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Architectural Hybridization in Colonial Allahabad: A Comparative and Statistical Analysis across Institutional, Public, Religious and Residential Buildings

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Abstract - *Colonial architecture in India developed through a continuous process of adaptation in which imported European architectural principles interacted with local climatic conditions, construction practices, available materials, indigenous craftsmanship and social influences. This paper examines the phenomenon of architectural hybridization in the colonial city of Allahabad, a provincial administrative centre of the North-Western Provinces whose colonial architectural heritage has received comparatively little scholarly attention relative to the metropolitan centres of Bombay, Calcutta, Madras and Delhi. The study proceeds in two stages. The first stage develops a qualitative comparative framework informed by the work of Metcalf and Tillotson on colonial architectural hybridity and applies it to nine representative case-study buildings across institutional, public, religious and residential typologies. The second stage extends the investigation to a documented inventory of 49 colonial-period buildings, recording the frequency of occurrence of 38 architectural variables grouped under spatial organization, architectural elements, ornamentation and materials, and examines the statistical association between these parameters using Pearson correlation analysis, following the methodology of Fazli, Gupta and Mehta (2015). The findings indicate that symmetry, axiality and the arcaded verandah are the most consistently recurring characteristics of colonial buildings in Allahabad, that institutional and public buildings display the highest degree of hybridization while religious and residential buildings remain closer to European prototypes, and that spatial organization, architectural elements and materials are strongly and positively correlated while ornamentation varies more independently of the other parameters. The study contributes an empirically grounded, indicator-based reference for the recognition, documentation and comparative assessment of colonial-period buildings in Allahabad and offers a replicable framework for similar provincial colonial cities.*

Index Terms - Allahabad; Architectural hybridization; Colonial architecture; Heritage documentation; Statistical analysis.

I. INTRODUCTION

Allahabad one of the principal administrative centres of the North-Western Provinces under British rule — underwent a sustained process of urban and architectural transformation over the course of the nineteenth and early twentieth centuries. Earlier stages of this research established the morphological and spatial transformation of the city under colonial administration and produced an architectural record of its colonial-period buildings through measured drawings, photographic documentation and the recording of materials and construction techniques. The present paper draws on that documentation to analyse and interpret the colonial architecture of Allahabad, with particular attention to the phenomenon of architectural hybridization.

Colonial architecture in India rarely constituted a direct transplantation of European models. Rather, it evolved through continuous adaptation, in which imported architectural principles were reworked in response to local climatic conditions, construction practices, available materials, indigenous craftsmanship and the cultural and social context of the colonized territory. The resulting built forms were neither entirely European nor entirely indigenous, but occupied a hybrid architectural register whose nature, extent and expression varied by building typology, period and region. Understanding this hybridization is central to interpreting the architectural identity of colonial Allahabad and to situating it within the broader historiography of colonial architecture in India.

The analysis proceeds in two stages. The first stage assesses architectural hybridization qualitatively through nine representative case-study buildings drawn from four typologies institutional, public, religious and residential. The second

stage extends the investigation to a documented inventory of 49 colonial-period buildings and identifies the recurring architectural indicators of colonial Allahabad through frequency and correlation analysis of 38 architectural variables. Together, the two stages combine qualitative architectural interpretation with quantitative evidence to produce a structured, indicator-based reference for the recognition, documentation and comparative assessment of colonial-period buildings in Allahabad.

II. LITERATURE REVIEW

The scholarly understanding of hybridity in colonial Indian architecture rests substantially on the work of Thomas Metcalf and G. H. R. Tillotson. Metcalf's An Imperial Vision (1989) argues that colonial building in India, particularly after 1857, was not a purely aesthetic or administrative exercise but an expression of the political relationship between culture and imperial authority; the resulting Indo-Saracenic idiom represented an attempt by the British to project themselves as legitimate rulers connected to India's Mughal and regional pasts. Tillotson's The Tradition of Indian Architecture (1989) similarly traces the continuity, controversy and stylistic change in Indian architecture since 1850, examining how European revivalist styles were adapted and contested within the Indian context. Both studies provide the conceptual basis for reading hybridization not merely as a matter of ornamental borrowing but as a deliberate negotiation of planning, style, construction and climatic response the analytical categories adopted in the present study's comparative framework.

