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RESPONSE TO PROFESSOR ROSENBLOOM: FIFTY SHADES OF GRAY INFRASTRUCTURE: LAND USE AND THE FAILURE TO CREATE RESILIENT CITIES, 93 WASH. L. REV. 317 (2018).

Roberta F. Mann*

Professor Rosenbloom has made a valuable contribution to the growing legal literature on environmental resilience.¹ As he notes, local land use provisions and local infrastructure play a large yet overlooked role in responding (or not) to climate change pressures. Indeed, Rosenbloom finds that local infrastructure is ill-prepared to deal with the consequences of climate change, whether those are catastrophic weather, rising sea levels, or simply a climate with more temperature extremes.² Rosenbloom focuses on “gray infrastructure,” which he defines as static structures made from concrete or metal, designed to meet a predetermined set of criteria or maintain a fixed level of performance.³ Gray infrastructure is not resilient for two reasons: it deteriorates and it is inflexible. In large part, Professor Rosenbloom aptly diagnoses the problem with current land use laws and resulting inflexible gray infrastructure. However, his Article fails to address a foundational issue that, if unaddressed, will prevent meaningful progress toward adaptable cities: automobile dependence.

Using Des Moines, Iowa, as an example, Rosenbloom chronicles how severe weather predicted by scientists challenges gray infrastructure and puts public health at risk.⁴ Much of local infrastructure is privately built subject to local land use laws.⁵ Noting that “[o]ne of the most influential tools communities have to strengthen local infrastructure resilience to climate and ecosystem changes is land use laws,” Rosenbloom analyzes

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1. See generally Craig Anthony (Tony) Arnold, *Resilient Cities and Adaptive Law*, 50 IDAHO L. REV. 245 (2014); Robin Kundis Craig & Melinda Harm Benson, *Replacing Sustainability*, 46 AKRON L. REV. 841 (2013); Tracy-Lynn Humby, *Law and Resilience: Mapping the Literature*, 4 SEATTLE J. ENV’L. L. 85 (2014).

2. Jonathan Rosenbloom, *Fifty Shades of Gray Infrastructure: Land Use and The Failure to Create Resilient Cities*, 93 WASH. L. REV. 317, 319–20 (2018).

3. *Id.* at 322.

4. *Id.* at 329–34.

5. *Id.* at 321.

pervasive land use regulations for parking, stormwater management, and tree mitigation.⁶ The common focus of his analysis is the impervious surfaces, such as asphalt and concrete pavement, required by the regulations.⁷ Covering land with impervious surfaces creates run-off hazards, leading to flooding and pollution entering natural waterways. Land that is not covered by impervious surface has a better chance of absorbing rainfall and mitigating pollution.⁸ Rosenbloom recommends creating a more flexible legal structure for local land use regulations that can adapt to changing environmental circumstances.⁹

Rosenbloom's thoughtful article provides guidelines for localities seeking to improve climate resilience. However, in considering the foundational issue of the automobile-centric design of U.S. cities, a number of questions arise. Why do local land use regulations require large parking lots for businesses? Why are wide roads required for new developments? Why do gray infrastructure needs, like stormwater drains in roads, trump tree mitigation ordinances?

Rosenbloom focuses on a symptom, not the root cause. If cities tackle automobile dependence by providing accessible transit, bike lanes, and walkable neighborhoods, there will be no reason to increase impervious surfaces.¹⁰ The forces that have created our automobile-centric lifestyle are multiple and complex,¹¹ like the societal and environmental ills caused by that lifestyle.

The transportation sector is the largest contributor to climate-changing greenhouse gas (GHG) emissions in the U.S., amounting to about 28% of total emissions.¹² Cars and trucks create about 23% of annual U.S. GHG emissions.¹³ The automobile is the predominant commuting mode for all

6. *Id.* at 344–45, 350.

7. *Id.* at 350–57.

