# DESIGN AGAINST DIVISION: A FRAMEWORK FOR EVALUATING URBAN SEGREGATION THROUGH URBAN FORM

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## ABSTRACT
Urban segregation in the United States has arisen from racially unjust policies that have shaped cities, leaving enduring inequities in the built environment (Rothstein, 2018). Urban form, a city's physical design and spatial organization, plays a crucial role in reinforcing or dismantling these patterns. This research investigates how urban form influences segregation and identifies design interventions and practices that can facilitate a more inclusive urban fabric.

We developed a study that investigates and applies a replicable spatial evaluation framework grounded in literature and bolstered by case studies to assess how the physical form perpetuates or mitigates the enduring impacts of racial segregation. The framework was informed by a literature review and centered around five indicators of division: constructed, morphological, environmental, infrastructural, and visual, adapted from Knorr (2016). It was then applied through two case studies of historically segregated communities: Lincoln Heights, Washington, D.C., and the Lower Ninth Ward, New Orleans, Louisiana, to test the framework's validity and demonstrate its application for community planning revitalization.

Our findings indicate that, despite policy changes, divisive physical features persist in the urban layouts of both communities, continuing to reinforce trends of division and inequality. These include barriers such as inadequate pedestrian and transit systems, environmentally vulnerable locations, and inequitable planning and reinvestment strategies. The framework documents ongoing spatial inequalities and provides a tool for planners, designers, and community leaders to evaluate and address them, ensuring a transparent and replicable assessment that promotes inclusive design and planning equity.

## Keywords
Community Building, Racial Inequality, Spatial Analysis, Urban Planning, Urban Design

# 1 INTRODUCTION

Urban form encompasses a city's physical design and spatial organization that defines an urban environment. Urban segregation refers to the spatial separation of different groups within an urban environment based on ethnicity, race, and other socioeconomic factors, focusing on its role in a structural-spatial inequality framework (Dadashpoor & Keshavarzi, 2024).

The historical context of segregation showcases the depth to which systemic policies and regulations have shaped the material of urban form and reinforced patterns of inequality throughout. Segregation in the United States functions as both a social and spatial process. Institutional policies and regulations, including zoning laws, housing policies, education systems, and infrastructure, have all been leveraged to enforce and sustain segregation (Rothstein, 2018), leaving a shadow of physical and economic barriers that persist in the contemporary city.

Federal housing projects and policies instilled prolific systems of segregation. During the New Deal era, the Public Works Administration (PWA) imposed segregation in previously integrated communities across the Northeast and Midwest. White housing projects, such as Lakeview Terrace, a White development built in Cleveland, included a community center, playgrounds, green spaces, and murals, frequently seen in PWA projects for White families, but rarely for Black families (Rothstein, 2018). Federal housing policies, like those seen in the Federal Housing Administration's (FHA) mortgage insurance program and the Home Owner's Loan Corporation's (HOLC) practice of redlining, a system that denied mortgage insurance to Black families or neighborhoods with black residents, categorizing them as "high-risk", unsuitable for loans (Massey, 1993). Alongside the merging of the PWA with the United States Housing Administration (USHA), confined Black residents to specific areas while supporting the movement of White families into the suburbs.

Federally funded urban renewal projects of the mid-twentieth century targeted "blighted" areas for redevelopment, projects that disproportionately targeted Black and low-income communities, without the necessary support needed for their relocation (Fullilove, 2004). Highway construction also became a tool of exclusion at the same time. The federal government financed interstate highway projects and local initiatives that would demolish Black neighborhoods without any restitution (Rothstein, 2018). These highways, which were built for the growing White suburbanite population, produced devastating effects on Black communities, displacing residents, demolishing green spaces and community hubs, and exacerbating the extensive level of isolation Black communities were facing.

Alongside these federal practices, private intervention, such as racially restrictive covenants, which barred Black families from residing within or purchasing homes in many suburban neighborhoods, a practice that was later deemed unenforceable after the 1948 *Shelley v. Kraemer* Supreme Court decision (Rothstein, 2018), persisted under a different system of exclusionary zoning ordinances. These practices made certain that American communities were built on a system of exclusion, leaving Black families with limited options in housing and a lasting imprint on the urban form of cities (Trounstine, 2018).

