

455

**BUILDING TRANSFORMATIONS IN OLD JO O PESSOA  
(BRAZIL):***Spatial form impacts on uses and levels of built heritage  
conservation*

---

**RAONY SILVA, EUDES; DONEGAN, LUCY.**

---

**ABSTRACT**

This paper analysis relations between spatial configuration, uses and built heritage in João Pessoa old city centre (Brazil) as part of a recently finished master thesis. Urban transformations that João Pessoa city, dated 1585, has suffered along its centuries have brought a number of consequences for its initial settlement. Its gradual loss in economic relevance to other urban areas was followed by the arousal of some urban trends, recurrently seen in old centre areas of many large Brazilian cities, such as: degradation and loss of original building styles, vacant or underused premises, loss of residential use, feeling of insecurity. Such trends are emphasized by a rapid linearly oriented expansion of Brazilian cities; João Pessoa, first settled by the river, later directed itself speedily towards the sea. Assuming that spatial configuration impacts on movement in the city and affects modes of city occupation and economic dynamics (Hillier, 1996), this research presents the old city centre morphologic responses, comparing its spatial structure, uses, building maintenance and architectural style conservation. Relations between these attributes were investigated, diagnosing incompatibilities that generated some urban pathologies. For this, ground and upper floors uses and conservation state of circa 1800 properties were surveyed, and related to syntactic integration measures (continuity lines and of angular segment analysis), through comparative maps and graphs. Main observations in João Pessoa old city centre were (i) how morphologic transformations followed processes of use and function alterations; (ii) how roads movement hierarchy reflects on current occupation; (iii) consequences of form/function relations in built heritage conservation. Amongst other findings, there was an alignment between the level of topological importance of the Old centre in João Pessoa, variation in its economic importance and the transformation of uses in the area, culminating in the insertion of functions incompatible with built heritage conservation. The concentration of certain uses according to road hierarchy was also observed in the area, as the presence of few residential groups and larger number vacant premises on more segregated routes, and growing loss of original building styles with increasing potential movement, corroborating trends found in other studies in Brazilian cities (such as Trigueiro & Medeiros, 2003; Carvalho & Trigueiro, 2007;). Overall, three distinct sectors of spatial configuration and uses dynamics were identified, which showed distinct relations with built heritage conservation. The study thus contributed – in light of space syntax - to understand urban dynamics pertaining old centres in larger Brazilian cities, and the damaging effects of rapid loss of centrality in a mainly real-estate oriented planning.

**KEYWORDS**

Building transformations, Old city centre, Space Syntax, Building Conservation, João Pessoa.

**1. INTRODUCTION**

This paper synthesizes results of the main authors' dissertation (2016). What is here named "João Pessoa Old Centre", the study case, corresponds to the Strict Preservation Area stipulated by Paraíba Heritage conservation Office - IPHAEP (*Instituto do Patrimônio Histórico e Artístico do Estado da Paraíba*). The area involves around 1800 buildings and is located at the northwest of João Pessoa's

municipality, capital of Paraíba state, founded by the Portuguese in 1585 by the River Sanhauá (figure 01).

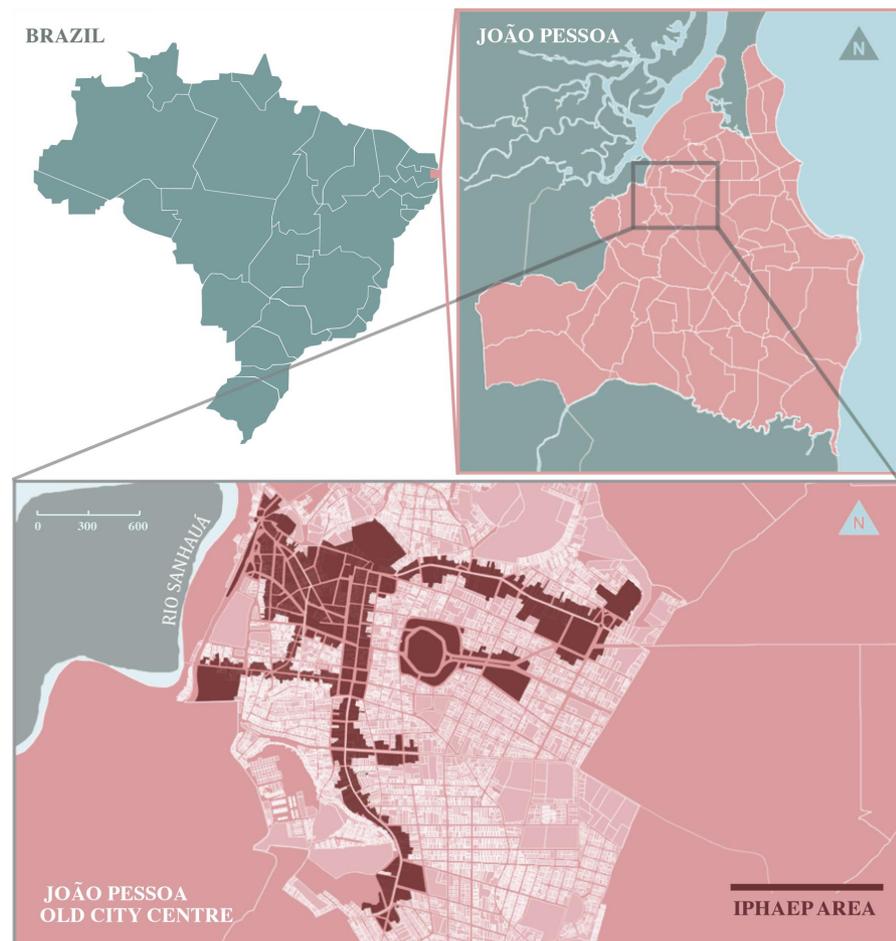


Figure 01: The study case in João Pessoa. Source: the authors.

João Pessoa's urban expansion process to far-away areas from its old centre, especially in the late twentieth century, helped develop new urban centralities (Andrade, 2007). This was followed by the gradual loss of the city initial nucleus economic influence, in a way that nowadays João Pessoa population no longer attributes to this area the importance it once had as a commercial, administrative and service hub (Lapa et. al, 2007). A survey carried out between 2011 and 2012 revealed 432 plots with one or more floors unused, corresponding to 24% of the cases in the studied perimeter – practically one for each four plots.

The current João Pessoa Old centre situation relates to the reality of many primary nucleuses of large Brazilian cities, caused by accelerated expansion dynamics, mainly oriented to one direction (Villaça, 2001). Old centres of north-eastern cities have acquired over time similar problems: architectural style alteration of its mansions; proliferation of vacant/underused premises; massive decrease of dwellers; feeling of insecurity; economic devaluation, etc (Bernardino, et. al, 2015).

Founding this research, natural movement is a fundamental aspect of cities (B. Hillier, 1996), impacting on how they are used and occupied: spatial configuration of the urban grid configures different hierarchies of potential movement (accessibilities); some uses take advantage of locations with more potential movement, which, in their turn, attract more movement and feed back into the cycle. An urban grid is viewed as a system in which any change to part of the system changes the system as a whole, as well as the relation between each part of it; thus centralities in the city also change as it evolves, as a changing process (B. Hillier, 1999); understanding such processes are vital for cities planning and revitalization.

As people tend to move in lines (Hillier & Vaughan, 2007), axial maps are drawn to represent the city's system of potential movement hierarchies, which are then processed for topologic accessibilities,

as integration. As developments of the axial map, continuity maps unify lines with slight angular deviations (Figueiredo & Amorim, 2005), and angular segment analysis measures potential movement for line segments (approximating block sizes) and ponders angular deviations (Hillier, 2009). Additional to understanding movement in the global system, radius measures are analysed to avoid edge effects and to observe a local phenomenon (Turner, 2007); for axial analysis radii can be limited by topological steps, for angular segment analysis by metric radius.

