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# An Investigation into Visualization of Heritage Sites: A Case of Bai Harir Complex, Ahmedabad

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**Abstract—** The concept of heritage protection of monuments, sites, and precincts of significant cultural diversity is well practiced and evolved with various legal instruments. It has been recorded in traditional Indian culture, archaeology, antiquity, and monumental studies from the ancient past. In contemporary times, the various custodians are safeguarding the distinctive nature-based setting of monuments that evolve a blanket of the urban landscape. The context-based setting requires appropriate connections for monument sites and precincts with some control mechanism to ensure management and systematic future development. The paper aims to investigate visual parameters for site-specific settings with visibility analysis to regulate the heritage and its settings. In recent years, the draft heritage byelaws for protected monuments have been under preparation by various institutes and organizations. However, the volume of work is large, whereas the number of bylaws being prepared is limited and needs more effort from the ground reality. Additionally, these byelaws lack an objective approach to justify rich heritage knowledge through context-based assessments, guidelines, and recommendations. This paper justifies site-specific studies by visualizing culturally significant Monuments and their surroundings. Demonstration through visual simulation tools and the view control method would be applied to document the data. The paper discusses Ahmedabad city, India with a selected case study site under National Monument Authority (NMA) categorization as per the provisions of the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010. Site-specific decisions can ensure the richness of Indian cultural heritage by prescribing the limits of prohibited and regulated (100 and 200 mts) areas around a monument and protected area. These areas are also referred to as the proximity and setting of monuments. This paper indicates the monument, Bai Harir complex, Ahmedabad, under category 7, in urban/ semi-urban limits. Further, it addresses existing findings by implementing a view control approach and visibility analysis as a visual assessment method via photographs, mapping, and geographic information systems.

**Keywords:** Monument and sites, Byelaws, Visual Assessment, View Control, Site-specific Settings, Visibility Analysis.

## INTRODUCTION

A heritage monument or precinct's setting is an area that may have an impact in question but is not particularly valuable or significant in and of itself. The International Council on Monuments and Sites (ICOMOS) hosted its 15th General Assembly and Scientific Symposium in October 2005 in Xi'an, China. The "setting" theme is taken as its


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main focus and the setting is referred to as an immediate and extended environment. The Xi'an declaration recognizes that heritage buildings derive significance and distinctive character from their meaningful relationships of physical, visual, spiritual, setting, and cultural context. The declaration stresses the modifications and changes in development, as it carries the significant layer of the past and its culture. The monument and its setting should be managed to retain cultural significance by proactively leading modern development in historic locations (ICOMOS, 2005). The monument's surrounding is characterized by its vision from a certain distance as a symbolic meaning to the neighborhood, town, or city (Haddad *et al.,* 2022). There must be the prevention of monuments' significant settings from inappropriate visual (built form), encroachments, and land usage. Xian's statement during the ICOMOS meeting was particularly advised to consider, the monuments and their surroundings with significant skylines, sight lines, and adequate distance between any new public or private development (United Nations Educational, 2012). Historic buildings are important factors to consider while managing these cultural resources. Management of heritage sites and their settings involves various strategies that involve a value-based approach to protected or unprotected precincts or monuments (Ringbeck, 2008). The management of sites has become a crucial aspect of regulating urban development with a specific approach to contextual settings (Ababneh, 2016). Currently, India has around 3,695 national landmarks and heritage monuments (Ministry of Culture, 2013). These have varied surroundings and situations, with various challenges and issues. Rapid urbanization, harsh environmental conditions, visible pollution and careless development affect the heritage sites and their immediate neighborhood (Vishakha Kawathekar, 2020). Cultural sites are being neglected due to lack of suitable legal measures and enforcement, leading to careless interventions that disregard their setting and context (John, 2023). However, the settings are frequently populated places where the locals maintain a strong connection with the monument and play a vital role in sustaining its significance in society (Piatti & Martin, 2011). The association of locals recorded that there is very little empathy towards acknowledging the heritage and its landscape. Historic places such as Hampi and Golkonda Fort serve as a testament to the preservation of the heritage that the AMASR Act of 1958 enacted to regulate the development (Ancient Monuments and Archaeological Sites and Remains Act (AMASR), 1958). Before the 1958 Act, the protection of randomly known monuments of ancient, archaeological, historical, or artistic significance was declared under the 1904 Act as being of national importance (Ajay Khare, 2015). The 73rd and 74th Amendments brought the national law for built heritage protection Ancient Monuments and Archaeological Sites and Remains Act (AMASR) 1958 (Vishakha Kawathekar, 2020). The protection definitions of the act have been declared as ancient monuments, antiquity, and archaeological sites, and the remaining declaration analysis applies to those whose age is above “100 years” which recognizes protected areas in a restricted archaeological sense, declarative powers, and acquisition powers (Bernard Feilden, 2003).

