small households rather than families. Although there are some rental and social units, most dwellings are affordable for middle-income buyers, resulting in a lack of diversity and a major incompleteness in the urban design of a sustainable urban form.

District Griffin - Griffintown Sector (2007-ongoing) (6 ha)



**Figure 4:** District Griffin - Griffintown Sector (2007-ongoing) (6 ha)

District Griffin - Griffintown Sector is characterized by a densely compact urban form, as reflected in the high level of occupation of each urban block (Figure 4). The private promoter has not incorporated this major project into the urban fabric with sufficient concern for the preservation and enhancement of the site characteristics (Lachine canal) and the surrounding natural environment (S). The project has maintained and

extended the existing road network of the typical orthogonal grid of Montreal, ensuring urban contiguity and connectivity and its link to existing and adjacent urban structures (R). It reuses a former industrial site to ensure a compact agglomeration of the neighbourhoods constituting the city as a whole. The new urban ensemble is about 800 meters from the Bonaventure metro station, but the rail infrastructure and the fast lanes of Bonaventure boulevard form barriers to pedestrian movement and to mobility throughout the urban form, thus impeding non-motorized expeditions.

The former land subdivision system has been erased to encourage a high level of development at the scale of each urban island (P). The high elevation and the scale of the built framework have a crushing effect on the pedestrian space of its narrow streets, characterized by numerous blind facades and by underground parking access (BF). Even though the extremely high density of the urban form should normally ensure the delivery of various services, make urban activities more viable, and favour public transit implementation and use, the new ensemble is nevertheless experiencing a deficit in urban services, including schools. The predominant two-bedroom apartment typologies do not offer the diversity of urban form to attract multiple household sizes, age groups, cultures, and incomes or to foster social interactions and harmonious communities. Note that the project offers introverted commercial centers at the base of high-rise residential buildings, i.e. shopping concourses easily accessible by car via underground parking and offering services to residents and neighbourhood communities alike.

Certain forms of housing and commercial operations have addressed the question of energy impact, for example the first building in Quebec to be constructed with a solid wood frame made of cross-laminated timber (CLT) panels, known for their strength, efficiency, and ecological performance. However, we should note that residential towers in a Nordic climate may experience a great deal of surface heat loss in winter (northwest winds) and often require cooling in summer (B/S). The vertical development of the tower makes it an extremely energy-intensive form, both during its construction and during its period of operation (Arantes, 2012), potentially entailing a high energy-consumption impact. The high density and impactful footprint of residential towers will serve to preclude any extension of habitat or easy access to appropriable semi-private or public outdoor space (B/P). Narrow streets characterized by numerous blind facades and/or underground parking access are not conducive to walking or cycling (B/R). The City has launched a remodelling of the streets to promote travel by foot and by bike and to improve the quality of pedestrian access to public transit so as to transform the grid through a comprehensive greening strategy (B/S).

The project is embedded in a neoliberal development model reflected by a modern archetype, i.e. the residential tower on a podium. Unfortunately, the urban fabric of the district is ill-suited to incorporating such a vision of the vertical city given the small size of the existing blocks characterizing this part of Montreal. Due to its lack of typological diversity, the project has failed to generate a social and generational mix. In addition, because of the significant height limitations imposed by the City (TOD sector), the neighbourhood

is being created without offering the services, public spaces, and community facilities needed to sustain a district of such density.

#### Jenkins Project - Lachine East Sector (2015-2020)



**Figure 5:** Jenkins Project - Lachine East Sector (2015-2020) (4 ha)

The new plantation and the preservation of existing trees, along with the cleaning of polluted land, will eventually create a new habitat in a former heavy industry site (S) (Figure 5). The new road network meshes seamlessly with its surroundings, providing connections to the north and to Boulevard Saint-Joseph (R). The new public regional train system is still under construction, and the five minutes (400 meters) that it takes to reach the new transit infrastructure is not very inviting (industrial context and heavy traffic); hence, easy access to public transport is still an important problem. The plot subdivision enables a better integration of the built framework in relation to the size of the urban fabric of the former neighbourhood located to the north (P), thus making it possible to subdivide the former industrial lots. The project features a certain level of compactness of the general urban form and a degree of urban contiguity and connectivity to the existing urban forms located north of the former industrial zone (BF).

