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ABSTRACT

Capital Architecture is a symbol of a nation's global presence and the cultural and social focal point of its inhabitants. Since the advent of High-Modernism in Western cities, and subsequently decolonised capitals, civic architecture no longer seems to be strictly grounded in the philosophy that national buildings shape the legacy of government and the way a nation is regarded through its built environment. Amidst an exceedingly globalized architectural practice and with the growing concern of key heritage foundations over the shortcomings of international modernism in representing its immediate socio-cultural context, the contextualization of public architecture within its sociological, cultural and economic framework in capital cities became the key denominator of this thesis.

Civic architecture in capital cities is essential to confront the challenges of symbolizing a nation and demonstrating the legitimacy of the government. In today's dominantly secular Western societies, governmental architecture, especially where the seat of political power lies, is the ultimate form of architectural expression in conveying a sense of identity and underlining a nation's status. Departing with these convictions, this thesis investigates the embodied symbolic power, the representative capacity, and the inherent permanence in contemporary architecture, and in its modes of production. Through a vast study on Modern architectural ideals and heritage — in parallel to methodologies — the thesis stimulates the future of large scale governmental building practices and aims to identify and index the key constituents that may respond to the lack representation in civic architecture in capital cities.
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**METHODOLOGY & TECHNOLOGY**

- Conventional Engineering
- Beton-Brut + Standardization
- Complex Curvature
- Concrete Construction
- Reinforced Concrete
Foremost, to my father and mother, family & friends, without your support I would not have made it so far. To Marie-Christine Beshay, the partner of my life, I am thankful for your ongoing encouragement and your outstanding editing skills, including the following words.

I am indebted to my advisor Professor Roger Connah, Graduate Director of the Azrieli School of Architecture, for his immense influence on the thoughts of this thesis, through his encouragement of excellence and pursuit of knowledge in contemporary approaches and technologies in architecture. Working with Prof. Connah on the design of the Vertigo book series greatly encouraged self-development and the progression of architectural thinking throughout my graduate studies.

I am immensely grateful to Dr. Stephen Fai, Director of the Carleton Immersive Media Studios (CIMS), who, by allowing me the opportunity to work with him on various related projects since 2012, has greatly influenced the philosophical and technological premise of this thesis. I sincerely thank Dr. Fai for generously providing an outstanding work environment equipped with the latest in cutting edge digital technologies, available through Autodesk, that were essential to this thesis.
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Last but not least, I am greatly honored and appreciative of the review committee composed of Inderbir Riar, Johan Vourdoow and Alexis Sornin for awarding this research a Thesis Distinction, and for the generous recognition by the John Adjeleian Foundation to this body of work by awarding it the John Adjeleian Award for Excellence in Structural Design.
The powerful image of suited bureaucrats and uniformed personnel crossing the Bundestag's pedestrian bridge over the River Spree, and across from where the Berlin Wall once stood, remains imbedded in my memory of Berlin. At this symbolic vantage point where I stood, eight Crosses are positioned in the foreground of the new Federal Legislative buildings of Germany to commemorate the East-German civilians that were gunned down by the GDR soldiers attempting an escape to the West.

No modern capital city, in my opinion, had greater significance in the 20th Century and in the course of modern history than Berlin. At each stage of Berlin's development, the ruling regime had imprinted signs of its power on the architecture and urban design of the city. From the Bismarck Strasse and the Unter Den Linden East-West axis, to the most megalomaniacal dreams of Hitler and Speer of a monumental new Berlin, and to the Communist monumentality of the East, the city reveals its past nostalgically at times and deeply mysterious at others.

The opportunity to live in Berlin, as part of the 2011 DSA, and to work with Professor...
Annette Homann on a proposal at the political heart of the German Capital, revived my interest in highly symbolic institutional architecture and in its ability to convey rich meaning. In an attempt to situate the following thesis closer to my progression of ideas on this subject, I will briefly describe the conclusions obtained from the development of the forum project in Berlin.

The Thread of Federation in Berlin is charged with history, politics and bureaucracy. After the reunification and decades of spatial and institutional marginalization, the "Band des Bundes" proposed by Axel Schultes responded closely to the need for a Parliamentary and Government Quarter, which would be integrated in the city and open to its citizens. The symbolic gesture of the Thread, crossing the Spree from East to West, patches over the wounds inflicted by the wall and indicates that Legislative and Executive buildings would stand opposite from one another and become connected by a central citizen's forum.

The proposed forum had to convey, above all, a sense of governmental approachability and provide a public space that engages the inhabitants in becoming true participants. After exploring the role that architecture plays in creating the institution, and the emerging behaviours in response to the architectural compositions, I came to realize that the act of building governmental architecture in capital cities allows for the possibility of diagnosing much wider social, cultural and historical phenomena.

In the relationship between Berlin and its various parliamentary precincts over time,
the planned spatial resolution is immensely revealing of the political relationship between the governors and the governed and the social and economic influxes of the period. Intentionally built to serve and symbolize a nation as a whole, capital cities and civic buildings within them are purveyors of a nation's perceived identity over time.

Out of concerns over the increasingly dominant global building practice and the consequential lack of symbolic intent in civic architecture, grew my desire to investigate the evolving emphasis on institutional symbolism in contemporary civic architecture and in its modes of production.
Capital cities are centers of political power and decisive geo-spatial grounds for national symbolism. More than seats for leaders and bureaucrats, the government buildings within them serve as symbols of state and reveal the cultural balance of power within a society. The public built environments commissioned by governments reflect the interests of the state in social order, economic activities, and industrial expertise. Capital cities today fall under the two major categories of pre-modern and modern. While pre-modern Western European capitals, like Paris, Rome and London, have well-established modes of cultural production and carry a symbolically rich architectural heritage—dominantly Neo-Classical—this thesis will focus on capital city after the advent of modernism.
The modern capital is no longer ruled by an enclosed parliamentary precinct or a citadel set aloft the highest hill and surrounded by a large military presence. As Lawrence Vale notes, in his book on architecture power and identity in capital cities, "the government has burst the bounds of the capitol to fill the capital". The capital city has become a large bureaucratic institution with thousands in office buildings spread around the city's central cores or in distant governmental pods. Similarly structured to private offices, the activities within governmental buildings range from the most complicated and ethically responsible to the most administrative and mundane.

State commissioned architecture has witnessed a dramatic decline in its qualitative properties after World War II. Since most western governments abandoned their role as designers of national architecture in favour of a less involved administrator status of public buildings, the commissioned private architects began to mimic commercial office buildings on low budgets. For instance, as outlined by the General Service Administration of the United States, the title of Supervising Architect was changed to Assistant Commissioner during the 1950s and the position's level of involvement in design decisions was greatly reduced. While no single cause can be solely at the source of this decline, the socio-political priorities in democratic societies and economic constraints generally tend to be the key factors.

Modern capitals are expected to be above all else, the seat of government and the focus of its symbolic presence. In Vale's description, he notes that pre-modern capital cities were the most populous and the wealthiest cities.
in their states, until the industrial revolution era, when capital cities lost their population to surrounding industrial cities. As such, “the modern city should make up for its lack of size and economic diversity with symbolism”9 (p.23).

Although symbolic forms changed since modernism, desire for symbolism has not decreased. The need to signal the presence of the ruler to the ruled has not diminished even in the most democratic societies.10 Could capital cities and government districts within them be conceived without conflicting with the thrust of capitalism? We may effortlessly come to the conclusion that through its architectural manifestations, modernization in capitalist states has led to the gradual globalization of demeaned versions of modern architecture.11 While this statement may be judged as a generalization – with many outstanding examples of Modernism standing testament – it is with certainty that modern civic architecture around the world has been far less attuned to the specifics of place12.

Grand symbolic state buildings need to be understood in terms of the political and cultural contexts that help bring them into being. Rather than establishing abstract guidelines that dictate general symbolic and representative qualities to a universal civic design, the intention of this thesis is to visualize an architectural construct where a developed methodological approach is carefully contextualized when implemented within a certain setting. The architectural implication of the thesis would not be limited to a proposition or to a single intervention in a specific capital city; rather the established theoretical premise would be more adequately evaluated
CAPITAL ARCHITECTURE

through its implementation in multiple contexts which could then be judged by comparison.

Architecture in different capital cities reflects the differences and struggles of gender, class, race, identity and culture under the ruling regime. The level of uncertainty when engaging a civic project in a foreign state with unfamiliar socio-cultural lineages is increased and such difficulties tends to be reflected in the constructed outcome. Based on these beliefs, the architectural implications of this thesis need to be tested within a familiar context and where the socio-cultural influxes are deeply evaluated and understood. The sites chosen for investigation in this case are the Pine Woods district in Beirut and Victoria Island in Ottawa. Both of which have immense historical value and monumental national significance to their respective capital city.

The projects will be explored not only in terms of the universal issues surrounding them, but more so in the specifics of the geo-spatial, physical, and historical settings. Parallel to this investigation, a vast research on architectural methodology and the use of the technology is presented in the form of a visual and written commentary. This parallel twofold approach maintained throughout the thesis highlights the methodology and technology as a key contributor to symbolism and monumentality in civic architecture. Neglecting the technological factors and methods of construction as facilitators of symbolic gestures would be ill-informed; particularly when considering the sheer scale of civic projects and the mobilization of effort and resources required in accomplishing such undertaking. In his book Studies...
on Tectonic Cultures, Kenneth Frampton argues:

"The full tectonic potential of any building stems from its capacity to articulate both the poetic and the cognitive aspects of its substance. This double articulation sup­poses that one has to mediate between technology as a productive procedure and craft technique as an anachronistic but renewable capacity to reconcile different productive modes of intentionality".14

In this thesis the parallels of architecture and its methods of implementation aided by technology are intended to merge where one is no longer distinct from the other. The thesis intends to establish a distinctive methodological approach that contextualizes to the specificity of place in ways that may not have been imagined or reproduced within different settings. By investigating the nature of the relations between built form and socio-political purpose, first through the examination of ma­jor Modernist government districts in capital cities, and then through the architectural implications, this research seeks means of situating new forms of institutional symbolism.
This phase of the research focuses on distinguishable precedents from Modernism in capital cities; in an effort to understand their strengths and weaknesses and to situate the thesis subject in modern and contemporary discourse.
The concept of designing a city to showcase the organs of government administration is a modern idea\textsuperscript{15} that first emerged with the dissolve of monarchies and the democratization of states. In pre-modern capitals the ruling regimes depended explicitly on large military presence and the workplaces and accommodations for civil administration were deemed unnecessary\textsuperscript{16}. In contrast, today's capital cities have been purposely designed, or have subsequently been expended, to be dominated by the purposes of national administration. The focus of this chapter is on key modernist governmental mega districts, their immediate and extended context, and the social and political forces that brought them into existence.
The purpose of Brasilia as a new Capital was to create a renewed sense of National pride by building a 21st Century city that is modern in its entirety. Brazil was anticipated to secure a place in the world of highly sophisticated, industrialized, and modern nations and to project a renewed sense of national unity. The decision to design and build a new capital city or a new parliamentary district tends to be made singlehandedly by a regime and not by a unified nation. This decision often implies an economically straining commitment, a great deal of political motivation, and requires the mobilization of human resources that may be as costly as mobilizing military power.

Building Brasilia was motivated by a constitutional provision of a new capital and its completion fulfilled the article in Brazil's first republican constitution of 1891. On the Brazilian plateau, where the city's central geographical location was chosen, descends the waters that lead to the Tocantins River to the north, the Plate to the south, and the Sao Francisco to the east. The location was specifically chosen for the capital to represent the watershed of Brazil's development both literally and symbolically.
The conscious political efforts of Juscelino Kubitschek's, pledging to comply to the constitution in building the new capital, expressing issues of national identity and engaging in modern forms and cultural production through the dramatic deployment of labour and technology, eventually paid off in 1955, by winning the election campaign\(^1\). Not only was the move of the governmental seat from Rio successfully promoted to signal symbolically the end of rule from the city associated with Portuguese ruling; but also to stress the need of establishing a unified Brazil by condensing distant and disconnected governmental institutions in a single central location.

