

Anna Neimark*

A REPORT ON WAR AND PEACE: NOTES FROM THE DESIGN TRENCHES

ABSTRACT: Based on a series of courses, beginning with a studio at the Southern California Institute of Architecture (SCI-Arc), this essay explores the American fort as a precedent in design. It refers to fortifications as geometric abstractions of war. The argument traces the forts' genealogy to tactics of projection, developed by French military engineers, Sébastien Le Prestre de Vauban and the marquis de Montalembert. Conflating projectiles of mortar with projections of line and CNC tool paths, the essay proposes a practice of design focused on *tour de main* techniques. This figurative term becomes an alternative to the *tour de force* monuments of the avant-garde's compulsion for change. In these wars of abstraction, the rear-guard emerges from the design trenches as the harbinger of stasis.

KEYWORDS: avant-garde, cavalier perspective, fortification, rear-guard, stasis, *tour de force*, *tour de main*

* Anna Neimark: Southern California Institute of Architecture (SCI-Arc), Los Angeles; anna_neimark@sciarc.edu.

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Change is fundamental to the language of warfare: the exchange of gunfire, a regime change, a changing of the guard. By contrast, stasis fends off change from happening, defending equilibrium, even peace. One historical building type that negotiated attack and defense—change and stasis—was the fortress. Its external figure was regulated to resist cannon fire with calculations that incorporated the impact of ballistics on stone walls. Its internal form, meanwhile, often included the layout of barracks and other elements of domestic arrangement.

In the United States, military fortifications, such as Fort Sumter, where the American Civil War began in 1861, and Fort Pulaski, where a Confederate garrison surrendered in 1862, continue to serve a historical and political function. Managed by the National Park Service, they are public parks, museums, grounds for battle re-enactment, and material sites for forensic research. About two dozen structures belonging to the Third System of defense still populate the Atlantic, Gulf, and Pacific Coasts. Although the forts no longer function as architectural negotiators of war and peace in contemporary combat, their analysis sheds light into techniques for battling change and representing stasis.¹

In a series of courses, beginning with a studio that I led at the Southern California Institute of Architecture (SCI-Arc), the American Fort served as a pedagogical instrument, a Ship Argo that mobilized the monument anew. We compared the process of re-drawing and re-constructing the precedent to Theseus's mythic vessel that was rebuilt, part by part, in the name of preservation.² The ancient paradox represents the original conflation of stasis with change; at one and the same time, the ship could

¹ Historical analysis of the forts traces changes in U.S. history through the sites of these monuments. Consider, for example, that the planning and construction of Fort Pulaski was overseen by the soon-to-be Confederate General Robert E. Lee when he was a U.S. Army Engineer. While his equestrian statue was removed from Richmond, Virginia, in 2021, following protests in the wake of George Floyd's murder, his works of engineering continue to occupy the American seashore. It is possible to touch the fingerprints of enslaved men who had been forced to make bricks for the fort in a nearby plantation, because they are imprinted in the bricks' surface. After the fort's seizure by the Union army, Pulaski became the final stop along the Underground Railroad. Anon., "Words Have Power: Fort Pulaski National Monument," National Park Service, <https://www.nps.gov/articles/000/words-have-power.htm>, (accessed 2 March 2021).

² "The ship on which Theseus sailed with the youths and returned in safety, the thirty-oared galley, was preserved by the Athenians down to the time of Demetrius Phalereus. They took away the old timbers from time to time, and put new and sound ones in their places, so that the vessel became a standing illustration for the philosophers in the mooted question of growth, some declaring that it remained the same, others that it was not the same vessel." (*Thes.* XXIII, 1) *Plutarch's Lives*, vol. 1, Harvard University Press, Cambridge, Mass.; William Heinemann, London, 1967, p. 49.

be interpreted as both changed and unchanged, as an original and a fake. In studio, modeling the forts re-enacted and altered the original monument's meaning in similar ways.

