



Redlining and the Built Environment

The Case of Streetlights

Nefara Riesch and Michael Zanger-Tishler

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Introduction | *Project Motivation*

“We don't know the magnitude of the collateral consequences of [discriminatory housing] policies, we're only beginning to scratch the surface.”

April De Simone,
Co-founder and Partner
Designing the WE

Introduction | *Project Motivation*

- The recent digitization of Home Owners' Loan Corporation (HOLC) redlining maps has presented an opportunity for researchers to contribute to our understanding on the effects of the practice.
- With these maps, scholars have studied the relationship between redlining and topics as diverse as segregation, tree cover, and gun violence (Faber 2020; Namin et al 2020; Jacoby et al 2018).
- While scholars have noted that, for example, a lower rating from HOLC is associated with more violent crime, there is still much to learn about how the use of these maps result in differential social and health outcomes across neighborhoods and cities/towns.

Introduction | *Project Motivation*

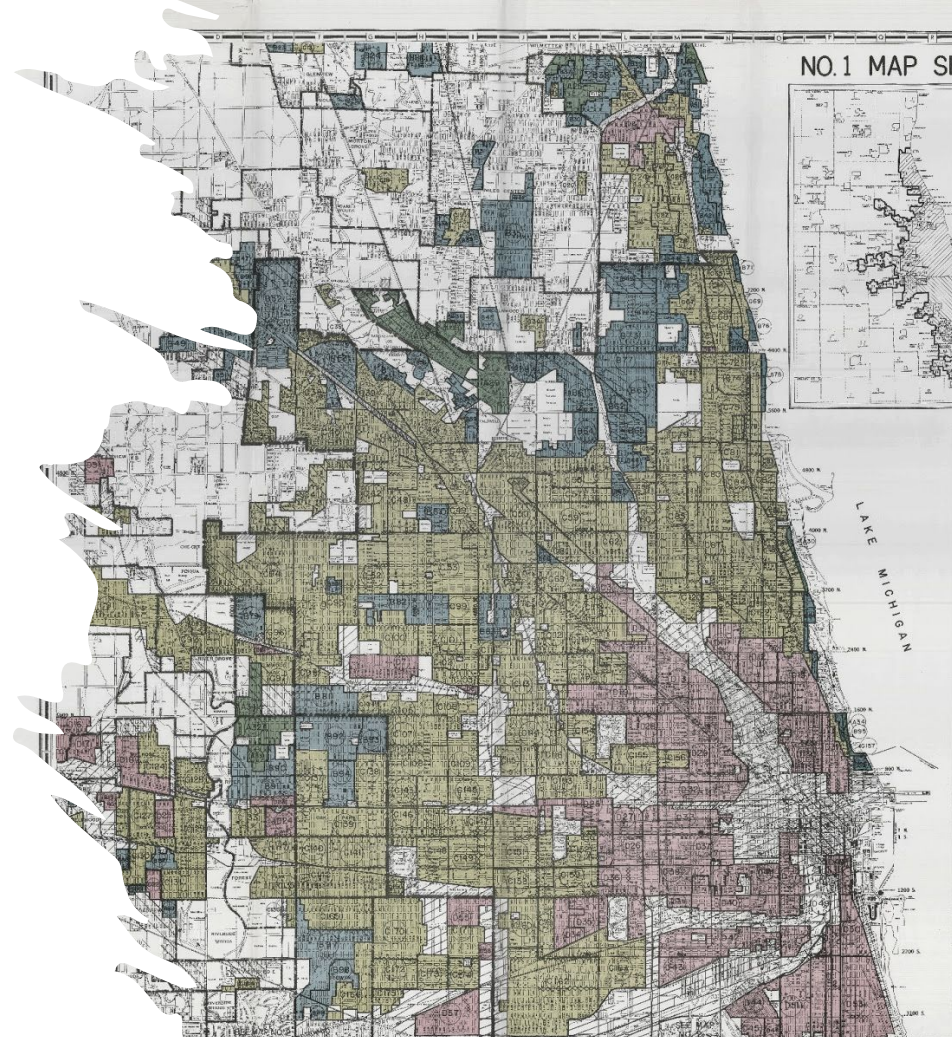
- Our project seeks to provide a mechanism through which redlining may have mattered: street lighting.
- Investigating the installation of streetlights can contribute to research on the relationship between redlining and changes in physical space, as their placement is a fundamentally political process. Municipalities choose where to place them.
- Because streetlights are a ubiquitous and important part of the built environment, studying them can provide insight on how redlining affected social and economic outcomes.