8. Roberta F. Mann, *On the Road Again: How Tax Policy Drives Transportation Choice*, 24 VA. TAX REV. 587, 636 (2005).

9. Rosenbloom, *supra* note 2 at 366–83.

10. See KATIE ALVORD, DIVORCE YOUR CAR: ENDING THE LOVE AFFAIR WITH THE AUTOMOBILE 147 (2000) (“Bicycles encourage more compact communities, require less asphalt, and save land for other uses”); JANE HOLTZ KAY, ASPHALT NATION: HOW THE AUTOMOBILE TOOK OVER AMERICA AND HOW WE CAN TAKE IT BACK 342–44 (1997) (describing the “de-paving” movement).

11. See *e.g.*, KENNETH T. JACKSON, CRABGRASS FRONTIER: THE SUBURBANIZATION OF THE UNITED STATES 157–71 (1985) (describing how affordable automobiles, massive government investment in roads, and General Motors' successful efforts to eliminate public transportation ushered in the “new age of automobility”).

12. ENVTL. PROT. AGENCY, FAST FACTS: U.S. TRANSPORTATION SECTOR GREENHOUSE GAS EMISSIONS 1990–2016, at 1 (2018), <https://www.epa.gov/sites/production/files/2018-06/documents/420f18013.pdf> [<https://perma.cc/CUX2-32MM>].

13. *Id.*

metro areas in the U.S.¹⁴ Over three quarters of commuters drive to work alone.¹⁵ The American Public Transportation Association estimated that a typical two-car family generated 55% of its GHG footprint from automobile use.¹⁶ While demographic changes are moving in the right direction, with the largest decrease in automobile commuting coming from workers ages 25 to 29,¹⁷ the regulatory framework has yet to catch up. Even though millennials are moving from the urban core to the suburbs as they purchase homes and begin their families, they are seeking a different sort of suburban lifestyle, one not so dominated by the automobile.¹⁸

Despite reduced automobile use by younger people in urban areas, many city codes have excessive parking requirements.¹⁹ As detailed by Rosenbloom, typical city ordinances require developers to install a minimum number of parking spaces depending on the building size and use.²⁰ Apple's new campus in Cupertino provides a shocking example of parking mandates gone wild.²¹ Cupertino's parking minimums required Apple to build 11,000 parking spots for the 14 thousand employees who work at the company's headquarters—more square footage is used for parking space than office space.²² Nationwide, an estimated 17% of rent

14. Adie Tomer, *America's Commuting Choices: Five Major Takeaways from the 2016 Census Data*, BROOKINGS: THE AVENUE (Oct. 3, 2017), <https://www.brookings.edu/blog/the-avenue/2017/10/03/americans-commuting-choices-5-major-takeaways-from-2016-census-data/> [<https://perma.cc/9VEK-NWST>] (“Over 76 percent of Americans drive alone to work every day . . .”).

15. BRIAN MCKENZIE, WHO DRIVES TO WORK? COMMUTING BY AUTOMOBILE IN THE UNITED STATES: 2013, at 1 (2015), <https://www.census.gov/content/dam/Census/library/publications/2015/acs/acs-32.pdf> [<https://perma.cc/SG5N-Q4H8>].

16. AM. PUB. TRANSP. ASS'N, PUBLIC TRANSPORTATION REDUCES GREENHOUSE GASES AND CONSERVES ENERGY 2 (2008), http://www.apta.com/resources/reportsandpublications/Documents/greenhouse_brochure.pdf [<https://perma.cc/3ETU-CHDN>] [hereinafter APTA GREENHOUSE GASES BROCHURE].

17. MCKENZIE, *supra* note 15, at 8 fig.5 (detailing an estimated 2.6 percentage point reduction from 2006 to 2013 in the percentage of 25- to 29-year-olds who commuted by automobile).

18. Alan M. Berger, *The Suburb of the Future, Almost Here*, N.Y. TIMES (Sept. 15, 2017), <https://www.nytimes.com/2017/09/15/sunday-review/future-suburb-millennials.html> (last visited Sept. 5, 2018).