The syllabus introduced the course with a description of Samuel Holland's drawing for a 19th century Canadian fort, a landscape under the siege of visual representation (Fig. 1). Grey smog forms the terrain's natural contours. Multiple layers of wash accumulate into a cloudy outline on a strategic hill. A dark shadow indicates the depth of a steep cliff. Along its murky edge, a burnt sienna line strikes a tactical boundary. At every corner, bastions project the pentagon's perimeter into a pointed star, rippling to form undulating embankments: banquettes, parapets, scarps, ditches, and glacis. In this strategic plan, Holland dissolves the monumental figure of a fortified citadel into a dynamic field of visual effects. This abstract geometry superimposed upon the land is a beautiful apparition in its own right; it is also a practical document for construction. Built in 1820 by the British forces to defend against an American threat, the fort of Quebec is one of dozens that materialized the geometric abstractions of war on the Atlantic coast of this continent.

The pedagogical intent of introducing the studio with a drawing was to focus the students' attention on the geometric details and atmospheric qualities of fortress projection. After all, projection of line work is intimately related to projectiles of cannons and mortars: both are vectors in need of a target, be it paper, masonry, or earth.³ In his discourse on fortifications, Louis XIV's engineer, Sébastien Le Prestre de Vauban, also introduced this military art with a description of fundamental terms. From point to square to pyramid, he developed a guide for applying geometric principles to the geography of the ground. The exercises for constructing equilateral triangles using arcs, calculating the inclinations and heights of mountains using triangles, estimating the distances between points using mountain peaks, and projecting "the height of a tower built upon a rock" using projected distances, trained the reader to recognize paper and ground, geometry and geography, marks and landmarks, as interchangeable.⁴ When,

³ Robin Evans described the reciprocal relation between a projectile and its target and projective geometry and paper in the essay "Architectural Projection," in E. Blau, E. Kaufman (eds.), *Architecture and Its Image: Four Centuries of Architectural Representation. Works from the Collection of the Canadian Centre for Architecture*, Canadian Centre for Architecture/The MIT Press, Montreal, 1989.

⁴ S. Le Prestre de Vauban, *The New Method of Fortification*, 5th ed., S. and E. Ballard, London, 1722, p. 34.



Figure 1. Samuel Holland, “Plan (no. 2) shewing the ground whereon the citadel is proposed to be built: The ground lines of the present fortifications are colour’d yellow, and those of the proposed, red,” William L. Clements Library, University of Michigan Library Digital Collections. Reproduced by permission of the William L. Clements Library.

a century later, Samuel Holland projected the fortification of Québec with ink and wash on paper following these geometric principles, his representational tools converged the vectors of war into the stasis of ichnography, providing insights into both military strategies and representational methods.

Disagreements existed among 19th century military engineers regarding the best method for defending against the increased firepower of modern warfare. Some embraced a radical shift toward perpendicular fortifications as promoted by the marquis de Montalembert, a critic of traditional theories espoused by Vauban.⁵ This was particularly pronounced in North America where French colonial envoys reinvented the forts' forms, replacing hardened bastions with compact designs for densely packed vaulted casemates that maximized artillery might.⁶ Thus, we see that fortification served as both a building and a site for disputing military expertise. Those attached to its traditional forms maintained that the fort's power derived from the symbolic presence of stone, while others found interest in its strategic instrumentality. Following Montalembert, we can view the fortress structure as a *tour de force*, in both senses of the term, figurative and literal.

Bruno Latour has noted that war, beyond its obviously destructive role in history, has also served as a source of metaphors in critical discourse.⁷ This is also useful for teaching design. Through disciplinary writing and aesthetically presented arguments, architects engage in territorial battles that call for change, often invoking history's relevance or irrelevance for contemporary practice. These positions attempt to shift the field with new formal tactics of attack. The so-called "avant-garde"—the part of the army that goes ahead of the rest—stands apart from the masses, arguing for original positions, for tabula rasa conditions, for eradicating the old in search of the new. Perhaps this is why the "military perspective," also described by Yve-Alain Bois as "cavalier perspective"—a charging rider's view without a vanishing point—was so prevalent in disciplinary arguments on form for the sake of form. "Closer to 'fact' than to appearance," Bois writes, "[...] [axonometric] drawing shows a concern with synthetic

⁵ J. Langins, "The Challenge of Montalembert," in *Conserving the Enlightenment: French Military Engineering from Vauban to the Revolution*, The MIT Press, Cambridge, Mass., 2004, pp. 281–324.

⁶ Antoine Picon, Guest Lecture, Princeton University ARC 505b Option Studio (Neimark & Osman), École Nationale d'Architecture Paris Val de Seine, October 21, 2022.