In old centres of Brazilian cities relations were found between urban configuration and land uses (Trigueiro & Carvalho, 2007; Trigueiro & Medeiros, 2003; Trigueiro, Teixeira et. al, 2005), identifying that buildings formerly set on routes that used to be part of the city integration core (most integrated lines of the city), and lost its movement potential, received new functions and had architectural elements disfigured by conversion, especially for commercial use.

Additionally, built heritage conservation issues should be thought of side-by-side with uses, as urban vitality is fostered by the close presence of complementary activities, shortening trips and fomenting diversity of people in the streets in different hours of the day (Jacobs, 1992); more activities with active interfaces also brings a sense of natural surveillance to the street.

This work compares João Pessoa Old centre spatial configuration transformations with land uses and building conservation, searching for patterns between the collected data to identify links, problems and conflicts between configuration, economies and maintenance of built heritage.

## 2. DATASETS AND METHODS

The first step to understand morphologic influences in the present condition of João Pessoa old centre buildings was to analyse diachronically alterations on potential movement of the city. Luciana Agra's (2006) dissertation reconstitutes maps of the city urban fabric on different development stages. From the interpretation of these maps, axial maps were drawn and processed for each analysed period, based the linear representation provided by MUsA, updated by the authors. These maps were also processed as continuity maps, considering little angular deviations as continuities, as approximating potential vehicular movement (Figueiredo & Amorim, 2005). Continuity lines were shown valid analysis due to the sinuous disposition of many important routes in the João Pessoa axial system.

Additional to the axial map provided by MUsA, maps elaborated by Dias (2013) comprising João Pessoa metropolitan area (adding the municipalities of Bayeux, Santa Rita and Cabedelo) were also used. Dias (2013) found that relations between movement and uses in streets of João Pessoa old centre fitted with the metropolitan region context; Bayeux municipality, for instance, has quick access to João Pessoa old centre, hosts the airport and represents one of João Pessoa's main accesses. Integration values were also processed in Angular Segment Analysis (ASA) in global and local-intermediate radii (R 1200m), allowing a more approximate comparison between buildings and integration, as values vary for each block.

Syntactic measures of the diachronic analysis were: Global Integration (Rn) and Intermediate Integration (RR, Radius-Radius; in João Pessoa case, R5). Almost always RR Integration values reduced edge effects and approximated more closely João Pessoa city dynamics; as such, this measure was focused in this analysis. This corroborated Medeiros (2006) observations: in comparison to various other Brazilian cities, João Pessoa stood out as a system where main city routes and most globally integrated axes diverged. This situation does not occur with RR integration. Contributing to this scenery seems to be: a scattered occupation along the years forming urban nucleus relatively distant from each other, the sinuosity of some main routes and the presence of large barriers as the Botanical Garden (with over 515 hectares).

To compare João Pessoa spatial structure and the current situation of buildings in its old centre, a survey was carried out between December 2011 and July 2012 addressing land uses and built heritage state of preservation. Buildings within the Strict Preservation Area were photographed, forming a

collection of almost four thousand images. Information was first inserted in files and transferred to a spread sheet. As differences were perceived between the buildings structural conditions (following the buildings life cycle) and the historical architectonic styles preservation (figure 09) - and understanding that both matter for feasibility of heritage conservation - for each building the following data was analysed:

- a) Conservation State followed Paraíba States' Historic and Artistic Heritage Institute (IPHAEP) classification – used since 1987, when the State government enlisted the historic centre buildings. Thus it was classified in:
  - i. Well maintained: buildings that externally exhibit roofing, cladding, architectonic elements, railings, doors and windows in good structural state;
  - ii. Moderately maintained: buildings that exhibit only partially roofing, cladding, architectonic elements, railings, doors and windows in good structural state;
  - iii. Ruinous: buildings that exhibit only partially roofing, cladding, architectonic elements, railings, doors and windows in precarious structural state;
  - iv. Total ruin: buildings in a precarious state to the point where architectonic elements are no longer recognizable.
- b) Architectural Façade Integrity classification was created by the author, as protection agencies classifications always included the buildings interiors. It complied with degrees representing main changes in João Pessoa old centre building façades, classified in:
  - i. Unaltered: façade with original architectural style characteristics preserved. Windows and doors styles were disregarded as they are not structural and are easily modified;
  - ii. Little altered: façades that suffered partial alterations in its original architectural style characteristics, either by their age or refurbishment;
  - iii. Altered: façades that lost its original architectural style characteristics by intense modifications;
  - iv. Contemporary: newly built façades, on vacant plots or by demolishing old façades.
- c) Land Uses: an initial classification was not used to guarantee specificities; uses were first recorded including establishments names. Uses were surveyed by floors, separating ground floor, first floor and other floors. After this uses mapped were separated in: commercial/services, vacant premises, storage, institutional, residential and parking, based on main changes in the area and on classifications used in studies with similar methodologies (such as Trigueiro et. al, 2005; Trigueiro et. al, 2007).

Georeferenced systems, GIS (softwares OpenJUMP and QGIS) were used to facilitate data manipulation and analysis. The cartographic base used was the “*Jampa em Mapas*” database, of João Pessoa Municipal Office (PMJP, 2012). Using this base within GIS, all survey data analysed attributes were inserted in each of the 1781 plots making up the Strict Preservation Area; thematic maps were created for visual analysis and statistical analysis were made, founding the arguments exposed here.

### 3. RESULTS

#### 3.1 João Pessoa urban evolution

Partial analyses of João Pessoa's spatial configuration evolution were registered in the paper “*From Sanhauá to new centralities*” (Raony Silva, 2012). Diachronic analysis (figure 02) showed accordance between the variation of topologic hierarchy and economic importance for society of João Pessoa old centre, contributing to understand processes that led to its current condition.

While the old centre held the city integration core (up to 1970), it maintained its relevance as commercial, administrative, leisure and services hub. As the urban grid spread – and the old centre gradually lost value within the city morphologic hierarchy –, economic movement started to distribute to newer most integrated areas of the system. Observing this loss in potential movement hierarchy as influencing the economic decrease of João Pessoa old centre led to questions regarding consequences to building transformations in this area, and validated the city global analysis as means to discuss local conservation and preservation issues.