19. Rosenbloom, *supra* note 2, at 351.

20. *Id.*

21. Alissa Walker, *How Parking Lots Are Ruining Los Angeles: LA's Parking Crisis Is Fueling its Housing Crisis*, CURBED L.A. (July 21, 2017, 2:15 PM), <https://la.curbed.com/2017/7/21/16011386/parking-lots-bad-los-angeles-development> [<https://perma.cc/DW9J-5J8A>].

22. *Parkageddon: How Not to Create Traffic Jams, Pollution and Sprawl*, ECONOMIST (Apr. 8, 2017), <http://www.economist.com/news/briefing/21720269-dont-let-people-park-free-how-not->

goes to paying for “free” parking.²³ The excess cost of parking leads to unaffordable housing.²⁴ In 2015, Minneapolis reduced its parking requirements for housing developments near transit, eliminating the parking mandate for buildings with fewer than 50 units and cutting the mandate in half from one space per unit.²⁵ The result was more affordable housing.²⁶

Notwithstanding the demographic trends, there are forces working to maintain the current automobile-centric U.S. lifestyle. Traffic engineers tend to focus on cars and often give low priority to trucks and cyclists.²⁷ Road design guidelines focus on traffic capacity rather than making the road system safe for all users.²⁸ Many public transit advocates argue that improved public transportation infrastructure and increased public transportation usage will reduce GHG emissions.²⁹ But these public transit advocates face challenges from anti-tax advocates. For example, Americans for Prosperity, a 501(c)(4) organization, is working to defeat public transit expansion proposals in cities and counties across the country.³⁰ These anti-transit campaigns are framed as anti-tax campaigns because of a systematic bias towards cars in transportation funding.³¹ While highway funding is built into state and federal budgets, public

create-traffic-jams-pollution-and-urban-sprawl [https://perma.cc/B9B9-R97H]. Apple got the number of parking spaces *down* to 11,000 by showing that 28% of employees used means of transportation other than single-occupancy vehicles. Kristi Myllenbeck, *Apple Park: Cupertino Shares Insights into Traffic, Sheer Size of Project*, THE MERCURY NEWS (Sept. 12, 2017, 6:54 AM), <https://www.mercurynews.com/2017/02/24/apple-campus-city-public-works-shares-insights-into-traffic-sheer-size-of-project/> [https://perma.cc/LVY5-SEXG].

23. C.J. Gabbe & Gregory Pierce, *Hidden Costs and Deadweight Losses: Bundled Parking and Residential Rents in the Metropolitan United States*, 27 HOUSING POL'Y DEBATE 217, 225 (2017), <https://www.tandfonline.com/doi/pdf/10.1080/10511482.2016.1205647?needAccess=true> (last visited Sept. 5, 2018).

24. See Walker, *supra* note 21.

25. Angie Schmitt, *How Parking Mandates Tilt the Market Towards “Luxury” Housing*, STREETS BLOG USA (Feb. 1, 2018), <https://usa.streetsblog.org/2018/02/01/how-parking-mandates-tilt-the-market-toward-luxury-housing/> [https://perma.cc/6WMW-VYN7].

26. *Id.*

27. Warwick Pattinson & Russell G. Thompson, *Trucks and Bikes: Sharing the Roads*, 125 PROCEDIA: SOC. & BEHAV. SCI. 251, 253 (2014), <https://www.sciencedirect.com/science/article/pii/S1877042814015092> (last visited Sept. 5, 2018).

28. *Id.*

29. See, e.g., APTA GREENHOUSE GASES BROCHURE, *supra* note 16, at 1.

30. Hiroko Tabuchi, *How the Koch Brothers Are Killing Public Transit Projects Around the Country*, N.Y. TIMES (June 18, 2018), <https://www.nytimes.com/2018/06/19/climate/koch-brothers-public-transit.html> [https://perma.cc/62JG-FH7Y].