Brasilia had to be inaugurated during Juscelino un-renewable presidential term of five years and the architects were given virtually unlimited resources to complete the massive undertaking. Brasilia was proudly inaugurated before the deadline during the forty first months. The country's construction workforce was mobilized from all Brazilian cities and slums with the hope and promise of a better life in a new city order.

This order was merely a diagram submitted by Lucio Costa to a competition, which was organized by Kubitschek and his favoured architect Oscar Niemeyer. Costa's diagrammatic city plan conveyed images of flight, seemingly inspired by a sense of rapid forward motion and in keeping with the slogans of the president the simple gesture of the plan was chosen\(^2\). In the public explanation of his proposal, Costa states that the crossing axis of the plan signifies the Christian Crucifix since Christianity is deeply rooted in Brazilian beliefs\(^3\). He intended it to evoke the early missionaries' exploration of the harsh Amazonian plateau environment, paving the way to the crossing of the two
roads which led to the designation of Brasilia's specific location.

Oscar Niemeyer was handed the responsibility for the design of all the national buildings of Brasilia. Both architects designed Brasilia with the fundamental belief that the capital's social organization must be based on the principle of social equality. Brasilia became a stratified city whose plan assumed no class segregation and had no income based hierarchical patterns of residential section at relative distances from the privileged position of the capitol. Niemeyer and Costa sought to incorporate all levels of income into each residential sector and within individual buildings. As a result the plan denied high-income officials the privileges of high-status in low-density residential locations near their central workplaces.

When it came to representing appropriately governmental institutions and the leadership of the political elite, no expenses were spared for the sake of social equality. Similarly to all the capitals that preceded it, Costa's plan is focused on the capitol complex. Designated in Brasilia as the Three Powers Plaza, the complex is located at the culmination of the major governmental axis where it holds the position of the head to a body and could visually dominate the residential winged axis of the city. Designed by Niemeyer the capitol complex contains the three branches of national government; the legislative assembly halls and secretariat, the executive offices or Planalto Palace, the Supreme Court and a museum dedicated to Brasilia's history.

Brasilia's balance of power differs from previous capitals in the symbolic dominance of the bureaucracy over the legislature with the secretariat towering over the Na-
tional Assembly halls. Nevertheless, the dominating twin towers of the Congress do not overwhelm the distinctive formal treatment of the Assembly chambers that contribute to its instant visual recognition as the national symbol of Brazil.

Confronted with the dilemma of symbolizing their country and engaging in the complex task of representing Brazilian national identity Niemeyer and Costa could not have shied away from monumentality and from exploring its possible manifestations in modernity. Costa goes as far as referring to the entire city as the monument in his writings, and argues that the capital city and its symbolic structures must be imposed on and command the landscape rather than being discreetly inscribed onto it. For Niemeyer, the qualities of being modern and unique were at the heart of Brasilia's symbolism. The effortless recognition of the National Congress as a monument allowed its diagrammatic reproduction throughout the country and provided Brazil with its first truly national architectural symbol.

Although Niemeyer's buildings in the Three Powers Square make no specific reference to anything historically or indigenously Brazilian, his work exemplified a Brazilian contribution to a more situated form of the International Style. Niemeyer was arguably the first architect to explore the ability of modern construction methods and the potential formability of concrete in evoking contextual references. Vale explains that it is the lightness with which Niemeyer employs curvilinear forms, and not by the obvious use of elements common to the days of colonialism that he was able to express the same plastic intentions and love of curves with richly refined forms that are characteristics of the colonial style of Brazil. More modestly, Niemeyer claimed
on many occasions, in interviews and in his writings, that he was deeply inspired by the great mountain range in the backdrop of Rio de Janeiro and the beautiful curves of Brazilian women.

To a great extent, the sleek curvilinear forms entered modern architecture in Brazil. Soon this style proliferated elsewhere both in Niemeyer's own work and inspirationally in the work of trending architects that began exploring less disciplined forms of sweeping curves. While this forward driven thrust of Brasilia inspired hope and change in many across the globe, soon after its completion, the capital became a naturalized subject of criticism. International critics continually dredged upon the lack of humanism at street level, the dominance of the automobile on all aspects on the cityscape, and the alienating utopia executed in a tumbura rasa approach that was deemed inappropriate for Brazil. In fact, the reality of the outcome is such that a very specific set of social and political circumstances, in 1955, brought Brasilia into being a Brazilian creation. It was designed and built by Brazilians and since its plan and details both emphasize the connection of the city to the larger landscape of its place, Brasilia as a cultural and political product, could not have been reproduced elsewhere.

For its unique global position and the unsurpassed totality of its modernistic monumental center, Brasilia was awarded the status of Historical and Cultural Heritage of Humanity by UNESCO in 1987. It remains the only city in the world built in the 21st century and based on modernist principle to attain such a status.
"The inception of the Permanent International Fair in Tripoli was commensurate with the Welfare State's 'strong public sector involvement in all matters of building, public works, and civic projects...big plans, comprehensive concepts and infrastructure improvements on a large scale'.

[Styliane Philippou]\(^{24}\)

This section of the chapter will be concentrate on the Permanent International Exhibition fairground in Tripoli (PIE, 1962-74); Oscar Niemeyer's second largest urban project. To this day the PIE remains unfinished and shrouded in mystery, a utopia in ruin, in the capital of the Northern Governorate of Lebanon.

Oscar Niemeyer's architecture was motivated by technological inventiveness and the quest for unique and surprising formal qualities. Niemeyer's early work was
contextual in many ways and became distinctively associated with Brazil. Lucio Costa famously noted that Niemeyer's Brazilian architecture was constructed using unskilled laborers whom were allowed to craft concrete in order to express the architectural traditions of their church building ancestry as opposed to the clock building lineages of the Swiss.

Regardless of the detraction that were brought about by Western press and periodicals, Brasilia as a concept and execution remained largely inspirational especially in the developing world. During the 1950s, many decolonized states were struggling with issues of identity and self-representation and the notion of a new city as a catalyst for progress and national identity was hugely appealing. The Lebanese Government took notice of Oscar Niemeyer's architecture and Brazilian political ambitions; and in 1962, he was invited to Lebanon to design the Permanent International Fair complex.

Following the independence of Lebanon in 1943, the government sought to unite the populace under a new order distant from French colonialism. The French influenced many aspects of Lebanese civic life; more so positively than in other regions of the Middle-East and Africa. They had imported the Beaux-Arts traditions and typical Parisian urban planning. For instance, Beirut's Etoile square set aloft a raised roundabout and surrounded by grand stone edifices stand testament to French colonialism to such extent that the city was commonly referred to as the Paris of the Middle East. The French also established a political order by creating a constitutional compromise between the numerous religious factions of deeply sectarian

Fig 1.12: Model of the Fair revealing the Exhibition Canopy

Fig 1.13: Aerial view of the fairground showing the residential sectors.
regions, which were unified within a republic that came to be recognized as Le Grand Liban and included the cities of Tripoli and Beirut.

After a civil unrest in 1958, and during an era of political disruption, the Lebanese government initiated infrastructural and environmental rehabilitation programs through the commissioning of ambitious civic projects in an attempt to restore stability and governmental control. General Fuad Chehab, President at the time, was at the forefront of the reformation effort; and soon after his mandate, Lebanon would embark on a journey leading to the most distinguished period in its history which came to be known as the times of Chehabism. In his delicate act of balance and harmony between Christians and Muslims, Chehab engaged the populace in deliberate detractions from factional tensions and feudal politics with large scale social developments, the nationwide modernization of the building and transportation industries and increased government expenditures. Part of those grand visions was the development of the central district of Tripoli and Niemeyer was invited on behalf of the public works to design the Permanent International Fair and the neighboring areas.

Preferring a coastal site, Niemeyer initially criticized the process that led to the selection of the central districts, arguing that due to the permanence of the fair it should have been preceded by an in-depth study of the urbanization in order to guarantee the organic integration of the fair with the future expansion of Tripoli. Niemeyer eventually presented a proposal encompassing an entire new city quarter with the fair as its focal point and accommodating numerous cultural and leisurely activities.
programs. He also proposed zones for housing, commerce, sports, entertainment and tourism, in a buffer zone between the fair and the Mediterranean Sea. Niemeyer's priorities were similar to those in Brasilia and he attempted to solve the issues of housing and social equality, which he saw in Tripoli to be greatly subjected to commercial interests.39

Oscar Niemeyer put forward an idealized oval zone of 10,000 hectares distinguished from the clutter of Tripoli’s traditional pattern of natural urban growth. His initial sketches of the proposal depict a rejection of common urban and exhibitions typology of isolated buildings and desire to impose a unifying order in many ways indifferent to his work in Brazil. The plan as a whole revealed a mind-set common to modernism in major urban interventions, in which the new would not be treated as a continuation of the old and traditional, but rather as a substitute for it.40

The fair’s central building was a vast flat canopy (750 x 70 meters), under which the pavilions of the various countries would be arranged. Niemeyer describes it as "single roof...a mere shell to encase the exhibits". In his scheme, Niemeyer chose to return to the ideas of nineteenth-century enclosed expositions which he thought would guarantee "plastic discipline and unity".41 Offset from the grand and simple canopy Niemeyer arranged fourteen reinforced-concrete pavilions and shade generating forms which he linked together with water pools.

Across from the largest pool, the Experimental Theatre; a re-occurrence in white concrete of Niemeyer’s typical shell domes is intended for the widest variety of in-
door performances. Hovering over the adjacent pool, and crowned with a helipad, the Space Museum's inverted geometry evokes travel and ascension in keeping up with the themes of an advancing society. Further down the curved canopy, a large ceremonial ramp ascends to the open air theatre which culminates with an imposing double curved acoustic shell in site-cast concrete. Towards the top of the ramp, the large three point arch reminiscent of Le Corbusier’s Palace of the Soviets proposal of 1931 marks the entrance of the theatre.

Given the most commanding position, The Museum of Lebanon as is where Niemeyer begins to inject symbolic references to Lebanese traditions. Designed on a square grid typical to Niemeyer’s work in Brasilia - such as the Dawn’s Palace and the Ministry of Foreign Affairs - the perimeter colonnade structure of the pavilion clearly refer to Tripoli’s architectural history and the typical arches of Northern Lebanon with its three dimensional pointed arches. Architect and architectural historian Styliane Philippou describes the pavilion as “The Museum of Lebanon floating in a shallow, reflective pool, Niemeyer’s ubiquitous instrument of narcissism that transforms his buildings into flowers conscious of their beauty”.

Oscar Niemeyer’s approach to issues of symbolism and monumentality was composed and executed in similar ways to his work on the monumental core of Brasilia. Niemeyer was convinced of the potential of concrete technology of the time in expressing meaning, and shocking the viewer. Though referentially, Niemeyer reveals his sensitivity to the old and traditional by re-inventing it with new and modern form.

The period of stability and economic prosperity in Lebanon was short-lived, and the work on
the fair was interrupted just before its completion in 1974. The following year, the onset of a devastating 15 years civil war sealed the fate of the Tripoli’s fair and the nation’s public work programs. For the duration of the war, fair grounds were captured by the Syrian army and used as a base and weapon depot. Though it was not significantly damaged, it remains today in its unfinished state, a deserted park of concrete ruins, enclosed to the public and proclaimed only by vegetation.

Tripoli is in desolate need of integrating the Permanent International fair into a civic and cultural place, away from commercial driven spectacles and commodities. The threat to the fair integrity is the post-war era of full blown privatization and lack of comprehensive civic visions. In early 2004, the Chamber of Commerce of Tripoli and Northern Lebanon proposed a consumer driven transformation of the Permanent International Fair into a "tourist village destined to accommodate millions of visitors a year, based on the model of Disneyland". Fiercely rejected by local and international conservationists for its disrespect to Niemeyer’s architecture and the original intentions of the project, an effort in 2005 organized by the World Monuments Fund in New York inscribed the Fair complex in the World Monuments Watch List of hundred Most Endangered Sites.

