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Contents

Dutch Framed Houses in New York and New Jersey

Clifford W. Zink

DUTCH AMERICAN timber framing is a unique vernacular building technology and a key element in defining houses built in America by the Dutch. While Dutch American timber houses today appear to be less common than masonry ones, they were the commonest structures in the seventeenth and eighteenth centuries. The evolution of timber framing throughout the Dutch American period (from 1624 to early in the nineteenth century, years in which the influence of the Dutch remained discernible) illustrates both the transference and the adaptation of European material culture to the New World, especially the process of acculturation as expressed in traditional building practices. Scholars have usually defined Dutch American houses by outward forms, such as a gambrel roof with a spring eave, or by certain interior details, such as a jambless fireplace. Some have noted the Dutch system of heavy floor joists and have begun to address types of floor plans, but no researcher has adequately examined and identified Dutch American timber framing.

The particular timber-framing system used by the Dutch colonists came from the Netherlands, and that, in turn, had its origins in early northern European building types. The system followed a structural logic—a conceptualization of handling space, structural forces, and aesthetics. This logic determined the form of both timber and masonry buildings because the spatial parameters were based on the physical limitations of timber. The earliest American houses show that the Dutch transferred their seventeenth-century building technology to the New World in simplified forms that relied on their rules of construction yet met the need for expediency in settling a new land. Since New Amsterdam was established as a trading post by a private company, there was little impetus to give its structures the elaborate decorative treatment commonly used on buildings in seventeenth-century Netherlands; instead, the builders employed only key elements of the Dutch conceptualization of building, some of which became symbols of the colonists' cultural heritage. The refinement of the key elements over the 200 years following the initial Dutch settlement illustrates the transformation of a parent culture in a colonial setting: immigrant builders adapted their Old World traditions to new environmental requirements, material sources, and building ideas and, following the English conquest of 1664, merged their timber-framing practices with those of Anglo-Americans. They eventually created hybrids that demonstrate a cross-cultural melding of European-based house-building technologies in America. This study identifies the timber-framing characteristics that define Dutch American houses

Clifford W. Zink is a consultant in the restoration of historic buildings and is working on a history of industrial architecture. He is a partner in an architectural firm and executive director of a nonprofit corporation that is planning the preservation and redevelopment of the John A. Roebling's Sons Co. historic industrial complex in Trenton, N.J.

This article is based on the author's 1985 master's thesis for the Columbia University Graduate School of Architecture, Planning, and Preservation. Many people have contributed to this research, including several with whom the author first learned to look at timber buildings while restoring Glencairn, an early eighteenth-century farmstead in Princeton, N.J.: Stephen Zink, Elric Endersby, Alexander Greenwood, and Richard Hunter. Others who helped him to understand timber framing include Yun Sheng Huang, Joseph Hammond, Richard Harris, and Karen Peterson. Persons who provided assistance include Henk Zantkuyl and Piet van Wijk in the Netherlands; Neil Larson, Bill McMillen, Ruth Piwonka, and Ken Walpuck in New York; Gwendolyn Wright; Frank Matero; Gordon Loader; Leslie Goat; Shirley Driks; and Theo Prudon, the thesis reader; and especially his thesis adviser, Catherine Lynn, Columbia University.

and traces their evolution over time. Floor plans, roof types, and other details will be discussed only in relation to framing characteristics.[1]

Among the major European building traditions brought to the New World, that of the Dutch has received comparatively little attention.[2] Most Dutch American buildings were vernacular structures. There are no landmark or monumental houses that epitomize Dutch American design, as Paul Revere's house and Westover represent English seventeenth- and eighteenth-century house types. Unlike the Netherlands, where thousands of seventeenth-century buildings survive, nearly all the early buildings in New Netherland have long since disappeared. Most settlers in New Netherland built timber houses for expediency, knowing that these could be replaced by more permanent masonry structures as time and prosperity permitted.[3] That, combined with the continuing pressure for new development in the region which has occurred since the beginning of European settlement, has contributed to the destruction of houses and most other evidence of the early Dutch culture, except for place names and road layouts. The surviving buildings have been altered or expanded and have become even less noticeable with the suburbanization of the region.

Students of Dutch American material culture have always faced the problem of defining who were the "Dutch" in America. New Netherland was a polyglot settlement from the beginning: besides the Dutch, there were Flemings, French Huguenots, and French-speaking Belgians. For the purposes of this article, *Dutch* will be used to refer to people from the Netherlands and adjacent countries who were of Dutch birth or who became commonly identified with the Dutch during the colonial period and retained that identity even after the establishment of New York.[4] A "Dutch house" is one that exhibits, in form and fabric, those architectural features commonly found in the Netherlands or adjacent Lowlands regions. A "Dutch American house" is one constructed in the New Netherland area by "Dutch" colonists, using architectural precepts that were transferred from the Netherlands.

Initially the Dutch settlers built houses they perceived as suitable to the type of setting they were creating in their colony. In New Amsterdam and other urban settlements, they built houses that resembled those in small cities in the Netherlands (fig. 1), while in the agricultural areas of the lower Hudson River valley, such as Brooklyn and north-central New Jersey, they built houses resembling farm dwellings. Following the English conquest in 1664, the colony's urban settlements rapidly absorbed English culture, and Dutch-style urban buildings became increasingly scarce, except in the upper Hudson region near Fort Orange (now Albany) where the English cultural and economic influence remained weak. Thus, in the upper Hudson region, urban Dutch buildings influenced the design of farm and village houses in the surrounding areas well into the eighteenth century, as the Dutch clung to earlier, and often obsolete, architectural symbols of their cultural heritage.

[1] Restoration and moving of eighteenth-century houses and barns in the central New Jersey area, where both Dutch and English settled, has provided the opportunity to study distinctions between their building traditions firsthand. These buildings, and others recorded in surveys like the Historic American Buildings Survey (HABS), are in Mercer, Somerset, Middlesex, Morris, Monmouth, Hunterdon, and Bergen counties in New Jersey and in Brooklyn, Staten Island, and Rockland, Dutchess, and Columbia counties in New York. The research has also included early archival documents of New Netherland, studies of Dutch and English houses in America, published drawings and photographs of houses in the Netherlands, and field trips to open-air museums and to sites in England and the Netherlands that have historic timber houses.

[2] Scholars have studied English American timber houses for years in New England, Maryland, and Virginia, but with little comparative analysis. Abbott Lowell Cummings, *The Framed Houses of Massachusetts Bay, 1625–1725* (Cambridge, Mass.: Harvard University Press, Belknap Press, 1979), is the most comprehensive study of traditional timber framing in America to date. For New England, see also J. Frederick Kelly, *Early Domestic Architecture of Connecticut* (1924; reprint, New York: Dover Publications, 1963); and Norman M. Isham and Albert Brown, *Early Connecticut Houses: An Historical and Architectural Study* (1900; reprint, New York: Dover Publications, 1965). For early timber buildings in the Tidewater area, see Cary Carson, Norman F. Barka, William M. Kelso, Garry Wheeler Stone, and Dell Upton, "Impermanent Architecture in the Southern American Colonies," *Winterthur Portfolio* 16, nos. 2/3 (Summer/Autumn 1981): 135–96. Studies in Quebec focus on the tradition of elaborate roof trusses on masonry buildings and on *colombage*, the Norman-derived framing system of closely spaced studs. See Michel Lessard and Marquis Huguette, *L'Encyclopédie de la maison Québécoise* (Montreal: Agence de distribution populaire, 1972); and Michel Lessard and Gilles Villandré, *La maison traditionnelle au Québec* (Montreal: Editions Aux Hommes, 1974).

[3] Thomas Jefferson Wertenbaker, *The Founding of American Civilization: The Middle Colonies* (New York: Charles Scribner's Sons, 1938), pp. 64–65, 75.

[4] Many of these settlers had first migrated to the Netherlands to escape religious persecution. Other settlers came from Germany, Scandinavia, and even Poland and Hungary. For Flemish origins, see Wertenbaker, *Founding of Civilization*, pp. 35–36, 67–68. Peter Wacker has observed: "This diversity of ethnic origins is reflected by the fact that Demarest, Zabriskie, and Banta are good and common 'Dutch' names in New Jersey. Many settlers arrived in the New World bilingual, especially the French speakers, but in a generation or so the Dutch language, favored by the Company, the government, and the Dutch Reformed Church, won out, as did English, later o (Peter O. Wacker, "Dutch Material Culture in New Jersey," *Journal of Popular Culture* 11, no. 4 [Spring 1978]: 948–58). The Dutch language and legal system, the emphasis on commerce with Holland, and intermarriage, all contributed to the dominance of Dutch culture in New Netherland.

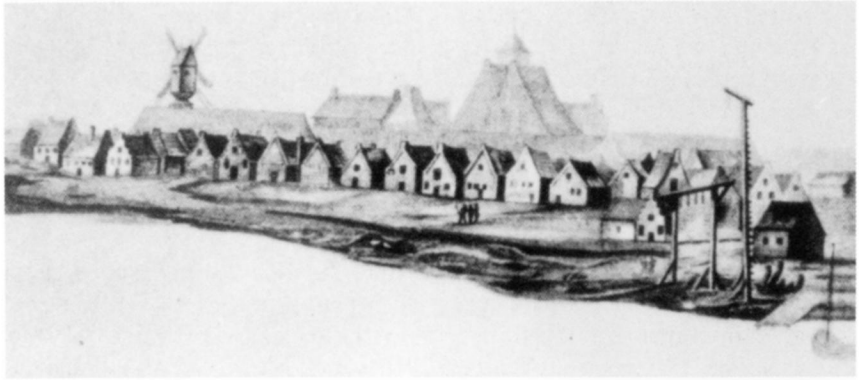


Fig. 1. "Prototype" view (detail), ca. 1660, seventeenth-century Dutch American one-and-one-half-story frame-and-brick town houses, New Amsterdam. From Maud Esther Dilliard, *Album of New Netherland* (New York: Twayne Publishers, 1963), frontis.

Throughout the rest of the region, rural Dutch architecture became the dominant influence on Dutch American house types, especially in Dutchess and Columbia counties and Brooklyn and Staten Island, as well as Monmouth, Middlesex, Somerset, and Hunterdon counties in central New Jersey. Today the largest number of timber houses appears to survive in Dutchess County and in central New Jersey. Both areas are particularly noteworthy because they also possess a number of eighteenth- and nineteenth-century hybrid buildings that demonstrate the depth of interaction between Dutch and English colonial cultures.[5]

The two principal books on Dutch American houses were written fifty years ago by Rosalie Bailey and Helen Reynolds. Although both authors relied heavily on genealogy of families and exterior form of the houses, their studies remain unsurpassed as comprehensive surveys of Dutch American houses. Architectural analyses of Dutch American houses have occurred primarily as part of larger studies of American architecture. In 1938 historian Thomas Wertenbaker identified the "lower Saxon peasant house," a combined barn and dwelling also called a *loshoes*, as the source for the Dutch American barn. While early documents indicate that Dutch settlers built some of these barn dwellings in New Netherland, the vast majority constructed separate dwellings and barns. Wertenbaker speculated, "perhaps the heat from the cattle and horses was uncomfortable in the scorching American summers, perhaps it was deemed unwise to have the thatched roof of the barn too near the roaring fire in the residence necessitated by the bitter cold of winter."[6]

Architect-author Thomas T. Waterman initially called public attention to a distinct framing style, explaining: "Dutch carpenters used widely-spaced heavy [anchor] beams carrying very thick floor boards instead of the girders, closely-spaced joists and thin floors of the English colonial builders. The feature of the huge, low beams of the Dutch houses alone gave a very different character to the interiors, and especially when the posts carried angular brackets [corbels], like ships' knees.

[5] Recent surveys in the upper Hudson counties have recorded many Dutch American timber houses, but published information is limited. Ruth Piwonka and Elise Barry's "Study of Ethnic Pre-Federal Architecture in Columbia County, N.Y." (Columbia County Historical Society, Kinderhook, 1984), surveys building contracts in the seventeenth-century documents of old Albany Co. and analyzes several buildings. The presence of Massachusetts-type frame houses in Columbia Co. offers a good opportunity for comparing Dutch and English framing techniques. See also Leslie Goat, "Historical Survey: Town of East Fishkill (Dutchess County), N.Y." (Town Hall, East Fishkill, 1984). The Richmondtown Restoration on Staten Island and Old Bethpage village on Long Island have a concentration of Dutch American timber houses, many of which were moved to these sites. For cross-cultural architectural influences, see Wertenbaker, *Founding of Civilization*, pp. 53–57.

[6] Rosalie F. Bailey, *Pre-Revolutionary Houses and Families in Northern New Jersey and Southern New York* (New York: W. Morrow, 1936); Helen W. Reynolds, *Dutch Houses in the Hudson Valley before 1776* (New York: Payson and Clarke, 1929). The Holland Society, for whom the book was published, wanted Reynolds to include only those houses to which members could trace their lineage. Other studies have focused on specific geographic areas or on promoting the "Dutch Colonial" as a model for new suburban houses: Maud Esther Dilliard, *Old Dutch Houses of Brooklyn* (New York: Richard R. Smith, 1945); John Boyd, "Early Dutch Houses in New Jersey," *Architectural Record* 36, no. 3 (July 1914): 31–48; Aymar Embury II, *The Dutch Colonial House: Its Origin, Design, Modern Plan and Construction* (New York: McBride, Nast, 1913). Wertenbaker, *Founding of Civilization*, p. 63. Wertenbaker analyzed "Flemish" building types but did not address framing or explain why the Flemish houses of New Netherland relate more to Dutch anchor-bent framing than to the colombage frames favored by the Canadians. Nor did he explain adequately why these settlers built Dutch barns and not the long, narrow, Flemish-style barn that prevails in French Canada.

. . . The beams are usually about seven inches by twelve inches."[7]

More recently scholars have focused on form or decoration, as did Bailey and Reynolds, and on floor plans. A few researchers have recognized the basic differences between Dutch and English framing techniques, particularly in regard to barns. While the origins and the engineering of Dutch American barns have been carefully studied, these have not been fully related to the framing in houses. No one has specifically analyzed the rationale and variations that characterize Dutch American house framing.[8]

The Structural Logic of Timber Framing

To comprehend Dutch American or any other vernacular building tradition, we must examine the structural system's effect on outward form, on distribution and use of space, on decoration, and on orientation. A structural system expresses the solutions to the problems the builders confronted and the decisions they made, whether consciously or unconsciously. By studying the changes in framing techniques, we can perceive how carpenters' conceptions of the process and function of building evolved during the 200-year period of this study.[9]

Richard Harris developed the concept of structural logic as he studied timber-frame buildings in England in the late 1970s. Structural logic is a rational system for organizing the load-carrying components of a building to accommodate engineering, spatial, and aesthetic requirements. It guides the builder's thought processes as he contemplates the project. The structural logic that shapes a vernacular building is significant because it represents the conceptualization process of one or a few builders, and it is a fairly succinct and personal statement. The logic is not necessarily something that the builder is consciously thinking about and probably reflects the ways in which he learned to conceive of a building. Such concepts become part of an unconscious process. An analogy exists in everyday speech, inasmuch as we speak without consciously thinking of the logic of our language; we follow the rules and use the pieces automatically. In buildings, carpenters could incorporate changes in some aspects of their structures, but they rarely varied certain features even though acceptable alternatives existed. Harris theorized that these were "keys to the process: without any one of them its logic would be destroyed."[10]

Like language, the logic of building is culturally bound; it is based on the culture that produced the logic and that is native to the builder. The cultural expressiveness of traditional carpentry has not been fully explored for several reasons: carpentry is often covered by surface finishes; most scholars are unfamiliar with structural principles; and carpentry was not a process that was described in American documents until the late eighteenth century. Because traditional practices were handed on

[7] Thomas Tileston Waterman, *The Dwellings of Colonial America* (Chapel Hill: University of North Carolina Press, 1950), p. 213.