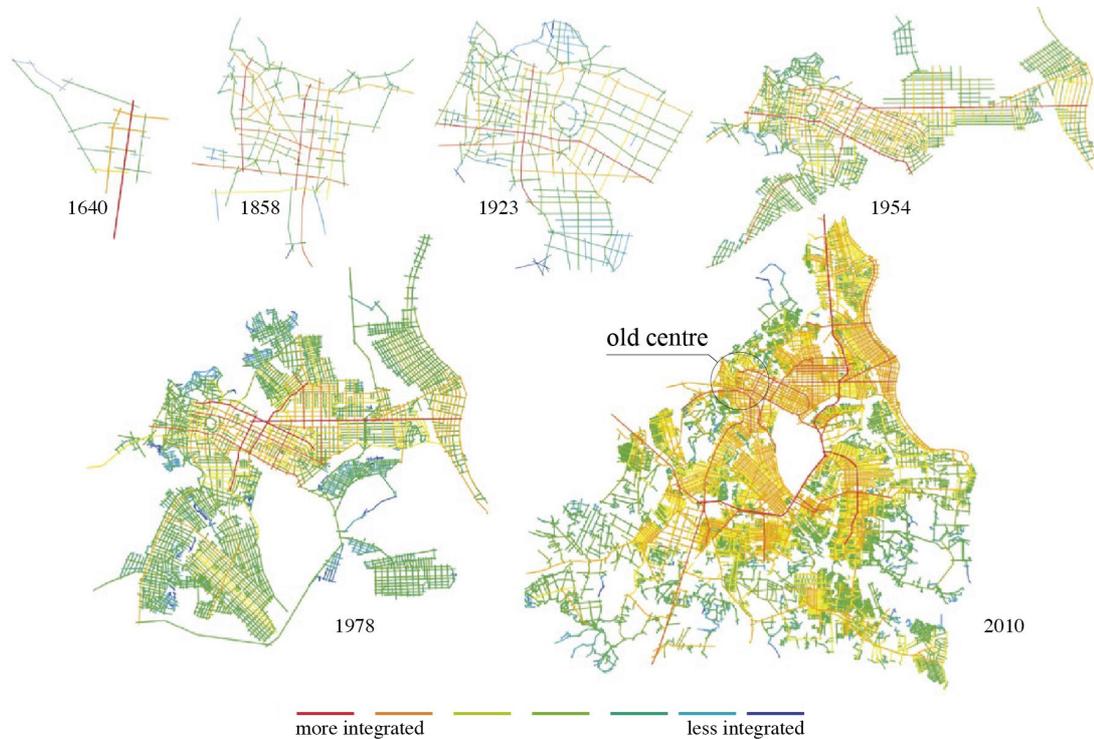


Figure 02: João Pessoa continuity maps in different expansion stages showing RR Integration. Source: the authors, based on the city reconstitution maps by Oliveira (2006).

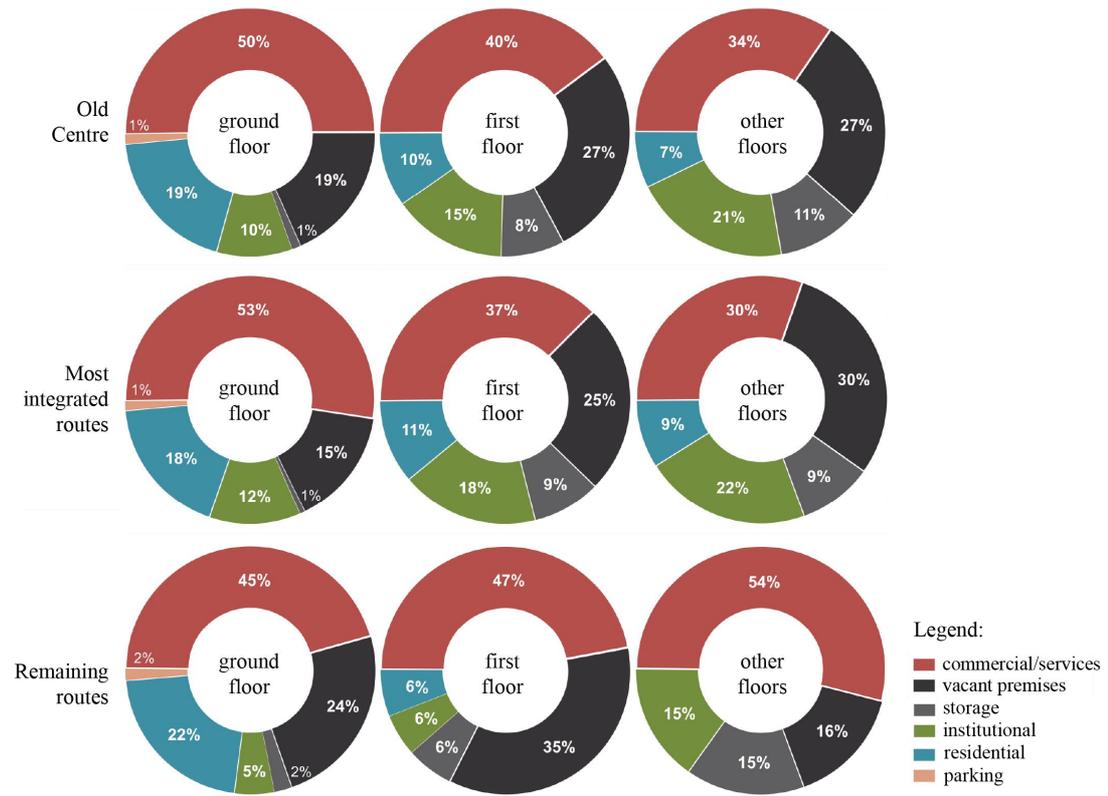
### 3.2 Relations between form, uses and built heritage

Uses analysis at João Pessoa old centre can be synthesized in four main traits: (1) a massive number of vacant floors; (2) commerce and service occupy an expressive part of the perimeter, reaching 50% of ground floor occupation (graph 01); (3) the low presence of dwellings; (4) as a consequence of these traits, a mainly daytime occupation; only 21% of buildings are used at night. João Pessoa Old centre is an essentially daytime commerce and services area with a substantial group of plots without effective occupation.

Graph 01 shows an oscillation of building occupation by floors. As floors rise, the quantity of commerce and services decreases and the percentage of vacant or storing facilities become predominant – showing the underuse of upper floors in the area. The percentage of vacant or storing facilities rises from 20% on ground floor to 38% on upper floors.

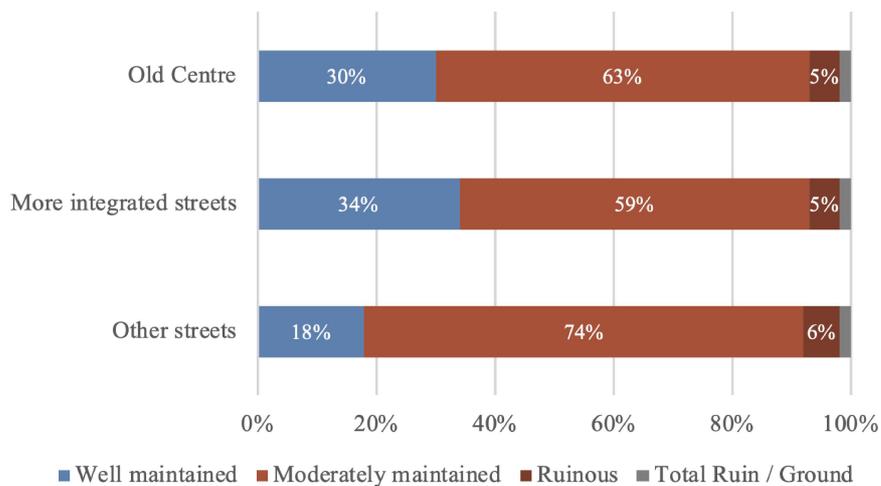
Land uses for the city most integrated routes (the 5% of routes with highest values) within the old centre were also compared against the old centre remaining routes. The strongest contrast happens on the ground floor, where the number of commerce and services rises to 53% for most integrated routes against 45% for remaining routes. Inversely, the quantity of vacant premises reaches 15% at most integrated routes, while for the other routes it rises to 24% on the first floor, up to 35% on upper floors, showing more economic interest on routes with higher potential movement. A concentration of

residences on less integrated routes was also noted, where they represent 22% of plots, against 18% on routes with higher integration.



Graph 01: Land uses on (from up to down): (i) João Pessoa old centre; (ii) on its most integrated routes; (iii) on its remaining routes. Source: the authors.

Data collected concerning João Pessoa old centre buildings conservation state reveal that only 30% of the buildings are well maintained, reflecting a wearing off appearance of the set. The condition of total ruin happens in 2% of the cases. The situation aggravates considerably as the area loses movement potential. On most integrated routes the buildings conservation state is better, as 34% of the buildings are well maintained, while for the other routes this number drops to 18% (graph 02). This data, together with the land uses of João Pessoa old centre, shows its more integrated routes retaining more economic interest, with less vacant premises and the concentration of well-maintained buildings.