In his description of the PIE the philosopher Jalal Toufic notes: “The fairground complex is a contemporary set of ruins; a set of ‘ruins’ trying to live on its own time of postponed utopia”. If Brasilia, the Heritage Site of Humanity, is a proud symbol of the nation’s progression into the modern world; as long as the Tripoli’s fair remains an unfinished and endangered ruin, it will stand testament to Lebanon’s socio-political decline and the slow recovery of its war-torn landscape.
If this research is to gain an understanding of the representational agency of architecture and its perceived value in national context it would need to examine the principles of modern heritage and the designation processes of heritage foundations.

The term *Modern* designates in general the various twentieth-century movements that combine functionalism with aesthetic ideals; rejected historical precepts and styles.48

With the advent of modern architecture and urbanism, architects had a new set of tools with which to approach issues of symbolism and identity in capital cities. In Kenneth Frampton's book on the history of Modern Architecture, he remarks that: 'Whereas technological changes led to a new infrastructure and to the exploitation of an increased productive capacity, the change in human consciousness yielded new categories of knowledge and a historicist mode of thought that was so reflexive as to question its own identity' (p.12).50

Consequential to the emergence of modern modes of architectural production, and associated criticism, marked the birth of historic preservation.51 Initiated as an effort
CAPITAL ARCHITECTURE

to preserve historic architectural and natural heritage threatened by the advent Modernism, preservation began to reflect upon the great works of Modern-era and their perceived cultural value.

The assessment of the significance and quality of architecture is a lengthy process that can only be evaluated over time; posing significant challenges in the case of modern heritage. The lack of recognition and appreciation of the architecture of the recent past, coupled with the lack of cohesive historic contexts or architectural studies, has led to neglecting many significant buildings and civic complexes.

UNESCO envisaged, in 2001, the preservation of modern architecture in its wider context as the heritage of the twentieth century. This originated out of the notion of representativity, which was understood from a regional and state-oriented basis. Moreover, the emergence of DOCOMOMO (Documentation and Conservation of Buildings, Sites and Neighborhoods of the Modern Movement) emphasized the idea and design concept over the resulting physical form and the contextual studies they led on the category of Modern Movement in architecture and city planning was concluded in the involvement of the aspect of authenticity. This included the authenticity of the idea, form, construction, details and used materials within the architectural context.

Through the work of Le Corbusier, this chapter will discuss issues of appropriation and authenticity, recognized by key heritage foundations, as constituents to representation and national symbolism in the architecture of capital cities.
Le Corbusier's first attempt to address issues of symbolism and national identity was with his proposal for the Palace of the Soviets competition in 1931. His relatively low key composition, in comparison to other entries with monstrous neo-classical buildings, Le Corbusier envisioned, perhaps for the first time in his career, a complex that proclaims a deviation from strict internal necessities. He intended for the Palace of the Soviets to become a symbolic construct responsive to a newly liberated socialist cultural milieu.

In 1911, through his travels in the Mediterranean, Le Corbusier studied ancient architectural sites and traced the process of creative thought in architecture, analyzing the monumentality of ancient temple sites, cathedrals and Renaissance palaces. Le Corbusier assumed that the serenity and harmony of the traditional environment was at risk of being replaced by a new culture concluded that it is necessary to harmonize architecture with the new social and economic conditions. Conversely, in his propos-
al for the Palace of the Soviets, Le Corbusier's response to the idea of a reconstruct-
ed society was disconnected from the local and spatial trivia of Moscow. His ideals
of social continuity, manifested only within the assembly itself, were not evocative of
an attempt to integrate his structures as part of the urban continuum.

In his book *Crisis of the Object*, Colin Rowe compares Le Corbusier's competition en-
try to that of the Parisian architect Auguste Perret. Rowe suggests that the responsive
placement of Perret's gestures was immediate to the context while the outcome of Le
Corbusier's proposal occupied the site. Rowe highlights that: "With their explicit spa-
tial connections with the Kremlin and the inflection of their courtyard towards the river,
Perret's buildings enter into an idea of Moscow which they are evidently intended to
elaborate" contrary to Le Corbusier's buildings, which are not as responsive to site as
they are symbolic constructs (p.125).

Colin Rowe's analogy on space-definer versus space-occupier objects defines em-
phasizes that the significance site: "The one is a statement of historical destiny, the
other of historical continuity; the one is a celebration of generalities, the other of
specifics; and in both cases", stressing the idea that site itself functions as a represen-
tative icon.

The Palace proposed by Corbusier was eventually deemed inappropriate of an icon
intended as a meeting place for all communists and as a symbol of the imminent
triumph of communism over monarchy. The proposal of the architect Boris Iofan to
erect the tallest structure of the time topped with a hundred meters statue of Lenin

Fig.2.2: Plan view of le Corbusier's center focused scheme

Fig.2.3: August Perret's proposal framing the site by engaging the perimeter
was hardly surprising for communist Russia.

The *generality* of Le Corbusier's early urban planning approach and its tendency to result in spatial imposition were not indifferent to the subsequent Modernist Movement that emerged. Modernism was appealing for its *neutrality* and its ability to communicate the advancement of a *post-colonial* country into the technologically and aesthetically advanced elite group of nation.
The design of Chandigarh is pertinent to this research for constituting the first notable attempt of using modern architecture and urbanism to envision a capital that symbolizes progress and conveys national identity in a postcolonial context. Le Corbusier saw Chandigarh as an opportunity to implement Modern thinking in city planning as exercised in his Ville Radieuse. For the Indians, it was more a question of creating imposing and powerful images of the governmental institutions and the authority of the State.

Through its new architecture Chandigarh was to become the symbol of an independent India from British Imperialism. Furthermore, when the Punjab was divided and its ancient city Lahore was annexed by Pakistan, the Indian detachment remained with no governmental, commercial and spiritual capital. Chandigarh was initiated to compensate for the lack of a governmental seat in Indian Punjab and its site was selected for its natural beauty, proximity to transit routes and strategic location from
hostile Pakistan⁶⁶. As a result of conflicts and political turmoil throughout India at the time, the desire for grandness was hampered by the need for a strict economy⁶⁷. During the various design phases, Le Corbusier had to maintain the integrity of each of the building’s programs while working within the budgetary limitations. Le Corbusier remarked during his visits that: “India [had] the treasures of a proud culture, but her coffers [were] empty” (p.122)⁶⁸.

Unlike Brasilia, Chandigarh was negotiated between multiple agencies and was not the creation of a single vision⁶⁹. The process that brought Chandigarh into being began first, with the initial plan of Albert Mayer, then with Mathew Nowicki’s intervention and finally with Le Corbusier’s execution. The fact that Le Corbusier retained many of the seminal ideas of Mayer and Nowicki, is an indicator that all three architects had the same intention, that of symbolism. Mayer’s motivations for this plan are highlighted by Vale as “seeking symbols, to restore or to create prides in [the Indian Citizen] and [this] country” (p.123)⁷⁰.

Conversely, Le Corbusier concentrated on controlling the imagery and iconography of the place by emphasizing the views behind the privileged quarters and further drawing on the perspectives of the visitors to the capitol and far beyond to the dramatic landscape of the Indian Punjab⁷¹. The result was a 220-acre enclave of dominant government buildings, an "acropolis of monuments"⁷² (p.77) separated from the nearest housing by a canal and a boulevard and reached by a wide approach road that allowed the capitol complex to radiate its dominance for miles⁷³.

Fig.2.5: Chandigarh's master plan with the capitol at its head

Fig.2.6: Indian workers breaking rubble by hand to make aggregate
The buildings of the capitol were characterized by an honesty of materials which in itself became indicative of its context over time. They were constructed with concrete left unfinished in its roughest form of conveying both complex and rectilinear geometrical structures. These quickly became the architectural characteristic of Chandigarh, set amidst landscaped gardens and parks and shadowed by Le Corbusier infamous monument of La Main Ouverte.

Le Corbusier’s Open Hand monument was erected 28 meters high from the pit of an amphitheatre. Although the Open Hand is a reoccurring element in Le Corbusier’s architecture and paintings and is hardly indicative of anything traditionally Indian; its placement in Chandigarh as a monument was for him: “a sign of peace and reconciliation [...] that is open to give and open to receive” (p.613). Regardless of its origins and significance to the contest, Le Corbusier’s Open Hand monument became the official symbol of Chandigarh. Indian architect Sangeet Sharma describes the hand in his book which aims to find the identity of Chandigarh’s architecture as: “A hand that may symbolize, the openness, hospitality and richness created, open to provide for the population, and even more the hand of the All-Mighty Creator to bless the populace.” (p.15)

Setting aside the usual condemnation of Le Corbusier’s idealism, lack of humanism, integration and appropriateness to the context, his buildings of the capitol are an exceptional formal achievement in their devise of a new form of symbolism for government buildings in modernity - however insensitive they may be perceived for India.
Though the unconventional idea of a detached capitol complex in a segregated city - offset from a central processional axis - was imitated by many, no subsequent architect has orchestrated an equivalent complexity of form, meaning and richness of imagery in a capital city. For those reasons Chandigarh, is on the tentative list of becoming inscribed as a Modern Heritage site.
Within the range of conceivable approaches to architectural design or major civic interventions that are pertinent to this thesis, is an envisaged balance between the most persistently international to the most resistant to global influences.

As discussed in the previous chapters, the issues of monumentality and the symbolic tasks in modern capitals are increasingly complex, especially considering that they are no longer bound to the walls of the capitol and are spread throughout the city. Such tasks are more than ever reflected through the relationship between the capitol building, the assemblage of institutional structures surrounding it, and in the overall context.
The universal nature of Modernism undermines the influence of local culture, labour, climate, and politics. By infusing meaning in significant national architecture the production of buildings translate the subtleties and complexities of the context into built form. More so in capital cities than elsewhere, the long lasting impact of these forms occurs at the sweeping scale of a nation.

The works of architecture and urban design in capital cities should assume distinctive responsibilities in the production of national symbolism. During the 1960s, the dissatisfactions from the various movements of modernism were manifested due to their inherent universality and inability to vehicle symbolic intent specific to a group or nation. High modernism and the International Style for instance, have been followed by the gradual globalization of cheapened and diluted versions of early modernism that are even less tuned to the specifics of place.

Since then, architects and theoreticians have been seeking models that are more critically tied to the specifics of site, place and culture. In his paper Towards a Critical Regionalism, Kenneth Frampton defines the term of his title as an attempt to "mediate the impact of universal civilization with elements derived indirectly from the peculiarities of a particular place".

Perhaps the most notable attempts of reviving such interests in humanism and re-
Regional identity were brought forward by the architecture of Louis Khan. Rather than a sweeping view of Khan's work, his capitol complex in Dhaka will constitute the main point of this argument. Through the capitol complex, this chapter will examine the reactions to universality and probe ways of situating symbolism.

LOUIS KHAN'S CITADEL
DHAKA, 1962-83

From a formal perspective, it may appear that the National Assembly of the capitol complex in Dhaka is more situated within Louis Khan's body of work that it is a conception of Bangladesh. Though Louis Kahn's buildings house the national governmental institutions of Bangladesh, they were originally intended for the capital of East Pakistan.

The capitol complex in Dhaka was commissioned to Kahn in 1962, in a time of political instability between East and West Pakistan and where political powers needed to be reinstated in the East. The capitol would be constructed in the East, to mirror the government that already existed in the West and to represent the region's well-being. After a civil war, East Pakistan was separated and became to be known as Bangladesh.

Fig. 3.1: Khan's capitol revealing its sheer scale
desh and Dhaka was designated as the capital. The change in the hosting institution, together with many more gradual and subtle shifts of association over time, serves to confirm and intensify the Bangladeshi symbolism of the complex.