[8] Allen G. Noble, *Wood, Brick and Stone: The North American Settlement Landscape*, vol. 1, *Houses* (Amherst: University of Massachusetts Press, 1984), compares Dutch American house forms to those of other European origins. Studies of barn framing offer the best comparisons of timber-framing traditions in America: Eric Arthur and Dudley Witney, *The Barn: A Vanishing Landmark in North America* (Toronto: A and W Visual Library, 1972); Henry Glassie, "The Barns of Otsego County," *Geoscience and Man* 5 (June 10, 1974): 177–235. These show the visual differences between Dutch American barns and Anglo-American barns but do not correlate barn framing with house framing or identify a structural logic. John Fitchen, *The New World Dutch Barn: A Study of Its Characteristics, Its Structural System, and Its Probable Erectional Procedures* (Syracuse: Syracuse University Press, 1967), analyzes framing from an engineering perspective, identifying the properties of wood that contribute to its use in framing and the engineering forces that affect the buildings. He also discusses how joinery and framing design account for these forces. Theo Prudon, "The Dutch Barn: Survival of a Medieval Tradition," *New York Folklore Quarterly* 2, no. 4 (December 1976): 121–40, identifies the origins of Dutch American barns in the medieval hall-house tradition in northern Europe and queries the relationship between barn and house framing. Elsa Gittleman discusses some Dutch framing details in "Staten Island Houses" (Master's thesis, Columbia University, 1982). Dell Upton, "Traditional Timber Framing," in *Material Culture of the Wooden Age*, ed. Brooke Hindle (Tarrytown: Sleepy Hollow Press, 1981), pp. 35–93, compares English, German, and Dutch framing and discusses some key features of Dutch American timber framing, including an underlying framing concept.

[9] Upton and others have cited timber framing as the most interesting of European American building technologies. The extensive supply of virgin timber in America promoted, for a time, a resurgence in timber-framing technology, which had lagged in Europe as sources of timber became progressively depleted. See Upton, "Traditional Framing," pp. 38–41.

[10] Discussions with Harris, an architect and a historian of medieval buildings, in 1980 encouraged me to define the structural logic of Dutch American framing. An outline of his theory is contained in Richard Harris, *Timber Frame Buildings* (London: Arts Council of Britain, 1980), pp. 13–21, a catalogue for a traveling exhibition on English buildings. For formation of group symbols and how these relate to aspects of our conscious and unconscious, see Richard Kuhns, *Psychoanalytic Theory of Art: A Philosophy of Art on Developmental Principles* (New York: Columbia University Press, 1983), pp. 39–81. Of all the group symbols or collective representations, architecture is particularly potent as it is ubiquitous and enduring. Vernacular architecture represents group symbols differently from formal architecture because it is based on local interpretations rather than national or international ones. How this affects identity and interaction with the artifact is a question for further exploration.

Fig. 2. Seventeenth-century Dutch American interior with exposed anchor-bent framing. South Room, Jan Martense Schenck house, Brooklyn, N.Y., ca. 1675, as reconstructed at the Brooklyn Museum. (Brooklyn Museum.)

from one builder to another, the buildings themselves are for the most part the only documents.[11]

Although all timber-framing techniques share similarities based on the nature of wood, the tools, and the process, the structural logic of framing varies among different cultures. Cultures that are very different will most likely have widely divergent framing concepts—for example, northern Europeans rely on triangulation for rigidity, while the Chinese employ horizontal and vertical interlocking to achieve the same result. Related cultures may share certain framing techniques, such as the similar use of anchor bents in northern German and Dutch structures. But variations can also occur within a culture, as Harris has observed: "a regional [building] dialect can achieve great diversity while still obeying the rules of a national language," which explains the variations in bent framing in barns. The logic of Anglo-American carpentry is based on the box frame, Dutch American on the anchor-bent frame, French Canadian on *colombage* (close studding) and roof trusses, and German American on *Fachwerk* (panel framing).[12]

Timber frames that serve decorative as well as structural functions are particularly informative, for aesthetic choices influence the selection, sizing, finishing, spacing, and joining of timbers as much as engineering considerations do. These choices strongly express the building's identity as a cultural object. Compare, for example, the concepts expressed in a Dutch American interior (fig. 2) to the concepts expressed in an Anglo-American house in Massachusetts (fig. 3). The Dutch-derived frame relies on a close series of large timbers to bear the loads. The English-derived frame gives primacy to the summer beam, which bears the major loads much like a keel in a boat. The mingling of these framing systems in America created a hybrid: by the early eighteenth century carpenters working in Dutch English areas framed houses with a combination of summer beams and anchor bents, barns

[11] Since structural logic was not a written tradition, there are no documents that articulate it. Early building contracts contain some evidence, and drawings such as those by HABS provide information since the framing displays a visual logic. To comprehend the logic, one has to learn to think like a traditional carpenter, and the best way to do this is by working on the buildings, as this forces one to conceptualize the logic from the process and the material itself. Details of timber selection, spacing, tooling, and joinery illustrate how carpenters compensated for the forces they perceived in the frame. Anchor-beam-post joints, for example, can vary from one building to another in the number of pegs, in the shape of mortises, and in the extended tongues, showing how different carpenters conceptualized the structural demands and solutions.

[12] Harris, *Timber Frame Buildings*, p. 13. Log-building traditions, which are not really framing systems, also show cultural origins in their execution. If we were to give the same problem of building a structure of a particular size and utility, say a one-story house of a certain dimension, to traditional carpenters from England, the Lowlands, and China, the result would be that the organization and technique of the timber frame of the first two would be different but would relate more to one another than to the third. For illustrations of traditional Chinese buildings, see Nancy Steinhardt, *Traditional Chinese Architecture* (New York: China Institute, 1984), pp. 37–45.

Fig. 3. Seventeenth-century Anglo-American interior with exposed box framing. Appleton-Taylor-Mansfield house, Saugus, Mass., ca. 1680. (Courtesy, National Park Service, Saugus Iron Works.)

with a combination of anchor bents and box framing.

In framing a building with timber, or steel for that matter, the structural skeleton organizes and defines architectural space, the individual members attenuate the resulting physical forces, and the joinery transfers these forces from one member to another. Posts and tying, or anchor, beams, are assembled into transverse sections called bents, creating two-dimensional space. These are linked with perpendicular framing members—girts (in the middle of the posts) and plates (at the top)—to make the space three-dimensional. Joints are designed to maximize the ability of wood to handle the kind of force that is being transferred from one timber to the next. A simple dovetail linking a post to a beam primarily resists tension; a tenon at the foot of a rafter resists compression. The anchor-bent joint resists both tension and compression; it has long tenons (or tongues) that protrude through the post and are tightened by the insertion of wedges (fig. 4). Some joints link framing, and therefore forces, in two dimensions (for example, anchor-bent joints), while others link three dimensions (for example, lap-dovetail joints).[13]

[13] For the evolution of English framing and joints, see Cecil Alec Hewett, *The Development of Carpentry, 1200–1700: An Essex Study* (Newton Abbot: David and Charles, 1969).

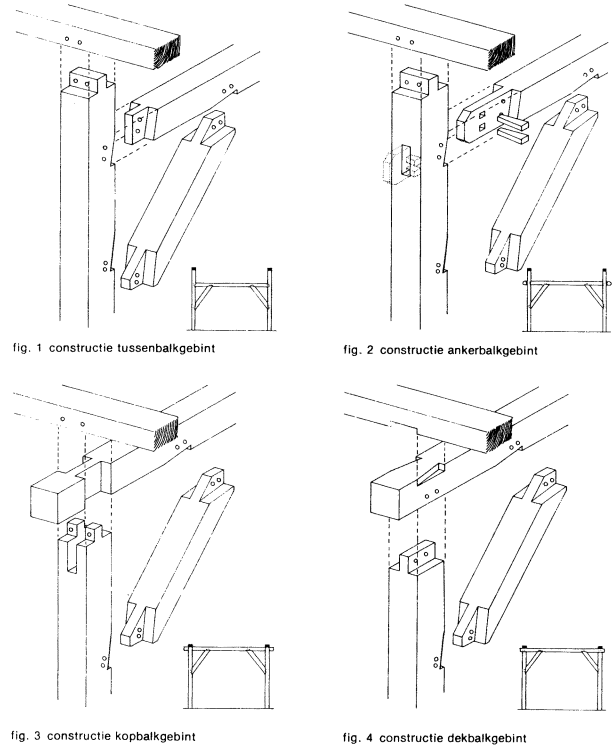


Fig. 4. Netherlands H-frame anchor-bent joinery. *Top*: one-and-one-half-story anchor bents; *bottom*: one-story anchor bents. From G. Berends et al., *De Benaming van houtverbiningin* (Arnhem: Stichting Historisch Boerderij-onderzoek, 1982), p. 17.

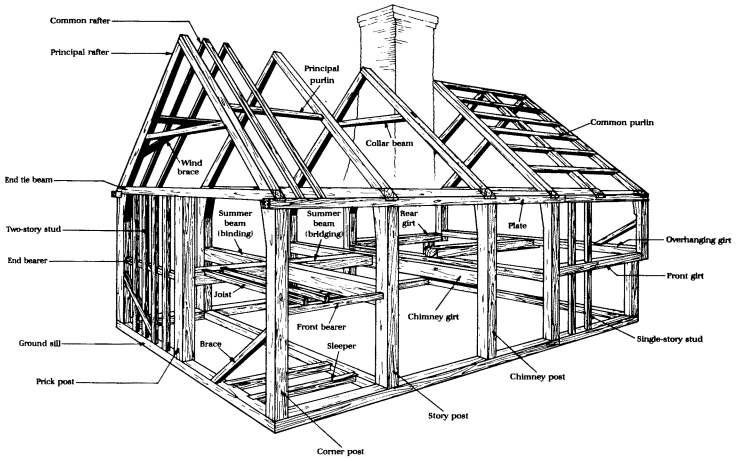


Fig. 5. Seventeenth-century Anglo-American timber box framing. Gedney house, Salem, Mass., ca. 1665 and 1700. From Abbott Lowell Cummings, *The Framed Houses of Massachusetts Bay, 1625–1725* (Cambridge, Mass.: Harvard University Press, Belknap Press, 1979), p. 58.

According to Harris, the three key elements in a traditional English box frame are the lap-dovetail joint, the bay system, and the upper face orientation (figs. 5, 6). The lap-dovetail joint connects the plate, the tie beam, and the post in a single intersection, which requires a thicker post at the upper end (like a gunstock). Principal rafters are usually framed into the top of the tie beam through separate lap-dovetail joints. The linking of posts and tie beams forms two-dimensional bents, the major structural components of a frame. The bay system separates bents into cubicles or boxes that define rooms within the plan. The carpenter enlarges the building by adding boxes side by side or one atop the other. Because bents are widely spaced, the main loads from the roof and floors are transferred through the plates and other horizontal beams to the posts, which then carry the loads to the ground. (The horizontal beams that run parallel to the eave wall between the bays are called summer beams in the interior walls and girts in the eave walls.) The horizontal transfer of loads is a principal element in English framing logic. The upper faces of the bents are the sides from which the carpenters lay out the frame and join the timbers. Despite the varying dimensions of the beams and posts, English carpenters joined them flush for framing accuracy and placed these upper faces toward the most important spaces in the building.

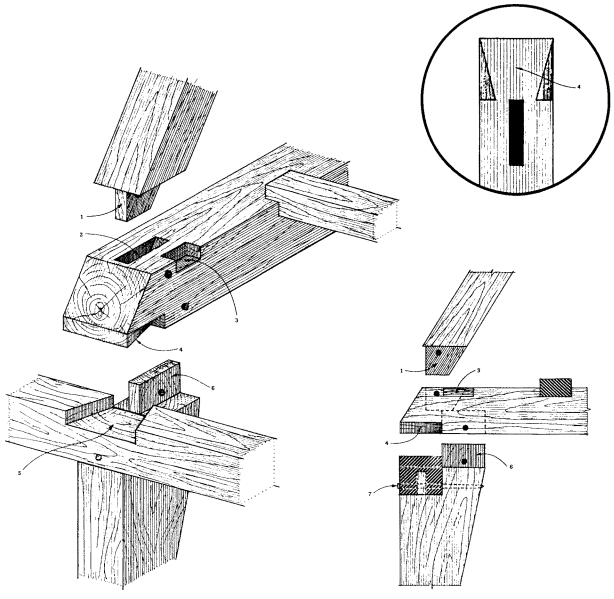


Fig. 6. Seventeenth-century Anglo-American lap-dovetail joinery. Fairbanks house, Dedham, Mass., ca. 1637. From Abbott Lowell Cummings, *The Framed Houses of Massachusetts Bay, 1625–1725* (Cambridge, Mass.: Harvard University Press, Belknap Press, 1979), p. 53.

While there are some variables, the key elements form the logic of the frame because they control the interconnections that transform the individual pieces into a three-dimensional structure. Since they do not "predetermine the design of the building, they [can] be applied to . . . anything from the humblest cottage or barn to a manor house or palace." The logic behind this framing system is readily visible in early American buildings framed by English carpenters.[14]

The Structural Logic of Dutch American Framing

Dutch American timber framing displays an underlying structural logic that developed within the framing tradition of the Netherlands.[15] It, too,

[14] Harris, *Timber Frame Buildings*, p. 21. See Cummings, *Framed Houses*, pp. 63, 86; and Kelly, *Early Architecture*, pp. 23, 42. In later Anglo-American framing, carpenters avoided the complicated lap-dovetail joint by lowering tie beams below the plate level to allow separate plate/post and tie-beam/post joints.

[15] This description does not attempt to identify fully the structural logic in the European source areas, which can be

is based on three key elements: the anchor bent, the anchor-bent joint, and the close spacing of bents. The anchor bent, the basic two-dimensional component, is assembled in an H-shape configuration. It carries the main forces generated by the weight of the materials (dead loading), the use of the building (live loading), and external pressure in the transverse plane (wind loading). It also begins to define the major space within the building and determines, in part, the one-and-one-half-story form. Carpenters could expand the buildings vertically by raising the posts 4 feet or so, but longer posts were more likely to bend, given the pressures exerted by the roof. Some carpenters built two-story structures by employing two-story posts with a second tie beam at the top, but this variation on the basic form had limited use because of its inherent instability. Most carpenters expanded the buildings in the transverse direction by adding a side aisle (or aisles, in the case of most barns) to the anchor bent or by lengthening the anchor beams to widen the span.

The anchor-bent joint, between the vertical post and the horizontal anchor beam, is the primary connector in the building. This two-dimensional joint transfers the floor loads to the posts and, more important, stiffens the frame against racking, or going out of plumb in the transverse direction. The structure determined which variation of the joint the carpenter chose: a simple mortise and tenon, or reinforced with diagonal braces (corbels), knees, or protruding tongues. All were designed to bear the stresses inherent in the anchor-bent frame; the last was nearly always present in Dutch barns (because the size of the building put increased tension on the anchor-beam joint) and was also used on some houses in the Netherlands, Belgium, France, and Quebec, Canada (figs. 7, 8).

The close repetition of anchor bents creates three-dimensional space and transfers the loads from the upper stories and roof directly to the ground (unlike the box frame in which loads are transferred longitudinally through girts or summer beams perpendicular to the bents). In the purest form, carpenters lined up the rafters with the anchor bents. Buildings were expanded longitudinally by the addition of anchor bents. In contrast to the Anglo-American houses, in which individual bays 12 to 16 feet wide typically define rooms, the width of rooms within a Dutch American house is dependent on the number of anchor bents.

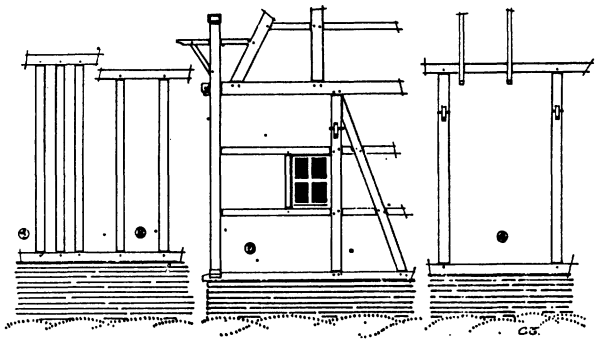


Fig. 7. Flemish timber framing details. *Left*: colombage framing in Normandy and West Flanders; *center*: anchor-bent and panel framing in East Flanders; *right*: anchor-bent framing in Flanders. From H. Meijburg, *Onze oude boerenhiuzen* (Brussels, 1920).