⁷ B. Latour, "Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern," *Critical Inquiry*, 30, 2, 2004, pp. 225–248.

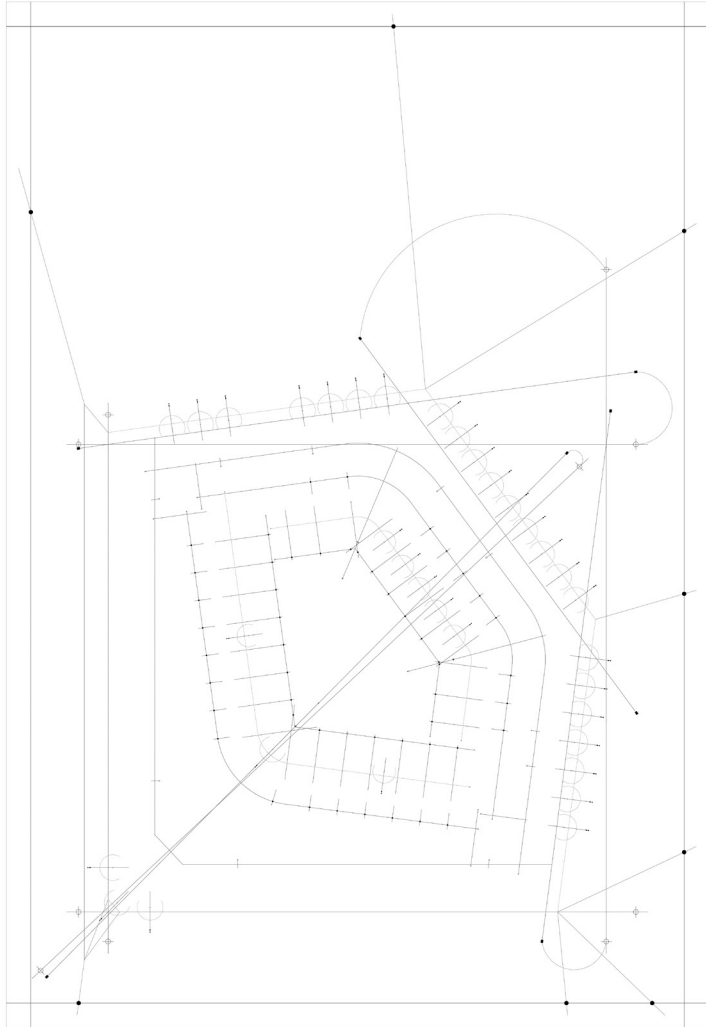


Figure 2. Julie Riley, Analytical Plan of Fort Macon in North Carolina, “Abstractions of War, Wars of Abstraction” studio, SCI-Arc, Spring 2021. Courtesy of Julie Riley.



Figure 3. Julie Riley, Analytical Model of Fort Macon in North Carolina, “Abstractions of War, Wars of Abstraction” studio, SCI-Arc, Spring 2021. Courtesy of Julie Riley.

representation of space.”⁸ Through constant forward motion, the architect’s parallel projection embodied the cavalryman’s vision to displace historical knowledge, because it was based in a subjective point of view and in too much contextual reference. And so, the vanguard advances without a historical drag on change, arguing for architecture’s autonomy, directed to the present or to the future, but never indebted to the past.

In wars of abstraction, as in any war, there cannot be an *avant-garde* without a rear. The rear stays back, hunkers down under siege, and resists. In this stationary position, territorial planning requires slowing down time. In the design studio, precedent analysis lays the groundwork for such gradual or even subtle changes rather than the upheavals of the *avant-garde*. By projecting forward with the tools of the cavalier, while strategically facing toward the rear with the attention of the besieged, students documented precedents without the pressure of use. Against the impulsive decisions made in the rush of a conflict, as often experienced during a design charette, slow-moving exercises brought about subtle visual effects to extend attention. Our studio called these tactics *tours de main*: more like recipes, they are practiced turns of the hand, learned through repetition.⁹ Students reproduced the monumental form of a fortress with analytical drawings, rendered projections, and milled models.