A “monument” is a structure or object with historical, cultural, or symbolic significance (Bernard Feilden, 2003). It can be a physical structure, such as a building or statue, or intangible concepts related to culture and communities. The setting of a monument refers to its immediate surroundings and the context in which it is located (Corney & Payne, 2014). The setting plays a crucial role in establishing the relationship between the monument and the local community, integrating it into their lives (John, 2023). The preservation of the monument's setting is important to protect it from factors such as erosion, land development, and modernization (Basu *et al.,* 2013; ICOMOS, 2005). Under the AMSAR Act, the Archaeological Survey of India (ASI) is responsible for the protection and upkeep of nationally significant Indian monuments, sites, and antiquities (Publication of Notification of National Monuments Authority, 2011). Nevertheless, ASI's authority is limited to the border of the monument or precinct that the act designates as a "Notified Area," which may or may not have a memorial placed there. The "setting" around ASI-protected monuments and precincts is the subject of a new amendment to the AMASR Act (2010), which establishes a "Prohibited Area" of 100 meters and a "Regulated Area" of an additional 200 meters (with provisions for extending the restriction, if necessary). The Prohibited Area is off-limits to new construction, while in the regulated Area, monument-centric Heritage Byelaws shall govern development as initiated under the National Monument Authority (NMA) (Publication of Notification of National Monuments Authority, 2011).

The monument's heritage setting comprises a wide range of different contexts, including cultural sites, heritage sites, and historic urban landscapes (John, 2023). These settings are essential for comprehending the relationship between heritage and its stakeholders (Corney & Payne, 2014). With an emphasis on preserving and protecting the immediate environments of heritage places, the significance of settings in architecture, history, and archaeology has been acknowledged. The limits and thresholds of heritage

settings have also been included in the expansion of the idea of "place" (Bari, 2018). Griffiths, in his paper, suggested that the setting of heritage assets is just one specific aspect of consideration for assessing the impact of the proposed development, but it is relevant to all assets, whether world heritage sites, cities, monuments, or landscapes. (Griffiths, 2017) All heritage assets have a setting. One can manage heritage settings using the integrated participation from theory, conservation manual revision, and various policy measures (Fazan, 2023). Griffiths discusses the case studies from China, Italy, Malta, Turkey, and Peru with management practices in heritage settings. Explored the Management aspects (Griffiths, 2017) include financial resources, human resources, knowledge management, and relationships with the audience and scholars. Kalin & Yilmaz reviewed the effects of urban growth pressure on cultural world heritage assets and how the protection of heritage values is investigated with various comparisons of sites (Romo-Berlana *et al.,* 2023). Ababneh suggested effective management of cultural heritage sites through comprehensive urban development strategies to protect historic environments (Ababneh, 2016). The protection considerations of heritage assets and their settings can be regulated by framing a planning-based approach to the development around them. Sukwai investigated the landscape and terrain from the perspective of visual sensitivity to the cultural/ sacred sites (Sukwai *et al.,* 2022). Visual sensitivity is defined in the paper context as the capacity of heritage to maintain visual distinctiveness and signify the relationship with its surroundings. The visual sensibility assessment should contribute to the geographical landscape and monument setting. The suggestions are enquired through viewshed and skyline analysis considering the visual integrity of the mountain view corridor. The results showed that the buffer zone has more visual values and characteristics to the cultural landscapes from the view corridor of Chiang Mai's historic city. Therefore, the study argued that even low/medium-rise buildings that inappropriately appear in the horizontal visual plane could increase the sensitivity to this panoramic view (R. Zhang *et al.,* 2021). Zhang examined the visual analysis study of the inner spaces of monuments with deterioration risks to mural paintings studied by the visual analytics method that supports the risk management process (G. Zhang *et al.,* 2024). The assessment with graphs, charts, and maps is used to identify the pattern, color, and texture to develop action for protection led by data-driven decisions (Deufemia *et al.*, 2014). Introduced visual analytics to analyze and explain recent archaeological discoveries of large repositories of documents and drawings. The visual investigations for interpretations of new archaeological findings, detection of interpretation anomalies, and discovery of new insights. Qian experimented with a geo-visual analytics tool for archaeologists to analyze archaeological events (Qian *et al.,* 2016). Bari proposed a system for evaluating visual quality by combining visual features such as vistas, sense of place, visual absorption capacity, and aesthetic appeal with landscape character, assigning a high, medium, or low visual quality value to the landscape (Bari, 2018). Visions are subjective and impacted by personal interpretation, the outcomes will not be definitive. These visual cues can only be assessed based on established criteria and standards. Oťahel' assessed the visual quality of monuments from Bratislava city by evaluating the conditions of visibility of eight historical monuments based on multiple viewpoints surveyed and confirmed from a people-centric approach (Oťahel' *et al.,* 2018). The approach of viewpoint selection was subjectively and objectively identified. The method represented a comprehensive way of defining and verifying the places and ranking for effective sightseeing of city monuments from the urban study perspective. The visual clutter and proportion are the primary components to estimate visual impact. Keleş explains the visual character of natural and human-made artifacts and physical-biological sources (Keleş *et al.,* 2018). The physical presence of a historical landscape can be assessed with one of the approaches of the quality assessment method. Edirne City has experimented with conserving cultural resources with a planning-based approach. Tsuboi suggests, that urban landscapes are experienced by the people's perception of the built environment (Tsuboi *et al.,* 1979). The variables have been developed in the research with parameters like coherence, imageability, historicity, visual impressiveness, complexity, legibility, accessibility, security, inconsistency and city identity to approach and navigate based on the degree of visuality to the historic places. Sukwai explained the visually sensitive areas to be managed with the buffer zone identification (Sukwai *et al.,* 2022). The delineation of the buffer zone is of visual sensitivity values defending the view corridor concerning the regulation and recommendations. This method of viewshed and skyline analysis considers the pedestrian's visual limitation implemented in Chiang Mai City to produce the baseline for a built environment from an identified buffer zone to keep the built aesthetic harmonious in its cultural sense.