With the three basic elements, Dutch American carpenters could design and frame different types and sizes of domestic structures—one-room cottages, multiroom houses, and barns. Yet while houses and barns displayed the same structural logic, they required somewhat different execution because of their size and utility. In the early houses and in barns built during all three periods, the framing members expressed the structural aesthetics of the building, and the carpenters employed various techniques, from rough planing to beaded and chamfered edges, for visual effect. As architectural tastes evolved, houses were subjected to more changes than barns. The increased availability of mill-sawn timbers of smaller scantling made framing more expedient but less attractive. With the concurrent shift in aesthetics toward plastered surfaces and applied rather than structural ornamentation, fewer framing elements remained visible. During the eighteenth century, posts that carpenters would have left exposed in the earlier period were hidden behind wall finishes; however, the display of floor joists persisted in many houses as an expression of Dutch American building into the nineteenth century. Eventually, the covering of the interior framing diluted the structural logic because it diminished the value placed on the size, dressing, and spacing of the components.

quite elaborate due to the mixing of traditions. It identifies essential aspects of Dutch framing logic which characterize seventeenth-century practices both in the Netherlands and in New Netherland. The two traditions evolved somewhat differently in the eighteenth and nineteenth centuries, the former adhering to its origins, and the latter diverging under new influences. In Dutch American barns, because of their larger size, the separation between the bents is wide enough to form bays, a major distinction between these and houses; however, barns lack girts to transfer the major loads horizontally between bents, and the space is not divided according to the separation of the bents, as in English framing.

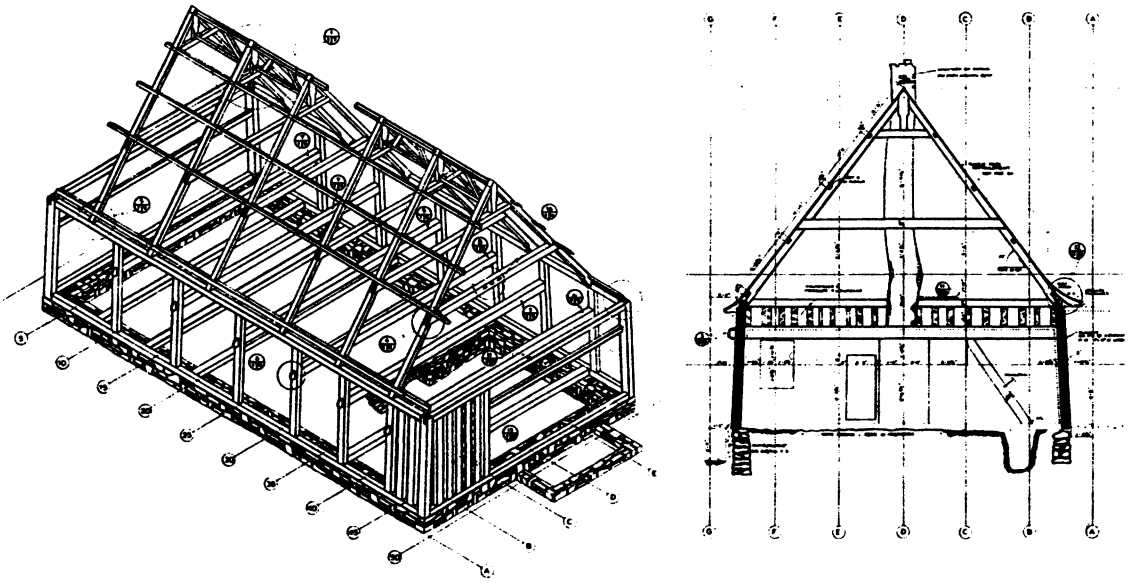


Fig. 8. French Canadian timber framing: colombage and anchor-bent framing. Pichet house, Sainte-Famille, Ile d'Orleans, Quebec, eighteenth century. From John Rempel, *Building with Wood and Other Aspects of Nineteenth-Century Building in Central Canada* (Toronto: Toronto University Press, 1980), pp. 142–43.

In large part the hallmark of Dutch American framing logic is its simplicity. The Dutch have long been associated with thrift in the Netherlands, and their dwelling and building traditions reflected this. In the early period the Dutch American colonists used first-floor spaces for both living and sleeping, so they required only small, simple dwellings. The simplicity of the framing logic had another implication as well: it limited the forms and sizes of their buildings.[16]

Construction of Dutch American houses was not a particularly difficult task, which was important in New Netherland because labor was scarce and expensive. Carpenters could lay out a full-size template for anchor-bent-and-rafter sections and then make as many of these as needed. Since there were no elaborate three-dimensional joints to fashion, builders needed to have only a limited repertoire of simple joints for the entire project. The simplicity of the construction is borne out by the early building contracts, which usually specified the size of the building but limited framing information to comments such as "the end bents with corbels."[17]

Secondary principles determined the number and spacing of anchor bents. Typically houses usually had an odd number of bents, with five or seven common in small houses. The origins of this may lie in the shortage of timber during the Middle Ages, which had prompted some regulations that limited people to gathering only enough timber for a five-frame house. New Netherland had no scarcity of timber, yet settlers continued to consider five-bent house and barn frames appropriate.[18] The spacing between bents in Dutch American houses usually ranged between 3½ feet and

[16] Some Anglo-American one-and-one-half-story houses were built with one-story box frames. The second-floor joists sat on top of the wall plate, and the upper half story was formed by knee walls recessed from the first-story wall plane. See Henry Chandlee Forman, *Tidewater Maryland Architecture and Gardens* (New York: Architectural Book Publishing Co., 1956), pp. 73, 78; and H. Chandlee Forman, *The Virginia Eastern Shore and Its British Origins: History, Gardens and Antiquities* (Easton, Md.: Eastern Shore Publishers' Associates, 1975), pp. 69, 239.

[17] Early box-frame construction techniques were considerably more elaborate. For framing techniques in the Netherlands, see L. A. van Prooije, *De Vakleu en et vak* (Arnhem: Stichting Historisch Boerderij-onderzoek, 1984), pp. 36–46. Arnold J. F. van Laer, trans., *New York Historical Manuscripts: Dutch*, ed. Kenneth Scott and Kenn Stryker-Rodda, vol. 2, *Register of the Provincial Secretary, 1642–1647* (Baltimore: Genealogical Publishing Co., 1974), p. 13; for other contracts, see pp. 15, 16, 33, 35, 91, 147. For Anglo-American framing contracts and techniques, see Cummings, *Framed Houses*, pp. 52–94. A ca. 1637 description of a box-frame house in Massachusetts states that the girts "must not be pinned on, but rather eyther lett in to the studds or borne vp with false studds and soe tenented at the ends" (*Winthrop Papers*, 4th ser., vol. 7, Collection of the Massachusetts Historical Society [Boston: For the society, 1865], pp. 118–20).

[18] In the Netherlands, even numbers of bents were not uncommon (Prudon, "Dutch Barn," p. 131). Fitchen, *New World Barn*, p. 42. Fitchen also illustrates barns with more bents.

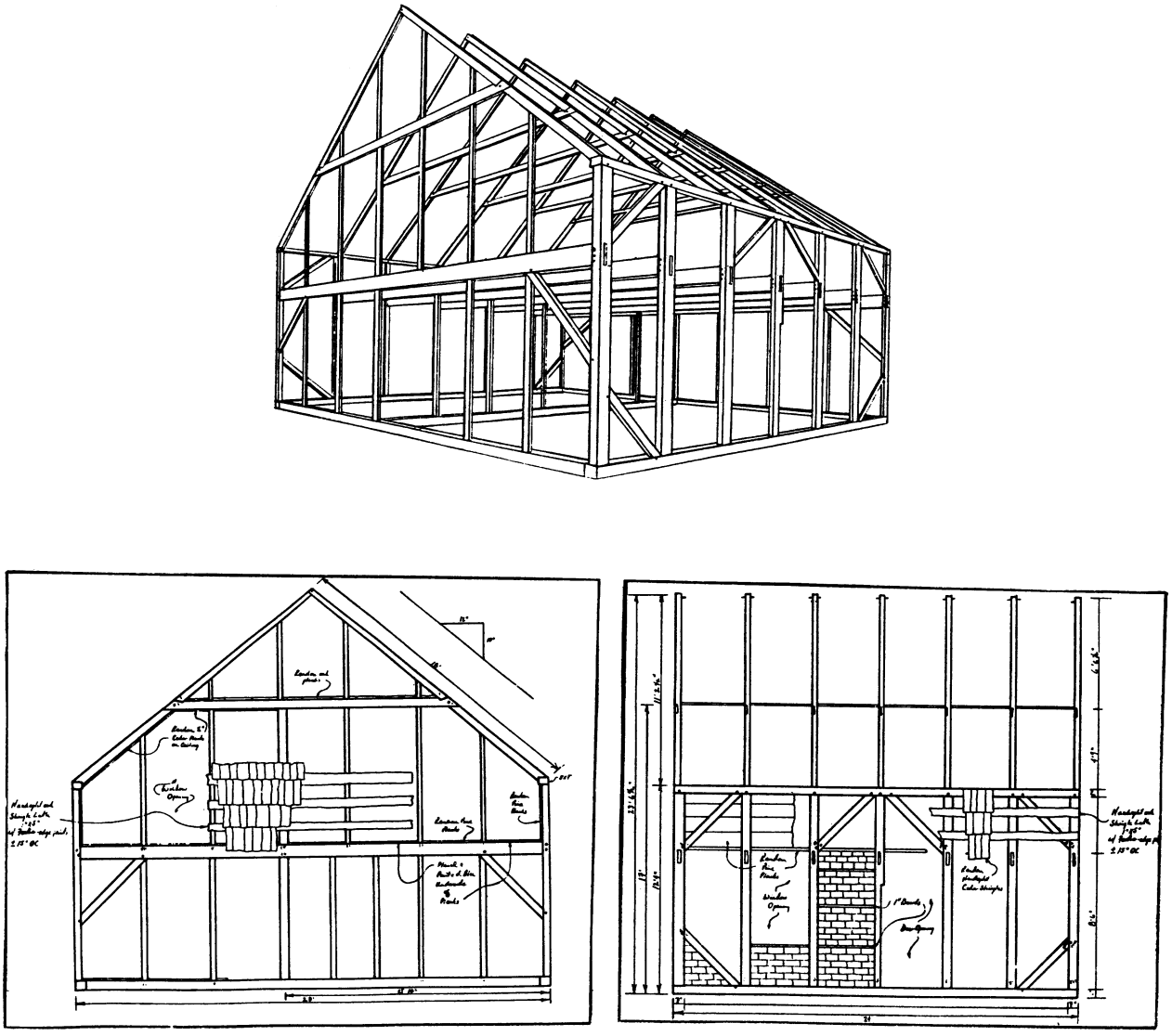


Fig. 9. Dutch American anchor-bent framing: seven anchor bents 4 feet on center, with one front room and two rear rooms. Hand house, Dutch Neck, Mercer Co., N.J., ca. 1740; demolished 1978. (Drawing, C. W. Zink.)

5½ feet. Five-bent houses were commonly 15 feet wide with roughly 3½ feet between bents, 18 feet wide with 4½-foot spacing, and 22 feet wide with 5-foot spacing; seven-bent houses were typically 22 feet wide with 3½-foot spacing or 24 feet wide with 4-foot spacing (fig. 9). There were, however, exceptions to these rules. The Jan Martense Schenck house, erected in Brooklyn, had twelve bents, and later houses had more bents to accommodate the addition of hall passageways to the plans. Many of the surviving Dutch American barns have either four- or five-bent frames, with the space between them varying between 10 and 14 feet, although some barns had six, seven, and nine bents.[19]

Secondary principles also guided the use of other joints: half dovetails at collar-beam-rafter intersections to resist tension and compression; gains for attaching smaller secondary members to larger ones; and notches on plates to keep rafters from sliding.[20] Convention determined the size and position of timbers within the frame. Anchor beams were always rectangular and placed vertically, and the height-to-width ratio varied roughly between 1⅓ to 1 and 2 to 1. The vertical orientation provided the greatest resistance to deflection, and the proportions maximized timber's weight-to-strength ratio. First-floor joists were often placed horizontally, had widely varying dimensions, and were po-

[19] Fitchen, *New World Barn*, pp. 115, 118.

[20] Fitchen, *New World Barn*, p. 124.

sitioned closer together than second-floor joists. They were seldom lined up with the anchor bents, eliminating the need for three-dimensional joints. Posts within the walls were rectangular, and the wider side was placed perpendicular to the anchor beams to strengthen the mortise joints.

The built-in limitations of the system prevented carpenters from using it in structures that had complex functions or aesthetics. Unlike the Anglo-American carpenter, whose box frame was readily adaptable to the two-story, center-hall, Georgian house in the eighteenth century, the Dutch American carpenter had to integrate his structural logic with a design that required different framing techniques. While we often think of traditional carpenters as conservative in their building practices, the evolution of Dutch American framing illustrates the Dutch carpenters' ability to adapt their structural logic to meet changing demands.[21]

In their earliest form, the primary and secondary principles of Dutch American structural logic derived directly from the timber-framing traditions carpenters had learned in the Netherlands, although not all the regional variations in Dutch techniques were transported to the New World. To comprehend the structural logic employed by Dutch American carpenters, we must briefly examine these antecedents.

Dutch American Framing Origins in the Lowlands

The Lowlands encompasses distinct regions of the Netherlands, Germany, and France, and within these are areas in which the varying building practices intermingled, just like the population, such as in Flanders. Lowlands timber framing is a broad topic, and in this essay we can only identify some of the principal sources for Dutch American house framing.

In northwestern Europe, timber-framing techniques derived from the prehistoric hall house built with stakes driven into the ground and covered with a simple A-shape roof (fig. 10). Later houses had horizontal ties that opened up the center area and created a loft for storage. Nave-only and nave-and-two-aisle types emerged simultaneously, with a nave-and-one-aisle type evolving from the latter. All three relied on the anchor bent as the basic structural component.[22]

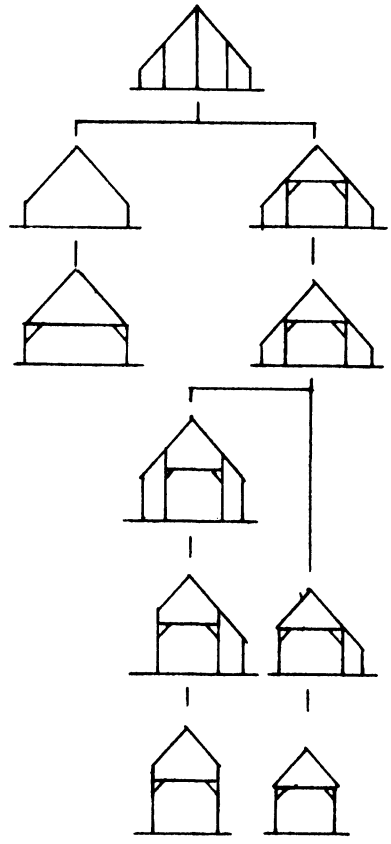


Fig. 10. Development of anchor-bent framing in northwestern Europe from prehistoric times to the eighteenth century. (Drawing, C. W. Zink after M. Emerick after Henk Zantkuyl, in Theo Prudon, "The Dutch Barn: Survival of a Medieval Tradition," *New York Folklore Quarterly* 2, no. 4 [December 1976]: 124.)

Environmental conditions in the Lowlands affected the development of the building types. The region had limited forests, strong winds, frequent rain, a high water table, and soft soils, all of which encouraged low-profile buildings that used timber conservatively, minimized the effect of the wind, and spread loads evenly along the walls. Builders came to favor the one-and-one-half-story anchor-bent frame with side aisles and with a roof extending close to the ground. This frame had advantages over other types of construction: houses with masonry load-bearing walls required pile foundations on soft soils; box-frame houses with widely spaced posts likewise concentrated loads; and colombage framing had more closely spaced studs that required more timber (see fig. 7).[23]

[21] Prudon, "Dutch Barn," p. 123.

[22] Karl Baumgarten, "Some Notes on the History of the German Hall House," *Vernacular Architecture* 7 (1976): 15–20; and Prudon, "Dutch Barn," pp. 123–26.