31. *Id.*

transit receives only a small portion of that funding.³² Therefore, expanding public transportation projects usually requires a vote to raise taxes. Voters in Nashville, Tennessee, recently defeated a proposal to fund a public transport project with a one-percentage point increase in the city's sales tax.³³ Americans for Prosperity played a major role in its defeat by organizing door-to-door canvassing teams against the proposal.³⁴

The coming wave of technology, including autonomous vehicles (AVs) and drone delivery, will impact the need for impervious surfaces. AVs have the significant potential to change land use patterns, reducing the need for urban parking structures.³⁵ According to the International Transport Forum, up to 90% of vehicles and their associated parking spaces could be removed from cities by implementing fleets of AVs.³⁶ Consumer-owned cars are inefficient and underused: most are used for less than one hour per day, sitting idle for about 95% of their life.³⁷ In 2012, there were an estimated 500 million parking spots across the United States.³⁸ With about 250 million registered vehicles in the same year, that was two for every car.³⁹ If you placed the on-street parking spaces available in San Francisco end-to-end, they would stretch 900 miles—more than the 840 miles of California coastline.⁴⁰ AVs reduce parking

32. Roberta F. Mann, *Sustainably Funding Highway Infrastructure: Tax Fuel or Miles?*, 31 AUSTRALIAN TAX FORUM 609, 618 (2016), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2907737 [<https://perma.cc/9PVT-HGM5>] (click "Open PDF in Browser").

33. Joey Garrison, *Nashville Voters Overwhelmingly Reject Transit Referendum*, USA TODAY NETWORK: TENNESSEAN (May 3, 2018, 7:31 AM), <https://www.tennessean.com/story/news/politics/2018/05/01/nashville-transit-vote-davidson-county-mass-transit/564991002/> [<https://perma.cc/84HM-XB7L>].

34. Tabuchi, *supra* note 30.

35. BENJAMIN Y. CLARK, NICO LARCO & ROBERTA F. MANN, SUSTAINABLE CITIES INITIATIVE: URBANISM NEXT, THE IMPACTS OF AUTONOMOUS VEHICLES AND E-COMMERCE ON LOCAL GOVERNMENT BUDGETING AND FINANCE (2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3009840 [<https://perma.cc/38N9-WPT4>] (click "Open PDF in Browser").

36. INT'L TRANSP. FORUM, URBAN MOBILITY SYSTEM UPGRADE: HOW SHARED SELF-DRIVING CARS COULD CHANGE CITY TRAFFIC 19 (2015), https://www.itf-oecd.org/sites/default/files/docs/15cpb_self-drivingcars.pdf [<https://perma.cc/W34L-2B4Q>].

37. *Id.* at 27.

38. Michael Kimmelman, *Paved, but Still Alive*, N.Y. TIMES (Jan. 8, 2012), <https://www.nytimes.com/2012/01/08/arts/design/taking-parking-lots-seriously-as-public-spaces.html> (last visited Sept. 5, 2018) (estimating between 105 million and two billion parking spots).

39. *Number of Motor Vehicles Registered in the United States from 1990 to 2016*, STATISTA (2018), <https://www.statista.com/statistics/183505/number-of-vehicles-in-the-united-states-since-1990/> [<https://perma.cc/C43W-5LXE>].

40. Press Release, SFMTA Mun. Transp. Agency, SFMTA Completes Citywide Census of On-

needs because they may be readily operated as shared vehicles and can be stored remotely when not in use. Rather than take up a parking spot, AVs can be continuously deployed as rideshares.