A wider body of scholarship has examined hybrid colonial idioms in India's metropolitan centres. Studies of Bombay have shown how the Indo-Saracenic style there emerged through the deliberate combination of Gothic Revival and Indo-Islamic elements, and how local patrons, masons and building traditions shaped construction alongside British architects and engineers, producing an architecture that was jointly authored rather than unilaterally imposed. Comparable readings of Indo-Saracenic architecture in other regional and colonial port cities including Ceylon and Madras treat the style as an ambivalent, negotiated form situated between metropolitan and indigenous traditions rather than as a fixed stylistic category. This literature is broadly consistent with the present study's finding that hybridization in Allahabad was typology-dependent rather than uniform: driven strongly by functional and civic considerations in institutional and public buildings, and comparatively limited in religious and residential architecture.

A recurring limitation in this literature is its concentration on the major presidency and metropolitan cities Bombay, Calcutta, Madras and, for the imperial capital, Delhi with markedly less attention to the architecture of secondary administrative centres of the North-Western Provinces such as Allahabad, despite the city's importance as a seat of the High Court, university and provincial administration. The present study responds to this gap by extending the documentation and analytical framework developed for metropolitan colonial architecture to a provincial administrative city.

On the methodological side, the quantitative component of this study follows the approach demonstrated by Fazli, Gupta and Mehta (2015) in their statistical analysis of variables in heritage buildings, in which architectural characteristics identified through literature and field documentation are recorded across a building inventory, scaled or coded for presence, and examined using descriptive and correlational statistics to identify significant and recurring variables. Applying a comparable framework to the architectural indicators of colonial Allahabad allows the qualitative interpretation of hybridization to be complemented by an empirically grounded account of which characteristics recur most consistently across the surveyed building stock, and of how the four broad parameters of spatial organization, architectural elements, ornamentation and materials relate to one another statistically.

III. RESEARCH ELABORATION: FRAMEWORK AND METHOD

A. Qualitative Framework for Hybridization Assessment

As no standardized framework exists for assessing architectural hybridization in colonial buildings, a comparative observation matrix was developed specifically for the colonial architecture of Allahabad, informed by the analytical categories used by Metcalf and Tillotson. Each case-study building was examined against a common set of parameters planning and spatial organization, European architectural features, indigenous architectural features, ornamentation, materials and construction technique, and climatic adaptation allowing consistent comparison across building typologies. Nine buildings were selected as representative case studies: Muir College, CAV Inter College and Mary Wanamaker Girls' Hostel (institutional); Thornhill &

Mayne Memorial and Mayo Memorial Hall (public); Saint Joseph Church, All Saints' Cathedral and Garrison Church (religious); and a representative Anglo-Indian Bungalow (residential).

B. Quantitative Framework for Architectural Indicators

The second stage of analysis extended the investigation to a documented inventory of 49 intact colonial-period buildings drawn from a preliminary survey of 58 structures in the city. Thirty-eight architectural variables recorded through documentation were grouped under four broad parameters Spatial Organization, Architectural Elements, Ornamentation Details and Materials following the analytical structure used by Fazli, Gupta and Mehta (2015) in their statistical study of heritage building variables. The presence of each variable was recorded for every building in the inventory, and the frequency and percentage occurrence of each variable was calculated. A Pearson correlation analysis was then carried out between the four parameters to examine the statistical relationships among spatial, architectural, ornamental and material characteristics of the surveyed buildings.

IV. RESULTS AND FINDINGS

A. Comparative Hybridization Assessment

Table I summarizes the comparative hybridization assessment across the nine case-study buildings. In institutional buildings, all three case studies adopt European principles of institutional planning symmetrical composition and axial organization reflecting British concepts of order and administrative control but differ markedly in architectural expression. Muir College shows the most elaborate composition, combining Gothic Revival features (pointed arches, a tower, vaulted spaces) with indigenous elements such as chhatris, domes and chajjas, while CAV Inter College and Mary Wanamaker Girls' Hostel show a more functionally driven expression incorporating local materials and passive climatic response. Hybridization in institutional buildings therefore appears to be driven primarily by educational function, functionality and climatic adaptation.