[23] See Fitchen, *New World Barn*, pp. 40–41. Comments regarding the Dutch house in the landscape developed from Piet van Wijk, conversation with Clifford W. Zink, March 14, 1985. Van Wijk is a cultural geographer on the staff of the Stichting

The damp climate prompted Lowlands carpenters to build structures that would enable farmers to store grain in the loft, thus a single roof sheltered food, humans, and livestock, as warmth from the inhabitants, livestock, and open hearth slowly dried the grain. Over time the barn and dwelling areas were moved to opposite ends of the building. In the barn portion the nave provided a wide threshing floor, large overhead grain-storage areas required heavier timbers, and the side aisles became stables for the animals (fig. 11). In the dwelling portion the nave served as the living area, the aisles were used for bedsteads (built-in bed cabinets), and the loft for storage. The aisle dimensions became closely linked with the sizes of the bedsteads. The open central hearth was replaced, first with hoods made of timber and eventually with masonry jambless fireplaces that were relocated to the gable end for stability. The tall jambless fireplace allowed more air to reach the slow-burning peat, the principal fuel, which projected warmth throughout the rooms. Detached nave-and-two-aisle houses grew out of the dwelling portion of the hall house, and then by eliminating one aisle, householders could add windows along the side that faced the sun, yet still maintain the protective low profile on the north (figs. 12, 13, 14). This prompted the relocation of the entrance from the gable end to the longitudinal window side and fostered the construction of longer houses with side-by-side rooms that took advantage of the light.[24]

Scholars have identified five types of traditional farm buildings in the Netherlands, four of which relate to Dutch American buildings. The first two of these, the "Frisian barn" and the "aisled house" (or loshoes), derived from the early hall house. During the medieval period the dwelling area remained closely integrated with the stable and crop-storage areas. Although still attached, the dwelling portion of later houses became more discernible as a distinct section.

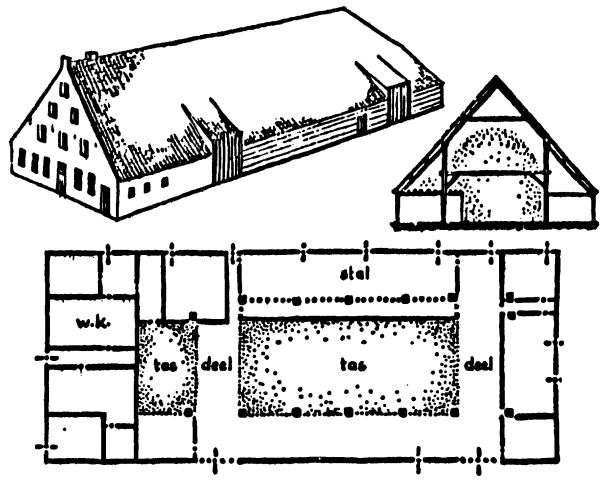


Fig. 11. Netherlands farmhouse, combining barn and dwelling, with nave-and-two-aisle anchor-bent framing. From R. C. Hekker, "De Ontwikkeling van de boerderijvormen," in *Duizend jaar bouwen in Nederland*, vol. 2, *De Boukunst na da middeleeuwen*, ed. S. J. Fockema Andreae (Amsterdam: Albert De Lange, 1957).

The second two types relevant to Dutch American houses are the "Zeeland barn group" and the "Flemish barn group," both of which developed in the sixteenth century, first as houses attached to barns and later as separate buildings. The Zeeland group mixed elements from Frisian and western Flemish houses. They were rectangular buildings with the gable on the shorter side and a cross passage similar to those in houses in the Hudson valley. The Flemish group, influenced by the Flemish preference for side threshing floors, developed as a rectangular building with the gable on the longer side, a large living area in the front, and smaller rooms in the rear. This type relates to houses in Brooklyn, Staten Island, and New Jersey.[25]

Because of the proximity of Flanders, these last two types also relate to Flemish houses. Flanders, in western Belgium, was influenced by both France and the Netherlands yet developed its own building types. Flemish builders often employed a combination of anchor-bent framing and elaborate roof trusses and, instead of the more typical Dutch practice of infilling between anchor bents with wattle and daub or bricks, used either colombage framing or fachwerk framing. Colonists transferred some of these traditions to the New World: Huguenots in the Hudson valley relied on roof trusses; French Canadians on both elaborate roof

Historisch Boerderij-onderzoek in Arnhem, an association that has been studying, recording, and restoring farm buildings at its open-air museum since 1912.

[24] The nave-and-two-aisle barn portions of barn dwellings in certain Lowlands areas, such as Zeeland, in the southeastern Netherlands, are antecedents of Dutch American barns because of their framing and use. There is also a "Flemish barn group" in the southeastern Netherlands, with asymmetrical anchor bents and sometimes double rooms between the anchor-bent posts, that relates to barns built in New Jersey, as discussed below. See R. C. Hekker, "Historical Types of Farms—Plate X-1," in *Atlas of the Netherlands* (Delft: Topographic Service, 1973). Henk Zantkuyl, at the Monumentenzorg in Amsterdam, believes that the spacing of anchor bents in Netherlands houses was originally tied to the appropriate width for a bedstead (Zantkuyl, conversation with Zink, March 11, 1985).

[25] Hekker, "Historical Farms."

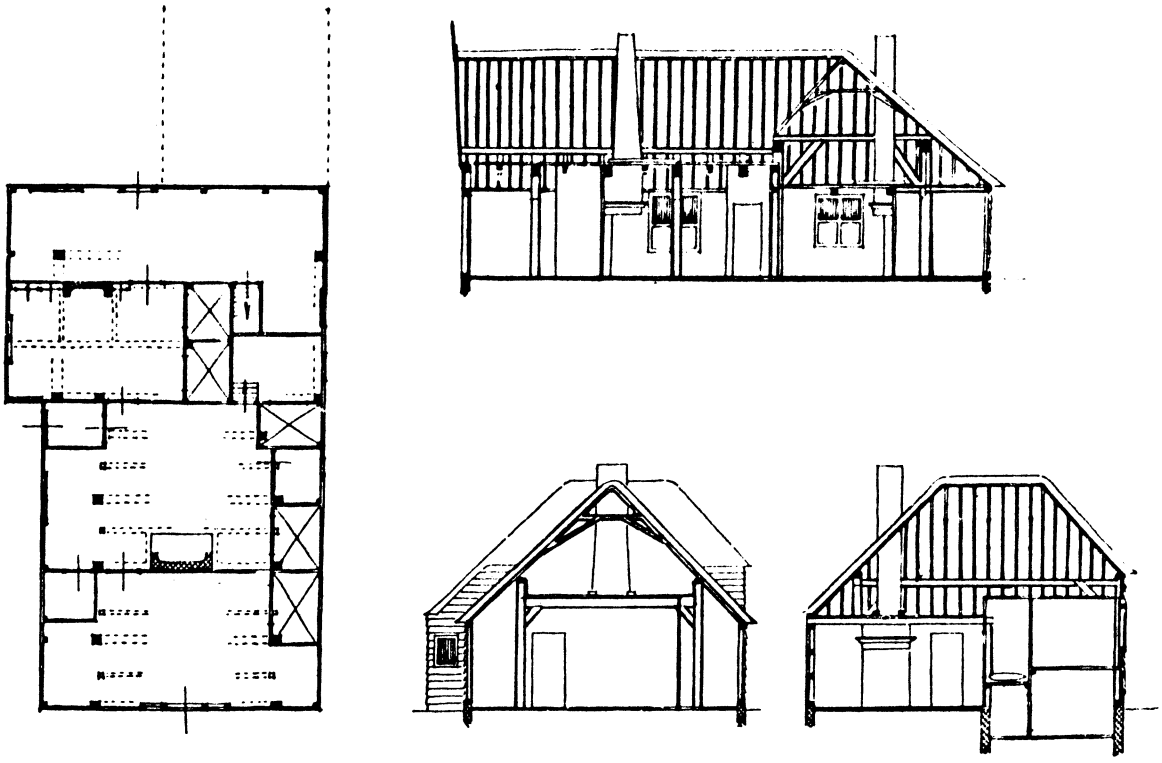


Fig. 12. Netherlands nave-and-two-aisle anchor-bent house with bedsteads in the aisles (boxed Xs). Broek in Waterland, Leeteinde 1672. From R. Meischke and Henk Zantkuyl, *Het Nederlandse woonhuis van 1300–1800* (Haarlem: H. D. Tjeenk Willink, 1969), p. 365.

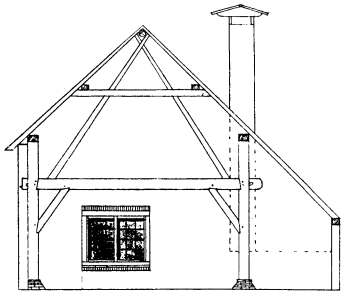


Fig. 13. Netherlands nave-and-single-aisle anchor-bent house. From R. C. Hekker, *Nederlandische boerderei in het begin der 19e eeuw* (Arnhem: Stichting Historisch Boerderij-onderzoek, 1967), p. 82.

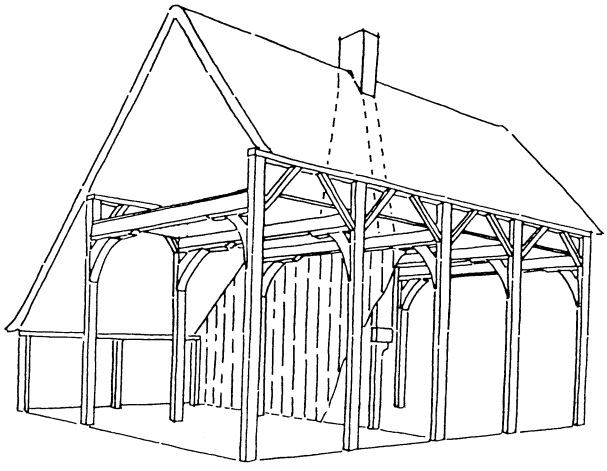


Fig. 14. Early seventeenth-century Netherlands anchor-bent framing: nave-and-single-aisle construction. (Drawing, Henk Zantkuyl.)

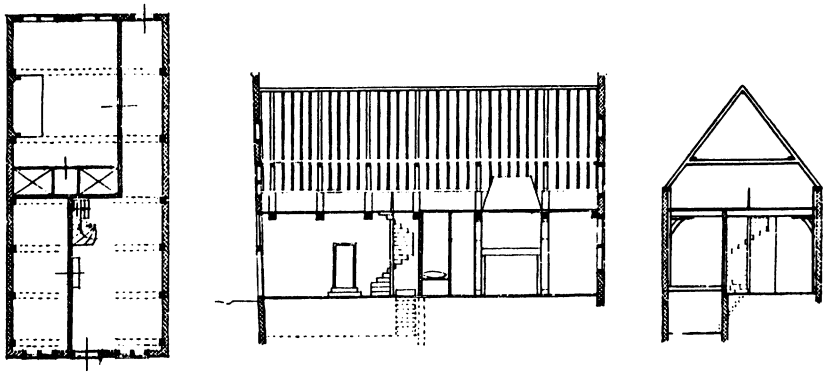


Fig. 15. Netherlands house with anchor-bent framing and brick cladding: two rooms wide within the anchor bents. Edam, Spui, ca. 1600. From R. Meischke and Henk Zantkuyl, *Het Nederlandse woonhuis van 1300–1800* (Haarlem: H. D. Tjeenk Willink, 1969).

trusses and colombage. The long, narrow, Flemish barns that lacked side aisles were built by French Canadians, but not by Dutch settlers in New Netherland.[26]

Flemish houses have several characteristics that are found on Dutch American houses. The Flemish often added overhangs to protect the soft stucco on exterior walls, and the overhangs provided some shelter for inhabitants and animals. The framing for these overhangs was not part of the rafter-and-wall system, but was added. Waterman identified this "Flemish flying gutter" as the prototype for the curving, or spring, eave employed by Dutch and French Canadian settlers in America. In farmhouses with nave-and-single-aisle construction in parts of Flanders and Zeeland, builders extended the aisles to create full rear rooms for sleeping or storage, instead of the Dutch-style bedsteads. Waterman identified a floor plan of one large front room and two small rear rooms as typical of early Dutch American houses in certain regions, and Wertenbaker cited a "Flemish cottage" floor plan, with two main rooms in the front and three smaller rooms in the rear aisle.[27]

While there were numerous variations on the basic building types, and others with pyramidal roofs, carpenters in the rural Netherlands never built timber-frame houses as elaborate as those in Germany, Belgium, Normandy, or England. In those regions carpenters developed such framing systems, often with intricately carved half-timber panels, partially in response to a demand for larger buildings with upper stories.[28]

In urban settings builders of Dutch timber-frame town houses applied, with some variations, the basic structural logic of anchor-bent-framed rural houses. The high demand for land and the limited street frontage led to long, narrow lots and the construction of unaisled houses with the main facades in the gable ends facing the street. Early town houses consisted of single-story, one-room buildings. Bedsteads were located along side walls (fig. 12), and hearths were located in the middle of the houses, along side walls, or occasionally at the rear (see also figs. 14, 15). Carpenters expanded houses lengthwise simply by adding anchor bents and widened them by lengthening the anchor beams to create two full rooms between the posts. In these one-story houses the posts stopped at the top of the anchor beam, and large, decoratively carved corbels made the connections rigid. For additional space in the garret, builders placed upper crucks (timbers) above the anchor beam or extended the posts to the one-and-one-half-story level in a typical H-frame pattern. For houses two or more stories tall, they piggybacked the bents (figs. 16, 17).[29]

[26] See Lessard and Villandré, *La maison traditionnelle*, pp. 212, 214. English settlers framed some early buildings with close studding, which was a common technique in England (Cummings, *Framed Houses*, pp. 70–71, 126–27). For Flemish-style barns in Quebec, see Arthur and Witney, *Barn*, pp. 115–39; for reasons that Flemish settlers in New Netherland built Dutch barns, see Wertenbaker, *Founding of Civilization*, p. 76.

[27] Waterman, *Dwellings*, pp. 204, 71; Wertenbaker, *Founding of Civilization*, pp. 73–74, 71.

[28] See Harris, *Timber Frame Buildings*, pp. 10, 26; Jacques Fréal, *L'Architecture paysanne en France: La maison* (Paris: Serg, 1977), pp. 194–214; Clemens Tréfois, *Van vakverk tot baksteen bouw* (Sint-Niklaas: Uitgeverij Danthe N.V., 1979), pp. 103–14; and Walter Sage, *Deutsche Fachwerkbauten* (Königstein im Taunis: K. R. Langewiesche Nachfolger Hans Köster, 1976).

[29] Wertenbaker, *Founding of Civilization*, pp. 42, 49–50. For the development of Dutch town houses, including a rare summary in English of Dutch research, see R. Meischke and Henk Zantkuyl, *Het Nederlandse woonhuis van 1300–1800* (Haarlem: H. D. Tjeenk Willink, 1969), pp. 524–32.

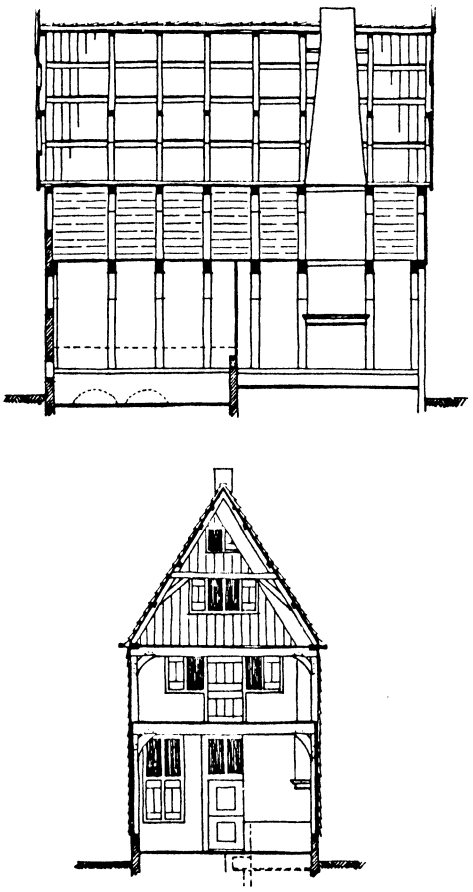


Fig. 16. Netherlands two story anchor-bent framing with clapboards. De Rijp, North Holland, ca. 1650. (Drawing, Henk Zantkuyl.)