Introduction | *Project Motivation*

- Some researchers have recently argued that redlining did not fundamentally change cities; they were simply reified manifestations of existing spatial stigma and did not necessarily have a causal impact on cities (Fishback et al 2020).
- This project intervenes in this debate by understanding whether streetlight density was already unequal prior to redlining, or if inequalities were exacerbated in the aftermath of the HOLC maps.
- Did city officials, after seeing these maps, make different decisions about where to place streetlights, or were these decisions primarily influenced by preexisting territorial stigma (Wacquant et al 2014)?

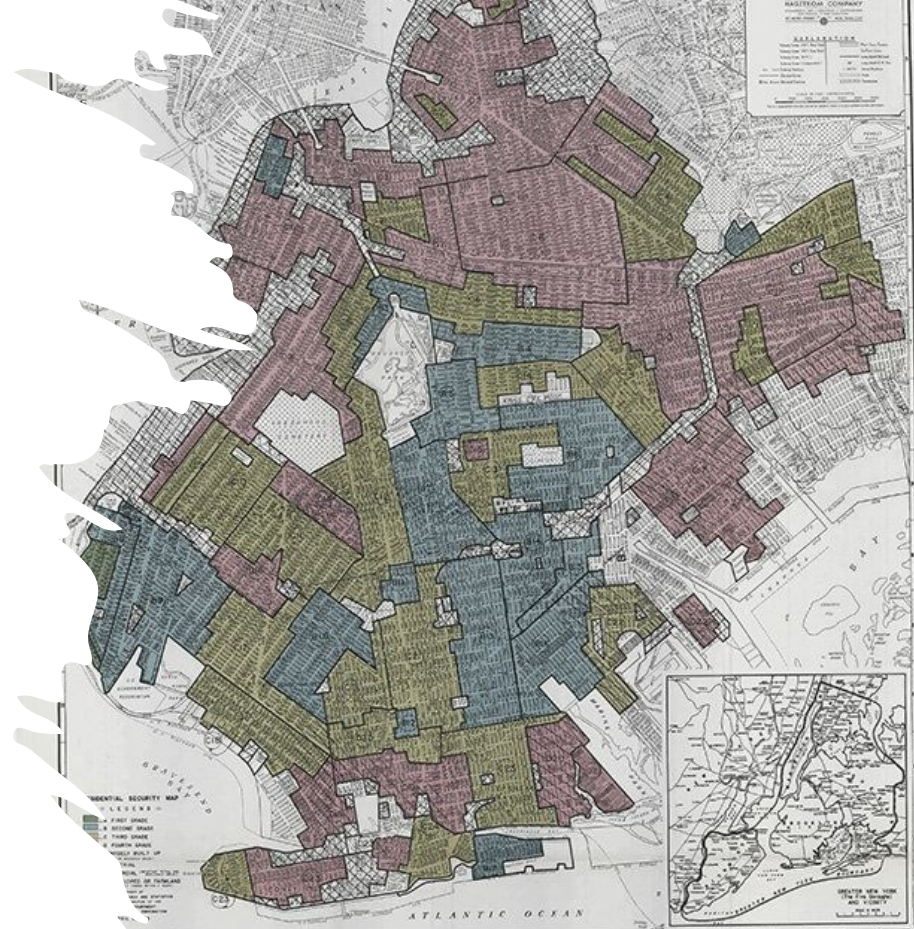
Introduction | *Historical Context*

- Coined by sociologist John McKnight in the 1960s, redlining originally referred to the federal government and private lenders' practice of drawing a red line around neighborhoods in which they intended to deny financial services based on racial and ethnic demographics (Hayes 2021).
- It has since been expanded beyond financial services to include the systematic denial or overcharging of services in communities of color in health care, access to fresh and healthy food, insurance, and other facets of life (“Redlining: Race and Inequality in America” 2015).