The methods for controlling views of significant cultural landmarks differ in various ways. Several approaches have been utilized to create methodologies applicable to context-specific circumstances in India. As recorded, this content-based research published is less in volume. The visual research studies for the monuments and their setting have not been approached from the conservation and planning

aspect in the Indian context. Therefore, research towards visual research studies is significant from a conservation and planning perspective.

## METHOD

This paper includes an extensive literature review from peer-reviewed journals and a detailed examination of books, reports, and key legislative sources. The research observation and gap have been determined based on the current practices in the conservation domain from the visual research perspective (Thomas, 2021). The study of visual research is a multidiscipline domain where this paper also incorporates the historical perspective to enhance the quality of research with heritage site investigations. The study was conducted in Ahmedabad city with primary data collection on the Bai Harir complex. GIS thematic mapping, analytical tools, and ArcScene for 3D were used for conducting this research (Represented in Fig. 01). The visibility analysis demonstrated the efficacy of the Bai Harir complex as a national heritage site. This research is primarily structured with the qualitative approach.

### SECONDARY STUDY

The literature review covered both primary and secondary sources, focusing on heritage and monument definitions, heritage settings, and legal instruments across India. It explored the heritage legal framework, as outlined in the conceptual theoretical framework in Figure 1, including the AMASR Act from 1958 to 2010, various charters and organizations, custodians of heritage protection and management, heritage schemes, policy interventions, and recommendations for urban development. It also examined planning theories related to historic cities and places, local, master, and regional plans, the Town and Country Planning Act, urban development guidelines, architecture and urban conservation books, and numerous research papers.

### PRIMARY STUDY

The qualitative method was used to justify the selection of the heritage site and the historic potential of the city. The study was conducted in Ahmedabad city, Bai Harir complex using primary collected data. Visual simulation tools are used to evaluate the potential effects of the future building, which culminates in the creation of bylaws particular to each site and enabling design rules for new and infill construction, with the help of digital software programs like AutoCAD, GIS mapping, and Google SketchUp as mentioned in Fig. 1 under a proposed theoretical framework. Schematic drawings, photographic proof, visual simulations, and graphics have been created. The assessment tools from GIS thematic mapping have been used to demonstrate the results on the ground by using Viewshed and Visibility analysis considering the parameters like digital elevation modelling, building footprints, 3d model of the site area with ArcScene, and static view decisions as the view control method.