Louis Khan himself viewed this commission as an opportunity to further his inquiry into the nature of institutions. He maintained that his job was not to create a home for the institution that is, but rather to build the shrine for the institution that could be. In designing the complex, Kahn viewed his task as that of finding a spatial representation for a philosophical ideal; insisting that the client's program is "only an approximation of a need", Kahn sought to demonstrate that "they need things they never knew they needed" (p. 282). The conception of the National Assembly in Dhaka is evidence of Kahn's advocacy for "citizen participation in the public realm as essential to the health of a democracy" (P. 33).

Kahn's central focus was on the possibilities of participatory public space and emphasis on the importance of institutions as the source of local civic culture. To amalgamate those concepts with his vision of architecture, Kahn travelled to Dhaka and various parts of India and Pakistan, and toured the region to better understand the culture, their values and communities. He was deeply inspired by the Mogul architectural heritage and deepened his preference of the "primitive over the polished, the authentic over the acculturated" (p. 33).

Louis Khan's ideals about authenticity led him to value the design quality that he referred to as archaic. As a result, Kahn conceptualized an approach that would
welcome the citizens to participate in the sense of community through the symbolic nature of two plazas - the South Public Plaza and the Presidential Plaza, topographically located at the south and north entrances of the Capitol Complex. His compositional and abstraction techniques having matured, Kahn layered the spaces, created multi-directional movement, and downplayed the entrance and the overall flow of the building in such ways that the user would be slowed to assimilate the monumentality and materiality of the space⁹².

In the Dhaka capitol, Khan defined monumentality as "a spiritual quality inherent in a structure which conveys the feeling of its eternity and that it cannot be added to or changed" (p.293)⁹³. Louis Kahn's capitol complex involved an act of transcendence which was attempt in part to restore meaning to monumentality in architecture.

For Kahn, the transcendence of his building was to be embodied not only in the creation of a monumental and overpowering presence in space, but also in the creation of a building capable of overcoming time; "an edifice rooted in the past and hardened against the future" (p.293)⁹⁴. It becomes clear that the fundamental quality of Kahn's intervention is that of permanence. As a result of Khan's envisioned timelessness: the core of the National Assembly endured forty years of famine, flood, military coups and violent uprisings. It has survived the civil war of separation during which it was occupied at various points by armies who used it as a warehouse, munitions depot, and headquarters⁹⁵.

Fig.3.4: View from the government hostels, built in brick, to the complex.
The symbolic shift from a building intended for West Pakistan to a fragile government of an independent Bangladesh means that Kahn's intervention was a positive sign of the development of a country's institution. From a technological perspective, the complex was far more than a grouping of buildings; it was a mandate to develop the local industry necessary to support the commission and the future ventures of Bangladesh.

This attempt to bring international recognition to Dhaka had exceptional consequences on the development of the country's construction industry and infrastructure. The construction of the capitol provided the Dhaka building industry with an education in modern methods and technologies and experience in using concrete and exposed brick. Brick flourished following its use and surrounding structures the capitol, and by 1990 it was "so extensively used that it [had] become a kind of official building material" (p.317).

The colossal effort that was employed from the Bangladeshi unskilled labour and primitive industry remains a staggering gesture in form and technique. The National Assembly, completed in 1983, maintained a building language that was locally comprehensible, and represented a style that became indigenous to the region.

Louis Kahn must be commended for being at the forefront of modern architects who sought to alter design to accommodate local climatic conditions and who sought to learn from traditional methods of environmental control. Not only did Kahn further his vision of designing a building that created emotions and encompassed a sense of
community, he also combined architectural elements that allowed the conception of a symbolic vehicle for a foreign state. In Sarah W. Goldhagen’s book, *Louis Kahn’s Situated Modernism*, she argues that The National Assembly in Dhaka represents Kahn’s complete “mature architectural vision” through its transformation from a monument to a symbol, all the while nurturing to the community, whilst maintaining its authenticity and representing Existentiality.

Throughout his work, Louis Kahn remained honest in the full expression of a building’s used materials. In the National Assembly in Dhaka, Kahn’s rejection of the masking finishes, plasters and veneers – permitted his capitol complex a continued representation as a situated work of humanity, in mind, body and spirit.
Spatially, globalization extends the project of colonialism by transforming local landscapes according to some global formula for efficiency and profit. No longer bound by the inconvenience of national allegiance that limited colonial empires, today’s economic interests operate almost free of national boundaries.

(Lisa Findley, p.22)

While previously examined examples propel fitting symbolism at the monumental scale of civic and governmental institutions, recent practices transitioned into more cheapened and diluted forms of Modernism and the International Style: with concrete and glass box parlaments becoming indistinguishably aligned with concrete and glass box offices and housing blocks.
From the onset, the parallel research on methodology and technology is intended to clarify the key limiting factors that may have contributed to such decline; though the critical reality of architecture as a result of an investment in market driven economies has yet to be investigated.

POLITICAL AMBITIONS

The capitalization of a city, as in the designation of a capital, is guided by underlying physical, social, economic and political motives. During the Industrial Revolution, many Western capitals lost large masses of their population due to favoring employment and entrepreneurial opportunities in neighboring industrial zones. Not only were those capitals transformed exclusively into centers of political power but their survival depended intrinsically on the capital accumulated from surrounding industrial cities.

The capital is holistically responsible for conveying a symbol of statehood and the lack of industry – thus capital; in capitals restrict the political ambitions in architectural production. The tendency of today’s urban projects is led by commercial interests and is sharply contrasted with the attitudes towards public good and the socio-political issues involved in the production of urban public spaces.
The commission of parliamentary districts or civic hubs is too costly for many governments to consider seriously. It takes immense wealth, time, cooperation, labour and deployment of resources for the construction of significant works of civic architecture; this, even without considering the creation of the most suitable buildings to the lifestyle, climate, geography, culture, social aspirations, traditions and economy of the country. Regardless, government commissioners and architects that seem to have embraced modernist design strictly on the basis of efficiency have most evidently highlighted the shortcoming of modernism.

Concerned with the decline of the caliber of construction, Kenneth Frampton, as quoted by Findley advocates for a new dimension for design implications:

"The dimension which resists the maximizing thrust of capitalism, determined now, as ever before, on the process of global commodification. In this context it is regrettable that the European Community should simultaneously both patronize architecture and engender its demise, as is evident from its ruthless pursuit of a unified market, irrespective of cultural cost. An unforeseen consequence of this economic impulse has been the recent attempts on the part of various member states to undermine the authority of the architect, and with it, one should note, the capacity of the profession to be effective in the design of civic form." (p.221)

Understanding the shortcomings of modernisms that Kenneth Frampton highlights, necessitates further inquiry on governmental practices and socio-economic con-
Public architecture seems to emerge today from the struggle between architectural qualities and capital. During the 1970s and 1980s, civic architecture in Western countries revealed a departure from the initial thrust of innovative and high-quality buildings at times when social and political priorities shifted towards mediating economic pressures, safe practices and standardization.

The US General Service Administration (GSA) outlined that when they wanted to build Modern at its best, they produced strikingly contemporary designs of modern masters. However, as the government sought to house legions of federal workers and to achieve the goals of standardization, direct purchase, mass production, and fiscal savings, economy and efficiency were often stronger driving forces than architectural distinction.

A recent inquiry on current commissioning processes of the GSA underlined that in government architecture the costs should be considered not only in terms of short-range monetary output, but also in terms of long-range maintenance costs and benefits to those who work in and visit the building, as well as the community where the building is located.
There remains a noteworthy absence of identification between modern public architecture in many capital cities and their government. What was deemed so sufficient at the time of their commission — by imitating distinguished precedents of early modernism — is now considered so culturally inappropriate by contemporary practice and heritage organizations alike.

From the nodes of research explored thus far the need for symbolism has evidently not diminished and in fact, it appears to be more desirable than ever. If in the architectural implication of the thesis, the prevailing idiom is to be that of cultural and political legitimacy expressed symbolically, it must accordingly be manifested in a more responsive relationship between modernity and cultural tradition.
"Let's look at public buildings not only as a machine to live in or to work in, a machine built for obsolescence to be discarded in 20 years, a machine that gives us the most efficient job for the least money. Let's look at public buildings as setting examples of excellence, as means to enhance their surroundings, as tools for building communities in the physical as well as the metaphysical sense."

(Wolf Von Eckardt, The Washington Post)\(^4\)

NORMALIZED RELATIONSHIPS

If the various case studies explored thus far tell us anything, it is that major civic complexes require long setting periods and can only be properly judged over time. This setting period is that of acculturation, and the emerging behaviours of participants in the civic space may not be unveiled until commercially-led interests have faded. Yet, even if the commercial dominance over contemporary public space seems to continuously drain the civility and culture out of public domains, previous examples
have proven that architects have the capacity to raise significant objections through their work.109

Architects are more so responsible in evoking adequate meaning in public institutional domain then in the private110. It is along those lines that the anticipated outcome of this research would represent a newer generation of attempts to reconcile modern architecture with local traditions and national identity. As Vale discusses, "If architecture is to retain or regain a position as an integrated and integral part of culture rather than a detached club for aestheticians, both architects and architecture crisis must probe the dynamics of the relationship between a building and its society" (p.322)111.

The premise of this thesis is, in a sense, a negation of siteless architecture and modular built form that is droppable anywhere, and it is rather a revaluation of the role of architecture in forging identity. As anticipated, the architectural implications of the thesis would unfold in the devise of a systematic approach to decrease the conventional constraints within which contemporary architects operate: policy and politics, laws and regulations, economy and financial restrictions, technological and material difficulties, to name a few. The overarching intention is to provide a glimpse of a broadened possible future for symbolism and meaning in civic and governmental architecture as a whole.

Somewhere in between the duality of the universal [modern] and the situated [traditional], the inquiry in this thesis on architectural meaning is seeking a sort of normalized relationship between contemporary architecture and national context.
The designation processes from heritage foundation of architectural value was traditionally grounded in abstract guidelines and general formal qualities of civic design. In a recent exchange related to this research, the conservation architect James Ashby, from the Heritage Conservation Directorate division of the Public Works of Canada stressed the fact that Modern heritage conservation is moving towards a "cultural landscape approach", which represents a shift away from heritage as individual monumental buildings valued by experts on largely aesthetic criteria.

Ashby emphasized that the shift is towards considering a broader set of values, including how the building works within its extended urban context and how it is valued by its community today and into the future (J. Ashby, personal communication, October 15, 2012). These considerations were brought to light not only in Canada but in many countries that are struggling to infill modernist super-scape with harmonized commercial and institutional occupancy at street level and enhanced pedestrian connectivity.

Essential to this cultural landscape approach, would also be the re-integration of isolated and peripheral civic modernist pods - such as Tunney’s Pasture Government district in Ottawa - into centralized public hubs for their surrounding areas. As previ-
ously outlined, in modern capital cities [specifically in democratic regimes], there is less emphasis on symbolizing statehood in a single prominent centre. The institutions of government and the principal structures housing aspects of national culture—museums, cultural and convention centers, religious shrines, and national galleries—may become dispersed across the city. This would lead modern capitals to start losing over time their clearly identifiable architectural center with typical peripheral housing districts, and would become polycentric with greater multiplicity of nodes.2

The spatial progression in and between those nodes would actively encourage public visitation as it would connect (or separate) distant objects and preserve a reciprocity of sight3 (picture the spatial relationship and visual connection between the Arc de Triomphe and the Grande Arches in Paris); thus becoming deliberately symbolic.

The spatial relationships between national buildings and other important structures send complex messages about the desired public perception of the housed intuitions. This projected self-identity, is largely influenced by its relative degree of isolation or its accessibility to the public (picture the extensive setbacks of the Supreme Court of Canada in Ottawa). Moreover, the dominant (or subservient) aspects of government complexes depend significantly on the scale of the building and the architectural manipulation of its proportions, its employed technology and use of materials.