The entrenched nature of segregative practices and ideals at the federal, state, and local levels throughout United States history has left a lasting impact on cities. Transit systems, land use patterns, and infrastructure placement that originated during the era of segregation continue to influence access to resources and opportunities, often affecting economic mobility and social integration. Communities that have been historically marginalized continue to face disinvestment, limited mobility, and environmental risks, conditions linked to urban design and planning practices of the mid-twentieth century. The persistence of these spatial inequalities is the basis of this study's focus on evaluating and addressing the division embedded in urban form.

The role of socioeconomic factors in the discussion of sustained segregation has been widely examined, while the physical configuration of the urban environment, comparatively, receives significantly less attention. Current studies on urban form often focus on individual features, lacking a comprehensive method for the assessment of these features on multiple levels and dimensions in a single framework.

These tools for evaluating urban form are rarely designed for use across multiple urban contexts. They are often highly site-specific and depend on assessment methods that make comparison and practical

application difficult. As a result, planners and designers lack a standardized way to identify and measure spatial elements that reinforce segregation.

This gap demonstrates the need for a systematic and repeatable spatial framework that categorizes physical features for both qualitative and quantitative evaluation. By adapting Knorr's (2016) five indicators of physical division into a measurable and replicable evaluation framework, this study can directly address this need and offer a tool for research and practical application.

This study uses spatial analysis to translate built environment features into observable indicators that can be evaluated and addressed. Understanding how power dynamics, inequalities, and systemic practices shape urban form helps designers and policymakers identify shortfalls in our built environment that maintain inequities. This insight is crucial for equitable community planning and expanding access to resources, an essential quality of cities needed to support and reflect the needs and identities of diverse populations.

### 1.1 Research Objectives

This study aims to:

- Develop a replicable spatial evaluation framework to assess how urban form contributes to or mitigates urban segregation
- Integrate five observable indicators of division identified by Knorr (2016): constructed, morphological, environmental, infrastructural, and visual, into a measurable evaluation criterion.
- Apply the framework to two historically segregated communities, Lincoln Heights, Washington, D.C., and the Lower Ninth Ward, New Orleans.
- Identify constant physical elements that contribute to the reinforcement of spatial inequity
- Provide a tool that planners, designers, and community leaders can use to evaluate and address inequities in the built environment.

By establishing this review method, the study will enable a precise evaluation of the spatial division on a small scale as well as provide a foundation for interventions that can resolve and promote more equitable urban environments.

## 2 METHODS

This study employs a comparative case study approach to examine how urban form sustains patterns of segregation in historically divided communities. The methodology consists of three primary components designed to create a universally applicable framework for evaluation. First, a literature review traces how segregative ideals and practices have persisted in the development of American cities. Insights from this review are synthesized into an assessment framework that translates qualitative concepts of division into measurable indicators. Finally, the framework is applied to two case study sites. Lincoln Heights in Ward 7, Washington, D.C., and the Lower Ninth Ward, New Orleans, Louisiana. These locations were selected for their history of segregation, divisive urban features, disinvestment, and redevelopment pressures. This application serves to test the framework's validity, demonstrate its analytical utility, and highlight its potential as a tool in community planning and revitalization.

### 2.1 Literature Review

This literature review establishes a basis for evaluating how urban form influences patterns of racial segregation in the United States. It begins with a discussion of specific historical policies, at the federal and local levels, that have cemented spatial inequality into the built environment. Following this discussion, an examination of how physical design in the urban environment may reinforce or disrupt patterns of segregation, identifying specific instances of physical division. Finally, insights on gaps in existing frameworks and discussions surrounding the evaluation of these types of divisions provide the basis for the spatial evaluation framework used later in the study. The criteria for the literature selection focused on scholarship that engaged with the intersection of racial exclusion and the built environment, with a particular interest in documentation of segregation in urban form. Foundational work was established in housing, zoning, and policy alongside urban design and planning research, involving urban

barriers with historical depth and contemporary issues. This literature review provided a basis that traced the historical roots of segregation along with the contemporary realities of urban form.

## 2.2 Framework Development

The analytical framework employed by this study was adapted from Knorr's (2016) five indicators of physical division, identified in the literature review as recurring elements that reinforce patterns of segregation. While Knorr's framework is qualitative, it was adapted for this study to feature a quantitative scoring system that facilitates comparison and replication across urban contexts.