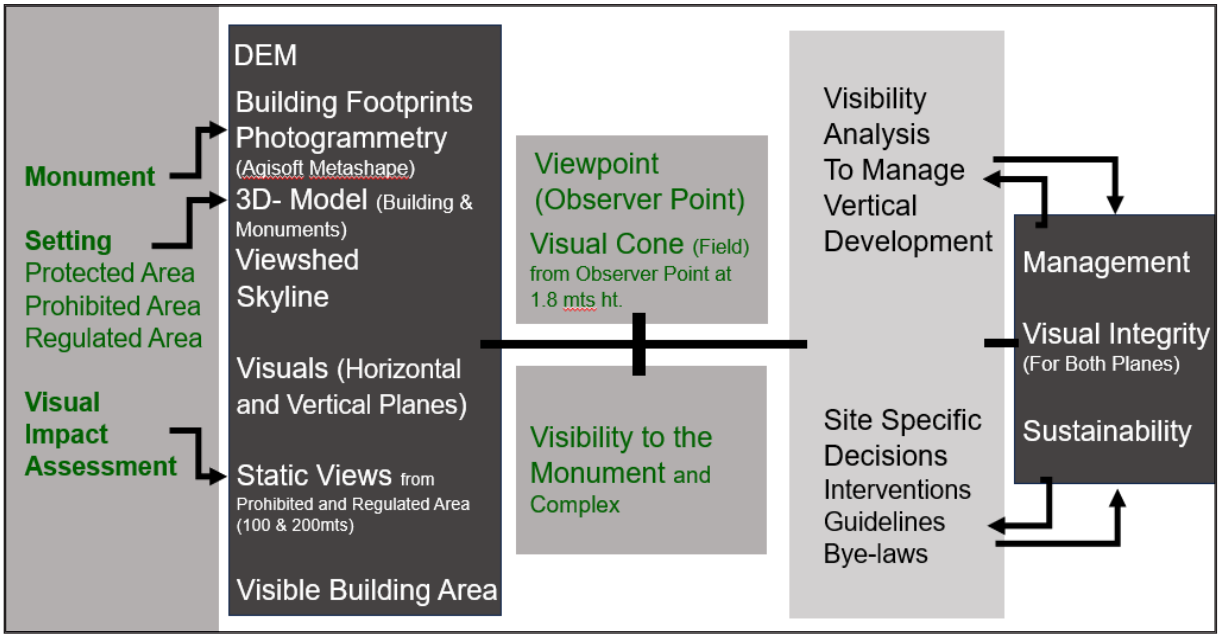


**Fig. 1: Proposed Theoretical Framework**

## Proposed Framework

The research's methodological framework was created following a survey of the literature, current theories, and books on heritage, and how visual studies might improve understanding of the existing scenarios around the heritage sites. How does visibility analysis aid the visual assessment for site-specific decisions, guidelines, and heritage bylaws?

As in Fig. 1 under the Viewpoint considerations, the ArcGIS software's built-in analysis tools have been used to determine the 100 and 200 mts boundaries to decide for the static location of human height average of 1.8 mts. One fixed location (currently used roadway taken as the point of view consideration) from 300 mts to the monument complex and another from 100 mts taking the current approach road as a base for the degree of visibility to the monuments (Ancient Monuments and Archaeological Sites and Remains Act (AMASR), 1958). The degree of visibility in the study area with a static view cone is an attempt to analyze various layers like building height, skyline, and vertical and horizontal visual band visibility from the observer point. The analysis is framed with Viewshed and visibility analysis in ArcScene to visualize a 3-dimensional view of the study area with visual cone considerations. Moreover, Fig. 1 presents the theoretical framework that establishes the anticipated results and conclusions by addressing the primary study inquiry. How would this visual impact analysis assist in managing historic sites by incorporating contextual information and using planning to regulate contextual-based heritage bylaws? The results were demonstrated with GIS – Arch map-10.4 and ArcScene- 3d model- building height, using a spatial analyst tool- visibility analysis. The outcome determines the raster surface visible to the set of observer features or identified observer points with static location. How much raster surface is visible from the located observer points to validate the visual assessment of the heritage sites from 100 and 300 meters? The analysis will demonstrate the relevance of visual study to frame context-based (site-specific) urban development and sustainable management of heritage sites and their precincts.

## CASE STUDY: BAI HARIR COMPLEX

### Criteria for Selecting Heritage Site Changing of Horizontal and Vertical planes

The study area is rationalized by fulfilling multiple categorizations (listed by NMA) with a contextual setting that largely integrates Category-4, "Ticketed Monuments", Category-6, "Living Monuments", and Category-7, "Monuments in the urban/semi-urban limits" (Archaeological Survey of India, 2019). Bai Harir/Dada Hari stepwell and complex is defined with horizontal and Visual bands. The visibility in both directions (horizontal; Stepwell and vertical; Mosque and Tomb) from 100 mts and 300 mts (100 mts from monument protected area prohibited area, further 200 mts from prohibited area = Regulated area) as the linear expansion notified by AMASR (Amendment and Validation Act 2010). The case study of the Bai/Dada Harir complex is considered with static position and view cone visuality from prohibited and regulated limits to justify the visibility parameters. As shown in Figures 2,3,4, & 5, the complex has a 16th-century Stepwell (horizontal visual plane), Mosque, and Tomb (vertical visual plane. This heritage complex significantly makes the study relevant for visual research-based studies in conservation and planning with its historical, architectural, and cultural values for the effective management of heritage sites.