The duplex and rowhouse building types are congruent with the residential typology in the existing grid located northwest of the site. Collective housing will help to create more vertical built areas, and it is important to ensure that the built whole does not clash with the more horizontal landscape. This diversity should encourage a mix as regards the age groups of households settling in the sector. The housing type favor diversity in household sizes and age groups, but the relatively high prices tend to eliminate lower income buyers. The medium level of density creates an urban form bringing together a community for which urban activities may be viable, but no services are available, and the sector remains strictly residential. There is a lack of public and commercial services in the neighbourhood. The project forms a small neighbourhood unit with assets such as the central park, which should be accessible to off-site residents (population transiting through the neighbourhood to the canal for example) (OS).

There are no explicit concepts related to environmental or biological concerns in the project. But we note that the compact form and the systematic use of party walls will have an impact in the area of energy reduction. The general orientation of the built framework favours sunlight distribution to at least one of the

faces of each dual orientation unit (B/S). But the layout of the buildings perpendicular to the main thoroughfares contrasts sharply with the layout of the urban neighbourhood located further north (B/P). The question of movement and mobility throughout the urban form with priority given to non-motorized travel is still problematic because of the importance of garages and motorized access to each unit (B/R). The project is structured by the succession of semi-public spaces in front of each unit and semi-private spaces in the back, complete with a central park and systematically planted trees along new roads (B/OS).

The designers of this project have put in place a living environment that is appropriate for families in order to counter urban sprawl at the metropolitan level. By developing a denser urban habitat, the project helps to combat a phenomenon that is largely responsible for greenhouse gas emissions in the Montreal area. Even though the industrial building of the Jenkins Company has been demolished, the promoter has created an urban ensemble that reuses a previously developed site in order to ensure a compact agglomeration of the neighbourhoods constituting the entire city, preventing sprawl, and countering the escape of middle-class families to the suburbs of the Montreal region. Nevertheless, care must be taken to avoid turning this self-professed sustainable urban design project into an enclave. The strict residential use of a sector located a certain distance away from the commercial core of Lachine borough remains an obstacle to giving this built environment a genuinely sustainable form.

## Conclusion

The proposed method of analysing the level of sustainability of planned built environments has made it possible to identify trends that reflect the evolution of urban design practices in Montreal. The synchronic and diachronic typo-morphological study provides an objective outlook regarding project characteristics, their relation to the urban fabric, and the level of integration that sustainability concepts have attained. The urban design of the city of tomorrow must continue to evolve while retaining what has been derived from the long learning process of recent years so as to avoid repeating past mistakes. It is therefore important to continue the work of reconnecting newly designed built environments to ever-changing urban forms by addressing more seriously and rigorously the current major issue, namely the development of more sustainable urban forms.

## References

1. Allain, R. (2004) *Morphologie urbaine, Géographie, aménagement et architecture de la ville*, Armand Colin, Paris.
2. Arantes, L. (2012). « Analyses énergétiques des tours d'habitation », *Les Cahiers de la recherche architecturale et urbaine* [En ligne], 26/27 | 2012, mis en ligne le 01 novembre 2017, consulté le 21 avril 2019. URL : <http://journals.openedition.org/crau/579> ; DOI : 10.4000/crau.579.
3. Arrondissement Cote-des-Neiges–Notre-Dame-De-Grace (2009). *Plan de développement et de réaménagement du secteur Namur/Jean-Talon*, Ville de Montréal.
4. Calthorpe, P. (2011). *Urbanism in the Age of Climate Change*, Island Press, Washington.