The framework's development drew on two primary sources: theoretical foundations from literature on segregation, architectural exclusion, planning, and law, as well as empirical observations from historical documents and site visits, which included photography of physical characteristics and informal interviews and discussions with community members to gain a deeper understanding of their community.

## 2.3 Framework Application

### 2.3.1 Case Study Selection

This framework is applied to two communities, selected for their distinct history and spatial context, yet similar experiences with segregation: Lincoln Heights, Washington, D.C., and the Lower Ninth Ward, New Orleans, Louisiana. These sites were chosen based on a set of criteria, with the most important being a documented history of segregation influenced by policy and structure, access to historical and spatial data sources that provide insights over many decades, and geographic and demographic diversity that tests the framework's adaptability.

Lincoln Heights, Washington, D.C., serves as a compelling case study for examining the persistence of urban segregation through the built environment. Its historical ties to post-Civil War development, shaped by black migration during a period of profound social and spatial changes, highlight its significance. Its name evokes associations with emancipation, resilience, and civil liberty, reflected in the naming of landmarks and community spaces. These stories have become an essential part of the community's identity. However, Lincoln Heights has faced notable challenges. Being separated from greater D.C. by the Anacostia River, alongside changes in the urban fabric, has led to gentrification, disinvestment, and uneven development, creating tensions between community character and redevelopment goals. This deep history, combined with cultural resilience and a continued struggle against displacement, makes Lincoln Heights a crucial place for examining how physical barriers and urban planning can reinforce inequality in communities.

Cultural diversity, economic fluctuations, environmental disturbances, and a long history of segregation have shaped New Orleans. The Lower Ninth Ward, a historically Black working-class community, has symbolized resilience and vulnerability. Its isolation, reinforced by waterways, industrial zones, and infrastructure barriers, has led to patterns of disinvestment and division. Hurricane Katrina further worsened these inequalities, as the community faced extensive devastation and a slow, uneven recovery. Despite this, the Lower Ninth Ward remains a hub of cultural diversity and community activism, with residents continuing to advocate for equitable planning and reinvestment. This layered history makes the Lower Ninth an important case study for understanding how form intersects with division to sustain inequality.

These cases provide similar yet contrasting contexts that ultimately allow for examination of both structural and spatial barriers key to the framework for analysis formulated and applied in this study.

### 2.3.2 Data Collection and Scoring Procedures

The data methods employed in applying the analysis framework are designed to be comprehensive and holistic, striving for a thorough understanding of the communities being studied while minimizing subjectivity and ensuring the validity of the conclusions drawn through the framework's application.

The evaluation used multiple data sources, including historical records, zoning maps, aerial photography, on-site photographic analysis, and, when accessible, community insights and commentary. The procedure for community analysis worked in tandem with this data collection. Beginning with base maps and aerial photography to certify that the selected communities were representative and aligned in scale. Following that, a site visitation was performed to identify physical features within the communities and assign them

to each of the five categories identified in the framework. Each category was then scored using the definitions described in Section 3.2. Scores were then recorded in the analysis framework with notes for contextual support. On the second day of site visitation, scores were reevaluated, revisiting potentially ambiguous features and talking with community members when possible to ensure a contextually grounded and bias-free final evaluation score.

### 2.3.3 Validity

This framework addresses multiple potential layers of division at varying depths. It can be adapted across various communities by emphasizing visible indicators, striving for a replicable and comparable evaluation format. Through consistent scoring definitions and the combination of historical and contemporary data, the risk of misinterpretation is reduced. However, limited in the number of cases used to verify the replicability of the analysis framework, the clear operational definitions for scoring allow future studies to apply the same approach elsewhere, maintaining its replicability. Subjectivity is unavoidable in a primarily qualitative assessment such as this study, but is mitigated by grounding choices in definitions and verifiable features.

## 3 RESULTS

### 3.1 Literature Review

This literature review establishes a basis for evaluating how urban form influences patterns of racial segregation in the United States. It begins with a discussion of specific historical policies, at the federal and local levels, that have cemented spatial inequality into the built environment. Following this discussion, an examination of how physical design in the urban environment may reinforce or disrupt patterns of segregation, identifying specific instances of physical division. Finally, insights on gaps in existing frameworks and discussions surrounding the evaluation of these types of divisions provide the basis for the spatial evaluation framework used later in the study.