Public buildings display a comparable pattern: both Thornhill & Mayne Memorial and Mayo Memorial Hall adopt formal, symmetrical Victorian planning organized around a central hall, executed predominantly in a Gothic Revival vocabulary, but incorporate local materials, craftsmanship and climate-responsive elements such as chajjas and arcaded verandahs. Public buildings represent a balanced synthesis of British architectural ideals and indigenous building traditions, with hybridization driven by monumentality, civic symbolism and local craftsmanship.

Religious buildings, by contrast, remain more closely tied to European architectural prototypes. All Saints' Cathedral follows a cruciform Gothic Revival plan, Saint Joseph Church adopts an axially symmetrical composition influenced by the Italian Renaissance, and Garrison Church retains the simpler longitudinal organization typical of European military chapels. Hybridization in this typology is largely confined to construction materials, craftsmanship and limited climatic adaptation, and religious buildings show the lowest degree of stylistic hybridization among the four typologies. The residential typology, represented by the Anglo-Indian Bungalow, likewise shows predominantly European domestic planning a symmetrical, detached form set within a compound reflecting privacy, ventilation and functional separation with local adaptation confined chiefly to materials (brick masonry, lime mortar, timber trusses, clay roof tiles).

Table I. Comparative hybridization assessment across institutional, public, religious and residential case-study buildings in colonial Allahabad.

Building (Typology)	Spatial Composition	Principal Elements & Ornamentation (Indigenous / European)	Materials & Climatic Adaptation	Interpretation of Hybridization
Muir College (Institutional)	Axial, courtyard-based academic layout	Indigenous: onion domes, chhatris, deep chajja, jaali patterns. European: pointed arches, vaulted halls, Gothic mouldings, tracery, entrance	Red brick, lime mortar, stone; jaali for ventilation, deep verandah.	Comprehensive Indo-Gothic composition; British planning enriched with Indian materials, forms and climatic

Building (Typology)	Spatial Composition	Principal Elements & Ornamentation (Indigenous / European)	Materials & Climatic Adaptation	Interpretation of Hybridization
		porch.		response.
CAV Inter College (Institutional)	Linear, symmetrical plan	Indigenous: peripheral verandah, chajja, deep recessed openings. European: segmental and semi-circular arches, urn finials, central pediment block.	Brick masonry with lime plaster; chajja for shading.	Predominantly colonial in character; hybridization expressed mainly through climatic adaptation.
Mary Wanamaker Girls' Hostel (Institutional)	Courtyard-centred plan with axial symmetry	Indigenous: arcaded verandah, courtyard. European: symmetrical composition, gabled facade, segmental arches, turrets with conical spires, entrance porch.	Exposed brick masonry, timber; central courtyard and arcaded verandah for ventilation.	Indian spatial planning adapted to British institutional forms; moderate architectural integration.
Thornhill & Mayne Memorial (Public)	Symmetrical plan with dominant central hall and secondary courtyard	Indigenous: courtyard, arcaded verandah, column capitals, geometric floor patterns. European: pointed arches, turret/spire, heraldic monogram, circular tracery, rose window, entrance porch.	Sandstone, timber; chajja and spire openings for ventilation.	Strong Gothic architectural identity enriched by indigenous climatic adaptation, local craftsmanship and regional materials.
Mayo Memorial Hall (Public)	Longitudinal hall with axial symmetry	Indigenous: chhatri-capped turret, deep verandah, chajja, colourful tile bands. European: pointed arches, flying buttress, Gothic tracery, gargoyles, finials, rose windows.	Polychrome sandstone, brick masonry; arcaded verandah, tower openings.	Predominantly colonial (Gothic) public architecture with selective indigenous elements and climatic adaptation.
Saint Joseph Church (Religious)	Axial symmetry	Indigenous: bench of Indian wood and joinery detail. European: entrance porch, campanile, statues, stained-glass paintings, oculus window.	Brick masonry, glass; recessed openings.	Italian-Renaissance vocabulary executed with local materials and craftsmanship; hybridization limited.
All Saints' Cathedral (Religious)	Cruciform plan with axial emphasis	European only: pointed arches, ribbed vaults, buttresses, spires, floral-motif and jaali-pattern glazing, gargoyles.	Wood, glass, stone masonry.	Largely intact High-Gothic composition with only incidental climatic adaptation.
Garrison Church (Religious)	Longitudinal nave with axial planning	Indigenous: deep verandah. European: entrance porch, pointed arch, turret, lancet window.	Clay-tile roof; arcaded verandah.	Simplified Gothic character; hybridization confined to climatic adaptation and local construction technique.
Anglo-Indian Bungalow (Residential)	Compact plan with frontal access	European only: sloping roof, symmetrical facade, finial.	Brick, red clay tiles; shaded openings.	European residential planning with only climate-responsive indigenous adaptation; lowest degree of hybridization observed.