Graph 02: João Pessoa old centre buildings conservation state (from up to down): (i) João Pessoa old centre; (ii) on its most integrated routes; (iii) on its remaining routes. Source: the authors.

The three related variables – form, uses and built heritage at João Pessoa old centre – reveal three sectors with distinct results, here grouped as: - Sector 01 corresponding to the old “low city”, nowadays the Varadouro neighbourhood; - Sector 02 corresponding to the old “high city”, nowadays the Centre neighbourhood; and – Sector 03, further south, formed by the avenues Trincheiras, João da Mata and João Machado (figure 03).

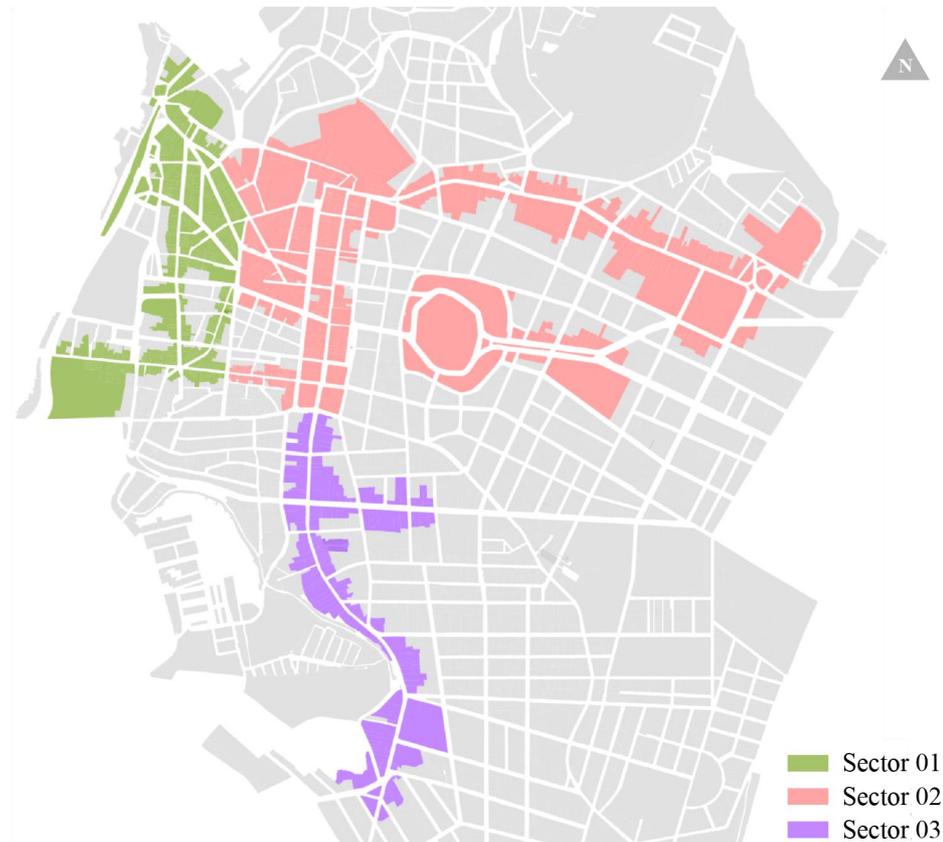


Figure 03: Demarcation of the three distinct sectors. *Soure:* the authors.

### 3.2.1 Sector 01: Low City, Varadouro neighbourhood

The sector known as the old “low city”, corresponding to Varadouro neighbourhood, has acquired since the city’s foundation characteristics of an area developed by activities related to a port; it has been known as a “business area” since colonization times (Castro, 2006); its intense commercial use was initially nourished by merchandise arriving by the Sanhauá River. Up to the beginning of the 20<sup>th</sup> century this sector also had some simpler dwellings; after the second half of the 20<sup>th</sup> century the area became essentially commercial as its dwellers migrated to newer areas of the city.

By the 1930s, the port was transferred to the neighbouring Cabedelo city (at its north). The port transfer to Cabedelo and João Pessoa’s expansion towards the sea contributed to this sectors economic decline in the second half of the 20<sup>th</sup> century. These factors were also highlighted (CPDCHJP, 2007) as determining the low city economic decline: the port transfer broke an indirect connection with Europe, and urban sprawl resulted in this area’s gradual loss of integration, visible on the maps from 1923 onwards (figure 04).

ASA Integration at radius 1200m (figure 04) reveals that the sector 01 has a few routes with high integration values – those connecting it with sector 02. However, as one descends towards the low city (closer to the river), topologic accessibilities drop reaching segregated levels (blue colour).

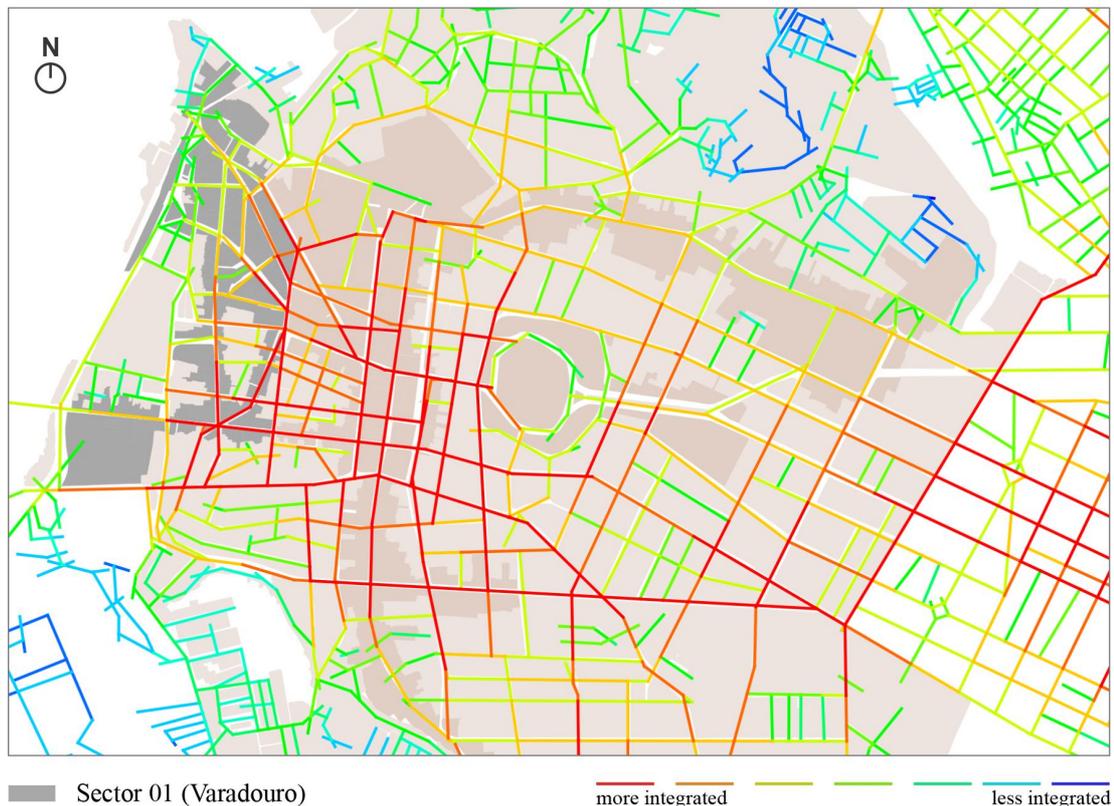


Figure 04: ASA Integration R 1200m of João Pessoa Metropolitan Region, showing central João Pessoa. Source: the authors based on Dias (2013) axial map.