### 3.1.1 The Role of Urban Form in Maintaining Segregation

Urban form, which includes the physical design and spatial layout of urban areas, influences how communities interact, move, and access resources. While policy established the legal framework of segregation, the physical form of cities is critical in maintaining the racial and economic divisions established through historical policy and planning practices. This spatial form of the built environment can either facilitate integration through connectivity and accessibility or reinforce separation through physical barriers.

Segregation is often sustained through architectural exclusion, an intentional or systemic practice perpetuated through the design of urban environments, limiting movement between neighborhoods. Examples include irregular street grids, highways, and buffer zones. Many of these architectural features are omitted as tools of segregation, as their appearance can be neutral or even beneficial to the overall urban environment (Schindler, 2015). It manifests in the everyday qualities of urban environments, where features such as sidewalks, crosswalks, and public transit lines can function as tools of exclusion, reinforcing and maintaining segregation.

Understanding the mechanisms that influence urban segregation enables the identification of its connection to urban form. This process involves identifying key indicators of a divided city, which are embedded within its spatial and physical designs. Collectively, these elements highlight how urban form may perpetuate segregation and provide a foundation for evaluating its persistence

These indicators reflect intentional design and planning decisions that align with broader social and political goals. Understanding how these spatial features perpetuate isolation is critical to developing strategies for remediation, building on prior scholarship by Knorr's (2016) design elements of a divided city, categorizing five observational indicators of physical division: constructed, morphological, environmental, infrastructural, and visual, which together provide a framework for assessing the degree to which urban form maintains and furthers urban segregation.

Landscape design has sometimes been used to reinforce segregation. Parks and open spaces, which can offer valuable physical, mental, and social benefits, were not always distributed equitably. In many cases, parks serving Black communities were intentionally placed in less desirable locations or further from

neighborhoods, making access more difficult. During the Jim Crow era, some parks were explicitly designated as “White only” or “Black only,” with those for Black residents typically having fewer amenities, less maintenance, and generally poorer conditions than those reserved for white residents (Mahato, 2024; Fleming, 2021).

### 3.1.2 Mechanisms of Physical Division

Building on Knorr’s (2016) framework, this study evaluates urban form through five observable indicators of physical division. These categories organize distinct spatial characteristics that can be measured and compared across different urban contexts.

**Constructed divisions** refer to intentionally built features that delineate boundaries and limit access to resources and opportunities. Examples include walls, fences, and berms that block access or visibility, reinforcing separation. For instance, the Liberty City “race wall” built in a neighborhood of Miami in the 1930s to separate a Black-only housing development from its White neighbors, remnants of which remain today. This merely scratches the surface of constructed divisions, with many expanding beyond a physical wall, such as gated communities, canals, and industrial zones.

**Morphological divisions** relate to the arrangements and configuration of the urban environment, used to dissuade movement through particular regions. Large block sizes and irregular street patterns, such as a change from a grid-like pattern to winding streets, discourage permeability (Knorr, 2016). This method of division reinforces socioeconomic and racial disparities, creating navigational obstacles that hinder integration.

**Environmental divisions** refer to natural or modified landscape features that influence spatial organization. Such divisions are evident in settlement patterns shaped by topography, where residents of higher socioeconomic standing reside along higher elevations, while residents of lower standing are relegated to the lowlands.

**Infrastructural divisions** are created by transportation and utility systems and include highways, rail lines, and utility corridors. Oftentimes, disproportionately impacting minority communities, serving as hard edges, and furthering physical and psychological barriers against cross-community engagement.

**Visual divisions** relate to perceptual cues in distinguishing one area from another, among the most subtle distinctions, as their presence is typically felt in the overall perception. Instances of change in building style, dentistry, maintenance, or quality. These visual contrasts often signal socioeconomic divides.

These indicators reflect a community’s narrative and connection with segregation patterns, revealing complex relationships between urban segregation and urban form. Together, they provide insight into how urban form shapes and reflects a history of segregation, and by applying this framework to case study communities, the research makes these divisions identifiable and measurable, enabling planning and design to specifically target interventions.