Architectural thought can now emerge from layers of information and parameters that are juxtaposed in a single design environment. This process encourages a collaborative effort and a multi-threaded transmission of the knowledge and data between various collaborators.

The 3D model can then be used to run advanced simulation algorithms, predicting the traffic flow, pedestrian behaviour, river tides, emerging patterns and many other design informing variables.

This provides a superior understanding of the site within its urban context and sets a clear relationship with key immediate and distant structures in the city.
"It is well known that seamlessness is always an attribute of perfection because its opposite reveals a technical and typically human operation of assembling".

(Roland Barthes, 1957, p.89)

The technological and material expressions of a building are not neutral and can be critical tools in architectural symbolism. Arnold Pacey, in *Meaning in Technology*, argues that "there are complex layers of meaning embedded in technology". Pacey outlines that from a global and political point of view, advanced technology demonstrates access to the resources and association with the greatness of invention. Additionally he points out that technology implies access to larger systems of production and control and that it is a statement of relative position in regard to other people, cities and nations.

The most *enduring quality* of national and state symbolic buildings is that of permanence. No ruling regime or culture as a whole deliberately wishes to articulate its ephemerality through the built environment it produces unless faced with serious pre-emptive constraints. Governments not only take decisions on how to represent spatially the political system of the country – for instance, the judgments about depicting the legislation in relation to the city and in juxtaposition to other institutions – but are also responsible to build *solidly* and with rich materials that embody national

Fig. 5.5: Fine-tuning through digital iterative processes
architectural values and that reflect the strength of the nation.

Described in the research on technology, parallel to phase one of the thesis, was that monumental and highly evocative continuous structures have been possible during modernism thanks to various implementations of cast in place concrete; though not without a certain degree of limitations. These construction methods are laborious and come at a remarkable cost; thus remaining largely exclusive. With conventional concrete casting, construction remains a close approximation of today's digitally imagined reality at best. The investigation of advanced and alternative methods to better express the emergent digitally designed architecture thus becomes a key factor in the architectural implications of this thesis.

Addressing these issues of constructability would necessitate a new phenomenon of fabrication and assembly that exemplifies a progress from where building elements are amassed together [at right angles], to one where the addition and juxtaposition of elements allows them to be held together seamlessly by virtue of their own shape.

ADVANCED ALGORITHMS
Implementation of a systematic approach to architectural design allowing the generation of responsive and intelligent geometry; sets of rules and relationships from which geometry is derived.

The resulting architecture would therefore be described by a sequence of processing steps, rather than a fixed end result of applied operations.
DEPLOYING MATERIALS & TECHNOLOGY

“What we now call "monumental architecture" is first of all the expression of power, and power exhibits itself in the assembly of costly building materials and of all the resources of art."

(Louis Mumford)

Concrete effortlessly became a replacement for heavy masonry walls and solid stones that had traditionally given state buildings the required assurance, stability and security. Yet since the 1960s, in the words of the GSA, civic and national buildings that should proclaim the highest standards of enduring architecture have rarely been on the leading edge of architectural practice and are rather comparable to contemporary buildings in the private sector.

During the 1950s and 60s, when industrial countries were infatuated with the development of new processes and the invention and patenting of unproven material mixtures and construction techniques, material failure in buildings were often the result. Additionally, construction technologies that were intended to be executable by unskilled labour for reasons of economy meant that the lack of knowledge in methods of use and poor workmanship, led to the decommissioning of countless public buildings due to...
deterioration and material and structural failures\textsuperscript{121}. From a broader view, the process of constructing modern buildings remains to this day an act of executing a multitude of mundane tasks and suffers considerably from a lack of complete integration.

Could the process of construction be streamlined in ways to obscure the transition between structure and space?

Could the imagined structure itself constitute the building envelope and the conventional structural grid be dissolved?

The structural principle that could be envisaged in response is one that departs from the \textit{kit of parts}\textsuperscript{122} approach highly revered by Modernism and High-Modernism, which heavily relies on conventional engineering and standardization, and results in the global reoccurrence of identical expressions.

While constructing architecture will always be an effort of placement and assembly, the divisive qualities of the \textit{kit of parts} approach - especially heightened by the advent of sophisticated software technology - breaks down the resolution of building treatments into manageable elements that are visually consumable. The monumental quality of continuous monolithic structures and their capacity to entail meaning are crucial aspects for the viewer's perception of \textit{scale}. Consequently, the proposed design implications will pursue the full integration of structural, spatial and formal elements.
INDEX / CONCLUSION

The subject of this thesis is highly resistant to a conclusion as it is rather suggestive of the beginning of a renewal phase. It is one that would set out from the three issues indexed in this chapter - the normalized relationships, the outstanding universal value, and the technological expression - and involves a successive contextualization of the projects (aided by deploying material systems and technology) into their selected study sites. Here again, it should be emphasized that the argument of this thesis may not be adequately evaluated if the architectural implications would involve a single proposal. The comparative approach exercised in the above research nodes is deemed most fitting to analyze the validity of the indexed modes of implementation.

Each of the proposed sites, in Beirut and in Ottawa, is unique both in relation to their capital context and to each other. While they may share many of the same issues, the architectural strategies for addressing the above questions would by necessity be different in each context. Designing [or critiquing] public project requires a deep understanding of the public as well as the built environment where the project would intervene. The above indexed strategies will provide the framework for the proposed interventions to be fine-tuned to the politics, history, culture and spatial practices as well as various other public modes of interaction.
The project in this chapter investigates the role of civic architecture in Beirut and questions its ability to re-instate identity and signify statehood. This is exceptionally difficult in the case of Lebanon, a weakened state which has not fully recovered from sectarian divisions and political corruption twenty year after the end of a civil war.

The post-war condition was aggravated by the complete privatization of Beirut's center and continuing failure of the government (or lack thereof) to act in reviving Lebanese statehood and prosperity. Beginning with the indexical parameters previously discussed, this proposed project in the Pine Woods District investigates the capacity of social and cultural institutions as alternatives to the commercially driven spectacle strategies that may be capable of shaping a new polycentric civic role for the capital.
The French Mandate over Lebanon after the Great War designated Beirut as the National Capital of a much larger multi-ethnic territory. The Mount Lebanon range was the home to the Christian Maronite and Druze communities for centuries. The formation of the Grand Lebanon in 1920 brought together various cultural and religious communities which were previously geographically and politically independent. The French annexed pockets of Shiite Muslim communities that immigrated from neighbouring countries to the south and Arab Sunnis communities that belonged to the provinces of Greater Syria in the north.

The inclusion of communities that had no national legion to Mount Lebanon in a newly formed state, coupled with a constitutional compromise based solely on the political representation of confessed religions, was a recipe for factional clashes and eventually led to the civil war. While no official history, to this day, was written on the devastating fifteen years of civil war concentrated in and around Beirut, it is important to situate the Pine Woods District (Horsh-al-Snawbar) - which was at the front line between East and West – within the urban clash for control over identity.
The issue of national identity in Lebanon reveals itself as a subjective self-concept that varies tremendously between communal groups whose interests overlap. The sensitive debate on identity (Phoenician and Canaanite ancestry versus Arabism) remains to this day divisive and is avoided in denial assuming that it may have significant religious overtones.

With the question of identity not resolved after the 1958 uprising, the infiltration of the Palestinian Liberation Organization (PLO) of Beirut lead to growing tensions between supporters of the liberation - the Pan-Arabist and the Christian Lebanese Front. Instating chaos between Christians and Muslims, was for the PLO, the best angle to fight Israel and the Lebanese Army simultaneously. Christian militias trained and fought in retaliation to the PLO and the conflicts between both groups escalated in 1975, inevitably turning the ancient heart of Beirut and the hills into a battlefield.

Quickly, the city became a war zone, divided between both groups in the East and West with a sniper controlled no-man’s land stretching from the sea and Beirut’s Central District down south to the Pine Woods District. This came to be known as the Green Line due to the vegetation and trees that took over where the lively multi-ethnic communities of the center had fled.

Many years of intermittent conflicts, which involved Syrian destruction of the East, Israeli invasion and French and US peace keeping troops, changed indeterminately the identity of Lebanon and the distribution of its population in the capital and throughout the country. The war eventually ended in 1990 with the signing of an accord based
on the redistribution of power in the Lebanese confessional system in relative peace
until the dramatic assassination of Prime Minister Rafic el Hariri in a car bomb in the
center of the capital which his financial ventures helped rebuilt.

THE RECONSTRUCTION

"Today, Lebanon's millionaires are finishing the work of the civil war gunmen who
destroyed so much of the city's heritage."
[Assem Salam, 1998]24

Rafic el Hariri was the head of the Lebanese government and mastermind of the
Law 117 of 1991 that led to the limitation of the role of the state and the handling of
responsibility for urban planning and the reconstruction to real estate companies25.
Hariri was also the major shareholder of the real estate company, Solidere, which was
entrusted with the implementation of the urban planning of the Beirut Central District
and major zones of the Green line. The relentless privatization of the reconstruction
and conservation operations meant that decision making could turn a blind eye to the
civic interests in absence of governmental control.

Beirut's Central District, the five thousand years old historic core of the capital, once
a vibrant centre of administrative, financial and commercial activity, was not only dev-
astated by war but also by the demolition and reconstruction efforts. Assem Salam,
the president of the Order of Engineers and Architects of Beirut, wrote in 1998: "If
the destruction of Beirut Central District during fifteen years of civil war has been
an agonizing experience for Lebanese citizens, the plan for its reconstruction has
exposed them to an intolerable vision of their capital's future". Salam further laments
the consequences of the privatization legislations: "The two main obstacles to the
destruction of the heritage and the memory of the old city have thus been removed,
and the town center has become a dead city, an empty field open to the speculative
ambitions of developers".128

As a result, the city's old souks and most of the historical and modernist structures
were essentially erased. The reconstruction effort of the center was for the private
companies another real estate development project; one that may only be controlled
by political intervention. Until the government re-exerts some control, those efforts
will continue to disfigure Beirut's Central District character, history and identity.

GEOGRAPHIC

In a war-torn capital where the interest in financial capital was the only distraction
and assurance against further conflict, could a renewed civic identity be projected
g eo graphically in iconographic nonpartisan ways?

The urban war in Lebanon projected identities into territories. The driving force of
this process was an urge to ensure that factional identities would be inscribed into
geographic places. This led to the destabilization of an already fragile coexistence accord based on confessions. If the relentless destruction of Beirut that took twenty years - fifteen years of war and another five of uncontrolled demolition - reveals anything is that the control over identity lies beyond the representational agency of architecture. The issue of identity in the case of Beirut would be best addressed by setting a framework for the construction of a transitional form of architectural representation - distant from the uncompromising commodification of the capital's center - which would then be allowed to evolve over time.

Accordingly, the proposal is not only the re-enactment of the Horsh as an open public park; but also, the gradual transformation of the Green Line corridor - which remained deserted and uncontested by any faction throughout the war - into a civic zone representative of reconciliation, and which balances out the transformation of the BCD into a global Commercial Center.

The creation of a new civic program offset from the center would first necessitate a clear geo-spatial understanding of the city beyond conventional cartography. The Directorate of Geographic Affairs of the Lebanese Armed Forces was contacted to provide layers of Geographic Information System (GIS) data. Those along with various other data sources allowed for the creation of a three dimensional model of the city which includes detailed topographic and transit representation, the Green Line, the BCD, and the Pine Woods district. This multidisciplinary modelling platform will eventually allow the aggregation of GIS and building models into a single visually rich environment facilitating the iteration and evaluation of various design interventions.