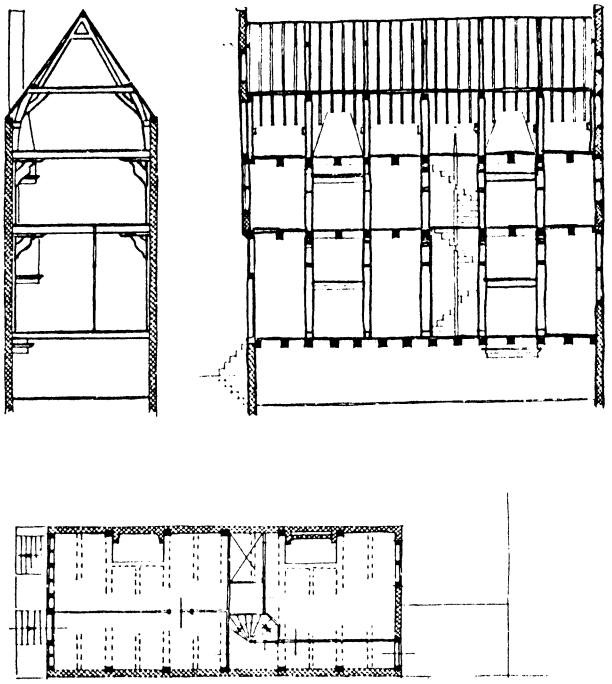


Fig. 17. Netherlands two-story anchor-bent framing with brick cladding. Amsterdam, Prins Hendrikkade, 1614. From R. Meischke and Henk Zantkuyl, *Het Nederlandse woonhuis van 1300–1800* (Haarlem: H. D. Tjeenk Willink, 1969), p. 101.

As early as the sixteenth century, to reduce the risks of fire, towns adopted regulations requiring that timber buildings be covered with thin outer walls of brick. These brick-veneer walls, which were not load bearing, might be applied to one, two, or all four sides of town houses. Builders also began constructing masonry houses with full interior timber framing or with corbels supporting the second-floor joists. Thus timber houses with brick veneer and brick houses with timber frames became visually indistinguishable from one another. Since timber framing provided the structural support for the early masonry houses, its structural logic continued to determine much of their design, including room dimensions and spacing. In villages like Broek in Waterland, timber houses were often separated from each other on larger lots which had the effect of reducing fire hazards.[30]

After 1650 new fashions led to covering of the interior timber structure with boards and, in the next century, plaster. As floor plans became more formal, bedsteads and stairways were removed from the main rooms, fireplaces were made smaller, and secondary rooms were transformed into additional primary rooms. These changes eliminated the visual importance of timber framing and encouraged new building technologies, although traditional framing continued in rural building well into the 1800s. Similar changes occurred in the New World.

New Netherland Timber Framing

The construction of Dutch American houses can be divided into three major periods. The first includes the Dutch colonial era (1624–64) and the years immediately after, while influence from the Netherlands was strongest. Settlers modeled their town houses and farmhouses on antecedents from the Lowlands, building simplified versions for expediency. The enduring impact of these prototypes confirms what cultural geographer Fred Kniffen has termed the theory of initial occupancy: the first imprint of a culture on a new landscape is long lasting and survives even after a new

[30] Meischke and Zantkuyl, *Het Nederlandse woonhuis*, pp. 530–31.

ethnic stock has succeeded the original settlers. According to Kniffen the imprint provides a base reference for all subsequent adaptation, and his theory is supported by seventeenth-century contracts that make reference to details or techniques used in previously built structures. In this first period, timber frames were highly visible interior elements and included large floor joists, wall posts, and corbels. Jambless fireplaces, nailing-plate hinges, and divided-light casement windows were common in New Netherland houses; however, many standard decorative features of Dutch houses, such as baroque gables and elaborately molded corbels, were not used in the colony. Thus in the initial transfer of Dutch culture, simplified versions of the essential architectural elements became the details of the colonial prototypes.[31]

The second period extends from the third quarter of the seventeenth century to the middle of the eighteenth century. Builders developed what have commonly become known as Dutch American house types and came under the influence of English building practices. While adhering to basic Dutch traditions, carpenters developed variations peculiar to the New Netherland area, such as the gambrel roof with a spring eave. They also began constructing symmetrical facades, but often kept the interior plans asymmetrical. They built fireplaces with side jambs and sometimes located them in corners. Carpenters came to rely on smaller timbers, placed bents closer together, and abandoned the practice of leaving wall posts visible. The persistence of the one-and-one-half-story form and exposed anchor beams are strong indications that, despite many changes in the appearance of houses, Dutch structural logic remained largely intact.

The third period extends from the middle of the eighteenth century through the first quarter of the nineteenth century. Strongly influenced by Georgian and federal styles as disseminated through pattern books, Dutch Americans built houses with symmetrical plans and plaster ceilings. Their carpenters developed hybrid frames, combining anchor-bent and box-framing practices, to construct large houses with gambrel roofs and center-hall plans. Toward the end of the period, Dutch building traditions slowly disappeared in house construction but continued to influence the framing of barns and outbuildings since these were less subject to changing architectural styles. As in the hybridization of house framing, carpenters in central New Jersey built hybrid barns combining Dutch and English techniques.

Since none of the earliest buildings from the first period survive, documentary sources provide the best evidence of their construction. These include pictorial images such as maps and views, travelers' descriptions, and legal manuscripts. The "Prototype" view of New Amsterdam, redrawn and printed in Amsterdam from sketches made on the site (see fig. 1), and the "Dankearts" or "Labadist" view, drawn in New Amsterdam, both dating from the 1660s, provide the earliest visual details of houses. In appearance the New Amsterdam houses are typical of those in small Dutch towns in that period: long, narrow structures with gables facing the streets, one-and-one-half stories high, although some may be two stories high. There is a mixture of timber buildings—characterized by clapboard gable ends and roofs without parapets—and brick buildings—characterized by stepped gables and brick arches.[32]

Following Dutch practice many New Netherland "brick" houses were actually timber-frame buildings with brick fronts. Official records in 1649 specify, "the houses in New Amsterdam are for the most part built of wood and thatched with reed, besides which the chimnies of some of the houses are of wood." Local governments adopted numerous fire regulations, including the abolition of thatched roofs and wooden chimneys, and began requiring brick facades on timber buildings. A 1661 contract of sale for an existing house specified, "the seller to be holden in the months of September and October next at his own expense to face the house on all sides . . . with brick." In 1676 the government in Albany regulated house size and material: "All new buildings fronting in the street shall be substantial dwelling houses, not less than two rooms deep and not less than eighteen

[31] Fred Kniffen, "Folk Housing: Key to Diffusion," *Annals of the Association of American Geographers* 55, no. 4 (December 1955): 551. For Dutch American windows, see Regina Kellerman, "The Stadt Huis of Nieuw Amsterdam" (Ph.D. diss., Pennsylvania State University, 1983). William McMillen, supervisor of restoration at Richmondtown, Staten Island Historical Society, has also done considerable research on this subject.

[32] For early views and maps, see I. N. Phelps Stokes, *The Iconography of Manhatten Island, 1498–1909*, vols. 1–2 (New York: Robert H. Dodd, 1915–16). Some recent interpretations of architecture have relied heavily on these documents. For a drawing with specific window and gable details, see Gary Schwartz, trans., *The Birth of New York: Nieuw Amsterdam, 1624–1664*, ed. Roelof van Gelder (Amsterdam: Amsterdam Historical Museum, 1982), p. 42. The Museum of the City of New York has built a model of New Amsterdam, ca. 1661, as part of a permanent display. For information about brick construction in the colony of New Amsterdam, see Kellerman, "Stadt Huis," pp. 27–34.

Fig. 18. Eighteenth-century Dutch American timber house with brick cladding. 922 Broadway, Albany, N.Y. (Historic American Buildings Survey, NY–378.)

feet wide, being built in the front of brick or quarry stone and covered with tiles." Travelers' descriptions from the eighteenth century, when many early houses were extant, also confirm the continued use of masonry facades on timber buildings in places as widely separated as New Brunswick, New Jersey, and Albany, New York.[33]

A few brick-veneer houses survived into the twentieth century and were recorded by the Historic American Buildings Survey. Attributed by the survey to the 1730s, both the Abraham Yates house in Schenectady and the house at 922 Broadway in Albany (fig. 18) display typical characteristics held over from the seventeenth century. The former has a full brick front with mouse-tooth parapets; the latter has brick only on the first-story facade. The Jan Breese house in Rensselaer (ca. 1723), has a timber frame that was clad with brick on three sides and infilled with brick on the fourth side, which may have had an addition attached to it (fig. 19). The expected period of survival for many timber houses was usually forty years or less; by the 1790s William Strickland wrote, "the old ones, built originally in the Dutch style are falling fast to pieces, as is always the case with wooden houses towards the end of twenty years, if the proprietors have not the means, or the inclination to keep them in repair."[34]

Building contracts contain much information about early buildings, and the majority of contracts are for timber buildings. Most specify the dimensions of the house or barn, and some refer to previous contracts for additional details. While they do not provide explicit instructions about framing procedures, their legal descriptions of the buildings indicate the persistence of Dutch structural logic. For example, several enumerate the number of anchor bents and corbels and refer to side aisles.[35] They also demonstrate that some early set-

[33] For a discussion of fire regulations, see Stokes, *Iconography*, 2:211. Piwonka and Barry, "Study of Architecture," p. 43; Jonathan Pearson, trans., *Early Records of the City and County of Albany and the Colony Rensselaerswyck*, rev. and ed. A. J. F. van Laer, vol. 3 (Albany: University of the State of New York, 1918), pp. 85–86.

[34] Adolph B. Benson, ed., *The America of 1750: Peter Kalm's Travels in North America, the English Version of 1770*, vol. 1 (1937; reprint, New York: Dover Publications, 1966), pp. 611–12. For the Yates house, see HABS NY–378; and Alice P. Kenney, "Neglected Heritage: Hudson River Valley Dutch Material Culture," *Winterthur Portfolio* 20, no. 1 (Spring 1985): 60. William Strickland, *Journal of a Tour in the United States of America, 1794–1795*, ed. J. E. Strickland (New York: New-York Historical Society, 1971), p. 135.

[35] Nearly three-quarters of the houses in Bailey's *Pre-Revolutionary Houses* are masonry, but many timber houses, such as those in central New Jersey, were left out because of their modest size. Surveys in Dutchess and Columbia counties indicate that many more Dutch timber houses survive than has been commonly recognized (Goat, "Historical Survey"). For New Amsterdam, see van Laer, *New York Manuscripts*; for Fort Orange, see Pearson, *Early Records*. For New Jersey, see N.J. HABS; and Elizabeth G. C. Menzies, *Millstone Valley* (New Brunswick, N.J.: Rutgers University, 1971), pp. 121–22, 132, 140–41. Piwonka and Barry, "Study of Architecture," p. 40.

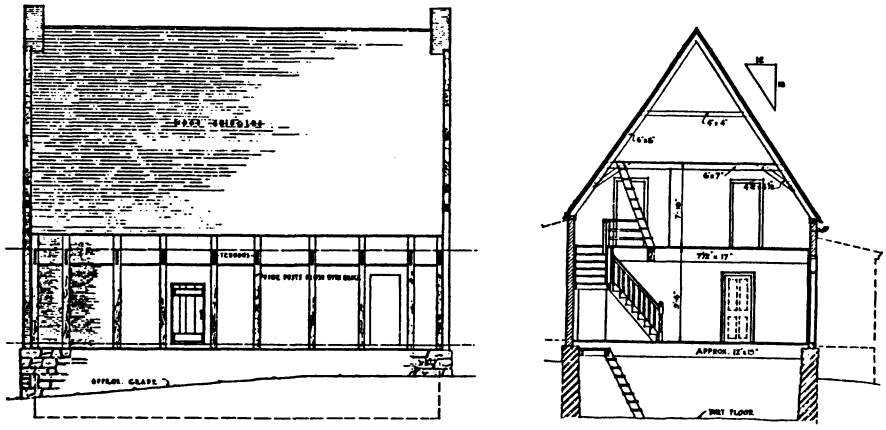


Fig. 19. Eighteenth-century timber frame with brick cladding on front and side walls. Jan Breese house, Rensselaer Co., N.Y. (Historic American Buildings Survey, NY–5A-2.)

tlers combined barn and dwelling, unmistakably in the Netherlands style. In 1641, two Dutch carpenters promised:

> to undertake together to make and build a farmhouse . . . to be ninety feet long and twenty-four feet wide inside the posts; the house to consist of ten bents, which are to be set nine feet apart, the beams of the bents to be twenty-four feet long, nine inches thick and fourteen inches high; twelve and one-half feet story under the beams and two side aisles (*uytlaten*) as long as the house, one being nine feet wide and the other ten feet wide, with three doors in each aisle, one door at each end and one door in the middle of each side aisle; at the end of the building a large, wide door, consisting of two upper and two lower doors. . . . The house shall be provided with attic joists . . . above with two lights . . . [and] on one side of the doorway a stairway is to be made straight [up to the garret] with a door all properly finished; the other gable truncated.

A contract drawn up in the following year specified a similar building 100 feet long, with side aisles for the 50-foot length of the barn portion and a double chimney in the 50-foot-long house portion.[36] Beyond the legal references, there is little evidence of how many of these structures were built; none have survived.

Some settlers erected separate barns, and a contract from 1675 confirms the continued reliance on Dutch framing methods. It specifies a "barn fifty feet long and twenty-six feet wide with an extension on each side ten feet deep and running the full length of the barn, and at each end a gable with a sloping peak [truncated]; furthermore to make in said barn five bents with five loft beams, of which five bents three are to have brackets, a double door at the front end of the barn, and one door in each of the extensions." This barn had typical Dutch features: a central nave within anchor bents that were supported by corbels; two side aisles; wagon doors in the gable ends; and smaller doors in the aisles for tending livestock. Several contracts cited specific barns for the builders to copy. In 1678, two Rotterdam carpenters contracted to build a barn at Catskill "according to the specifications of the barn of Herman van Gansevoort at Catskill, of which [one of the carpenters] has had the contract." Such references to previous buildings confirm that builders used existing prototypes and demonstrate the theory of initial occupancy.[37]

House contracts were similarly phrased. One of 1655 in Brooklyn described a two-room plan in a nave-and-one-aisle house "thirty feet long and eighteen feet wide, with an outlet [aisle] of four feet, to place in it seven girders [anchor beams], . . . and in the recess [of the aisle] two bedsteads, one in the front room and one in the inside room, with a pantry at the end of the bedsteads." As in the Netherlands, the width of an aisle was linked to the size of the built-in bedsteads. The emphasis on anchor beams and corbels in many contracts is indicative of their importance to the Dutch settlers who sought to articulate a concept of a suitable house interior. The contracts often specify ceiling heights, and some mention rooms, stairways, and other details that in combination provide data on the floor plans. In 1642 a "house carpenter" at Fort

[36] van Laer, *New York Manuscripts*, 2:16, 91–92.

[37] Pearson, *Early Records*, 3:424–25, 462–63. For the scarcity of barn dwellings, see Wertenbaker, *Founding of Civilization*, p. 62.

Amsterdam contracted to build "a house thirty feet long, eighteen feet wide [indicating at least two rooms], eight feet story under the beams, the end beams with corbels, all hewn square; the house enclosed all around with clapboards and covered with a good thatched roof, properly made, a tight ceiling of clapboards, three four-light windows, two outer doors, a vestibule, a pantry, a bedstead, a cased-in stairway to the garret, the chimney with wood extending above the roof and a mantelpiece built around it, a passage way three feet wide, with a partition."[38]

In 1660 Jeremias van Rensselaer, director of the colony of Rensselaerswyck, wrote a letter that conveys the significance Dutch colonists placed on anchor beams. Referring to his new house, he stated, "as to the joists being too heavy, I never heard any one say so, except that one beam, which lies before the chimney, is a very thick and heavy timber. And they ought not to be much thinner, for owing to the extra width of the house all depends on the joists, which have no corbels to stiffen them . . . the chamber story also has good beams, not too heavy, and of dressed lumber, free from knots." Large knot-free timbers were readily available in the New World, and their display in both masonry and timber-frame houses (see fig. 2) carried considerable prestige for these Dutch immigrants. Indeed, the scantling of anchor beams in some Dutch American houses was extraordinarily large: the Breese house has an anchor beam which measures 7½ by 17 inches despite that the house is only 24 feet wide.[39]

Dutch American Framing Types

Using a combination of archival data, field examination, and restoration experience, we can identify seven categories of Dutch American house framing according to the design of anchor bents (table 1, fig. 20). Five of these adhere closely to the basic structural logic, while the last two are variations. In both framing and form, the types range from the simplest to the most complex, and they are generally chronological in their order of appearance, although limited evidence about the earliest houses makes it difficult to establish a tight chronology. Examples of type 1, the basic Dutch form, were built throughout all the periods. Types 2, 3, and 4, with rear-aisle extensions, were built primarily in the first and second periods. Type 5 dates primarily from the second period; type 6 from the second and third periods; and type 7 from the last.