## 3.2 Framework

Table 1 shows the framework we developed based on the literature review.

**Table 1. Evaluation Rubric**

| Evaluation Criteria | No Presence 0 | 1 | 2 | High Presence 3 | Notes |
|---|---|---|---|---|---|
| **Constructed Divisions** | | | | | |
| **Morphological Divisions** | | | | | |
| **Environmental Divisions** | | | | | |
| **Infrastructural Divisions** | | | | | |
| **Visual Divisions** | | | | | |
| **Total:** | | | | | |

For each category, operational definitions were created to distinguish low, moderate, and high presence of division, with the scoring system using a 0-3 scale. 0 indicates no evidence of the feature or condition, 1 indicates a minimal or partial presence with minor impacts on connectivity and integration, 2 indicates a moderate presence of such divisions, resulting in noticeable impacts on accessibility, and 3 indicates a high presence of these features, causing a nearly complete barrier to integration and permeability for the community being reviewed. These definitions focus on tangible observational characteristics, rather than inferred or social indicators, striving for a replicable and transparent evaluation criterion.

While existing tools such as Crime Prevention Through Environmental Design (CPTED), historic redlining maps, and walkability indices provide insights, they fall short in capturing the multidimensionality and historically embedded nature of segregation in the built environment. CPTED frameworks focus primarily on safety and surveillance, surpassing broader structural inequities. Redlining maps document the history of exclusion that communities have faced, but do not account for how this legacy has been sustained in contemporary urban form. Comparably, walkability indices measure accessibility at the community scale but do not address how spatial barriers reinforce division. These limitations exemplify the need for a more comprehensive tool that integrates multiple dimensions of division and positions them within their historical contexts, ensuring a holistic understanding of how segregation persists in the built environment.

## 3.3 Framework Application

Lincoln Heights is a historically Black community in northeast Washington, D.C., shaped by a high concentration of public housing developments, restrictive zoning, and infrastructural isolation. Policies and design initiatives reinforced its separation from surrounding communities, which makes it a clear case for examining multiple forms of division. The examination was conducted in person as a community walkthrough over two days.

Referring to Table 2, Lincoln Heights scored highest in infrastructural divisions, followed by constructed, environmental, and visual divisions, and at its lowest in morphological divisions, reflecting the barriers present within the community. **Constructed divisions** earned a 2 due to the perceived containment of the community within the area; non-uniform roadway networks discourage pedestrian mobility but do not entirely restrict it. **Morphological divisions** were rated with a 1, as their impact is minimal and perpetuates other conditions, such as the disjointed pedestrian networks and reduced mobility (Figure 1). **Environmental divisions** were reviewed at a 2, as the Anacostia River, steep elevation changes, and the lack of public green space had noticeable impacts on accessibility and permeability, especially concerning connection to greater D.C. and movement across the Anacostia River. **Infrastructural divisions** are the most extensive of the reviewed criteria; transit access and pedestrian networks are severely limited within and outside the community. Receiving a grade of 3 in Table 2, these features restrict access among

individuals living within the community to essential services, highlighted by elevated levels of chronic health issues and maternal health issues when compared to more affluent White communities of D.C. (King et al., 2022). The final criterion reviewed, **visual divisions**, reflected current challenges facing the community (Figure 3). Blighted properties, surveillance iconography and technology, target hardening methods provided by Vacant Property Security (VPS) (Figure 2), are presented in branded metal doors and window coverings that signify the risk of vandalism and identify vacant properties.

**Table 2. Lincoln Heights, Washington, D.C. Results**

| Evaluation Criteria | No Presence 0 | 1 | 2 | High Presence 3 | Notes |
|---|---|---|---|---|---|
| **Constructed Divisions** | | | 2 | | |
| **Morphological Divisions** | | 1 | | | |
| **Environmental Divisions** | | | 2 | | |
| **Infrastructural Divisions** | | | | 3 | |
| **Visual Divisions** | | | 2 | | |
| **Total:** | | 1 | 6 | 3 | Total = 2/3 |