Introduction | *Historical Context*

- The Home Owners' Loan Corporation (HOLC) was created in 1933 to help address the foreclosure crisis during the Great Depression and under the instruction of the Federal Home Loan Bank Board created a systematic appraisal process (Aaronson et al 2021).
- HOLC graded neighborhoods based on lending risk, lowering grades for neighborhoods with immigrant, Black, and other non-white residents (Aaronson et al 2021, Connolly 2014, Jackson 1985).
- The Fair Housing Act of 1968 banned this practice in both the public and private sectors (Squires and Woodruff 2019)



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Introduction | *Existing Research*

The practice of redlining has had lasting social, health, and economic consequences.

- Municipalities appraised by HOLC became far more segregated (Faber 2020).
- Previously redlined areas are associated with elevated risk for late-stage cancer diagnosis (Krieger et al 2020)
- Neighborhood ratings affect household income in adulthood, the probability of upward mobility to the top of the income distribution, credit scores, and probability of living in a high-poverty census tract (Aaronson et al 2021).
- Historically redlined neighborhoods are associated with current day incidence of asthma, cancer, poor mental health, and lack of health insurance (Nardone et al 2020a).
- Lower HOLC grades are associated with adverse birth outcomes (Krieger et al 2020, Nardone et al 2020b).
- The rate of injury by firearm is highest in historically redlined neighborhoods (Jacoby et al 2018)

Introduction | *Existing Research*

Recent research provides insights into the possible physical changes that accounted for the outcomes associated with the practice of redlining.

- Neighborhoods that were once redlined are disproportionately impacted by rising temperatures, a finding with implications for health outcomes (Feola 2020).
- The level of tree canopy, which can be used as a strategy to reduce air pollutants, reflects past redlining gradation (Namin et al 2020).
- Redlining affected the geography of housing segregation by influencing the location of single and multi-family housing stock, locking neighborhoods with a high density of multi-family housing in a cycle of impoverishment (An et al 2019).

Our research seeks to build upon this literature by presenting another possible mechanism explaining the relationship between redlining and social outcomes – streetlights.



Introduction | *History of Streetlights*

- Street lighting is known to have existed as early as 500 BCE when natural gas and bamboo pipes were used to illuminate streetlamps in Beijing. (“History of Street Lighting”).
- In the early nineteenth century AD, coal-fueled lanterns were invented and installed across London. In 1816, Baltimore became the first city in the US with gas streetlamps (“A brief history of street lighting”).
- In 1878, the first electric streetlights were used in Paris (“History of Street Lighting”). Just a couple years later, electric “Brush” streetlights were introduced to the United States in Wabash, Indiana (Stouch Lighting Staff 2015).
- Some municipalities have kept records of streetlight (re)placement and/or installment over time through maps and lists.
- An example from 1987 Detroit is presented here.

Introduction | *Hypothesis*

- Municipal governments decide on the installation and placement of streetlights, making it an inherently political decision.
- Governments may have made decisions on streetlight placement based on perceptions of neighborhood worth and investment, reflected in HOLC grades/maps.
- Streetlights have been shown to cause a reduction in crime (Chalfin et al 2019) and are an integral aspect of neighborhoods.
- The placement and density of streetlights may have been impacted by redlining.
- Streetlights may be a mechanism through which redlining has affected the incidence of crime.

Section I: Data Collection | *Methods*

- Researchers emailed and submitted street lighting records requests to archives, libraries, historical societies, and city government offices.
- Cities were chosen based on availability of scanned/digitized HOLC maps and proximity/accessibility to research team.
- Cities contacted include Boston (MA), Houston (TX), Los Angeles (CA), New York City (NY), San Francisco (CA), San Jose (CA), Providence (RI) and St. Louis (MO).
- In most cities, we contacted multiple archives, both municipal and local historical societies.

Section I: Data Collection | *Limitations*

- Modern streetlight maps exist, but historically, they were not systematically created and archived to the same extent as fire insurance maps (the Sandborn fire insurance maps are all archived at the Library of Congress).
- Because streetlights have fallen under the purview of different agencies and companies over time, maps containing streetlight installation and location were not methodically organized for each municipality.
- After ceasing data collection efforts, the research team decided to use Boston as its primary case.