One student, Julie Riley, relied on documents such as military pattern books, National Park surveys, historic photographs, and geographic clues uncovered in the GIS data of surrounding terrain to reconstruct the geometric logic of Fort Macon (Fig. 2-3). Her plan presented a constellation of line work to identify centers and boundaries, denoting repeating rhythms, symmetrical reflections, and measurements that regulate the fort’s form. She used an OCE plotter to print the lines on mylar with toner that hardened into bas-relief, making the points and vectors into tactile form. The plans could be read, seen, and felt, as hatch work produced a raised terrain on the sheet. She toned the back of the mylar with an airbrush to inscribe shadows. The cannons’ projectile path was re-enacted with the push of the finger as it pushed the trigger to release a coat of paint onto the page.

⁸ Y.-A. Bois, “Metamorphosis in Axonometry,” *Daidalos*, 1, 1981, p. 50.

⁹ The studio borrows the term *tour de main* from Julia Child, who introduced it to an American audience in her first season of *The French Chef* while making a fluffy *omelette* [Child’s preferred spelling of omelet]. Omitting the eggs, she vigorously shakes an empty pan in front of the camera, demonstrating the brisk technique of the turning of the hand. J. Child, “French Omelette,” *The French Chef*, Season 1, PBS.

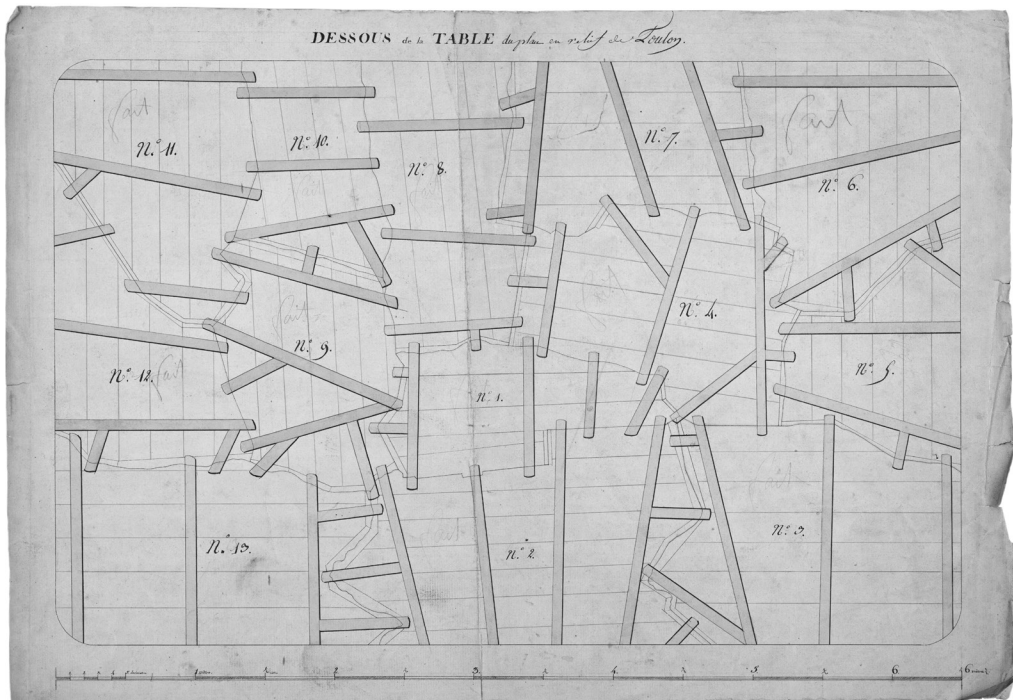


Figure 4. Below the table of the plan-relief of Toulon with bars of assembly, 1795, © Paris, Musée des Plans-Reliefs. Reproduced by permission of the Musée des Plans-Reliefs.

In addition to lessons in geometry, we also enacted lessons in modeling inspired by Vauban. Two-dimensional drawings were often inadequate for capturing the totality of a war's domain, especially in mountain regions and along the shorelines of the sea. Vauban's military bureaucracy developed scaled models to articulate the rendered surfaces in painted wood through the technique of the *plan-relief*. The models were assembled into monumental tables, serving as miniature battlefields for the view of generals and politicians in the Palaces of Versailles or Fontainebleau. In the military plan-relief, the continuity of the landscape above—superstructure—and the fragmented material support of the wooden framework below—substrate—staged a reciprocal relation. Elements of the total model would have been built on-site and transported by mules to be assembled in a workshop. There, an assembly drawing organized the geo-technical underside of the table.¹⁰ In one model, the town of Toulon was composed of thirteen parts, splined together by seventy reinforcing bars (Fig. 4).