**Figure 1.**
**Damaged sidewalks and waste disposal along children's playground. Photo by the authors.**

**Figure 2.**
**VPS coverings. Photo by the**


**Figure 3.**
**Yard sign regarding gentrification "Chocolate City now with 30% less Chocolate". Photo by the authors.**

The evaluation of Lincoln Heights reveals infrastructural divisions as the most significant barrier, reflecting severely limited transit access and pedestrian connectivity to essential services. Constructed and environmental divisions also have a notable influence, with non-uniform roadway networks, steep elevation changes, the Anacostia River, and a lack of green space reducing mobility and inter-community permeability. Visual divisions are persistent and identify blighted properties and reinforcement measures that create a perception of disinvestment and vulnerability. Morphological divisions, by contrast, have a minimal direct impact, while they mainly contribute to wider issues of mobility. Ultimately, these findings showcase how layered physical and infrastructural divisions can shape the lived experience of residents in Lincoln Heights.

The Lower Ninth Ward, historically a predominantly Black community, has experienced environmental vulnerability, intensive infrastructural isolation, and constructed barriers. Levee systems, limited access, and highway construction all contributed to their continued isolation. During a two-day site visit, we examined the community's resilience and ongoing recovery, using the analysis framework to review complex socio-spatial challenges and engaging with residents whenever possible.

Referring to Table 3, the Lower Ninth Ward scored highest in environmental and infrastructural divisions, reflecting the community's history with flooding and intensive infrastructural developments surrounding the community, such as the Industrial Canal and placement of I-10 along Claiborne Avenue. **Constructed divisions**, evaluated at a 2, take shape through the isolation of the community due to the levee system, isolating the community from greater New Orleans, ultimately contributing to the level of devastation the Lower Ninth faced during Hurricane Katrina and to the lack of permeability and access the community has from the rest of the city. **Morphological divisions**, receiving a 1 for low persistence, have persisted following post-Katrina reconstruction, resulting in fragmentation of the street pattern and housing stock (Figures 4 and 5), leading to irregular housing patterns that contrast new construction with vacant lots and the traditional homes of the community. **Environmental divisions** were reviewed at a 3, as its elevation is below sea level, reinforcing vulnerability to flooding alongside the potential psychological effects the previous levee failure has on current residents who persisted following Katrina. Despite this risk, stormwater management and green infrastructure development have been insignificant within the community. **Infrastructural divisions** include limited transit options, deteriorated facilities, fractured or insufficient pedestrian mobility options for movement within and beyond the community, seen in the Claiborne Avenue and St. Claude Avenue Bridges, and the Industrial Canal and levee system, which exacerbates the divide this community experiences from Greater New Orleans. **Visual divisions** persist from post-Katrina reconstruction, with vacant, blighted, and decaying structures (Figure 5) throughout the community, as well as images and iconography (Figures 4 and 6) displaying tension between the community and the city.

**Table 3. The Lower Ninth Ward, New Orleans, Louisiana Results**

| Evaluation Criteria | No Presence 0 | 1 | 2 | High Presence 3 | Notes |
|---|---|---|---|---|---|
| **Constructed Divisions** | | | 2 | | |
| **Morphological Divisions** | | 1 | | | |
| **Environmental Divisions** | | | | 3 | |
| **Infrastructural Divisions** | | | | 3 | |
| **Visual Divisions** | | | 2 | | |
| **Total:** | | 1 | 4 | 6 | Total = 2.2/3 |

**Figure 4.**
**Split street with van protesting development.**
**Photo by the authors.**

**Figure 5.**
**Abandoned home contrasts maintained home.**
**Photo by the authors.**


**Figure 6.**
**Political yard.**
**Photo by the authors.**

The assessment of the Lower Ninth Ward found that environmental and infrastructural divisions are the most severe, highlighted by the vulnerability the community faces due to flood risks and isolation caused by large-scale infrastructural projects such as the Industrial Canal. Constructed divisions further reinforced

this limiting permeability. Morphological divisions were found to be less influential but still impactful in the fragmented street patterns and irregular housing patterns emerging post-Katrina reconstruction. Limited transit, poor pedestrian mobility, and decaying facilities further disconnect Greater New Orleans. Finally, visual divisions are marked by blight, vacant properties, and yard signage. This reflects ongoing struggles over disinvestment and community identity; findings illustrate how overlapping environmental, infrastructural, and visual barriers continue to shape inequity in the Lower Ninth Ward.