GIS TIMELINE OF COVERAGE ZONES

The coverage areas of the woods and all the other contextual parameters can be overlaid in the 3D model and simulated over time. The GIS and Building Information Modelling (BIM) can be combined into a comprehensive infrastructure and context model that would allow the evaluation and comparison of multiple rehabilitation proposals simultaneously.
The name Beirut originates from the Phoenician word 'Beriet' or 'Barût' in Ancient Egyptian which translates into Pine (Snawbar in Lebanese), which is a type of Mediterranean pine tree that populates the hills of Beirut leading up to the mountains. Large parts of the pine forest were segmented-out to become an Ottoman Casino in 1917 which later became the Pine Residence during the French Mandate of Lebanon, a horseracing hippodrome in 1921. During the 1950s, the development of new roads crossing the Horsh and leading to its final triangular shape produced leftover pockets of woodland that became subject to conflict and appropriation, where parts were contested for Islamic cemeteries. From a pine forest of over 1,250,000 m² in 1696 to a park of 800,000 m² in 1967, the Horsh was left with 330,000 m²; a mere park roughly similar in size to the Permanent Exhibition Grounds of Tripoli discussed in the first chapter.

Today's Horsh is the complex end product of all the circumstances inflicted by rulers, armies, developers, authorities and even public misuse. Though one-third of Horsh is open to the public, frequenters continue to manifest their practices and desires regardless of the fences and regulations and in disregard to the landscape.

Only a handful of pine trees survived the civil war and the Israeli aerial bombardments of 1982. A re-design and plantation effort in 1995 reclaimed some of the tree coverage, but in a controlled landscaping master plan. The pines were planted in grid-like rows.
to allow for easy circulation and uninterrupted visual continuity towards the sea. The Municipality of Beirut, the owner of the land, regarded the Horsh’s new design as “symbolically essential of Beirut restoring its past glory” (p.5)\textsuperscript{32}. The landscape-oriented rehabilitation of the park was opened for a trial period, yet most of the park’s ground was soon closed down with the pretext of protecting it from uncivilized behaviour. The Municipality of Beirut controlled and restricted access to two thirds of the park by employing strategies of fencing and regulations\textsuperscript{133}. Since then, the municipality, experimented with various policies, all involving partial closures of the Horsh, yet the unwillingness to open the park towards the city in all directions rendered them unsuccessful.

Based on the 2004 electoral checklists, the Horsh Mosaic maps (pictured below) represent the confessional geographic distribution of communities around the park. Remaining only open to the west, the Horsh attracts people from the nearby southern and western neighborhoods, which consist of mainly low-income socio-economic groups\textsuperscript{134}. In justifying the decision to close the park, the Mayor of Beirut brings to light the intolerable practices of “harming the landscape and littering the Horsh that was conceptualized and designed as a place for respectfully and neatly enjoying nature (p.5)”.\textsuperscript{135}

While the municipality’s concern for preserving the landscape of the Horsh is justified to some extent, the adoption of such municipal strategies is in fact only accommodating those specific groups responsible for the so called uncivilised behaviours, which are not prevented from sneaking in and contesting the park for undesirable social practices\textsuperscript{136}. 

Fig. 6.12: (Horsh Mosaic), representation of confessions around the Horsh

Fig. 6.13: Panorama of western edge showing spatial degradation.
Fig. 6.14: Evolution of the Pine Woods over time; Diagrams courtesy of Fadi Shayya

Fig. 6.15: Panorama of the Horsh. Current state after the 1995 re-design
The Pine Wood District of Beirut requires a grander scheme, one that through its implementation would acculturate the surrounding population to the very concept of public space, which has been absent since the war. For its critical location within the infamous Green Line corridor, the Pine Wood is of such importance that any intervention would have to envisage the full integration of the park within the extended context of Beirut which as a result would endow a sense of self-responsibility for the population in using and maintaining the public space it provides.

Fig. 6.16: Conceptual proposal for the Horsh
A generation of Lebanese grew up without common public spaces in or between the three major sectors of the city; the East, West and South. The changing demographics due to large influxes of the population from Southern Lebanon to the Shiite suburbs, south of the Horsh and the state of deterioration of refugee camps towards the west have made the task or reintegrating those suburbs that much more challenging. The conceptual proposal arises from the need to permanently protect the remaining triangular footprint of the Horsh, whilst responding to the growing desire of the Lebanese to re-establish their last remaining opportunity for a great public space within the Municipality of Beirut.

The proposal's underlying motivation is to institute a framework for civil and cultural growth by using the Green Line corridor itself as a public permeable zone for the reattachment of East and West. The continuous programmable band replaces the park’s stone and steel gates by traveling the full perimeter of the site. The band marks a permanent porous line around the park which agglomerates at the Northern, Eastern, and Southern corners where it winds into structural volumes. The intention being that the clear demarcation of the park would serve for the prevention of future infringement on its territory.

The outside perimeter of the bands will organize a revived Bazaar typology with traditional open street shops which have existed in Beirut for thousands of years in various
architectural styles. The Bazaar and souks of old Beirut were more than clever places with well designed and engineered social and commercial infrastructure; they had a distinctive capacity in attracting crowds and enhancing public space without commercially dominating it.

The Souks projects in the BCD have in fact achieved the opposite. There, the new units of retail no longer belong to families and individuals, they are rented out to international corporations and large local distributors that cater to Arabs and European tourists, thus making them prohibitive to many locals and subject to seasonal tourism influxes. The concentration of international luxury brands and high-end retail outlets in the new *roofed Souks* created an enclosed Mall typology that alienates Mediterranean traditions; these would be avoided in the Pine district.

The Souk band exhibits the re-emergence of Beirut's legacy and the monumental seamless mass of the three volumes would house programs for a Civic Centre, a Cultural Centre and a National Gallery — all being symbolic civil functions that are absent from the capital. The sensible placement of the volumes on the three tips of the triangulated site avoids interference with the landscape design of 1995 and the bulk of the pine plantations. Using GIS data in the creation of an Infrastructure Model allows determination of precise coordinates of existing, and planned pine trees; thus aiding in the minimization of building footprints and the management of future plantation.

In this scheme, the open parking spaces that were paved as part of the 1995 re-design will be divided between small underground lots beneath the centers and half-buried...
parking super-structures, which roofs would support municipal public sports courts. In a study of the Horsh, Fadi Shaya observed that the existing sports courts are "seldom empty, except during morning hours and heavy rainy days" (p.4). Hence, burying the bulk of parking requirements will provide the space for proper tennis, basketball and football courts - which are currently built in miniature sizes to maximize the parking area - and allow the pines and vegetation to reclaim over misused paved grounds.

The detailed programs within each of the Cultural Center, the Civic Centre and the Gallery go beyond this description and will rather be depicted in the portfolio. Such programs would realistically necessitate years of proper development. In any case, the character of this proposal concentrates more on their placement in relation to the city.

The strategy envisioned for the Pine Woods is one that focuses on its development not only as a public park but more so as a civic attractor that draws clear relationships to its surroundings along the Green Line, and expands its universal value throughout the capital. This proposition of a harmonized public space, both in relation to its programs and to the city, aims to provide a new center as an energized alternative to the BCD's transformation into a restrictive place for consumption. The contemporary formal quality and technological expression of the complex does not imitate the Lebanese traditions superficially, rather it provides a protective yet permeable perimeter approach rendering it in such ways that it would seem to branch out from this particular space and time. The public center of Beirut becomes fused with its site and setup to consolidate with the overall context of the city over time.

Fig. 6.21: Sport Fields of the Horsh with the underground parking beneath the tennis and basketball courts.
Fig. 6.22: Bird's eye view of the Civic complex revealing the three volumes connected by the stretch of promenades, Souks and sport courts.
Fig. 6.23: Cultural Center towards the Tayouneh Roundabout. The revolving footprint of all three masses minimises the footprint and the disturbance of the soil.
Fig. 6.24: Archive, Exhibits and Public office space in the northern volume connecting to the sport courts. The 1995 re-design remains largely intact due to minimal footprint.
Fig. 6.25: The superstructure of the Civic Centre providing a central courtyard.

Fig. 6.26: Stretch of open-air retail stores towards the South-Eastern suburbs.

Fig. 6.27: The sport courts elevating at key points to provide parking and a link between the Civic Centre and the Archive+Exhibit Centre.
Fig. 6.28: Continuous concrete structures for the Souks, conforming to the topography of the Harsh.
Fig. 6.29: The basic continuous surface of the Souk, geometrically relaxed at the centre and providing structure and shelter for four retail units.
Fig. 6.30: The scripted structural pattern with 5 edges allows for greater surface continuity on the structure and light penetration to the retail units.
Fig. 6.31: Each quadrant is unique in shape (conforming to the topography) and in pattern. The quadrant may also be enclosed with advanced curtain systems as illustrated.
Fig. 6.32: 3D Visualization of the Souk promenades leading to the Cultural Center. The scale figures were generated using a pedestrian flow simulation and they are fully animated.
In evaluating this project, it appears that the challenge of designing in such a context with so many contradicting interests, difficulties and uncertainties, may lead the architect to get carried away with idealistic solutions to problems that may be far more complicated. Oscar Niemeyer's fair in Tripoli stands testament to how fragile the architectural implications of major public projects may be, especially facing the sporadic violent uprising, political instability and economic insatiability throughout the Middle-East. However may be limited an architect's input in relation to all the decision-making involved at political, financial and administrative levels, the Horsh proposal (on public land with full municipal ownership) comes as a necessary reminder of the desperate need of Beirut for a new symbolic focus distant from the privatized center - and all cities in similar situations for that matter.

The comparative analysis on the validity of the thesis' indexical approach leads us to the context of a capital city that cannot be more different. Whilst scrutinizing over the same issues, and introducing similar civic programs, the proposition in Ottawa will be considerably more focused on architectural scale rather than a full-blown urban insertion of a complementary city center.

Fig. 6.33: Developed proposal of the Horsh
If Beirut's self-inflicted misery during the war was a by-product of the failures of multiculturalism, then the Capital of Canada epitomizes its success. The project in Ottawa seeks a representational role for civic architecture among the functionalistic administrative efficiency of the Federal Government seat. At the very heart of Ottawa, Victoria Island provides an opportunity for needed cultural programs and the symbolic integration of the rich Aboriginal Heritage on the Island at the vanguard of Canada's legacy and identity.
A relatively young capital in comparison to Beirut, Ottawa is not a stranger to colonialism either. British-influenced capitals such as Ottawa represent the middle ground between colonial status and full legal independence. The story of the designation of Ottawa as a National Capital did not unfold as a Canadian internal affairs agreement; rather, a ruling in 1855 made by Queen Victoria to settle a dispute over which city — Montreal, Quebec City, Toronto, and Kingston — should administer the Provinces of Canada.

Previously named Bytown, the city owed its name to Colonel John By who oversaw the construction of the Rideau Canal after the war of 1812. Among the many of Ottawa's strategic advantages for the war efforts were a navigable river, bridgeable spans and an elevated hilltop worthy for the construction of a citadel. Though Parliament Hill was the site of By's military barracks, Ottawa witnessed an overall gradual and steady growth since its founding, thus reflecting the stability of the Canadian government.

The Canadian capital, however, appears to have been purely envisioned as an administrative enclave that relies on the nearby presence of established economic, social, and cultural networks. Until the fairly recent developments of the high-tech industry (mostly private corporations) in its suburbs and the merger of neighboring towns under its municipality, Ottawa's administrative role was sustained predominately by acting as a drain for the resources of the surrounding cities under its ruling.
Ottawa's beautiful riverfront of publicly owned land makes it appropriate for the dramatic placement of government and National buildings. The neo-gothic parliamentary spires on Parliament Hill were designed to be best approached along the diagonal, enabling them to convey maximum surprise and visual appeal.

Named the Confederation Boulevard, the looping Processional Axis in Ottawa is rather unusual; not only does it conjoin Parliament Hill with the Governor General's Residence but it also loops around to the other side of the river to join Ottawa and Hull. The symbolism of the capital district seemed to have reached out towards French territory through the act of urban design. By distributing various national museums, cultural and governmental structures within the loop on both sides of the river, the Boulevard essentially forms a sort of citadel set aloft the high grounds. As separatist pressures in Quebec increased the placement of the Place du Portage Federal offices (1970s) and other Canadian cultural programs along the Quebec side stood as symbolic testaments to national unity.