E-commerce, whether by conventional truck or drone delivery, will reduce the need for parking at shopping locations.⁴¹ The “sustainable city” movement,⁴² emphasizing walkable and transit accessible neighborhoods, will also reduce the need for parking while shopping.⁴³ AVs could even become mobile stores, stocked with merchandise ready for delivery to customers’ homes.⁴⁴ Shopping malls are already being repurposed as churches, schools, hospitals, and even as indoor farms.⁴⁵

Changing trends in transportation could also lead to greater acceptance of reduced parking minimums and even application of parking *maximums*.⁴⁶ The city of San Francisco is illustrative of the potential for change. Between 1968 and 1997, every neighborhood in San Francisco had a minimum residential parking requirement, no neighborhood had a residential maximum, and only one neighborhood (Downtown) placed an upper limit on the amount of non-residential parking.⁴⁷ Since 2005, parking requirements have been removed from a broad swath of the city. San Francisco has also changed other development requirements with a goal of reducing automobile dependence, including unbundling parking costs from housing costs, building secure bicycle parking, and requiring

Street Parking Spaces (May 22, 2017), <https://www.sfmta.com/press-releases/sfmta-completes-citywide-census-street-parking-spaces> (last visited Sept. 5, 2018).

41. Derek Thompson, *What in the World Is Causing the Retail Meltdown of 2017?*, ATLANTIC (Apr. 10, 2017), <https://www.theatlantic.com/business/archive/2017/04/retail-meltdown-of-2017/522384/> [<https://perma.cc/C8M6-KLYD>] (arguing that the rise of e-commerce and the oversupply of malls has “change[d] the face of American shopping”); *see also*, Berger, *supra* note 18.

42. Rosalie Anders, *The Sustainable Cities Movement 5* (August 1991) (unpublished working paper) (on file with Institute for Resource and Security Studies), <https://irssusa.files.wordpress.com/2013/10/sustcitiesmvmnt.pdf> [<https://perma.cc/4V23-YNTT>].

43. Jaime Lerner, *How to Build a Sustainable City*, N.Y. TIMES (Dec. 7, 2015), <https://www.nytimes.com/2015/12/07/opinion/how-to-build-a-sustainable-city.html> (last visited Sept. 5, 2018).

44. Thompson, *supra* note 41.

45. Emily Matchar, *The Transformation of the American Shopping Mall*, SMITHSONIAN (Sept. 12, 2017), <https://www.smithsonianmag.com/innovation/transformation-american-shopping-mall-180964837/> [<https://perma.cc/4X2D-KJX3>].

46. Fei Li & Zhan Guo, *Do Parking Standards Matter? Evaluating the London Parking Reform with a Matched-Pair Approach*, 67 TRANSP. RES. PART A: POL’Y AND PRACTICE 352, 353 (2014), <https://www.sciencedirect.com/science/article/pii/S0965856414001815?via%3Dihub> (last visited Sept. 5, 2018) (click “Download” then “Article”).

47. *A Brief History of Parking in San Francisco*, LIVABLE CITY (June 15, 2015), <https://www.livablecity.org/parking-history-sf/> [<https://perma.cc/RVU6-8NDJ>].

car share spaces in large new developments.⁴⁸ Other cities around the world are taking the same path, including Philadelphia, Zurich, Copenhagen, Paris, and Sao Paulo.⁴⁹ In Sydney, a parking space levy first implemented in 1992 has had a two-pronged effect: it has raised funds for public transportation and reduced urban congestion.⁵⁰

Beyond control of parking, cities have adopted other strategies to cope with an evolving climate. Las Vegas bans front yard lawns to save water.⁵¹ Federal standards require low flow toilets, and several states have added their own standards.⁵² Although, as Rosenbloom notes, local ordinances generally call for gray infrastructure to handle stormwater, one community built in the 1970s successfully fought housing codes.⁵³ Village Homes in Davis, California, was planned before “smart growth” and “new urbanism” became buzz words.⁵⁴ The developers used an open channel drainage system, which “creates a network of small, creek-like channels that hold rainwater and allow runoff to percolate back into the water table. . . .”⁵⁵ The developers saved \$200,000 by not using storm sewers, and the development handled high rainfall events without flooding, unlike the surrounding conventional developments.⁵⁶ This strategy has since been adopted by other local developments.⁵⁷ Village Homes also features narrow streets, bike paths, and edible common landscaping, including citrus, peaches, grapes, and figs.⁵⁸ Located in the Central Valley of California, Davis has hot summers. The ambient temperature in Village

48. *Id.*

49. Nate Berg, *Lots to Lose: How Cities Around the World are Eliminating Car Parks*, *GUARDIAN* (Sep. 27, 2016, 7:23 AM), <https://www.theguardian.com/cities/2016/sep/27/cities-eliminating-car-parks-parking> [<https://perma.cc/X2U7-L9QY>].