### Approach to the Heritage Site

View control methods in heritage conservation refer to the techniques used to regulate the visible output of information resources to enhance how people perceive and interact with monuments and artworks. These methods aim to facilitate the interest of onlookers and provide a more conscious approach to heritage management processes. Eye-tracking research based on two static locations considered with the current approach road to the study area surroundings. The visibility is measured with a visual cone and visual cues are used to understand how observers look at reassembled historic places and objects during pedestrian movement. The proposed static view from a vertical height maximum was taken to illustrate the outcome of 1.8 mts as stated in Figure 1. View control methods provide visitors with a more immersive and engaging experience in heritage environments to be sensitized toward heritage and knowledge.

### Bai/Dada Harir Complex Horizontal and Vertical Visual Band

Historically, Ahmedabad suburbs, created by Mehmood Beghda, expanded to the north of the city wall and were designated as haveli pargana (an administrative entity of many villages). Mehmood Beghda built a large territory outside the city wall. In the Haveli Pargana region, Dada Hari Ni Stepwell developed until eventually, settlement appeared and defined new boundaries for the Stepwell complex (Sriparvathy & Salahsha, 2021).

The existence of monuments that dated back to the Mehmood Beghda period and the Solanki dynasty. The complex includes a Step-well, a Mosque, and a Tomb. Figures 2, 3, & 4, present the significant architecture characterized by the Gujarat Sultanate style with an intricate blend of Hindu and Islamic carvings. Currently, the Stepwell serves as an ASI monument, and its surroundings (Asarwa area) are developed under the Town Planning Scheme (TPVD). The monument complex is centrally protected (AMASR Act) by the Archaeological Survey of India and was recently announced by NMA, as a monument categorized under semi-urban limits as explained in category 7. The complex is locally maintained under the supervision of (AMC) Ahmedabad Municipal Corporation. The AMASR Act of 2010 defines the monuments and their immediate surroundings with protected areas (complex/ precinct) 100 and 200 meters with prohibited and regulated areas respectively, in all directions from the monument-protected area (shown in Fig. 6). Fig. 2, defines the Bai Harir's complex protected, prohibited, and regulated areas with schematic vertical development of around 300mts. In the existing scenario in contemporary times, the complex is surrounded by various valuable other heritage components like temple trust and Gamthal Settlements.

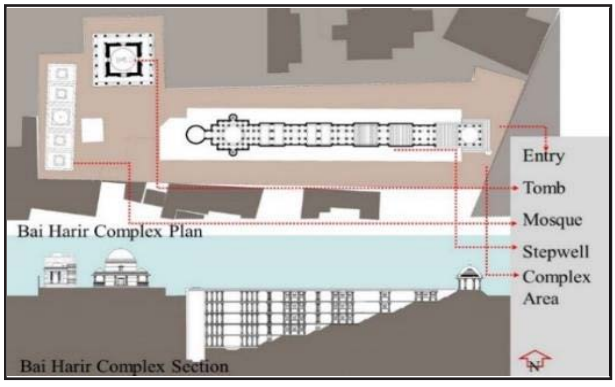


**Fig. 2: Stepwell Complex Plan & Section**

**Fig. 3: View toward the Entry to Complex and Stepwell including Mosque and Tomb**

Because of such other valuable heritage components, the complex and surroundings are culturally integrated from the past with religious and cultural activities. After the 19th century, the introduction of railways led to the development of the area with various fabric industries, godowns, coal yards, and other commercial areas that caused flux of migration, and eventually, informal settlements took place along the abandoned railway lines and compounds and coal yards currently used as the dumping yard.