Sector 01 spatial configuration and uses reveal a decline of commerce and growth of vacant premises as integration levels drop. This transformation is perceivable within a street, as at República street (figure 05): the half with higher integration measures concentrates commerce and services, and the other more segregated half concentrates vacant premises and residences; on the other hand, greater façade alterations happened on the most integrated half occupied by commerce, while the few buildings with unaltered façades are almost entirely dwellings.

As Sector 01 is close to integrated routes of the city, commercial use – the main activity from the initial settlement – remains dominant, especially on routes with higher potential movement. However, commerce is now different from when this was the main commercial area in João Pessoa; commercial use now, especially the many commerce and services of automotive equipment in the area (as the building shown in figure 9a), has altered dramatically its buildings façades architectural styles, revealing this use as incompatible with historic interest mansions.

Vacant or storage premises are, after commerce and services, the most frequent in this area – reaching 23% of ground floors, 52% of first floors and up to 56% of other upper floors. The figure 9b shows a building in this sector with only ground floor with uses, revealing a state of abandonment of upper floors. Over half of the upper floors in this sector are underused: a situation that contributes to the dismal state of building conservation in this area.

Spatial segregation in Sector 01 follows economic segregation: the more segregated, more underused or vacant plots the exhibits. The disinterest in installing commerce seems to heighten the chances of façade style preservation, as in the most segregated stretches are the buildings with least altered façades. Unaltered residences façades are also located on least accessible areas.

Finally, overall dominant uses in Sector 01 did not guarantee building conservation, as only 17% of its buildings are well maintained - as is the case for the building in figure 9c -, which further reinforces the area's economic decline.



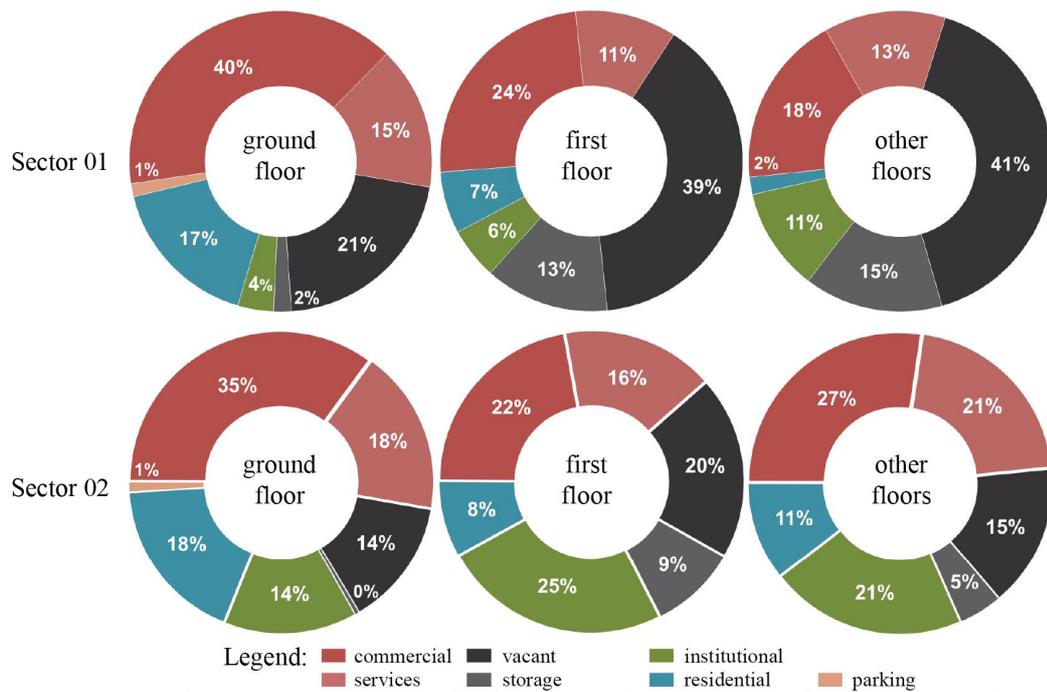
Figure 05: Land uses and architectural integrity of façades at República street showing ASA Integration R 1200m of João Pessoa Metropolitan Region. Source: the authors over map based on Dias (2013) axial map.

### 3.2.2 Sector 02: Low Town, Centre neighbourhood

While sector 01 was a designated mainly commercial area since the city's establishment, sector 02 was chosen by settlers to install main public squares, religious orders, government buildings, specialized services and residences of the economically privileged population (Vidal, 2004).

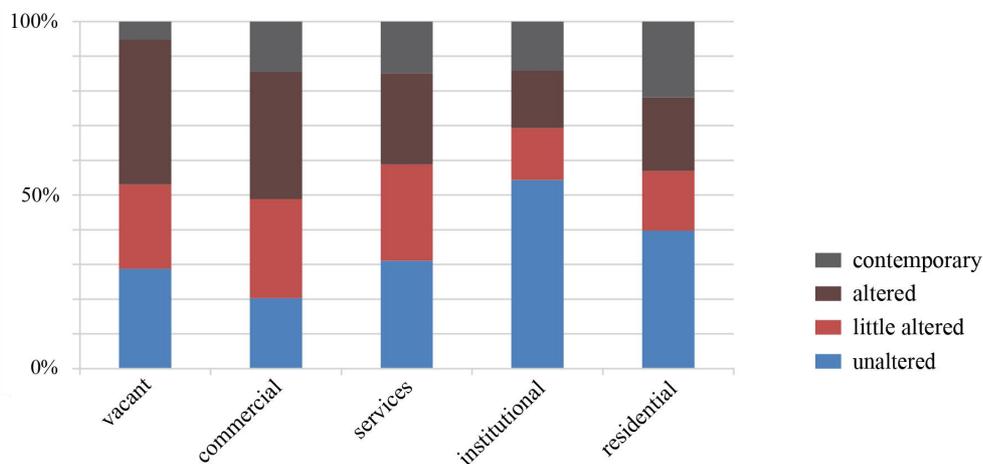
Until 1940 the city integration core was located between Sectors 01 and 02, the latter concentrating most of the routes with higher integration. As from the second half of the twentieth century the integration core started to move east towards the sea. With this morphologic displacement uses in sector 02 also began to change, with residences starting to be moved to these new flows; sector 02 started to become a more commercial and services area, giving rise to constant changes in its built urban landscape, especially after 1970. Beyond a verticalization process, old buildings started to suffer consecutive interventions to adapt to this growing commercial demand.

Two main features distinguish Sector 02 from Sector 01: the strong presence of institutional uses, from its beginning, and less vacant and underused premises (graph 03), for its location in a more privileged area economically and morphologically. Additionally, sector 02 has more buildings with a well-maintained conservation state (39% against 17% of Sector 01).



Graph 03: Land Uses for Sectors 01 and 02. Source: the authors.

Commercial uses are the ones that alter most the buildings Architectural Façade Integrity in sector 02 (graph 04), even more so than the vacant premises, highlighting problems with the installation of current establishments for built heritage conservation. Buildings maintaining its façade integrity are mainly those sheltering institutional uses and residences.



Graph 04: Buildings Architectural Façade Integrity by uses (Sector 02) Source: the authors.

Contrary to Sector 01, problems found between uses and built heritage conservation in sector 02 happened in places with high potential movement, with greater incidence of façade alteration caused by creating large openings to attract passers-by attention (as happens for the buildings show in figures 9d-e). Despite intense commercial activities, many upper floors were abandoned (29% for the first floor, figure 9e) revealing a loss in protagonism of an area that suffered verticalization followed by a loss in topologic accessibility within the city.