This inclusive symbolic attempt at forging a more representative urbanism of National Canadian identity overlooked Victoria Island's significance in the midstream. Aboriginal travelers and explorers depended on this ancient Ottawa River waterway for thousands of years as a vital transportation route. Victoria Island and its neighboring Chaudière Island is of immense historical value and has monumental national significance to Aboriginals and all Canadians.
The Victoria Island is sacred to the Anishinaabe Nation. The land formation had been used by First Nations people for centuries, which they refer to as Asinabka [Place of Glare Rock]. This site was the centre of convergence for trade and a spiritual and cultural exchange between Aboriginal Nations.

The areas of Victoria Island, the Chaudière Island and the Portage Rapids are well known to have served as an important sacred ceremonial place for the indigenous peoples of the land. The Ottawa River Islands are now featured on the list of First Nations’ land claims by the Algonquians in Quebec and Ontario on the basis of evidence in a painting of a prayer ceremony at the Chaudière Falls dating back to 1613.

Victoria Island is owned and maintained by the National Capital Commission (NCC). The Island formations contain the Ottawa Electric Railway Company Steam Plant, the Bronson Company Office and the Ottawa Hydro Generating Station at the west of Portage Bridge. The east side of Victoria Island itself houses the historic Willson Carbide Mill and a small indigenous quarter which exhibits history and activities of the First Nations.

In 1985, Grandfather Elder William Commanda had a vision to build a National Indigenous Centre on the Islands. Commanda inscribes in a vision statement that “the land has been waiting for these people to ignite the ancient communal fires again.”

William Commanda served as Band Chief of the Kitigân-zibi Anishinâbeg First Nation and holds the records of prophecies: “The Seven fires of the Anishinaabe prophecy represent key spiritual teachings, and suggest that the different colors and traditions of the human beings can come together on a basis of respect.”
Commanda understood the need of the Algonquin's Nations to engage in modes of cultural production; a complex activity that involves the implementation of strategies at different scales. Lisa Findley observes that at the largest scale, the most enduring activity for gaining political power, framework cultural productions and economic stability is building well and *durably*.

The underlying motivation of Commanda's vision for Victoria Island focuses on a National Aboriginal centre which would include "programs and processes that can lead to earth, individual and group healing, development and peace".

**PROGRAMMING THE ISLANDS**

Over the past three decades, Aboriginal peoples have slowly been reclaiming their right to bring ceremony and gatherings back to the Islands. Many Nations and groups, now hold meetings and sacred ceremonies on the Eastern part of Victoria Island, retrenching an indigenous spirit in its soil.

Various rehabilitation schemes for Victoria and the Chaudière Islands were proposed after the private company that owned most of the Chaudière Island, decided to sell out. Most notably, was a so called *Eco-District* urban plan in 1990 by Ottawa architect Mark Brandt, which called for mixed use of institutional and commercial programs on the western part of Victoria Island and throughout the Chaudière Island, with some room for industry.
Whilst playing on the word Eco, the scheme was overly controlled and opposite to the original intention of Edward Bennett's urban plan of Ottawa in 1915 with the City Beautiful theme of *picturesque islands*. The urban plan did not, however suggest any residential developments on the Island; Brandt underlines that the NCC regards the Islands as a "National Treasure far too special for letting people to just start putting up private condominium buildings".

The NCC's dream for Victoria Island is not distant from that of Commanda and includes a grand new building that would celebrate Canada's Aboriginal Peoples. The NCC's vision for a Cultural Centre also depicts the restoration of the Carbide Mill (a formally recognized Historic Place of Canada), as well as lookouts, footbridges and floating quays.

The National Capital Commission contracted architect Douglas Cardinal to develop a scheme for an Aboriginal Centre within the nation's capital. Various parties were involved in these discussions including Chief Commanda. Cardinal's translation of Commanda's vision interestingly goes as such: "The building’s design represents air, fire and water and will be shaped to symbolize the seven fires of the prophesy. The entrance in the shape of a turtle represents the Earth itself and the spiral symbolic form will be open to all people who come to gain from the Elders knowledge of true sustainability, Peace and Reconciliation, and the survival and thriving for the future."  

That being said, the purpose of this observation is not to lay any criticism on Cardi-
nal's symbolic and programmatic interpretations, but rather to draw attention to the central placement of the complex on the site which is typical of the modernist 'space occupier' impositions that were previously discussed. Agglomerating the cylindrical masses in the center erases the Carbide Mill and all built memory of the development of Victoria Island over time. Also, the excessive use of glass (surface divisions depicted in renderings) on tall tower like forms lead to questioning their earthliness on the site and symbolic appropriateness to Commanda's vision.

The symbolism and technological expressions articulated through the production of public architecture tends to highlight the identity and abilities of a dominant group within a multicultural society. In the case of Victoria Island, could an architectural intervention be intentionally symbolic of a group or their vision to project meanings that are common to all and open to various levels of interpretations and appropriations?

GEOGRAPHIC SCALE

Once more, the geography of the land plays a crucial role in the development of the project thanks to the technological advantage of Geographic Information Systems. David Harvey emphasizes that at the scale of geography if one is: "armed with the right kitbag of tools, it is possible to set up common descriptive frames and modeling procedures to look at all manner of flows over space...the diffusion of cultural forms...the networks of communications, energy transfers, water flows...the nodes of centralized power...of population and income...all these elements of spatial structure..."
become integral to our understanding of how phenomena are distributed and how processes work through and across space over time.” (p.15)\(^{155}\)

The importance of these new developments in data rich infrastructural mapping (Autodesk Infrastructure Modeler) cannot be further stressed. For this project the GIS modeling was crucial to precisely evaluate the topography and understand the dimension of flow over space throughout the core context of the city and beyond.

A complete 3D model of the city of Ottawa was built to include all minor and major structures on both sides of the river and all infrastructural layers of roads, amenities, vegetation and transit, to name a few. The GIS data originate from the City of Ottawa and were acquired through the GIS services of Carleton University. They cover all matters of civil infrastructure including aerial LIDAR 3D scans.

The GIS model of the city permits the optimization of viewing trajectories and the establishment of orientations connections, both technically and experientially. Such a model permits for the analysis of advanced simulation algorithms, prediction of traffic flow, pedestrian behavior, river tides, emerging patterns and many other design informing variables. This provides a superior understanding of the site within its urban context and sets a clear relationship with immediate and distant structures in the city.
Fig. 7.11: LIDAR point clouds of the extended context of Victoria Island created by the Ville de Gatineau in 2009 and acquired through the GIS services of Carleton University.

Fig. 7.12: LIDAR point clouds (here visualized in Revit) were meshed and used to generate the topographic model of Ottawa.
Fig. 7.13: Wireframe of the complete 3D model of the City of Ottawa visualized in Autodesk Infrastructure Modeler.
Fig. 7.14: Semi textured 3D model of the City of Ottawa visualized in Autodesk Infrastructure Modeler and revealing various Shape files data, vegetation, and 3D buildings.
Conventional buildings were not traditionally the primary mean for the Aboriginals to conceptualise space; instead they developed and constructed a deep and subtle relationship with the landscape. In the light of these reflections came the initiative for a structure that is both architecture and earth.

The picturesque landscape of the Asinabka suggests a sensibility to the ground. Consequently, the focus of the proposal shifted towards earthing the center’s super-structure by attempting to conform it to the Island’s topographic geometry. Once more, the intent was to engage with the perimeter of the site by the means of a full formal integration with the topography of the Island and direct physical connection with the water beyond the metaphorical.

Water is the most sacred element of life to the Indigenous people and their most precious resource. Establishing a physical connection with the earth, the sacredness of water posed challenges that were manifested in the conceptualization of the edge and in breaking down the scale and bulk of a building, without diminishing its monumental quality.

The devised approach is a departure from the conventional iconography of monuments and is thought to be a closer interpretation to Commanda’s vision. The building’s overall shape was determined after various iterations of physics simulation that subjected two surfaces - pinned together at the most western point of the Victoria

Fig. 7.15: Example of Computational Fluid Dynamics Simulation
Fig. 7.16: Surface deformation using MassFX physics engine in 3DSMAX
Fig. 7.17: Surface relaxation and transformation using various MassFX tools
Island 3D model - to a Computational Fluid Dynamic (CFD) simulation (details in portfolio). The resulting geometry was optimized by the simulation output and was allowed to morph and deflect to sustain the various programmatic elements; whilst maintaining the simulated deformation tendencies characterizing the flow of currents in the Ottawa River.

At once modest and monumental, the resulting massing is a continuous structural roof span, extending to the edges of the Island over the water and allowing for public access to the top. The continuous in-situ structure is built concrete sections with seamless joinery and with swatch patterns that alternate between light wells and patches for grass and plantations. The precise coordinates of the perforation are determined using a parametric algorithm that was based on natural light simulations which optimizes light penetration beneath the overhangs.

The linear structures extend to the western part along both edges of the Island and both cross beneath the Portage Bridge by means of a tunnel towards the south and a bridge crossing platform towards the north. In keeping true to the Aboriginal concept of peace and reconciliation, they join by overlapping each other to form the Conference Center and Auditorium programs - as originally desired by the vision statement programs.

The programmatic requirements of this vision were in fact twofold. They were laid by Elder Commanda to focus "first on the healing, strengthening and unification of the Aboriginal peoples, and second on sharing indigenous ideology, values and culture with all others, in order to develop a circle of all nations and a culture of peace."
The list of programs presented in the Victoria Island vision statement is listed below:

<table>
<thead>
<tr>
<th>SPiritual Healing Centre</th>
<th>Centre For All Nations,</th>
</tr>
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<tbody>
<tr>
<td>Spiritual/Ceremonial Centre</td>
<td>Peace Building 'Think Tank'</td>
</tr>
<tr>
<td>Cultural Revival - Arts, Crafts</td>
<td>Cultural Sharing</td>
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<tr>
<td>Language Centre</td>
<td>Racial Harmony</td>
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<tr>
<td>Elders' Gathering Place</td>
<td>Meeting Rooms</td>
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<tr>
<td>Healing Centre/Meeting Centre</td>
<td>Conference Centre</td>
</tr>
<tr>
<td>Archives/Library/Historic Research</td>
<td>Auditorium/Concert Hall</td>
</tr>
<tr>
<td>Medicines/Gardens/Greenhouse</td>
<td>Accommodations</td>
</tr>
<tr>
<td>Traditional Knowledge/Ideology</td>
<td>United Nations Meeting Space</td>
</tr>
<tr>
<td>Youth Developmental Centre</td>
<td>Restaurant/Gift Store</td>
</tr>
<tr>
<td>Children's Developmental Centre</td>
<td>Museum/Gallery</td>
</tr>
<tr>
<td>Research/Planning/Education</td>
<td>Children's/Youth Museum</td>
</tr>
</tbody>
</table>

(Commanda, 2003)

In terms of programming, the propositions for the complex stems from the thought of harmonizing both the visions of the First Nation and the NCC to create a National Cultural Centre that is open to all Canadians. The organization of the programs initiated in the twofold vision will be intermixed from the most public in the West of Victoria Island and the most private and involving ritual in the East A programming gradient based on the level of required privacy is implemented as illustrated below. Being the
most sacred, the eastern tip of the Island will be reserved for ritual practices and will preserve the grounds of the existing Anishinaabe encampment.

The Willson Carbide Mill will also be preserved for its historical value and landmark quality on the Island. The building's industrial character is softened by its classical scale, proportions and details which reinforce the picturesque character of its setting on Victoria Island. The presence of the Mill would be complemented by the centre's linear structure, maintaining a low profile which blends with the horizon and along the rocky edges of Victoria Island.

The physical nature of the complex, spreading over the bedrock, emphasizes its permanence, rich material readings and technological expressions. Thus it projects the identity and culture of its Anishinaabe hosts without directly drawing on shapes from their legacy and forcefully making the complex seem indigenous158.