Overall, among the four typologies, institutional buildings exhibit the most comprehensive expression of hybridization, followed closely by public buildings, whose primary objective of projecting authority and civic importance nonetheless accommodated significant local adaptation. Residential and religious buildings display the lowest levels of stylistic hybridization, remaining closer to their European prototypes and confining local adaptation chiefly to materials, construction technique and climatic response.

B. Frequency of Occurrence of Architectural Indicators

The 38 architectural variables were recorded across the inventory of 49 documented buildings. Table II presents the frequency and percentage occurrence of each variable, ranked in descending order. Symmetry and the presence of pointed or circular arches in verandahs are the most consistently observed characteristics (98% each), followed by axial organization (95%). Chajja and pitched roofs each occur in 70% of surveyed buildings, and the arcaded verandah in 65%, underscoring the centrality of climatic adaptation to the colonial architectural vocabulary of Allahabad. Ornamentation-related variables such as gargoyles, medallions, tracery, natural motifs and sculptural detail occur far less frequently (below 15%), indicating that decorative expression was comparatively building-specific rather than a standardized feature of colonial construction in the city.

Table II. Comparative occurrence of the 38 architectural variables across 49 surveyed colonial-period buildings in Allahabad, ranked by frequency.

S.No.	Architectural Variable	Parameter	Frequency (n)	Occurrence (%)
1	Arches / Verandah (pointed or circular)	Architectural Elements	42	98%
2	Symmetry	Spatial Organization	42	98%
3	Axis	Spatial Organization	41	95%
4	Chajja	Architectural Elements	30	70%
5	Pitched Roof	Architectural Elements	30	70%
6	Timber used in doors and windows	Materials	29	67%
7	Arcaded Verandah	Architectural Elements	28	65%
8	High Plinth	Architectural Elements	27	63%
9	Moulding	Ornamentation	25	58%
10	Brick	Materials	23	53%
11	Grand Scale	Spatial Organization	23	53%
12	Timber used in roof	Materials	22	51%
13	Exposed Brick	Architectural Elements	20	47%
14	Brackets	Architectural Elements	19	44%
15	Glass	Materials	17	40%
16	Central Hall / Atrium	Spatial Organization	15	35%
17	Finials	Ornamentation	13	30%
18	Arch above Door/Opening	Architectural Elements	12	28%
19	Pediments	Ornamentation	12	28%

S.No.	Architectural Variable	Parameter	Frequency (n)	Occurrence (%)
20	Vaulted Roof	Architectural Elements	12	28%
21	Jaali	Ornamentation	11	26%
22	Stone Cladding	Architectural Elements	11	26%
23	Turret	Architectural Elements	11	26%
24	Spires	Ornamentation	10	23%
25	Stone	Materials	10	23%
26	Geometrical Motifs	Ornamentation	9	21%
27	Painting	Ornamentation	7	16%
28	Chatri	Architectural Elements	6	14%
29	Rose Window / Oculus Window	Architectural Elements	6	14%
30	Tracery	Ornamentation	6	14%
31	Courtyard Planning	Spatial Organization	5	12%
32	Medallion	Ornamentation	5	12%
33	Gargoyles	Ornamentation	3	7%
34	Column (Classical)	Architectural Elements	2	5%
35	Entrance Porch	Architectural Elements	2	5%
36	Flying Buttress	Architectural Elements	2	5%
37	Natural Motifs	Ornamentation	2	5%
38	Sculptures	Ornamentation	2	5%