On sector 02 relations between uses and potential movement are noticed (ASA R1200m, figure 06), as commerce located on most integrated segments and residences on more segregated ones. Dwellings in the Centre neighbourhood concentrate on the northern sector, the most segregated stretch. On the

other hand, commerce and services, although existing throughout the protected perimeter, concentrate further south, on the most integrated stretch of the sector.

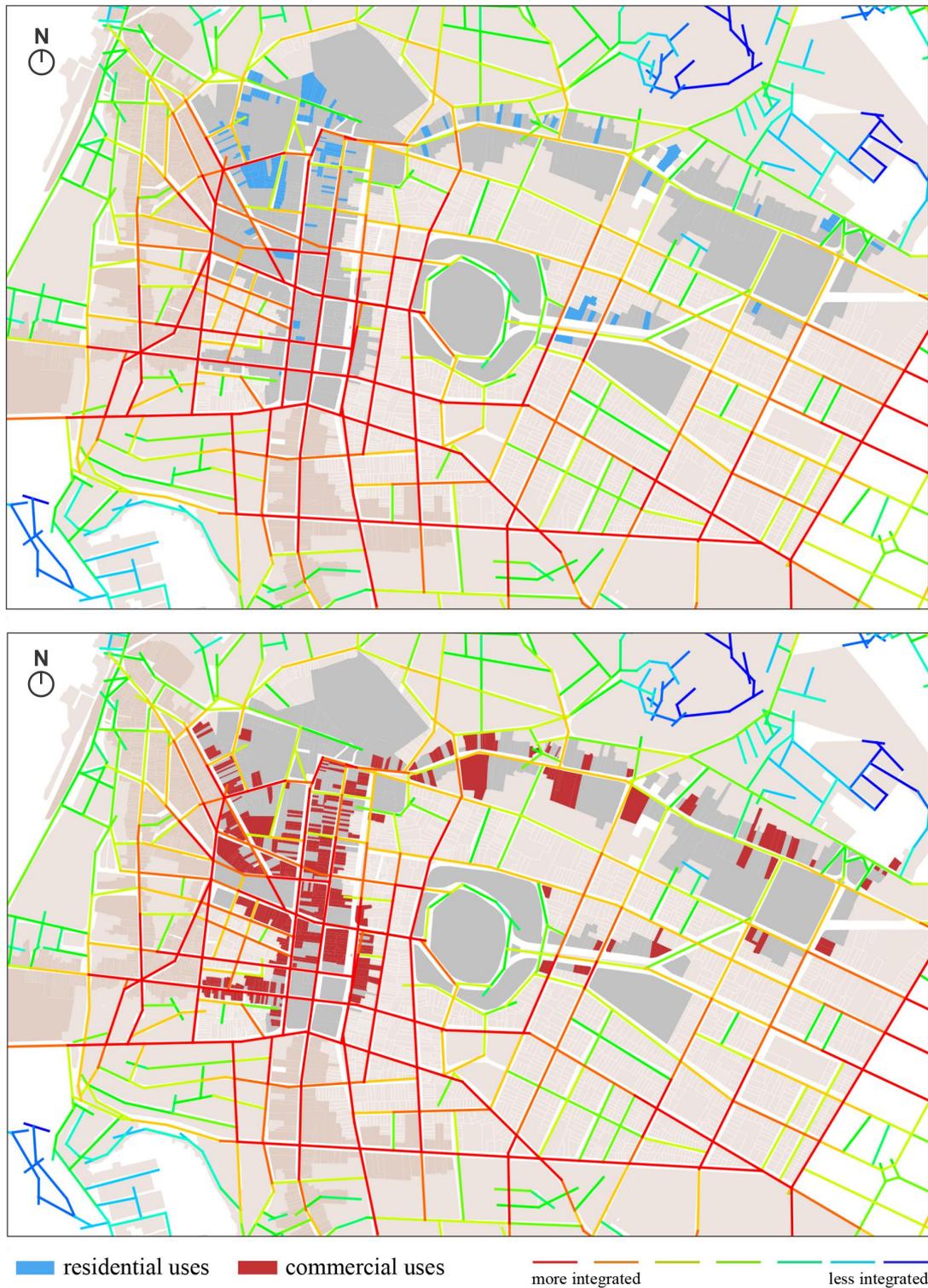
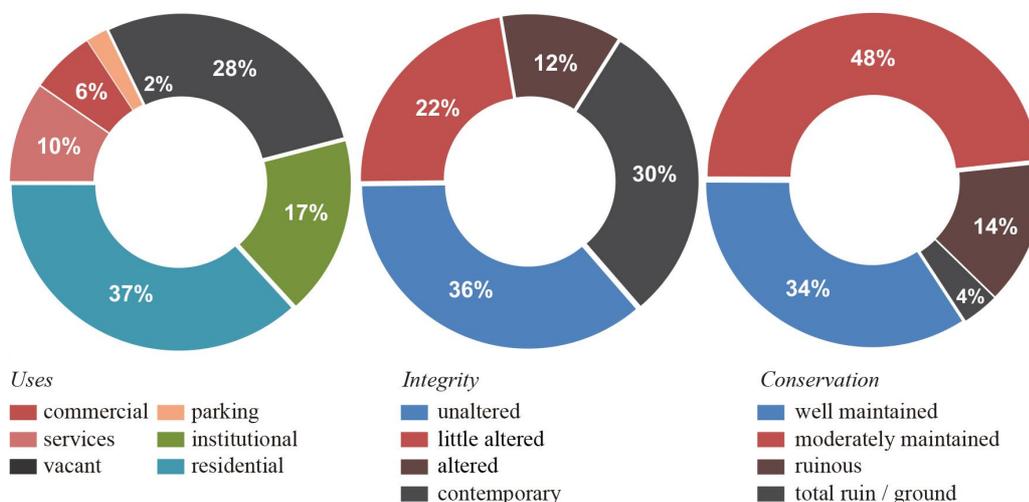


Figure 06: Residential (above) and commercial uses (below) of Sector 2 showing ASA Integration R 1200m of João Pessoa Metropolitan Region. Source: the authors over map based on Dias (2013) axial map.

### 3.2.3 Sector 03: The small palaces Cemetery

The sector 03, corresponding to the João Machado, João da Mata and Trincheiras Avenues, was separated for analysis because of three particularities: (1) residential is the most recurrent use

(representing 37% of plots); (2) it exhibits more unaltered buildings façades (36%); and (3) it has the largest proportion of abandoned buildings: 52 vacant premises (representing 28% of the plots in this sector), of which most of them (37, representing 71% of these vacant premises) maintain façades with architectural styles unaltered (graph 05).



Graph 05: Land uses, levels of Architectural Façade Integrity and of buildings Conservation State for Sector 03. Source: the authors.

This sector was developed with mostly residential characteristics, containing the so-called “Cotton Mansions” (Tinem, 2006). Especially from the beginning of the twentieth century, the middle and high-classes intensified occupation of these streets, at that time an immediate prolongation of Duque de Caxias street, which was an important street and the most integrated within the global system, and representing the main exit of the city to Pernambuco State. As the city developed east towards the sea (from 1960) the integration core no longer settled on the Avenues Trincheiras and João da Mata: flows on these started to happen exclusively towards the south, a direction contrary of most integrated routes (figure 07). Most privileged classes followed this movement installing their residences elsewhere; resulting in a process of abandonment exacerbated in the 1980s and 90s (as happens for the building in figure 9f, in which the plot is underused as a parking lot).