**Fig. 4: View of Mosque and Tomb from Stepwell**

At present, Bai Harir and its setting are ignored due to high-density growth and a lack of ground-level implementations. This opposing condition of growth in an immediate setting of the prohibited area with coal yards, encroachments, and informal settlements obstructing the horizontal as well as the vertical views of the monuments. The precinct is polluted with chemical-based air pollution due to the coal godowns situated on the edge of the complex. Fig. 5, manifests the existing issues due to coal godowns, resulting as a direct threat to the heritage building material quality, color, and aesthetics. However, examining existing scenarios through visual integrity to the specific settings can be an effective approach, and this angle of study is yet to be experimented with. From the perspective of design, architecture, and planning, CEPT University, NIRMA University, and other institutes have conducted many scholarly investigations on this study area. From an Architectural perspective, one of the studio projects from CEPT University, India focused on the revival of the Bai Harir complex. After establishing other associative values within the complex, an interpretation centre has been proposed as part of an academic exercise. This approach was taken from a conservation-based perspective to understand the historical record of Char Bagh Garden (Vyas & Patel, 2021). Another approach looked at transforming the urban development pressure to create a sustainable hub within Bai Harir Stepwell with the integration of open and built spaces as the harmonious blend of past and present with varied living experiences. Various Academic research contributing to the studies of Sound,

Senses, and design principles have been explored for this case. The visual study of the complex and its surroundings is unique and significant research that has not been recorded yet from conservation framework aspects.

**Fig. 5: Mosque and Tomb view from Godown Adjacent to the Complex Wall**

The complex prohibited and regulated areas are effectively approached with visual analysis to safeguard the monuments and their specific settings. This shared living urban heritage can also be acknowledged by proposing site and context-specific bylaws. Since the eleventh century, the Dada Hari complex historic site has been a culturally significant account. As this complex developed with above and below-ground construction techniques the visual band and its integrity are regulated from some specific view in present times to control the view as the symbol and landmark of the Asarwa. The coal yard obstructs the view of the mosque and tomb, leaving only the dome visible when viewed from the storage buildings, as shown in Fig. 5. The area has undergone extensive construction, with unauthorized development exceeding 6 meters vertically, as illustrated in Fig. 6, along with schematic sections of the immediate surroundings at distances of 100 and 300 meters. The coal yard and the trucks parked along the main approach road turned out to be an unsafe environment for the visitors. Therefore, more on-site research is needed to raise awareness among local communities and stakeholders, focusing on visual research to help preserve and manage important heritage sites.

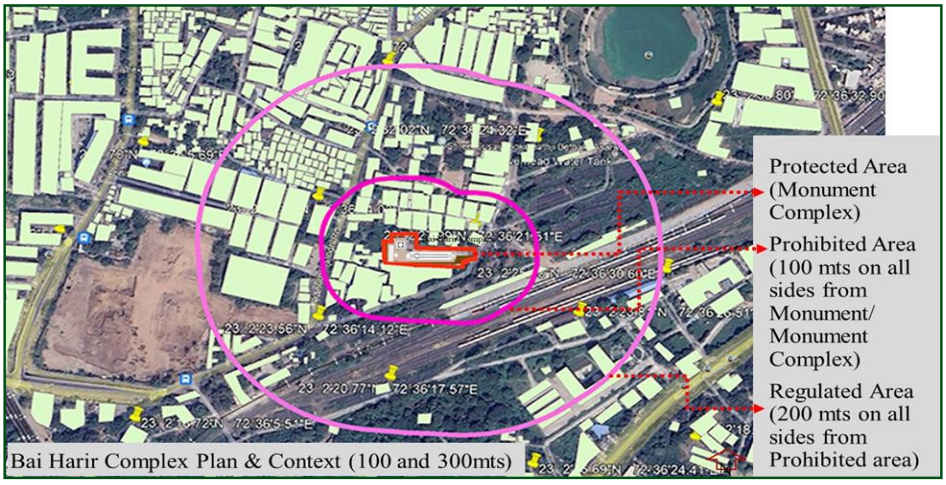


**Fig. 6: Base Map with 100 and 300 mts area Demarcation (Protected, prohibited, and regulated area)**

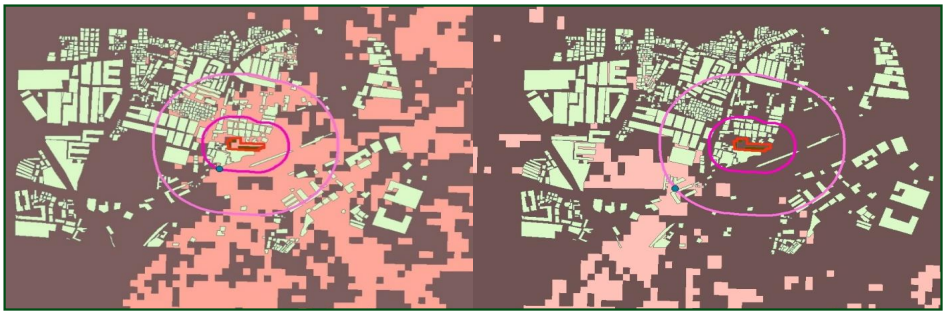

**Fig. 7. & 8: Visibility Area Measurement from static stationed point (Observer location and height 1.8mts), Left: Observer location from prohibited area, right: Observer location from Regulated area**