### 3.4 Comparative Synthesis

Together, these two cases show how different mechanisms within urban form can sustain segregation across contexts. A comparative analysis reveals both shared and different patterns of division. In Lincoln Heights, infrastructural barriers, limited transit access, and disjointed pedestrian networks were among the most significant in restricting mobility and access to essential services, compounded by constructed and environmental features that reinforce this isolation. The Lower Ninth Ward, however, is most altered by environmental and infrastructural divisions, with its low elevation, vulnerability to flooding, and isolating location due to the Industrial Canal and I-10. While morphological divisions were relatively minor in both communities, they both compounded alongside other forms of division, often worsening the effects on the community. Visual divisions also persisted among both sites, expressed in distinct ways, blight and target hardening infrastructure in Lincoln Heights, and vacancy and contested imagery in the Lower Ninth. Together, these findings provide a deeper understanding of how different combinations of the elements of division can sustain segregation across contexts, showcasing the necessity of place-based approaches to address urban inequity.

## 4 DISCUSSION

This framework serves as a tool of analysis as well as a reflective tool, providing planners, community leaders, and designers the ability to recognize the spatial consequences historical segregation has had on urban environments, providing the ability to convert more abstract ideas into the identification of tangible features that open the conversation surrounding how communities have remained disenfranchised through physical form.

### 4.1 Implications for Practice and Design

The findings demonstrate that physical and spatial divisions embedded within urban form continue to influence the persistence of segregation. outlining the importance of assessing these barriers, from large-scale infrastructural elements to smaller visual cues, when working in historically marginalized communities.

Applying this framework in practice can help practitioners better identify overlooked elements that perpetuate inequity. By scoring and mapping constructed, morphological, environmental, infrastructural, and visual divisions, they can prioritize interventions that repair permeability, improve access to services, and remove barriers that exclude residents. The method can also inform planning and zoning initiatives.

The framework is adaptable for use in community engagement, planning work, and design education. In participatory work, its categories can provide a clear and accessible structure for residents to document barriers in their communities, improving conversations between stakeholders and decision-makers.

In design, the scoring system can be integrated into site analysis, allowing early detection of these features to guide design choices toward a more inclusive solution. In academic studios, the framework can serve as a teaching tool for students by connecting site context with spatial analysis practices. Through this analytical approach, students and professionals alike can shift to proactively identify spatial conditions to address and begin resolving historical patterns of exclusion.

### 4.2 Limitations

This study is limited by its small number of case studies, which constrain the generalizability of its findings. While the selected sites provide contrasting geographic contexts, they do not capture the full breadth of segregated urban environments. Data subjectivity also posed challenges, as qualitative analysis inherently carries some degree of interpretation; this was mitigated through the operational definitions and scoring procedures outlined in Section 3. Additionally, the framework does not fully account for economic or policy-based divisions, which often contribute to, or even serve as the origin point of, specific physical

barriers. The framework prioritizes visibility and perception of lived experience, which may underrepresent the significance of particular elements in practice. For this reason, the framework should be used in conjunction with community input and historical research to ensure a comprehensive understanding of how divisive urban elements shape a community's day-to-day life.

## 5 CONCLUSION

This study demonstrates that urban form plays a critical role in maintaining patterns of segregation, with physical morphological, environmental, infrastructural, and visual divisions working in combination to sustain segregation over time. Historical segregation has left a lasting mark on urban communities, perpetuating systemic disinvestment, loss of community strength, and gentrification, all of which are reflected in the current form of such communities. By adapting Knorr's (2016) typology into a replicable, scored framework, this research offers a practical method for identifying and assessing features of the built environment.

The application of the framework to these two historically marginalized communities revealed that both communities have shown resistance and efforts at activism to preserve their identity, culture, and presence, attempting to regain agency against urban developments that may impact their communities. These actions provide insights for potential strategies that can promote more equitable and community-driven initiatives.

Future studies should apply this framework to a broader range of samples to better assess its ability in professional and academic practices. Exploring methods to incorporate community-based scoring that captures the experiential aspects of segregation and marginalization not addressed in this study will also enhance its validity. Addressing the legacy of exclusion perpetuated in urban form will require a sustained commitment, interdisciplinary effort, and tools that visualize the spatial aspect of inequality.

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