Different from the other Old city centre focused sectors, sector 03 did not suffer an effective transformation of its functions, as residential uses are still predominant and commercial establishments appear only in the beginning (north) of Avenues Trincheiras and João Machado – where integration levels are higher (figure 08). Even the proximity with the integration core and the intense vehicular flows were insufficient to compete economically with the new centralities emerging in João Pessoa opposite directions. The sector also has institutional uses concentrated on stretches with higher integration levels.

Another feature of these streets concerns the buildings conservation state: although it has a double proportion of well-maintained buildings in relation to Sector 01 (34% against 17%), it also has considerably more ruinous buildings than the other sectors (14% against 6% at Sector 01 and 5% at Sector 02).

Apparently, Sector 03 little function alteration protected it from the usual façade architectural alterations found in other areas of João Pessoa old city centre. Buildings deterioration in this sector usually happens due to vulnerability to natural elements of its abandoned mansions, while institutional uses and some dwellings seem to guarantee buildings conservation and somewhat unaltered architectural façades.



Figure 07: Part of João Pessoa's continuity map (Integration RR/R5). Arrows show the divergent directions between the city integration core main expansion direction and sector 03s direction flows. Source: the authors.

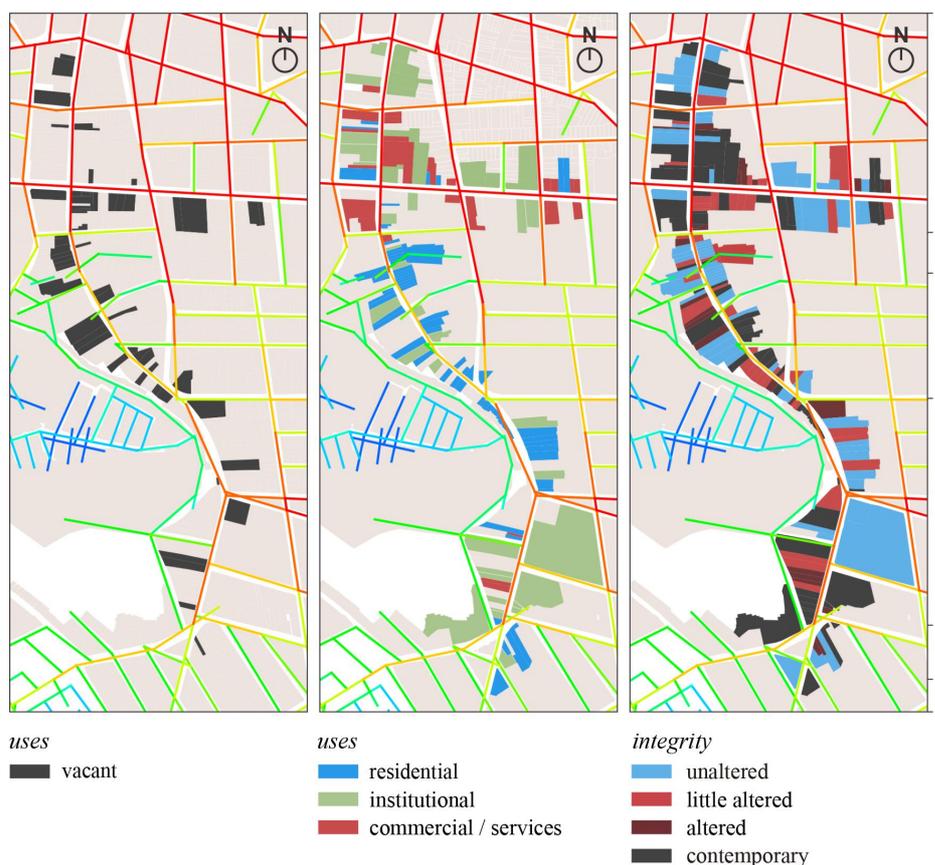


Figure 08: Land uses and architectural integrity of Sector 03 showing ASA Integration R 1200m of João Pessoa Metropolitan Region. Source: the authors over map based on Dias (2013) axial map.

While old mansions once lived-in by the rich where abandoned and little explored for other uses, sector 03 remained with many dwellings, especially in more central areas where integration levels are lower. Nowadays almost all resisting dwellings are small terraced buildings, different from the typology of the grand and abandoned eclectic small palaces. This reveals a fall in the buying power of its dwellers and society's economic disinterest for this area.

The considerable amount of old abandoned dwellings in Sector 03 leads to the assumption that this situation is a reflex of little merit assigned to the area for the installation of new dwellings. However, the survey also revealed the presence of smaller studios for rent in four of the areas' old mansions; in all cases mansions were internally refurbished for the new function, however still maintain their original façade architectural style unaltered.

The presence of a use in which its survival depends exclusively on the rotational interest for housing, even after sector 03 has gone through transformations that privileged rapid vehicular transport, supports evidence of peoples' choice to reside in this area, attracted by a specific typology – compact dwelling units. The grandiosity of the abandoned mansions contrasts with the current dwelling demand and the buying power of those who are interested in living there.



Figure 09: Buildings in João Pessoa old city centre showing varied levels of Conservation state and Architectural Façade Integrity. Source: the authors.

#### 4. DISCUSSION

The proposal of analysing João Pessoa old city centre under three interrelated variables – form, uses and built heritage – entrained reflections over how the area was and is being occupied, and over consequences for an integrated conservation of its built architectural heritage.

The sequence of events related to urban form and social transformations at João Pessoa old city centre were in many aspects close to what happened in Natal case (Trigueiro and Medeiros, 2003; Trigueiro and Carvalho, 2007), suggesting a possible pattern. Amongst other findings, there was an alignment between the level of topological importance of the Old centre in João Pessoa, variation in economic importance and the transformation of uses, culminating in the insertion of functions incompatible with built heritage conservation. Its commercial character, albeit still intense, indicates a past of unique centrality now weakened, exhibiting many vacant and underused premises and few building in good conservation state. Built heritage has suffered alterations and/or destruction, promoted by current new uses and abandonment.

The concentration of certain uses according to road hierarchy was observed in the area, as few residential groups and more vacant premises were found on more segregated routes, and growing loss of original building styles followed increasing potential movement, corroborating trends found in other studies in Brazilian cities (such as Trigueiro & Medeiros, 2003; Carvalho & Trigueiro, 2007;). Through space syntax analysis and the concept of natural movement (Hillier, 1996), relations were found between urban transformations and consequences of uses, functions and economic importance over the years. Occupation of more integrated routes exhibit fewer vacant and underused premises (on ground and upper floors), and more commerce, corroborating Hillier's (1996) proposition that land uses correlate closely with movement: uses that benefit from more movement, as commerce and services, are located on integrated routes, while residences on less integrated ones. This could also be observed when accessibility measures were analysed in a finer grain: the more integrated the city block stretch, more occupations and commerce; the more segregated, more vacant premises and residences. This relation was noticed on the three studied sectors. Levels of built heritage conservation revealed that occupation in integrated spaces isn't always beneficial, corroborating research in other Brazilian cities (Trigueiro & Medeiros, 2003).

Overall, three sectors of spatial configuration and uses dynamics were identified, showing some distinct relations with built heritage conservation. Sectors 01 and 02 showed more commerce and building renewals, while Sector 03, even less integrated, exhibited continual residential uses and vacant premises even on ground floor, maintaining more of the original architectural façade styles, although with precarious building structures. Some traits resembled in these sectors: the state of the mansions on Sector 03 resembles the most segregated parts of Sector 01: the loss in potential movement caused abandonment and ill conservation; on the other hand, the loss in economic interest protected buildings from architectural style alterations, more frequently found in Sector 02.