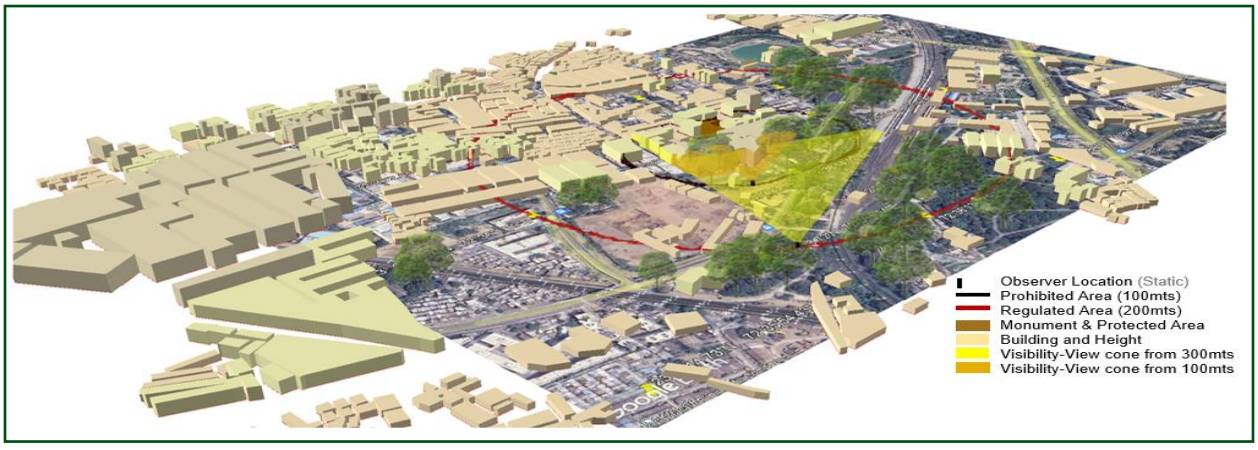


**Fig. 9: Bai Harir Complex (Monument) Visibility Area Measurement in 3D Space from Prohibited and Regulated Area**

**Table 1. The Assessment Table for all the Analyzed Parameters based on Responsive Parameters**

| S. No. | Parameters | Bai Harir Complex |
|---|---|---|
| | (reference from AMASR, 2010 and Proposed by-laws, NMA) | Category 7: Monuments in the urban/semi-urban limits |
| 1. | Vertical Visual Band | Yes |
| 2. | Horizontal Visual Band | Yes |
| 3. | Skyline | Needed |
| 4. | Site Coherence | Needed |
| 5. | View Control Points | 02 (Static) |
| 6. | Height, FAR & Setback | Needed |
| 7. | Approach | Not Safe |
| 8. | Addition & Alteration | Needed |
| 9. | Relocation | Not Needed |
| 10. | Public Amenities | Needed |
| 11. | Signage & Direction | Needed |
| 12. | Universal Access | Needed |

## RESULTS AND DISCUSSIONS

The paper discusses multiple visual studies, from building to urban domain, with multidisciplinary evaluations of monument settings. The literature study was conducted from local, national, and international case examples with multiple methods adopted for visual study. The analysis of this research aims to analyze the relevance of this study in a conservation-led planning approach. It also tries to answer the question, how can visual research through visibility analysis assist in regulating the conservation legislative framework for heritage sites and their contextual setting?

Visibility analysis is taken as a major objective to assess the existing scenario of the Dada Hari complex. The visibility analysis components were tested with ArcScene 10.4 Viewshed analysis and Visual cues analysis with static observations. The observation points controlled with the present approach road fixed at the vertical height of 1.8 as an average to view the complex from 100 and 300mts (results are shown in Figures 7, 8, & 9). Figures 7 & 8 explain the degree of visibility measurement from 100 and 300 mts (prohibited and regulated area), Archmap visibility analysis, represents the dark brown shade, which is not visible from the fixed point and vertical height, and the Redish -Pink color is the area which is visible from both static locations. The static location is decided based on the present road connection to the monument reach. The result has been recorded with the buffer, Viewshed analysis in 2D, observer locations, and 3D view planes as analyzed through figures 7, 8, and 9. Figures 7 and 8 represent the 2d visualization of space about the building heights and observer height from the distance of 100 and 300 Mts. The degree of vision reflected in the result, the heritage complex (monument and its complex) is almost visible from 100mts. As noted in the result from the viewshed analysis, from 300 mts visibility to the monument and complex is very low. It is difficult to navigate towards the heritage site without being visual. The immediate surroundings (unplanned development) obstruct the view of the tomb and mosque. ArcScene 10.4 is utilized in Fig. 9 to provide a three-dimensional understanding of the space concerning the fixed height and static location. Regarding the building heights, the ensuing result presents the same result in 3D space, and it is clear that the complex's aesthetic significance is being negatively impacted by