5. Caniggia, G., and G. L. Maffei (2001). *Architectural Composition and Building Typology: Interpreting Basic Building*. Firenze, Italy: Alinea Editrice.
6. Communauté métropolitaine de Montréal (2011). *Plan métropolitain d'aménagement et de développement (PMAD)*, Montréal.
7. Conzen, M. R. G. (1969). *Alnwick, Northumberland: A Study in Town-Plan Analysis*, No. 27. 2nd ed. London, UK: Institute of British Geographers Publication.
8. Ellin, N. (1999). *Postmodern Urbanism*. New York, USA: Princeton Architectural Press.
9. Gu, K. (2010). "Urban Morphological Regions and Urban Landscape Management: The Case of Central Auckland, New Zealand." *Urban Design International* 15 (3): 148–64.
10. Gu, K. (2020). *The Teaching of Urban Design: A Morphological Approach*. *Journal of Planning Education and Research* 2020, Vol. 40(4) 472–481.
11. Jabareen, Y.R. (2006). *Sustainable Urban Forms: Their Typologies, Models, and Concepts*. *Journal of Planning Education and Research* 26:38-52.
12. Kropf, K. (2009). "Aspects of Urban Form." *Urban Morphology* 13 (2): 105–20.
13. Kropf, K. (2017). *The Handbook of Urban Morphology*. Hoboken, New Jersey: Wiley.
14. Lévy, A. (1988). "Forme urbaine, tissu urbain et parcellaire." In *Morphologie urbaine et parcellaire*, edited by P. Merlin, E. D'Alfonso, and F. Choay, 93–98. Saint-Denis, France: Presses Universitaires de Vincennes.
15. Lévy, A. 1992. *La qualité de la forme urbaine: problématique et enjeux*. Nantes, France: Ville, Recherche, Diffusion.
16. Lévy, A. (2005). "Formes urbaines et significations: revisiter la morphologie urbaine." *Espaces et sociétés* 122 (3): 25–48. doi:10.3917/esp.122.0025.
17. Merlin, P. et Choay, F. (1988). *Dictionnaire de l'urbanisme et de l'aménagement*. Presses universitaires de France, Paris.
18. Mishler, E. (1990). *Validation in inquiry-guided research: The role of exemplars in narrative studies*. *Harvard Educational Review* 60: 415-41.
19. Muratori, S. (1959). *Studi per una operante storia urbana di Venezia. I', Palladio 3-4*. 2nd edn, 1960, Istituto Poligrafico dello Stato, Roma.
20. Panerai, P., M. Demorgon, and J.-C. Depaule (1999). *Analyse urbaine*. Marseille, France: Parenthèses.
21. Samuels, I. (2014). "ISUF Task Force on Research and Practice in Urban Morphology: An Interim Report." <http://www.urban-form.org/about.html#projects>.
22. Scheer, B. C. (2008). "Urban Morphology and Urban Design." *Urban Morphology* 12 (2): 140–41.
23. Still, T. (2002). *Transit-oriented development: Reshaping America's metropolitan landscape*. On Common Ground, Winter, pp. 44-47.
24. Talen, E. (1999). *Charter of the New Urbanism*. 2nd ed. New York, USA: McGraw-Hill.
25. Transportation Research Board of the National Academy (1996). *Transit and urban form*. Report 16, vol. 2. Washington, DC. National Academy Press.
26. Vernez-Moudon, A. (1992). *A Catholic Approach to Organizing What Urban Designers Should Know*. *Journal of Planning Literature*, Vol. 6, No. 4.
27. Ville de Montréal (2014). *Schéma d'aménagement et de développement de l'agglomération de Montréal*. Direction de l'urbanisme, Service de la mise en valeur du territoire, Montréal.
28. Ville de Montréal (2013). *Programme particulier d'urbanisme secteur Griffintown*, Direction de l'urbanisme, Service de la mise en valeur du territoire, Montréal.
29. Whitehand, J. W. R., and C. M. H. Carr (2001). *Twentieth-Century Suburbs: A Morphological Approach*. London: Routledge.
30. Whitehand, J. W. R. (2017). "Bridging the Gaps: Urban Morphology 20 Year On." *Urban Morphology* 21 (1): 2–4.