Assuming that rescuing a building conservation state is less complex than recomposing modified architectural elements, the main damage to architecture seems to come from uses alteration at most integrated routes; buildings functioning as residences suffered fewer function alterations and guaranteed better conservation state and architectural façade integrity. This aligns with reasoning presented by Trigueiro and Medeiros (2003) and corroborates Trigueiro and Carvalho (2007) findings in Afonso Pena Avenue in central Natal city: on sectors where commerce became predominant only 15,2% of buildings preserved their architectural style, while for residential sectors 39,3% were preserved.

Commerce and service as dominant uses, the proliferation of vacant premises and the low amount of residences means little occupation in the area at night and causes a sense of insecurity. Diversity of uses and more than one primary function (Jacobs, 1992) – attracting people moving at different times of day and night – can help reintegrate occupation modes and reinstate the neighbourhood qualities; specifically, residences with sufficiently high density and diverse commerce and services attending the local population. One possible action to ameliorate uses and built heritage conservation problems might be for the public authority (as João Pessoa old city centre manager) to incentive sensible old mansions adaptation into smaller dwellings, that seems adequate in João Pessoa old city centre as processes of this kind were already found happening spontaneously in Sector 03. The extensive underused or vacant floors in João Pessoa old city centre buildings are opportunities for public management interventions seeking to balance the homogeneity on its streets.

The study thus contributed – in light of space syntax - to understand urban dynamics pertaining old centres in larger Brazilian cities. Relations found show the validity of investigating city form in order to understand complex problems that affect old centres and their buildings , especially in Brazil where old centre share some common conditions, where accelerated expansion dynamics (Villaça, 2001) cause rapid transformation processes, revealing damaging effects of rapid loss of centrality in a mainly real-estate oriented planning.

## NOTES

MUsA: *Morfologia e Usos na Arquitetura* research group of the *Universidade Federal do Rio Grande do Norte*, UFRN (Brazil).

## REFERENCES

- Andrade, Paulo Augusto Falconi de. (2007). *Metamorfose dos Centros Urbanos: uma análise das transformações na centralidade de João Pessoa-PB, 1976-2006* . Dissertação de mestrado – Programa de Pós-Graduação em Engenharia Urbana. João Pessoa: UFPB/CT.
- Bernardino, Iana; Lacerda, Norma (2015). *Centros Históricos Brasileiros: Tensões entre a obsolescência imobiliária e a construção de novas espacialidades*. Revista Brasileira de Estudos Urbanos e Regionais V17. Online.
- Castro, Amaro Muniz. *Centro Histórico de João Pessoa: ações, revitalização e habitação*, Dissertação de Mestrado, PPGEUA/UFPB. João Pessoa, 2006.
- CPDCHJP – Comissão Permanente Para o Desenvolvimento do Centro Histórico de João Pessoa-PB. *Projeto de Revitalização do Antigo Porto do Capim*. João Pessoa, 2007.
- Dias, Clóvis (2013). *A força da forma: entre o rio e o mar o Centro de João Pessoa ainda perto do Sanhauá*. Tese de Doutorado, Universidade Federal da Bahia, Salvador.
- Figueiredo, L. *Linhas de Continuidade no Sistema Axial*, Dissertação de Mestrado, Universidade Federal de Pernambuco, Recife, 2004.
- Figueiredo, L., & Amorim, L. (2005). Continuity lines in the axial system. *Proceedings of the Fifth Space Syntax International Symposium*, pp. 162–174.
- Hillier, B.; Hanson, J. (1984). *The social logic of space*. Cambridge, Cambridge University Press.
- Hillier, B. (1996). *Space is the machine: a configurational theory of architecture*. London, UK: Space Syntax. Retrieved from <http://eprints.ucl.ac.uk/3881/>
- Hillier, B. (1999). Centrality as a process: accounting for attraction inequalities in deformed grids. *Urban Design International*, 4, 107–127.
- Hillier, Bill; Vaughan, L. (2007). *The city as one thing*. *Progress in Planning*, 67(Elsevier), 205–230.

- Hillier, Bill (2009). *Spatial sustainability in cities: Organic patterns and sustainable forms* (p. K01:1-K01:20). Presented at the 7th International Space Syntax Symposium, Stockholm: D. Koch, L. Marcus and J. Steen.
- Jacobs, J. (1992). *The death and life of great American cities*. New York: Vintage Books.
- Lapa, T. A.; Ribeiro, E. L.; Silveira, J. A. (2007). *Percursos e processo de evolução urbana: uma análise dos deslocamentos e da segregação na cidade*. *Arquitextos* (São Paulo. Online), v. 1, p. 090.
- Medeiros, V. A. S. de. (2006). *Urbis brasiliae ou sobre cidades do Brasil : inserindo assentamentos urbanos do país em investigações configuracionais comparativas* (Tese / Thesis). UnB, Brasília. Retrieved from <http://repositorio.unb.br/handle/10482/1557>
- Medeiros, V., Holanda, F., Trigueiro, E. “From Compact Colonial Villages to Sparse Metropolis”, *Proceedings, 1st International Space Syntax Symposium, SSL/UCL, London, 2003*.
- Oliveira, José Luciano Agra de. *Uma contribuição aos estudos sobre a relação transporte e crescimento urbano: o caso de João Pessoa*. Dissertação de Mestrado, Universidade Federal da Paraíba. João Pessoa, 2006.
- PMJP – Prefeitura Municipal de João Pessoa. *Jampa em Mapas*. Disponível em: <http://www.vitruvius.com.br/arquitextos/arc000/esp508.asp>. Acesso em: 26/03/2012.
- Raony Silva, Eudes (2012). FROM SANHAUÁ TO NEW CENTRALITIES. Morphologic changes in the urban development of João Pessoa, state of Paraíba, Brazil. *Proceedings, Eighth International Space Syntax Symposium*. Santiago, Chile: PUC.
- Raony Silva, Eudes. *Centro Antigo de João Pessoa: forma, uso e patrimônio edificado*. Dissertação de Mestrado, PPGAU/UFRN. Natal, 2016.
- Tinem, Nelci (Org.). *Fronteiras, marcos e sinais: Leituras das Ruas de João Pessoa*. Editora Universitária. João Pessoa, 2006.
- Trigueiro, E., & Medeiros, V. (2003). Marginal heritage: Studying effects of change in spatial integration over land-use patterns and architectural conservation in the old town centre of Brazil (pp. 20:1-20:16). Presented at the 4th International Space Syntax Symposium, London.
- Trigueiro, E., Medeiros, V. “The bridge, the market, a centrality forever lost and some hope”. *Proceedings, 7th International Space Syntax Symposium*. Istanbul, 2007.

Trigueiro, E., Carvalho, E. “The New Cidade Nova”. *Proceedings, 7th International Space Syntax Symposium*. Istanbul, 2007.

Trigueiro, E., Teixeira, Cavalcanti, A., Da Silva B.E., 2005, “Fragments of a Fading Heritage: Assessing Effects of Change in Urban Function over Building Conservation in the Northeastern Hinterland of Brazil”, A. van Nes (Ed.), *Proceedings, 5th International Space Syntax Symposium*, TuDelft, Delft.

Turner, A. (2007). From axial to road-centre lines: a new representation for space syntax and a new model of route choice for transport network analysis. *Environment and Planning B: Planning and Design*, 34(3), 539–555. <https://doi.org/10.1068/b32067>

Vidal, Wylma Carlos Lima. *Transformações urbanas: a modernização da capital Paraibana e o desenho da cidade, 1910 – 1940*. Dissertação de mestrado – Programa de Pós-Graduação em Engenharia Urbana. João Pessoa: UFPB/CT, 2004.

Villaça, F. (2001). *Espaço intra-urbano no Brasil*. São Paulo: Studio Nobel: FAPESP.