The Schenck house, partially preserved in the Brooklyn Museum, may be the oldest surviving type 1 example (figs. 21, 22). It originally had two rooms, an entrance on the eave side, and a chimney in the middle. The house relates to a Netherlands urban type known as an unaisled double house, such as those in Zaandam, but the Netherlands versions usually had entrances on the gable end, with bedsteads and chimneys along the side walls that often abutted other houses. The availability of open space in New Netherland led colonial builders to relocate the entrance along the eave wall and, in contrast to the Schenck house, position the chimney on the gable end. The one-and-one-half-story frame of the Schenck house has twelve anchor bents with corbels, and nearly all the first-story interior framing is visible. The roof structure of tapered rafters and double collar beams is a simplified version of seventeenth-century Dutch framing that often had additional support struts between the anchor beams and the rafters. In the colony, thatch or wooden shingles required fewer framing members than did the tiles commonly used for roofing in the Netherlands.[40]

An unaisled structure was suitable for masonry or masonry-veneer houses. The Breese house (see fig. 19), the Bronck house in Coxsackie, the Van Alen house in Kinderhook, and the Mabie house slave quarters in Rotterdam, all dating from the early eighteenth century, have timber frames as the primary structure, despite their external masonry. The circa 1711 De Windt house in Tappan has masonry bearing walls yet follows the basic

[38] Waterman, *Dwellings*, p. 19; van Laer, *New York Manuscripts*, 2:13–14. Zantkuyl has been drawing timber frames based on the descriptions in New Netherland contracts such as these to determine the form and structure of the early houses (Zantkuyl, conversation with Zink, April 1985).

[39] Piwonka and Barry, "Study of Architecture," p. 49; HABS NY–5A-2, sheet 4.

[40] See Marvin D. Schwartz, *The Jan Martense Schenck House* (Brooklyn: Brooklyn Museum, 1964); and Henk Zantkuyl, "Het Jan Martense Schenckhuis te Brooklyn," *Bulletin van de koninklijke Nederlandsche oudheidkundige bond*, 6th ser., 17 (1964): 59–80. Recorded by HABS in 1934, it was reconstructed in 1964 by Dutch and American architectural historians, who differed in their interpretation of the location of bedsteads and partitions. Zantkuyl sees the house as an important representative in the development of the unaisled double house because of its anchor-bent details, the large window in the east wall, and the asymmetrical position of the fireplace, which relates to the location of bedsteads that were usually placed in the aisles in nave-and-aisle houses (Zantkuyl, conversation with Zink, March 11, 1985).

Table 1. House Framing Types

Type 1 An unaisled structure with a single room between the anchor-bent posts, although it may have enough anchor bents to be more than one room long. This, the simplest and most basic house type, was built throughout the New Netherland area, and surviving examples date from all three periods. Small barns and outbuildings were also often of this plan.

Type 2 A nave-and-single-aisle structure with basic symmetrical anchor bents and a shed-roof extension, or outlet, on the rear. The roof of the shed can have a separate pitch, or it can follow the line of the rear rafter (resembling the form of an English "saltbox" frame). In plan, this type can have one room within the anchor bents and one or two rooms in the outlet, in which case the ridge is parallel to the shorter side of the resulting rectangle. It can also have two rooms within the anchor bents and two or three rooms in the outlet, in which case the ridge is parallel to the longer side. The second-floor area above the aisle is too small for living space.

Type 3 A nave-and-single-aisle building with asymmetrical anchor bents and an asymmetrical gable. In the transverse plane the frame has three posts of unequal height: the front anchor-bent post extends to the one-and-one-half-story height; the rear anchor-bent post, which is actually the middle of the three posts, extends higher to support a purlin plate at the collar beams, usually at the intersection with the rear rafters; and the aisle post is the shortest of the three, extending to the height of the rear wall, which is lower than the front wall. Type 3 has the same first-floor plan and ridgeline possibilities as type 2, but the second-floor space of the aisle can be used for storage or as full-size rear rooms, depending on the roof pitch.

Type 4 A nave-and-single-aisle building with an asymmetrical anchor bent and a symmetrical gable. The front anchor bent and aisle posts are equal in height; the rear anchor-bent post (the middle of the three posts in transverse section) extends higher to the purlin plate and supports the collar beams nearer to their midsection than does the post in type 3. Type 4 buildings have the same floor-plan possibilities as type 3.

Type 5 A structure with symmetrical anchor bents, a symmetrical gable, and anchor beams long enough to span two rooms. Posts forming the first-floor partitions extend only to the second-floor joists; separate posts on the second floor support the collar beams. There are several possible first-floor plans: one front and one rear room between the anchor-bent posts; one front and two rear rooms (both of these plans form a rectangular house with the shorter side parallel to the ridgeline); two front rooms and two rear rooms; and two front and two rear rooms with a central hall (both of these plans form a rectangular house with the longer side parallel to the ridgeline). The second floor has space for full front and rear rooms within the knee walls.

Type 6 A two-story frame that diverges from the basic anchor-bent structure because it has two-story posts and two tie beams, at the second- and third-floor levels, on each bent. The posts can extend equally above the upper tie beam to form a symmetrical roof or unequally to form an asymmetrical roof. Bents are more closely spaced than in other types to promote vertical stability. Surviving examples include three plans: two side-by-side rooms, two rooms and a side hall between the posts, and four rooms with a center hall.

Type 7 A one-and-one-half-story hybrid gambrel frame that combines anchor-bent and box-frame techniques and illustrates the effect of Georgian building practices on Dutch American framing. Second-story anchor bents at bay intervals maximize space. The main framing can vary: typical anchor-bent construction; closely spaced wall posts, anchor bents along hall partitions and gable walls, and intermediate joists joined to a summer beam; or anchor bents at bay spacing and intermediate anchor-beam-style joists supported by wall girts. In plan this type usually had a center hall and two rooms on either side.

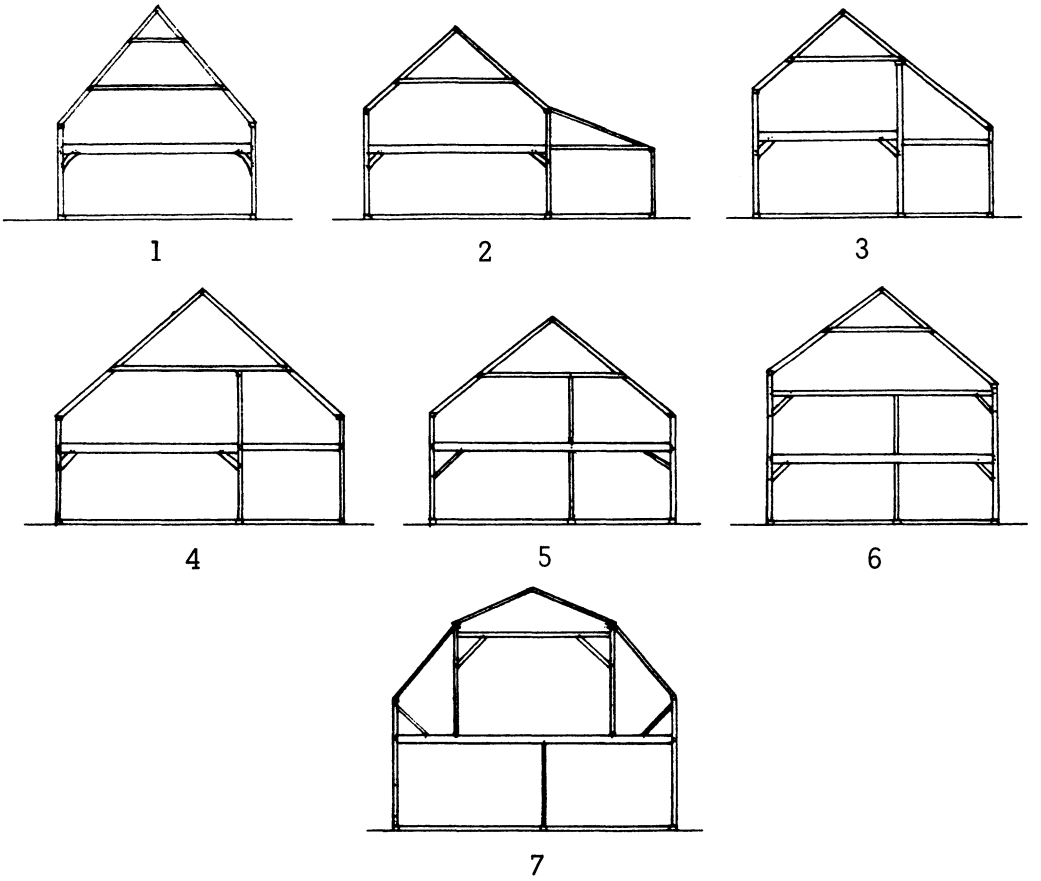


Fig. 20. Dutch American anchor-bent framing types (see table 1). (Drawing, based on actual buildings, C. W. Zink.)

form, in a one-and-one-half-story version, with the roof and second-floor framing defining the shape and size of the structure.[41]

Although complex house types became increasingly common, carpenters in the outlying areas continued to build the basic type 1 frame into the early nineteenth century. The Burroughs house (ca. 1810) in Harbourton, Mercer County, has a two-room-wide frame with nine anchor bents. Its anchor beams and posts are of smaller scantling than in earlier houses, so the bents are closely spaced. Except for the absence of corbels, the frame follows the same basic design as the Schenck house and demonstrates the endurance of Dutch structural logic.

The nave-and-aisle type evolved from Dutch antecedents that were built to take advantage of sunlight from the south and to resist inclement

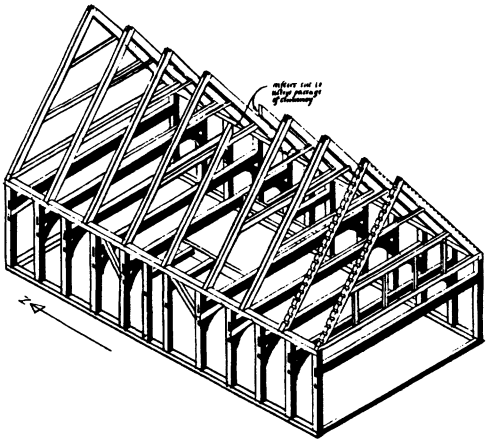


Fig. 21. Dutch American anchor-bent framing: one-and-one-half-story nave frame. Jan Martense Schenck house, Brooklyn, N.Y., ca. 1675. From Marvin D. Schwartz, *Jan Martense Schenck House* (Brooklyn: Brooklyn Museum, 1964), p. 14.

[41] The roof framing of the De Windt house, which is more elaborate than that of the typical Dutch American house, has upper struts supporting the roof and relieving the outward thrust at the top of the masonry walls. It may derive from the Flemish area of the Lowlands. HABS NY–4123.

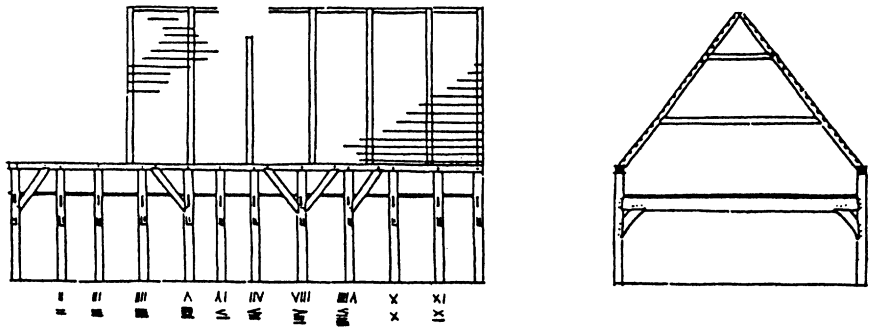


Fig. 22. Dutch American anchor-bent framing: From Henk Zantkuyl, "Het Jan Martense Schenckhuis te Brooklyn," *Bulletin van de koninklijke Nederlandsche oudheidkundige bond*, 6th ser., 17 (1964).

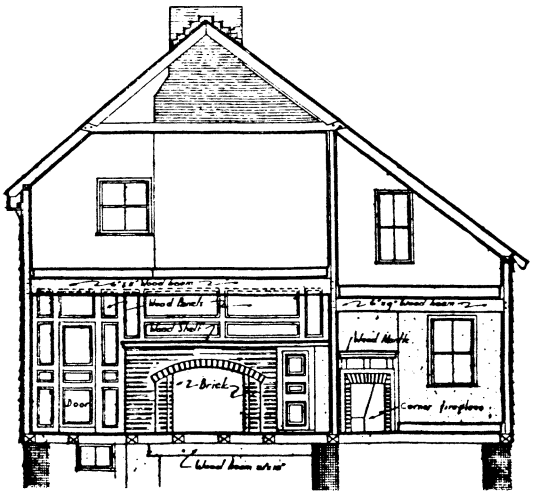
weather from the north. The aisle on most Dutch houses was used for bedsteads or for storage. Although bedsteads may have been common in New Netherland during the early period, Dutch Americans eventually followed the preference in other areas of the Lowlands for using the aisles as separate sleeping or living rooms. Examples of type 2 framing were common in the Netherlands (see fig. 12) and probably in the colony as well. The early section of the Nevius house (ca. 1747) in Hillsborough Township, Somerset County, has five anchor bents and a full rear room in the aisle. The brick-clad Breese house had a rear aisle (see fig. 19). The eighteenth-century Ackerman house, a masonry building in Paramus, Bergen County, is also a type 2 house.[42]

The type 3 John Craig house, built in Monmouth County around 1720, has a particularly tall middle post, but the roof pitch is too low to provide usable space above the aisle on the second floor. The John Welling house, built slightly earlier in Mercer County, has two front rooms and two back rooms on both floors (fig. 23). One rear room has a corner fireplace, a common feature in central New Jersey Dutch American houses of the second period because of English influence from the lower Delaware River valley. The anchor beams and the aisle second-floor joists are large and prominent, in the Dutch American fashion. A third example is the small section of the Pieter Wyckoff house in Brooklyn, which has undergone numerous changes, including a recent extensive restoration.[43]

The Corneles Couwenhoven house, in Monmouth County, built in three sections, two of which the Historic American Buildings Survey dated circa 1700 and 1735, is representative of type 4 framing (fig. 24). The oldest portion had exposed anchor beams and posts, and the anchor bents by the exterior-wall fireplace had corbels. The 1735 section also had exposed anchor beams. The second floor of the aisle has full rooms, as in the type 3 Welling house, and the roof framing has upper collar beams, as in the type 1 Schenck house. The

[42] For farmhouses of this type and period and for an architectural survey of Netherlands farmsteads at the turn of the nineteenth century, see R. C. Hekker, "De Ontwikkeling van de boerderijvormen," in *Duizend jaar bouwen in Nederland*, vol. 2, *De Boukunst na da middeleeuwen*, ed. S. J. Fockema Andreae (Amsterdam: Albert De Lange, 1957), pp. 197–323; and R. C. Hekker, *Nederlandische boerderei in het begin der 19e eeuw* (Arnhem: Stichting Historisch Boerderij-onderzoek, 1967). Recent renovation of the Nevius house has enabled extensive examination of the framing. The roof was altered in the twentieth century, but evidence of the original nave-and-aisle framing exists. For the Breese house, see HABS NY–5A-2; for the Ackerman house, Wertenbaker, *Founding of Civilization*, p. 74.

[43] The Craig house had no collar beams in the low-pitch roof frame. Instead of the usual diagonal braces between the posts and plate in the longitudinal section, it had one long diagonal brace extending from plate to sill, similar to a wind brace across rafters. The second-floor space in the aisle is not large enough for a room (HABS NJ–543). For the Welling house, see HABS NJ–09. As in many other Dutch American houses, that these two are associated with non-Dutch owners illustrates how the Dutch framing logic influenced building practices in adversely populated areas. Documents at the Monmouth County Historical Association indicate that the carpenter who built the Dutch-framed early wing of Middleton Hall, Monmouth Co., was English (Joseph W. Hammond, conversation with Zink, May 1980). For the Wyckoff house, see HABS NY–428; and John Milner Associates, "Wyckoff House Historic Structure Report" (New York Department of Recreation, New York, 1979). The Schenck and Wyckoff houses are rare survivors of early Dutch American houses in Brooklyn. Since many Dutch settlers first lived in Brooklyn before moving to farming areas in New Jersey and the Hudson valley, these represent house types that influenced Dutch American building in subsequent settlement areas. An example of this Dutch migration from Brooklyn to New Jersey and its expression in house forms are documented in Clifford W. Zink and Richard Hunter, *Archival Research, Architectural Restoration, and Archaeology at Glencairn* (Trenton: New Jersey Historic Commission, forthcoming).