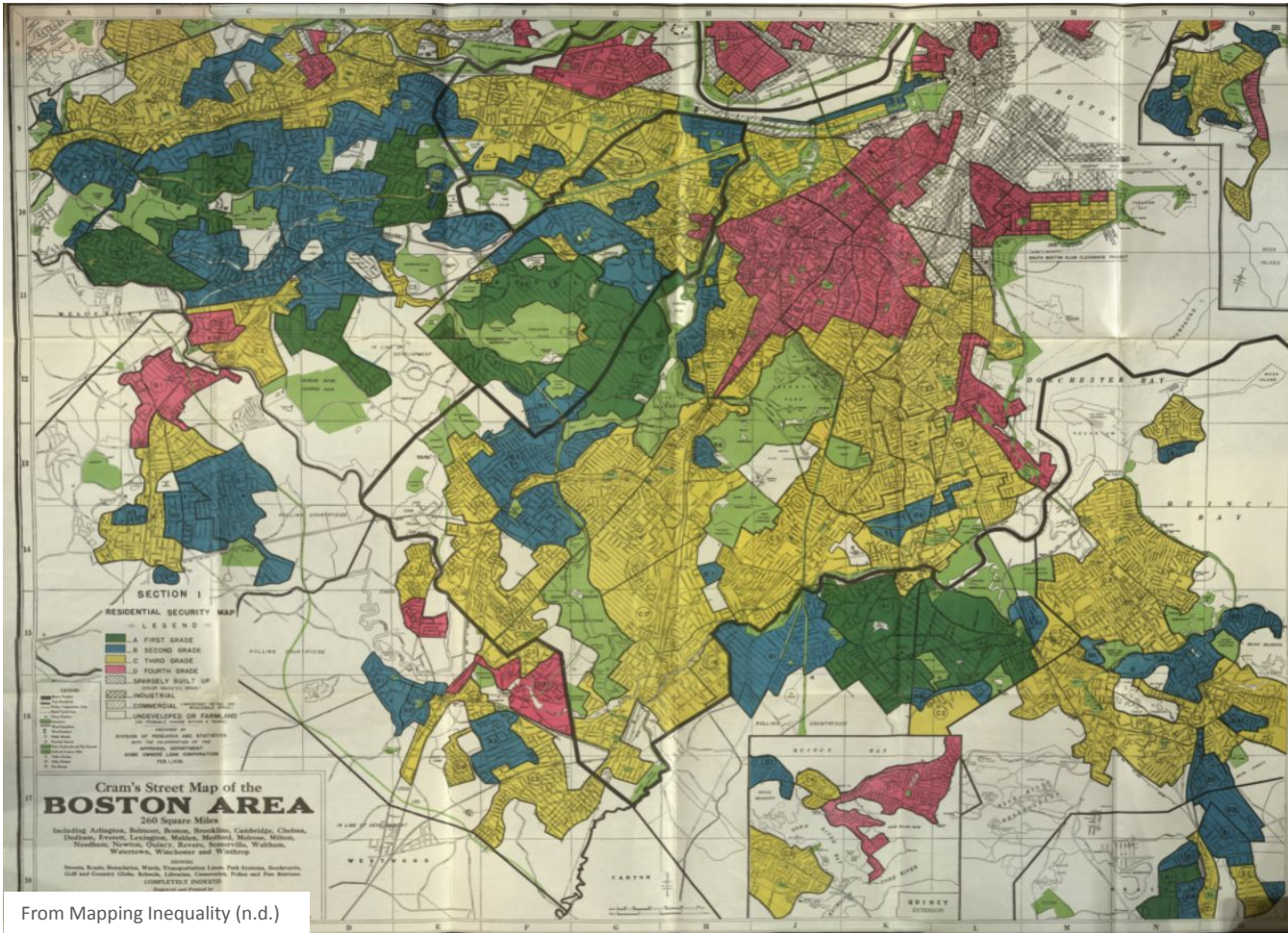
Section II: Boston case | *Overview*

- We primarily relied on an in depth study of the City of Boston’s “Street Lighting History Collection”
https://www.cityofboston.gov/images_documents/Guide%20to%20the%20Street%20Lighting%20History%20Collection_tcm3-41269.pdf
- The collection, preserved by a municipal employee with an interest in street lighting in Boston, consists of records of contracts, repair orders, lamp locations, reports about street lighting in the city, and historic photographs.
- The City of Boston used gas lamps beginning in 1828, and in 1909, the city began to install tungsten electric lamps. By 1913, all the gas lamps in the city proper had been converted to electric lamps.
- However, in residential areas of the city, they were not yet converted. In fact, the city only converted gas lamps to electric lamps in lower Roxbury and used gas lamps in residential neighborhoods through the 1950s.