Inspired by the insertion of the model table into the space of battle, as an extension of paper and ground, we too added a table surface to our process: the CNC mill, a four by eight table, a spindle, and a bit. Bits come in different sizes and shapes, each one able to cut, contour, or etch a numerically fed path onto a material slab. By specifying the variables of diameter, tip shape, and path, students wrote instructions for varied inscriptions. The drill bit marks the figure, contours the topos, etches the seams, and textures the surface. Students did not produce smooth forms with this machine as was once the fashion; rather, they programmed the mill to bounce with a staccato, decaying and rustivating the hard surface of foam with force and friction. One student, Holland Seropian, captured the stony texture of Fort Montgomery's residual wall with multiple drill paths, specifying the 1/4" straight flat bit for rough cutting the profile, the 1/8" tapered angle ball nose fluted bit for undulating the surface pattern and flip-boring holes, the vee-groove ten-degree carving bit and the vee-groove thirty-degree router bit for inscribing the mortar joints. (Fig. 5-6) The armed spindle became a precise ballistic as it attacked the territorial space of the model table from above. This is by nature a subtractive process, at times sculptural, at other times, stochastic.

¹⁰ I. Warmoes, *Le Musée des Plans-reliefs*, Éditions du Patrimoine, Centre des Monuments Nationaux, Paris, 2012, p. 36.

In the process of translation, a new Argo-like image of the fortress emerges. The gradual exchange of parts appears as an act of preservation. But all precedent work is slow theft, a sort of gradual exchange. In analyzing the fort, one vault, mound, stone, joint at a time, students produce a “structural object, created not by genius, inspiration, determination, evolution, but by two modest actions (which cannot be caught up in any mystique of creation): *substitution* [...] and *nomination*.”¹¹ In the tradition of a conceptual approach to art, such models of appropriation, as described by Roland Barthes, offer an alternative to avant-garde myths of creation, allowing for the possibility of design in a state of stasis. The fort thus serves as a pretext for those who arrive at current debates from the design trenches rather than along the frontline.

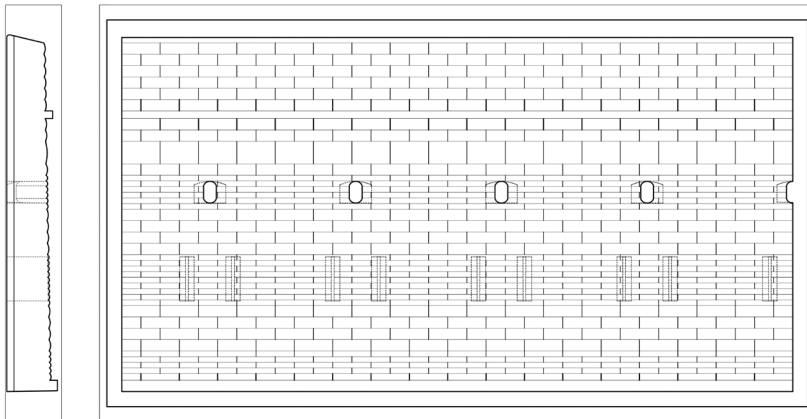
We borrowed the language of military tactics as the studio’s *lingua franca*, mobilizing the fort’s visual representations into miniature territorial battles. Students trained their ability to look strategically, to draw tactically, and to speak intentionally, as they readied themselves to confront the disciplinary field beyond studio. Lorraine Daston has written about the military engineer-geographers’ observation of the field and surveys of the land. She recalls their use of the term “*coup d’œil*,” or a strike of the eye, a view that recognized advantages for attack and positions for defense bringing measure and confidence to decisions that may otherwise feel too complex. The eye’s training follows “the piecemeal, the procedural, the painstaking, and the pedantic [...] logical rigor, attention to detail, narrow focus, mechanical rule following, and step-by-step demonstration,” even as the expression appears to be associated with instant inspiration, even genius.¹² Daston describes the judgment of a *coup d’œil* as the synthesis of long-term study with dedicated attention. Similarly, we consider *tour de main* and *tour de force* as models for an architect’s training. From the monumentality of a vision, a *tour de force* reflects the avant-garde tradition, arguing for timely change; meanwhile, the restraint behind a *tour de main* aligns with the rear-guard position, engaged in seemingly timeless reverberation of stasis.

