Since 2013, critics have publicly debated the Los Angeles County Museum of Art’s plans for a $600 million campus redesign by Peter Zumthor that requires razing three deteriorating 1965 buildings designed by William Pereira and a 1986 addition by Hardy Holzman Pfeiffer Associates. While many, including Christopher Hawthorne, the architecture Critic for The Los Angeles Times, generally support the Zumthor plan, some favor renovation of the existing buildings or have voiced their emotional attachment to the old structures.

“There’s this real sense of nostalgia for place, even if the place doesn’t function anymore,” said the museum’s director, Michael Govan. Rather than sweeping such sentiments under the rug as he stewards the campus overhaul, Mr. Govan has commissioned the artist Vera Lutter “to confront these sites that have meaning and preserve them through her work.”

The German artist is known for searing, ghostly photographs of industrial relics made through a camera obscura process that projects an inverted black-and-white image directly onto light-sensitive paper. Mr. Govan calls this project a “bookend” to Ms. Lutter’s photographs of a former Nabisco factory in 1999 before its transformation into Dia:Beacon, commissioned by Mr. Govan when he directed that institution.

Over the next year at the Los Angeles museum, Ms. Lutter will set up several room-size pinhole cameras in and around the buildings slated for demolition. While her bright outdoor scenes may need exposures of a day or two, a dimly lit gallery view requires a nine-month exposure, giving Ms. Lutter one shot to get it right.

“It’s risky and exciting,” said Mr. Govan, who plans to exhibit the monumentally scaled photographs at the museum in 2018 when demolition begins. “Her images are like physical witnesses to time and place in a way I never imagined a photograph could be.”