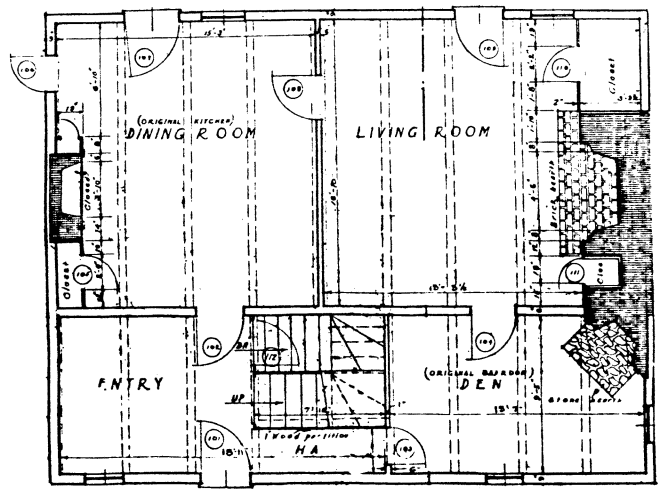
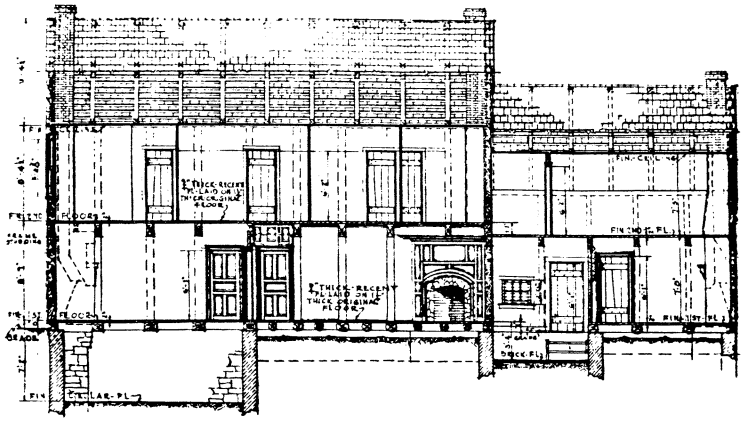
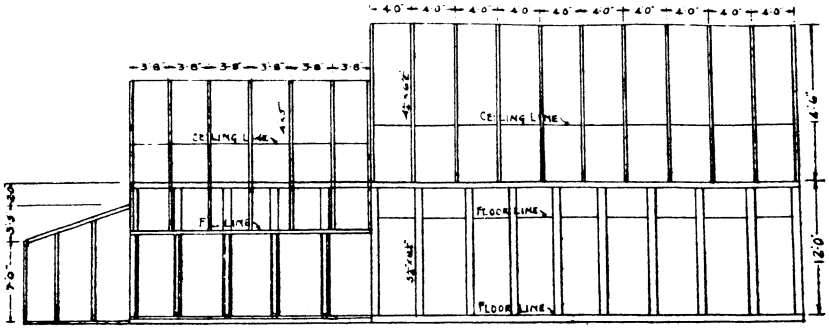


Fig. 23. Dutch American anchor-bent framing: nave-and-aisle frame with front and rear rooms under an asymmetrical gable. John Welling house, Mercer Co., N.J., ca. 1711. (Historic American Buildings Survey, NJ–409.)





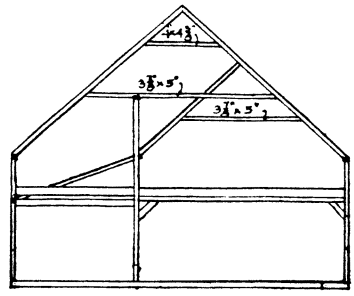


Fig. 24. Dutch American anchor-bent framing. *Small section*: nave frame with added aisle room; *large section*: asymmetrical nave-and-aisle frame under a symmetrical gable. Corneles Couwenhoven house, Monmouth Co., N.J., 1700, 1735. (Historic American Buildings Survey, NJ–646.)

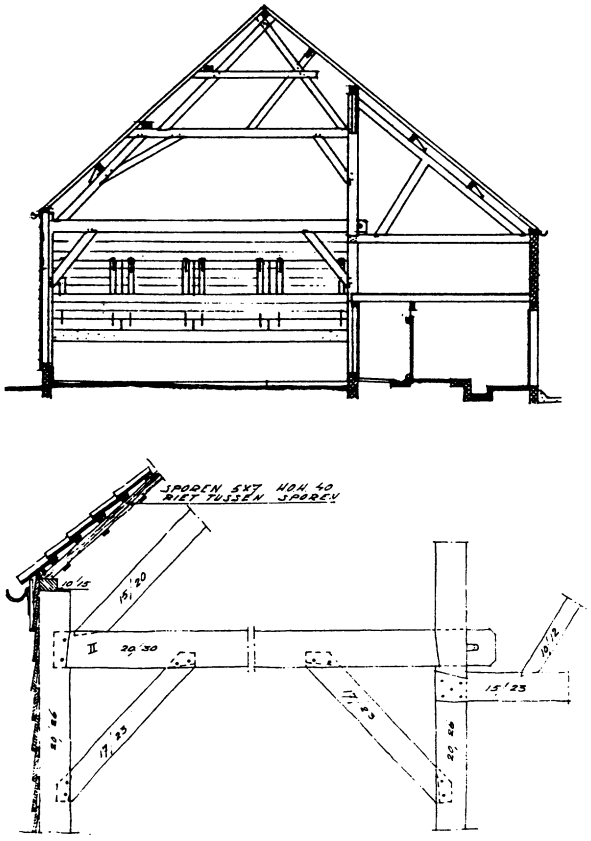


Fig. 25. Dutch American barn framing with asymmetrical nave-and-single aisle anchor bents under asymmetrical gable. Cole barn, Hunterdon Co., N.J. (Drawing, Elric Endersby.)

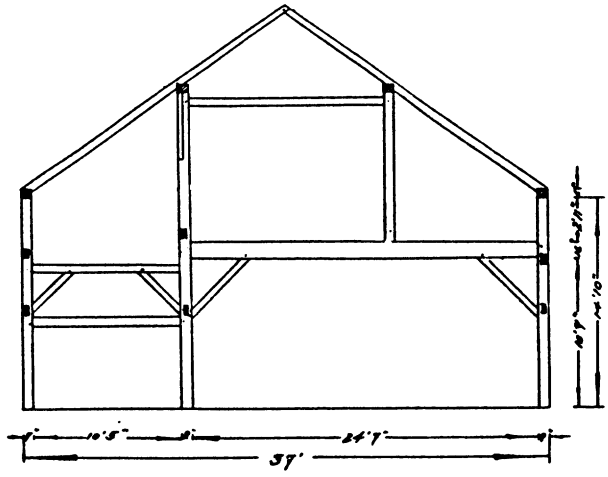


Fig. 26. Netherlands barn framing with asymmetrical nave-and-single aisle anchor bents under asymmetrical gable. Barn section of barn dwelling in Brielle, Netherlands. (Stichting Historisch Boerderij-onderzoek, Arnhem.)

third section, which appears to be of a later date, follows type 1 framing.[44]

Carpenters in central New Jersey also erected barns of type 4 frames. The Cole barn, built early in the nineteenth century in Readington Township, Hunterdon County, has two central bents that illustrate this most clearly (fig. 25). The building's size prompted the carpenter to place an additional post above the anchor beam to support the rafter purlin. The barn is square in plan, with entrances on the eave walls in the English tradition rather than gable entrances as used by the Dutch. This barn demonstrates how carpenters continued to follow the structural logic of a framing type in outbuildings well after they ceased for houses. Antecedents of type 4 framing exist in the Netherlands, as a barn dwelling in Brielle, Monmouth County, illustrates (fig. 26), although in that barn the rafter framing is more elaborate and irregular than on American examples.[45]

Type 5 houses became increasingly common in the eighteenth century and were of timber and of masonry. As the availability of pattern books increased and cross-cultural influences spread, house framing became more standardized and less idiosyncratic. Type 5 framing allowed carpenters to build larger houses but still use simple, symmetrical, anchor-bent framing that adhered to basic Dutch American structural logic.

The Hand house, built in Mercer County around 1740 (see fig. 9), exemplified a type 5 house prior to the dominance of Georgian symmetry. Unlike many earlier houses, the framing was regular; nearly all members were positioned exactly 4 feet on center. The house had a large room in the front with a cooking hearth and two smaller rooms in the rear, one with an English-type corner fireplace. The three-room plan had a number of precedents, including what Waterman labeled the Flemish plan as well as plans of early Swedish and German settlers and one promoted by Englishman William Penn for Philadelphia-bound colonists. Like many other Dutch American houses from this period, the second floor had both a

[44] The HABS drawings include many more framing details than usual. In contrast to the second-floor joists, those of the first floor are continuous and exceptionally large. Corner fireplaces show the influence of English architecture. HABS NJ-646.

[45] The Cole barn and a similar one called Van Doren's barn were recorded during dismantling by Elric Endersby as part of the Princeton History Project, Princeton, N.J., in 1985. For Brielle, see *Jaarsverlag* (Arnhem: Stichting Historisch Boerderij-onderzoek, 1983).

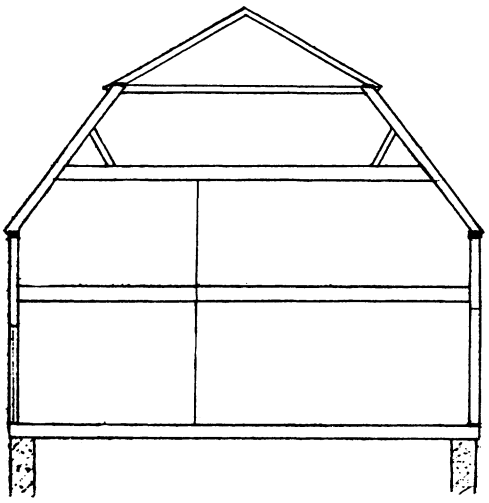


Fig. 27. Dutch American gambrel-roof framing with two collar beams. Tyson-Gryon-Lake house, Richmondtown, Staten Island, ca. 1740. (Drawing, C. W. Zink.)

finished room with a matched-board ceiling and unfinished rooms with exposed rafters.[46]

The Holmes Hendrickson house in Monmouth County exemplifies the influence of English design on type 5 Dutch American houses. While the main section, built circa 1752, presents Georgian symmetry in its facade and is asymmetrical in plan, having two large front rooms and two smaller rear rooms, all are of different sizes as in the type 3 Welling house, with no central hall. The three fireplaces are in corners, but the framing is Dutch in its structural logic. The anchor beams are visible the full depth of the house. The roof has the typical one-and-one-half-story profile and a spring eave.[47]

The Tyson-Gryon-Lake house (ca. 1740) in Richmondtown, Staten Island, is a type 5 house with an early version of the Dutch American gambrel roof (fig. 27). Each lower pair of rafters has two collar beams, the upper of which serves as the base for upper rafters set on a low pitch. No purlin plates support the rafters, and the attic story between the collar beams does not have full headroom. This roof-framing method conserves timber and provides more space on the second floor by enabling the lower rafters to be pitched slightly steeper than in a normal A-shape gable. The gambrel design relates to techniques used in the Netherlands: instead of continuous rafters, lower rafters support a collar beam that in turn supports upper rafters, which can have the same or a different pitch from the lower rafters (see fig. 26). The framing is similar to that in a mansard roof, which is also a possible source of the Dutch American gambrel in the lower Hudson region, through the influence of settlers with French origins, including the Huguenots.[48]

The Jean Hasbrouck house (ca. 1712) in New Paltz, Ulster County, New York, shows continuous anchor beams spanning a depth of two rooms in a type 5 masonry house (fig. 28). It also has an enormous roof truss in the style of roof framing in the Lowlands and France that reflects the Huguenot origins of its builders (fig. 29).[49]

Type 6 is exceptional because it does not follow the one-and-one-half-story anchor-bent rule, and because there is little evidence to document the extent of its utility. Its origins are uncertain: two-story frames in the Netherlands commonly had double anchor bents, with the second piggybacked over the first (see fig. 16). Whether built in timber or clad in masonry, these frames relied on corbels at every anchor bent for rigidity. Use of these frames may have descended from the northern Rhineland area where two-story framing with bents spaced closer together than in box framing was common. The Voorlezer house, built circa 1696 in Richmondtown, to serve in part as a schoolhouse, has a frame of this type (fig. 30). It has front and back rooms and a side hall on both floors. There are additional floor beams between the anchor beams on the second floor in the front room, which was not uncommon in the Netherlands. The second- and third-floor framing for the side hall has smaller joists perpendicular to the bents. Front posts extend to form a knee wall in the attic, while rear posts stop at attic-floor level, creating an asymmetrical gable. This configuration resembles types 3 and 4, which have unequal anchor-bent posts. Diagonal braces are located only in the exterior walls, and the racking of this frame over the years demonstrates the inherent lack of vertical rigidity, which may account for the rarity of this type. This instability demonstrates the interdependence of the key components in any struc-

[46] The Hand house was recorded by Zink during demolition in March 1978, in Dutch Neck, West Windsor Township, Mercer Co. For an analysis of Penn's plan, see Carson et al., "Impermanent Architecture," pp. 141–44.

[47] HABS NJ–544.

[48] For the mansard connection, see Waterman, *Dwellings*, p. 201.

[49] HABS NY–471; Lessard and Villandré, *La maison traditionnelle*, p. 97.

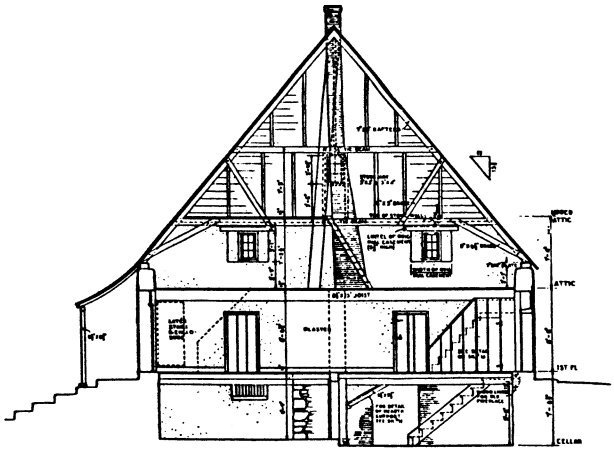


Fig. 28. Dutch American house, with roof truss. Jean Hasbrouck house, New Paltz, N.Y., ca. 1712. (Historic American Buildings Survey, NY.)