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¹¹ R. Barthes, “The Ship *Argo*,” in *Roland Barthes by Roland Barthes*, Berkeley/Los Angeles, University of California Press, 1994, p. 46.

¹² L. Daston, “The Coup d’Oeil: On a Mode of Understanding,” *Critical Inquiry*, 45, 2, 2019, p. 308.

Figure 5. Holland Seropian, CNC-Mill Instructions for the Model of Fort Montgomery in New York, “Tour de Force, Tour de Main” studio, SCI-Arc, Fall 2023. Courtesy of Holland Seropian.



——— 1.5 mm line
 ——— 0.5 mm line
 ——— 0.2 mm line
 0.5 mm dot

- I. 1/4" straight flat bit for rough cut of profile out of material.
- II. 1/8" diameter tapered angle ball nose fluted bit remove material between 1.5 mm lines to create surface undulation pattern and bore holes at depth.
- III. v-groove 10 - degree carving bit along 0.2 mm specified lines to depth of 1 mm to finish surface
- IV. v-groove 30 - degree router bit along 0.5 mm specified lines to depth of 1 mm to finish surface
- V. flip mill to bore through with 1/8" tapered angle ball nose fluted bit to complete bore holes at full depth.

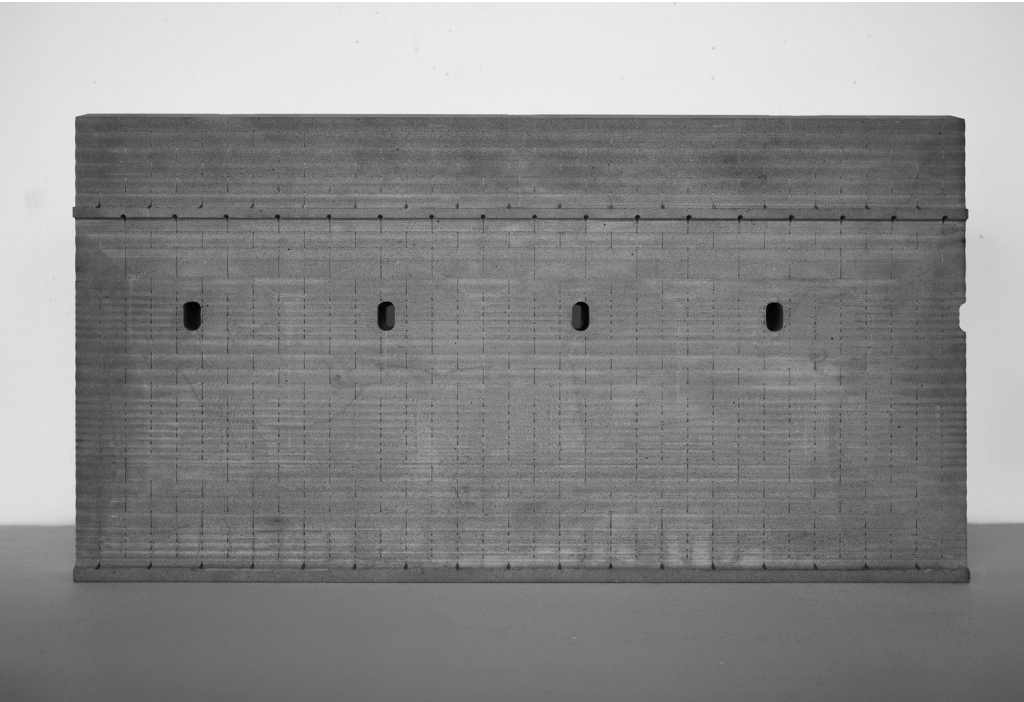


Figure 6. Holland Seropian, CNC-Milled Model of Fort Montgomery in New York, “Tour de Force, Tour de Main” studio, SCI-Arc, Fall 2023. Courtesy of Holland Seropian.

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