Section II: Boston case | *Overview*

- Though not maintained by the city, the City of Boston kept detailed records of the number of gas streetlights in service in the neighborhoods of Brighton, Dorchester, Charlestown, East Boston, Roxbury, South Boston, and West Roxbury. It also kept details on the number of fire alarms in the neighborhoods. These were fire alarms which used to be on public streets and were ways for citizens to contact firefighters in case of a fire.
- We present descriptive graphs of these changes over time for both the number of gas streetlights and fire alarms. We collected annual data for available neighborhoods.
 - Note that this is relatively limited to certain neighborhoods that seem to have retained gas lamps.
- The Boston Redlining map (next slide) was published in 1938.
 - The neighborhoods have different grades, with areas such as Charlestown having been redlined (D grade) and areas such as West Roxbury graded Green and Blue (A and B grade).

Section II:
Boston
case | *H*
OLC
Redlining
Map

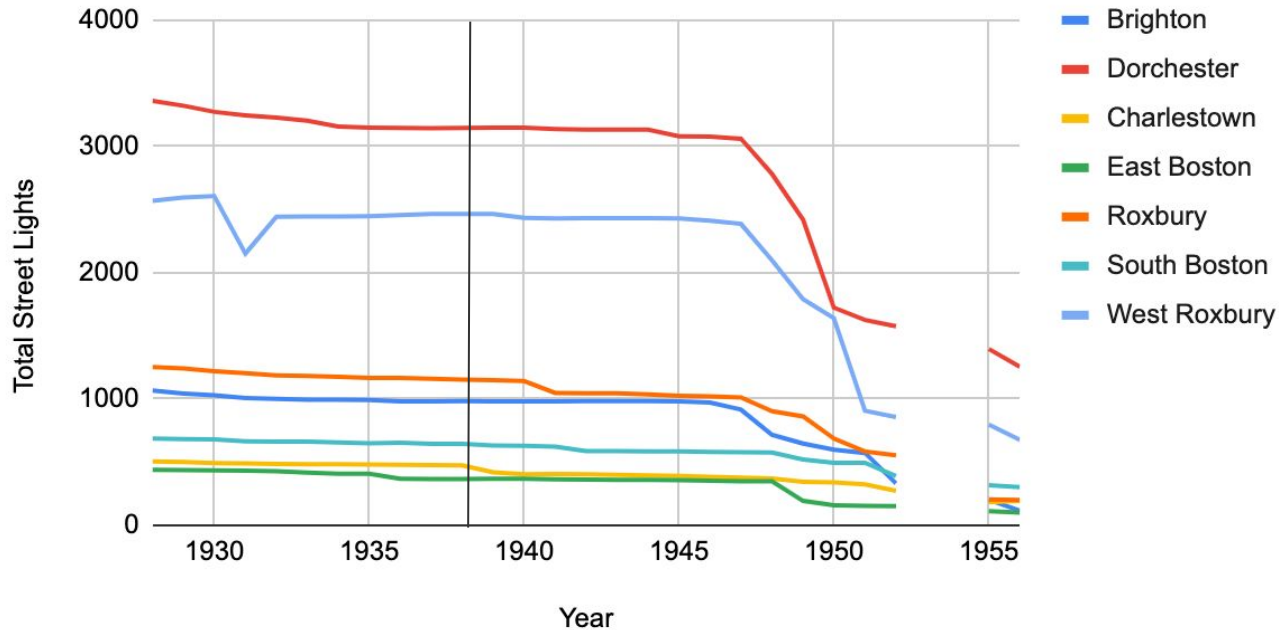


From Mapping Inequality (n.d.)