50. TRANSP. FOR NEW SOUTH WALES, *REVIEW OF THE PARKING SPACE LEVY ACT 2009 / REVIEW OF THE PARKING SPACE LEVY REGULATION 2009*, at 3, 8 (2016), https://www.transport.nsw.gov.au/sites/default/files/media/documents/2017/parking-spaces-discussion-paper-final_0.pdf [<https://perma.cc/S5WC-CDB9>].

51. Ian Lovett, *Arid Southwest Cities' Plea: Lose the Lawn*, *N.Y. TIMES* (Aug. 11, 2013), <https://www.nytimes.com/2013/08/12/us/to-save-water-parched-southwest-cities-ask-homeowners-to-lose-their-lawns.html> (last visited Sept. 5, 2018).

52. *Water-Efficient Plumbing Fixtures*, NAT'L CONF. OF STATE LEGISLATURES (Nov. 10, 2015), <http://www.ncsl.org/research/environment-and-natural-resources/water-efficient-plumbing-fixtures635433474.aspx> [<https://perma.cc/3ZBN-YLLW>].

53. Mark Francis, *Village Homes: A Case Study in Community Design*, 21 *LANDSCAPE J.* 23, 27 (2002) (reporting that city staff fought virtually every design concept).

54. *Id.* at 25.

55. *Id.* at 30.

56. *Id.*

57. *Id.*

58. *Id.* at 29.

Homes is significantly cooler than the surrounding neighborhoods, possibly due to the increased plant cover and reduced pavement.⁵⁹

While serving as a wonderful example of what is possible, the Village Homes concept has not been replicated.⁶⁰ One reason might be financing. Village Homes faced resistance from local banks⁶¹ because banks typically require development plans showing proof of compliance with local ordinances before approving financing.⁶² The developer, Mike Corbett, gave his assessment of the reason: “The problem is not that the public does not want it. . . . But developers are so closed-minded. They continue to build thousands of places where you can’t get around without a car.”⁶³

In conclusion, Rosenbloom has identified and adeptly explained how local gray infrastructure rules operate as a barrier to climate change adaptation. He has offered helpful legal solutions. One hopes, however, that society can move to a more permanent solution to the underlying problem of automobile dependence. Removing incentives for sprawl development would be a good start.⁶⁴ Reducing automobile use would both alleviate the need for pavement and mitigate GHG emissions.

59. The author has personal experience of this phenomenon, having lived in Village Homes in 1995-1996 while at U.C. Davis School of Law as a visiting professor. *See also*, Jay Feldman, *Planned Agricultural Communities: Where Utopia Meets Suburbia*, MODERN FARMER (Aug. 4, 2015), <https://modernfarmer.com/2015/08/planned-agricultural-communities/> [<https://perma.cc/Z9SL-4VV7>].

60. Francis, *supra* note 53, at 37.

61. *Id.* at 28.

62. Philip Langdon, *Yes, You CAN Finance Mixed-use Development*, PUBLIC SQUARE (July 31, 2017), <https://www.cnu.org/publicsquare/2017/07/31/yes-you-can-finance-mixed-use-development> [<https://perma.cc/JL39-85MC>].

63. Francis, *supra* note 53, at 38.

64. *See generally* Roberta F. Mann, *The (Not So) Little House on the Prairie: The Hidden Costs of the Home Mortgage Interest Deduction*, 32 ARIZ. ST. L.J. 1347 (2000) (explaining how the mortgage interest deduction incentivizes larger homes built on the urban fringe).