The architectural implications at the scale of Victoria Island begins with the discreet integration of the indexed approach - explored first in Beirut's urban scheme - leading to the amalgamation of architecture, institution and site. Symbolism in this proposal is not a formal and subjective interpretation in a traditional sense, it is rather an elaborate scheme of discreet technologies that are implemented as a process and are hidden in the outcome. By deriving the physicality of the complex from a phenomena of flow sacred to the cultural group, symbolism in this case is not enforced; it becomes open to the interpretation of all public participants and it is allowed to grow in meaning over time.
Fig. 7.25: Cultural Centre and relationship to site and surroundings. This image is extracted directly from the interactive model and is not a rendering.
Fig. 7.26: 3D Visualization of the populated Cultural Center using pedestrian flows and idle zones simulation tools that are interactive and animated in the 3DSMAX scene.
Fig. 7.27: 3D Visualization showing the relationship between the complex and existing aboriginal center and ritual grounds, as well as the Carbide Mill.

Fig. 7.28: Southern Elevation, sectioning through the Portage Bridge.
Fig. 7.29: The conference center, and amphitheater in the Western side of the Island connected by a pathway under the Bridge towards the north and a tunnel towards the south.

Fig. 7.30: Northern Elevation, sectioning through the Portage Bridge.
Fig. 7.31: 3D Visualization revealing the curtain system enclosure and the outdoor pathways along the Ottawa River.

Fig. 7.32: Section through the Cultural Center and the existing Aboriginal encampment. Note the cut through the bridged concrete column.
Fig. 7.33: Interior rendering revealing the result of the scripted pattern in the unified surface + structure + space generation and perforation system.

Fig. 7.34: Section through the Cultural Center and the Carbide Mill. Note the conforming relationship with the topography and the island's bedrock.
Fig. 7.35: Interior rendering in Cultural Center with the Gatineau shoreline and the Portage Federal Government District in the background.
Fig. 7.36: Exploded perspective view highlighting the structural, material and mechanical complexity of the center.
Fig. 7.37: Exploded perspective view highlighting the structural, material and mechanical complexity, including railings and enclosures over the bridged columns.
In the scenario of Victoria Island, the technological expressions of the proposed building are articulated by means of simulation algorithms that are situational to the context and the institution. The very concept of physics engines processes of generating architecture through a simulation of natural phenomena - which in this case is sacred to the Aboriginals - could have a vast resonance with the Algonquin Nation, and yet is discreet in the outcome. Such a method could minimize stylistic biases inflicted by participants in the production of architecture (including those of the architects) and helps in remaining true to the vision of a project both symbolically and programmatically.

In this sense, the act of producing public space reflects the specifics of place, culture and landscape and is universal only in its value to the broader context, within and beyond the capital city. In spite of that, the use of such methodology, however appropriate it may seem in conceptualizing a building that aspires to symbolize a nation, poses challenges when addressing issues of constructability.
As described in the index, materials and construction technologies may both facilitate architectural design or constrain it. If the proposition on Victoria Island solicits the monumental quality of continuous monolithic structures for their capacity to entail meaning and scale, a holistic integration of the construction processes would be more advantageous than the conventional practices discussed in the research nodes.

Pursuing the full integration of structural, spatial and formal elements requires the streamlining of the process of construction in ways to obscure the transition between structure and space. In continuing with the merger of the parallels between architecture and its methods of implementation the following chapter summarizes the constructibility of complex symbolic structures in light of breakthroughs such as Digital Automation.

Fig. 7.40: Example of constructed surface

In-situ concrete structures and the limitations of conventional methods of fabrication
- Lack of architectural flexibility.
- Costly and exclusive.
- Labour intensive and slow.
- Wasteful and high on emissions.
CHAPTER 8
DIGITAL AUTOMATION

Having discussed the motivations behind the integration of structure and space in the index, and exerted its potential for symbolism both in Beirut and in Ottawa at various scales, this project will conclude the methodology and technology section through its merger with the architectural implications of the thesis.

The advanced digital analysis techniques utilized in the architectural implications so far necessitate an adequate translation into built form in ways that exploit the full extent of design philosophy. Acclaimed for achieving economy of scale and efficiency, the use of the contemporary kit of parts approach explained earlier, dictates a repetition of patterns, which limits the customization and control over the quality of assembly and construction.

Until recent developments, Digital Automation remained limited in architectural practice in comparison to most other industries; largely due to scale limitations. Subtractive digital fabrication has been utilized to great success to facilitate the creation of building components with improved customization. Yet the Degree of Freedom (DOF) in the production of these components is relative to the number of machining axis available to the operators.
The DOF is in fact the geometric definition of the freedom of movements, either along an axis or rotation about an axis in three dimensional space\(^{161}\). Orienting a machining tool in any given direction in space requires a minimum of six degrees of freedom. Most numerically controlled machines have however far less DOF to reduce complexity and cost and the accumulation of tolerances caused by an increased number of moving parts\(^{162}\) — leading to precision loss. The limitations of these systems manifest themselves not only with the DOF being in direct correlation with the sophistication of machinery employed but also due to the fact that subtractive methods are generally more suitable for creating objects.

Space making is inherently an additive process and has always involved the deposition of building material on a perimeter relative to a certain height. While a proposition to automate such a process may seem entirely idealistic, it is in fact a patented reality. So far manifested at research level — for instance, Contour Crafting\(^{183}\) at the University of Southern California and Freedom Construction at Loughborough University\(^{184}\) — it remains a technical endeavor of problem solving and crisis relief and does not yet explore the full architectural potential of a seemingly limitless DOF attributed to layer deposition processes.

Relative to architectural scale, the additive fabrication of building elements would not require the level of mechanical precision and factory control needed to produce low tolerance components crucial to other industries such as the aerospace and automotive. Set aside from the exceptional advantages of full scale digital fabrication directly on site, the creation of building components using additive processes would also allow for a far greater precision of joinery which may help convey the continuity of monolithic in-situ structures.

Fig. 8.4: Example of large scale 3D Printing: [LEFT] Loughborough University, [RIGHT] D-Shape
THE 3D BUILDER

Drawing on the evaluations and conclusions of the twofold thesis, this exit project involves the design and construction of a large scale 3D concrete printer which has been extensively researched and under development from the onset. Codenamed the 3D BUILDER (3DB), this project will also help satisfy the requirements for a graduate independent study.

With the support and collaboration of Professor Johan Voordouw, this machine is now under construction and will continue as a research project after the completion of the thesis. Intended to be mobile, it was designed in Autodesk Inventor with a rigid all steel and sheet metal construction to fit on the bed of a standard half-ton pickup truck or an equivalent capacity contracting trailer. The gantry mechanism of the machine is inspired by a full scale woodworking CNC machine which was remodeled in Inventor to fit the requirements of a 3D printer intended to deposit heavy material. The cement extruder is a digitally controlled progressive cavity pump capable of extruding medium to high density bituminous mixtures and clay. The 3DB will initially be tested to build full scale architectural objects that interact with the human body, such as a bench. The machine will eventually be positioned to construct highly complex digitally designed scale models - such as the one proposed for Beirut and Ottawa - and full size building elements and artifacts.

The use of Inventor's cutting edge structural and fluid dynamics simulation capabilities eliminates most uncertainties by allowing the prototyping of the design directly
STEEL FRAME FABRICATION

[8.8, 8.9] The gantry is a sheet metal design and its components were laser cut and bent to shape with exceptionally high tolerances.

[8.10] Isolated structural members and flying gantry mechanisms components. The machine's dimensions are 1800mm x 1500mm and its bed capacity of X:1500mm x Y:1200mm x Z:1000mm. The overall shape and disposition allows it to be easily transported on a pickup truck or a trailer.

within the digital environment. The Science & Technology Center at Carleton University, a computer engineer and a chemist have so far been consulted for the 3DB and the construction of the frame is anticipated to be completed by the end of May 2013.
Fig. 8.14: Showcase Visualisation 03: Transportability
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The design of the extruder is based on the Moineau Pump or Progressive Cavity Pump principle. It can extrude medium to light density material with abrasives such as cement, polymer concrete, ceramic clay and porcelain mixtures. The feed is controlled digitally with a stepper motor and driver combination to maintain a consistent flow. The 3DBUILDER may still operate as a milling machine with the simple replacement of the extrusion head with a standard router or spindle.

EVALUATION
The research parallels explored in this thesis unify and culminate in a developed architectural and technological project, in which their combination provokes the future constructibility of symbolically charged monumental structures. In the meantime, one can only imagine the scalability of this building system proposed by the 3DB from that of a half-ton to that of a big-rig truck or from a single unit to the collective contribution of multiple digitally operated gantry systems combining effort in constructing in-situ structures on site with exceptional symbolic resonance.

Fig. 8.19: The Progressive Cavity Pump extruder designed in Inventor
In an attempt to confront the questions raised by this architecture thesis, which, in short, endeavors to build national symbols out of complex segments of concrete; the answer remains that the value and specificity of institutional architecture in its place could only be truly manifested over time.

Having researched the distinguishable case-studies of Modernism - leading the way to the Index and in turn to the comparative development of the proposals for Ottawa and Beirut; and having attempted to respond in different ways to the usual contemporary rhetoric on
regionalism, fitting within the context, permanence, references from traditional architectural legacy, and relying on specific methodologies and technologies – all reinforced the desire for symbolism in civic architecture and its transformation over time.

This body of work has emphasized that representing the agency of governmental and cultural institutions, especially in national context of a capital city, may require rethinking of the conventional approaches leading to architectural design and fabrication. In an effort to summarize the envisioned approach, it may be best described as a negation to modularity. Instead of modulating the outcome by creating repeatable architectural modules and/or formal elements (picture innumerable offices and modernist housing experiments), this contribution is an attempt to modulate a methodological approach that may lead to a holistic integration, both symbolically and programmatically, within the specifics of context and site.

Symbolism in this research was seen in opposition to formal and subjective interpretations of tradition. A framework was presented in the form of an Index which stresses the normalized relationships with site, the outstanding universal value for the future, and the technological expressions; and was executed and assisted by technologies that are implemented as a process and are hidden in the outcome.
Provided that those technologies were motivated by genuine adherence to the identity of the civic and cultural institutions explored, their utilization was focused on breakthroughs in the disciplines of information (GIS+BIM), simulation (CFD) and fabrication (DA). In light of these technologies, the comparative projects contextualized it in unique ways. What remains conversely similar is not only the integration with the site but also the full integration of the structural and spatial elements – resulting in continuous monolithic structures.

While in-situ structures are by no mean a new invention, their execution in this case differs in diminishing the visual impact of the concrete joinery. The visual seamlessness of a structural surface contributes experientially to the perception of its sheer scale, and the careful articulation of such formal expressions would enable the proposed projects to express their symbolic references more assertively.

Resolving the challenges of constructibility posed by the projects in this thesis may be laborious in their undertaking by conventional methods, and resource prohibitive. Merging the parallels between architecture and its methods of production, and obscuring the transition between structure and space, requires the streamlining of the processes of construction. Acknowledging the conservative nature of construction practices and the length of time it
take for new methods and technologies to enter common usage, it is with hope that the work in this thesis, leading to the pursuit of the exit project (the 3DB) will contribute to the knowledge-base on the symbolic resonance and constructibility of complex geometry in concrete.

It is my belief that human values can only be expressed through the development of symbolic thought. Crossing the threshold from need and efficiency to the depiction of meanings in acts of cultural production, is where the architectural implications of this thesis wish be to situated and from where they may begin to create a lasting cultural legacy.


23. Oscar Niemeyer 101 [Documentary]


Unfettered Market-Driven Development Poses a Threat to the Country's Architectural Heritage and Urban Public Space.


49. U.S. General Services Administration, Office of the chief architect, Center for historic buildings.


124. Fisk, R. (2001). Greed is destroying the beauty that was old Beirut. The Independent, 23 June.


126. Fisk, R. (2001). Greed is destroying the beauty that was old Beirut. The Independent, 23 June.


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