Section II: Boston case | *Results: StreetLights*

Gas Lamps by Neighborhood in Boston

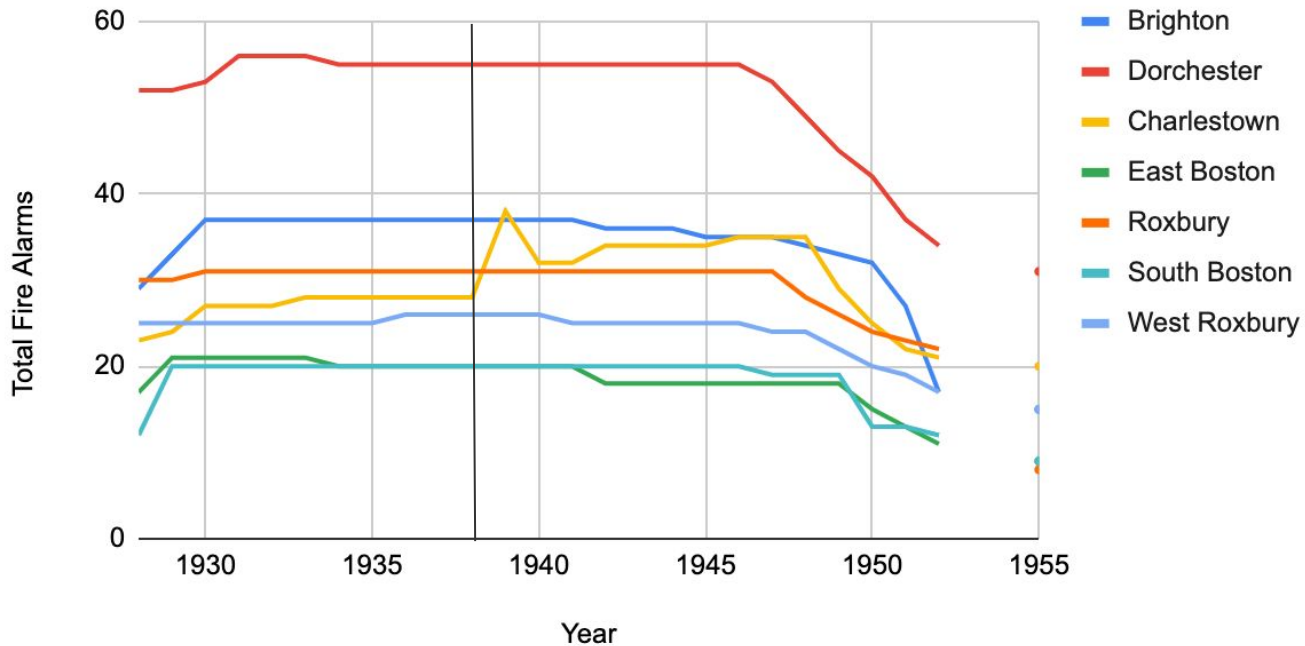
Black Line Represents the Year the HOLC was Published



Section II: Boston case | *Results: Fire Alarms*

Fire Alarms by Neighborhood in Boston

Black Line Represents the Year the HOLC was Published



Section II: Boston case | *Discussion*

- For gas lamps, we see visually that the publication of the HOLC maps had no impact on the number of streetlamps in these neighborhoods; there was no change. Any inequality already existed from when these lamps were installed.
- We find the same result when we look at fire alarms, with the exception of the installation of some fire alarms in Charlestown the year that the maps were published; but Charlestown was a highly redlined neighborhood, so this is the opposite result that we would expect!
- Ultimately, we see evidence that streetlamps and other durable aspects of the built environment may not have been directly changed by the publication of HOLC maps.

Section III: Future Research

- We used this stage of the research process to scope the feasibility of analyzing the relationship between redlining and streetlight installation.
- While our results may suggest HOLC maps/grading resulted in no change to the number of gas lamps or fire alarms in select Boston neighborhoods, future research should employ spatial causal inference methods to explore this and estimate the indirect effect of redlining on various crime and health outcomes via street lighting or similar built environment characteristics.
- Future research should build upon existing literature on mechanisms to better understand the social consequences of redlining.
- Regarding the Boston data, we would like to link these descriptive results to demographic information.
- We believe that these results shed more light on the relevance of redlining for the built environment.

Acknowledgements

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