C. Correlation among Architectural Parameters

To complement the frequency analysis, a Pearson correlation matrix was computed between the four architectural parameters Spatial Organization, Architectural Elements, Ornamentation and Materials following the statistical approach of Fazli, Gupta and Mehta (2015). Table III presents the resulting correlation coefficients. All four parameters are positively associated. The strongest relationship is between Spatial Organization and Architectural Elements (r = 0.763), followed by Architectural Elements and Materials (r = 0.730) and Spatial Organization and Materials (r = 0.705). Ornamentation shows comparatively weaker associations with the other parameters, particularly with Spatial Organization (r = 0.412), indicating that decorative expression was comparatively independent of a building's spatial characteristics.

Table III. Pearson correlation matrix of the four architectural parameters (Spatial Organization, Architectural Elements, Ornamentation, Materials).

	Spatial Organization	Architectural Elements	Ornamentation	Materials
Spatial Organization	1.000	0.763	0.412	0.705
Architectural Elements	0.763	1.000	0.654	0.730
Ornamentation	0.412	0.654	1.000	0.598
Materials	0.705	0.730	0.598	1.000

V. DISCUSSION

Read together, the qualitative and quantitative findings converge on a consistent account of colonial architecture in Allahabad. The frequency analysis confirms, at the level of the full building inventory, the pattern already visible in the nine case studies: symmetry, axiality and the arcaded verandah a climate-responsive element with no direct European precedent constitute the core, near-universal vocabulary of the city's colonial buildings, regardless of typology. The strong positive correlation between spatial organization, architectural elements and materials suggests that these three parameters tended to operate together, so that a building's formal planning, its architectural articulation and the materials and techniques used to realize it were closely interdependent choices. Ornamentation, by contrast, behaved as a more independent, building-specific layer of expression consistent with the case-study finding that decorative treatment varied considerably even among buildings of the same typology and period (for example, between the elaborate Gothic ornament of Muir College and the plainer, more functional treatment of CAV Inter College).

These findings support the broader argument in the literature advanced by Metcalf and Tillotson for the colonial architecture of India generally that hybridization was not a uniform or purely stylistic phenomenon but a typology-dependent process shaped by function, climate, available craftsmanship and the symbolic requirements of the building in question. Institutional and public buildings, whose colonial function required sustained everyday use by both British and Indian occupants and prominent civic visibility, show the most comprehensive hybridization; religious and residential buildings, more closely tied to European institutional and domestic prototypes and to smaller, more homogeneous user groups, retained a more consistently European character.

VI. CONCLUSION

This paper has examined architectural hybridization in the colonial buildings of Allahabad through a combined qualitative and quantitative framework. The comparative assessment of nine case-study buildings shows that hybridization varied systematically by typology, with institutional and public buildings exhibiting the most comprehensive integration of European and indigenous architectural elements and religious and residential buildings remaining closest to European prototypes. Extending the analysis to a documented inventory of 49 colonial-period buildings and 38 architectural variables confirms that symmetry, axial organization and the arcaded verandah are the most consistently recurring characteristics of colonial architecture in the city, and that spatial organization, architectural elements and materials are strongly interrelated while ornamentation forms a more independent, building-specific layer of expression.

The resulting set of architectural indicators provides a structured, empirically grounded reference for the recognition, documentation, comparison and future conservation assessment of colonial-period buildings in Allahabad, and offers a replicable methodology for the study of architectural hybridization in other provincial colonial cities of India that, unlike the major presidency towns, remain comparatively under-documented in the existing literature. Future work may extend the statistical framework developed here to a larger inventory, incorporate additional provincial cities for comparative analysis, and examine the relationship between the identified indicators and the current conservation status of the surveyed buildings.

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