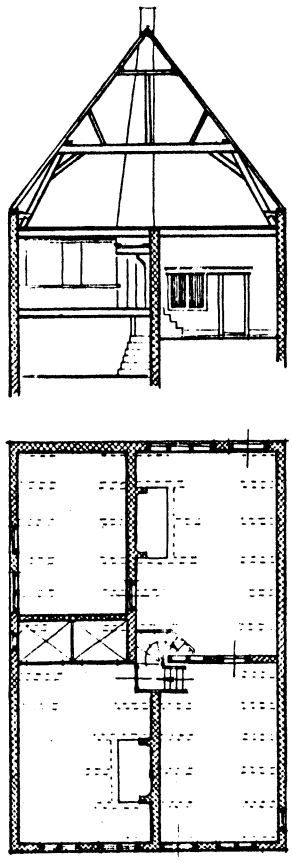


Fig. 29. Netherlands house, two rooms deep with continuous anchor beams between masonry walls. Zogenaamd Schultenhuis, Wanneperveen. From R. Meischke and Henk Zantkuyl, *Het Nederlandse woonhuis van 1300–1800* (Haarlem: H. D. Tjeenk Willink, 1969), p. 46.

tural logic: if carpenters varied the rules too much, they rendered the system ineffective.[50]

Despite the difficulties with rigidity, carpenters built type 6 houses with closely spaced two-story bents well into the nineteenth century. The Daniel Polhemus house, two and one-half stories with a two-room-and-side-hall plan similar to the Voorlezer plan, was built in Phalanx, Monmouth County, circa 1760. The Cornelius van Liew house, built in East Millstone, Middlesex County, circa 1743, had two-story framing details with a center-hall plan. Another house with a side-hall plan, built circa 1790 in Arneytown, Burlington County, near Monmouth County, had anchor bents and two-story posts, but the third-floor tie beams rested on top of the wall plates, a typical English technique. The Pinkney house, built circa 1824 in Ontario, had remarkably similar framing (called multipost framing in Canada) but a one-room plan between posts (fig. 31). That the latter two buildings were constructed with a combination of anchor-bent and box-frame details suggests that the cross-cultural mixing of building technologies led to similar constructional tendencies in widely separated regions. Other Canadian examples, with closer spacing of bents, may derive from colombage framing. Multipost and type 6 framing may have related origins in the Lowlands–Rhineland area.[51]

In the third period (late eighteenth and early nineteenth centuries), carpenters developed type 7 for large, Georgian-style houses. While the Dutch employed gambrel roofs in the Netherlands, these

[50] For timber houses, see H. Janse and S. de Jong, *Houten huizen: Een unieke bouwwijze in Nord-Holland* (Zaltbommel: Europese Biblioteck, 1970), p. 24; for masonry houses, Meischke and Zantkuyl, *Het Nederlandse woonhuis*, pp. 101, 232. McMillen believes that other early type 6 examples were built on Staten Island (McMillen, conversation with Zink, August 1986).

[51] For the Polhemus house, see HABS NJ–693; for the van Liew house, HABS NJ–648. The Arneytown house was stripped by looters in 1979, with the result that much of its framing was visible for photographing. For Canadian examples, see John Rempel, *Building with Wood and Other Aspects of Nineteenth-Century Building in Ontario* (Toronto: Toronto University Press, 1967), pp. 9, 99–158. Rempel theorizes that multipost framing could also be a forerunner to the balloon frame. Potential links between Dutch structural logic, the multipost frame, and balloon framing suggest further research.

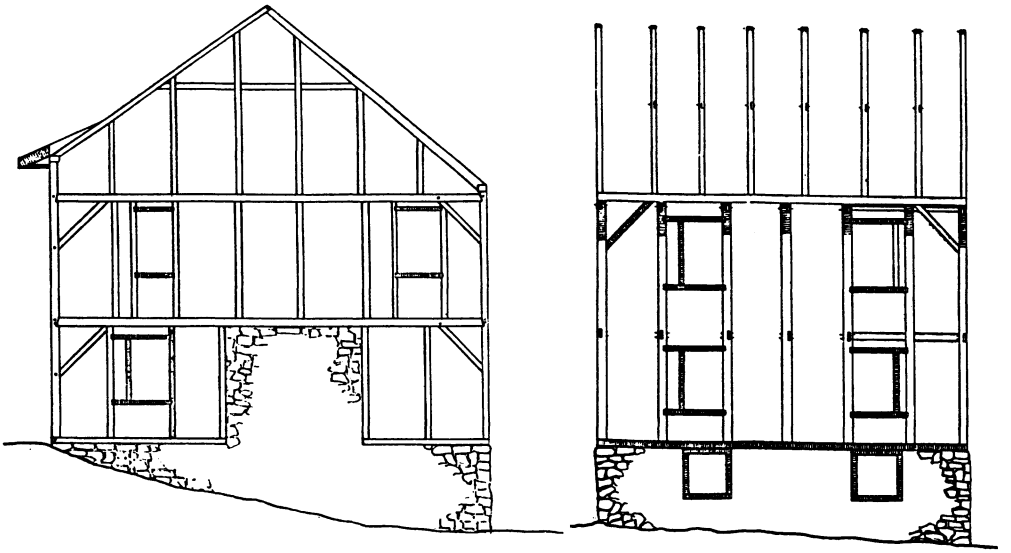


Fig. 30. Two-and-one-half-story Dutch American anchor-bent framing. Voorlezer house, Richmondtown, Staten Island, ca. 1696. (Drawing, 1972, after Loring McMillen, 1939.)

were not commonly used on rural buildings. The English and Swedes placed steeply pitched gambrel roofs on both one- and two-story houses in the seventeenth and eighteenth centuries. In the upper Hudson valley, carpenters built one-and-one-half-story Dutch American houses with steep English-style gambrels. The distinctive low-profile gambrel roof became quite common on lower Hudson valley houses, whether timber or masonry, during the third period. Together with the Flemish spring eave, this gambrel became the twentieth-century symbol for Dutch-colonial houses.[52]

The facade of type 7 houses was almost always symmetrical. The plans usually had center halls, with full front and rear rooms on each side. While seventeenth- and eighteenth-century Dutch settlers located their sleeping spaces on the first-floor level, by the end of the eighteenth century more formal living arrangements prompted them to relegate bedrooms to the second floor, out of sight of guests. Building such a structure required very long rafters which lacked structural support and created an inefficiently large space, as the type 5 Hasbrouck house demonstrates (see fig. 28). Carpenters responded to this problem by employing narrow anchor bents on the second story to support purlins. They spaced these anchor bents

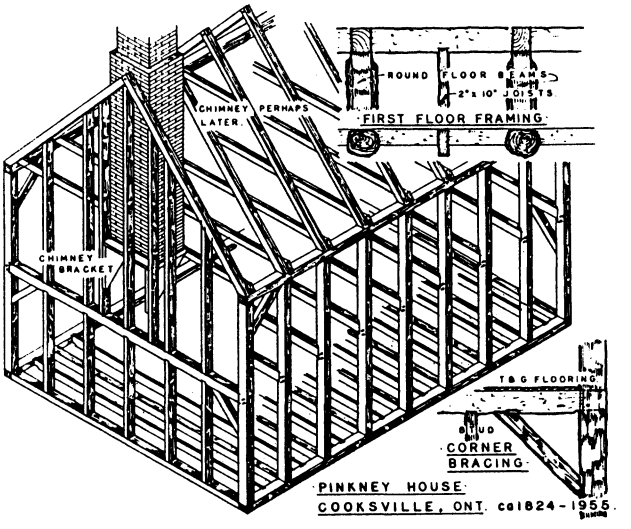


Fig. 31. Canadian two-story anchor-bent framing, with attic joists above the wall plates. Pinkney house, Cooksville, Ontario, ca. 1824. From John Rempel, *Building with Wood and Other Aspects of Nineteenth-Century Building in Ontario* (Toronto: Toronto University Press, 1967), p. 121.

[52] For English American gambrels on one- and two-story houses, see Forman, *Virginia Eastern Shore*; and Kelly, *Early Architecture*. For a comparison of gambrels, see A. Lawrence Kocher, "Gambrel Slopes of Northern New Jersey," *Bergen County History* (1970): 35.

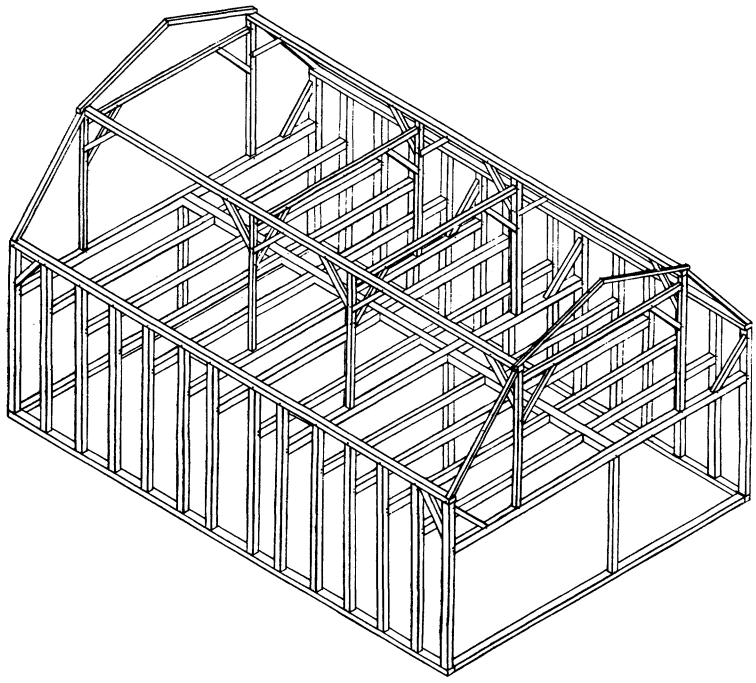


Fig. 32. Dutch American hybrid framing: anchor-bent posts with a second-floor summer beam and second-story anchor bents at box-frame intervals. Palin house, ca. 1750, East Fishkill, Dutchess Co., N.Y. (Drawing, C. W. Zink.)

widely, as in the English or Norman box-frame system, to allow a double pile of second-story rooms. The roof frame employed shorter rafters and provided maximum functional space on the second story, while maintaining the Dutch tradition of one-and-one-half-story houses.[53]

Such houses had either type 5 framing with repeating anchor bents or a hybridization of Dutch and English framing. The type 7 Palin house (fig. 32), built circa 1750 in East Fishkill, Dutchess County, has anchor-bent posts on the exterior walls but anchor beams only above the central-hall partitions. The other second-floor joists are joined to longitudinal summer beams that run the length of the center partitions, as in a box-frame design. The floor joists in this gambrel frame do not always have to be continuous to resist outward thrust, as in typical anchor-bent framing and the type 5 Tyson-Gryon-Lake house gambrel. Much of the downward force from the roof, which tends to push diagonally outward on the walls, is handled by the purlins. Interior posts, at the intersection of the central-hall partitions and the longitudinal room partitions, carry the loads to the ground floor. In the Palin house, the second-floor joists were covered by plaster, indicating that the owner had no intention of displaying Dutch-style heavy floor joists. The first-floor joists are much larger and span the full depth of the basement, although one might expect to see summer beams here as well.

Another version of type 7 hybrid framing is the Theodorus Wyck house, circa 1750, also in East Fishkill (fig. 33). This house had continuous second-floor joists which were exposed in the Dutch tradition. Instead of a series of repeating anchor bents, however, this one-and-one-half-story frame had anchor bents widely spaced at bay intervals. Horizontal girts in the front and rear walls supported the intermediate joists and transferred loads horizontally over the window and door openings, as in English box-frame construction. This hybrid may be a forerunner of the one-and-one-

[53] Kimball posits the origin of the mansard roof and hence the gambrel also in "the desire to reduce the height of the medieval roof [as in the Hasbrouck house], especially over buildings of a double file of rooms" (Fiske Kimball, *Domestic Architecture of the American Colonies and of the Early Republic* [New York: Charles Scribner's Sons, 1922], p. 45). For Anglo-American gambrel framing, see Kelly, *Early Architecture*, p. 60.

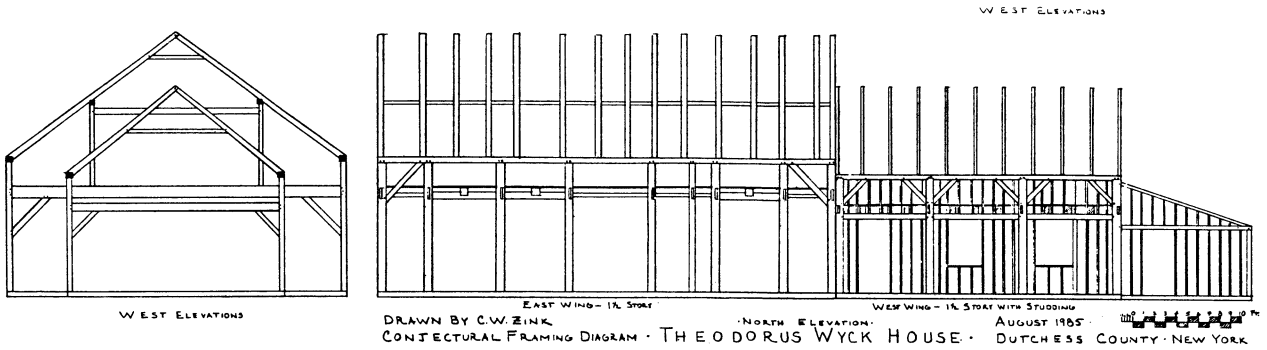


Fig. 33. Dutch American hybrid framing. East wing: widely spaced anchor bents with girts supporting intermediate anchor beams. Theodorus Wyck house, East Fishkill, Dutchess Co., N.Y. (Drawing, C. W. Zink.)

half-story frames in Greek-revival houses built in New York State and parts of New England.[54]

Some nineteenth-century carpenters who worked on Dutch American barns similarly increased the usable space in those buildings by rotating the ridgeline 90 degrees and building the aisle posts up to the full height of the anchor-bent posts, so that all the walls were two stories high. They also shifted the entrance to the eave side, and, instead of the low profile of a Dutch American barn with its gable entrance, the building from the exterior looked like a typical English barn. Yet the timber frame was still based on anchor bents, and the threshing floor continued to be dominated by huge anchor beams overhead. Carpenters created such barns from existing Dutch American barns, such as the Schenck barn in Dutch Neck, Mercer County, and they built new barns with this framing, such as the Czahor barn in Neshanic, Somerset County, erected in the mid nineteenth century. The stone barn at Tusculum, Princeton, Mercer County, circa 1811, displays this framing, too.

The Dutch English hybrid barns parallel the mixing of Dutch and English house-framing practices, and their readily visible framing makes them potent examples to study cross-cultural influences on timber framing in America. Like the Wyck house, they illustrate how carpenters combined key logical elements of different framing traditions to create a hybrid logic. From the Dutch tradition, the key element was the anchor bent with its two-dimensional tying joint, and from the English tradition, the key element was the bay-spaced box frame.

Besides the one-and-one-half-story anchor-bent form, the preference of the Dutch American carpenter and his client for prominent floor joists survived into the nineteenth century as a major Dutch building characteristic. These remnants of anchor-bent framing persisted throughout the third period as the last component of Dutch structural logic in many houses that otherwise were primarily Anglo-American. The two-story Ten Broek house (ca. 1760) in Somerset County is of masonry construction in the Georgian style, but it has continuous floor joists in the Dutch fashion. The only other Dutch features are the door at the entrance and nailing-plate hinges.[55]

In the nineteenth century the reliance on pattern books and the development of balloon and platform framing led to the demise, except in remote areas, of the timber-framing tradition in houses. During the transition, carpenters framed houses with a combination of post-and-beam construction and infilled balloon-framed walls, another example of hybrid building.[56]

Today we see the major legacy of the Dutch building tradition in familiar one-and-one-half-story house forms from the Hudson valley and

[54] The Wyck house was dismantled and recorded by Hopewell Valley Historical Society in 1985, under the direction of Kenneth Walpuck. My long-standing suspicion that one-and-one-half-story framing in Greek-revival houses relates to Dutch American framing is shared by Upton, "Traditional Framing," p. 75.

[55] The Broek house is in Ursula C. Brecknell, *Montgomery Township: An Historic Community, 1702–1972* (Montgomery Township, N.J.: Bicentennial Committee, 1972), p. 62. The early nineteenth-century portion of the Wyckoff house by Six Mile Run in Middlesex Co. along King's Highway (current Rte. 27) had exposed joists on the first floor; it was burned by vandals in 1983.

[56] The John McCosh house, built in Princeton in 1888, combined a heavy timber, braced-and-pegged frame with balloon-frame infilling, as observed during a major renovation in 1979.

from Bergen County. While architectural historians have usually concentrated on such forms and their decorative details, the study of Dutch American house framing reinforces the importance of understanding the role of structure in the evolution of traditional buildings. The ability to identify the structural logic that guides building processes will allow us to go beyond the physical evidence to the rationale that fostered it. Like the process that guided the construction of these vernacular buildings in the first place, their study should be holistic: examining them literally inside-out to comprehend better the builder's conceptualization of his work and the reasons behind his decisions. Further research opportunites include: the variation and distribution of Dutch American framing types; the interrelationship of framing to floor plans, jambless fireplaces, and window and door placements; comparisons of one-and-one-half-story Dutch, English, French, and German building technologies in North America; framing precedents in the Lowlands; and the influence of Dutch American framing on later building technologies and house types, such as Greek revival and hybrid house forms.