uncontrolled development. Viewshed and visibility analysis have been used to examine two approaches for visual impact assessment and visual band assessment. This may assist in managing vertical development specific to the heritage sites and their context. In heritage conservation, a policy-driven method can be applied in a context-specific way, using an integrated planning-led approach. Every historic site becomes a bridge between the past and the future. But who are these heritage places for, and to whom are they dedicated? Historic sites express their significance in various ways, through memory, experience, celebration, identity, politics, power, and more. Heritage sites should be preserved based on diagnosed sites' current values that can safeguard the future.

The Bai Harir site was examined from the visibility as the major concern to regulate area around the heritage sites for better development and content-based oriented. The paper tries to make an effort to highlight the debate concerning visibility both above and below ground from view control approaches. Visibility is one of the points notified by the NMA for making and proposing heritage byelaws, but there is no defined meaning of visibility, and the context of heritage sites is missing for such a study. To sustain the argument for a colossal skyline and visual band (as stated in Fig. 9 and Table 1.), this study attempts to show the extent to which the GIS- Archmap-10.4, Analyst tool using Viewshed and observer point for Visibility Analysis to examine the real-time context. The major parameters highlighted based on the literature and existing analysis are listed in Table 1. Depending on how contextual knowledge of monumental settings is understood, there may be additional dependent and independent variables. The topographical features, site setting, and geography are the main factors mentioned. The Bai Harir complex's current parameters, which were evaluated using the AMASR, 2010 Act as a guide, are presented in Table 1 and range from visual, skyline, view control point decisions, approach, placement of signage, and public facilities to universal access for a better overall experience.

Nevertheless, this study implemented contextual-based analysis through the utilization of visual assessment as a method for the effective management and protection of heritage sites, precincts, and their surroundings. The views in urban layers of settings are significant for the experience of the places by assuring the protection of cultural heritage and its settings.

## CONCLUSION

The heritage precincts specify factors like the impact of height, mass, scale, coverage, Floor Area Ratio, setback, visual integrity, and visual experience to be regulated and guided through appropriate legal instructions that can be created from its context itself as listed in table 1. However, it is necessary to address the regulation based on the architecture, style, and construction specifics of the monuments and their settings considering stakeholders. The construction materials and obstacles concerning the immediate site context need to be addressed to regulate the heritage sites. Both the vision control methodology and visual simulations under specific circumstances of analyst thematic mapping, incorporating viewshed and visibility analysis, can be utilized to investigate the actual circumstances on the ground, as demonstrated in 3D Figure 9. The degree of visibility is identified from the located observer point above ground level (AGL) as the building heights near or adjacent to the Bai Harir Complex. This analysis concludes and helps decide the surroundings benchmark to control and protect the heritage complex. While some changes are not wholly unfavourable, they must be evaluated in light of how they will affect the monuments' significance and distinctive values in their specific environment. The visibility, visual integrity, the impact of height, building mass, and scale, among other site-specific factors contribute to the visual experience and have long-term effects that must be controlled and managed by a suitable regulatory framework. Transparency and an objective rationale approach are essential to establish communication between the legislative body, professionals, and locals for bringing change that is sympathetic and logical to the monuments' protection. The heritage guidelines and recommendations must be made with consideration of the setting of each monument and its unique value. This scenario exercises two significant skylines (above and below the ground) and the visual appeal of the monumental setting and its surroundings conducted with the Bai Harirs complex. The visuality is evident in the horizontal and vertical bands above and below the ground for a better experience and appreciation of the values. Factors like visibility allowed visual assessment by establishing view control methods by targeting the viewing area, view control study focused on observers' view cone established in the specific monument context.

The research study used in the semi-urban area of Ahmedabad city’s ASI- Category 6 Monument can enable

objectively to guide logically and methodically to frame heritage bylaws. It is necessary to critically understand the monumental precincts with their prohibited and regulated areas with sensitive approaches that can bring the cast in situ solutions to determine the values for coherent sustainable development.

## CONFLICTS OF INTEREST

No conflict of interest was declared by the authors.

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