

DARC¹ Matters: Repurposing Nineteenth-Century Property Law for the Twenty-First Century

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ABSTRACT: This article considers the legal landscape underlying current efforts to develop a large-scale drone delivery system for small packages to the general public. Different options have been put forward, such as flying drones over highways, within a slice of airspace over private land, and in railroad and utility corridors. We argue that there are both practical and legal reasons for focusing on railroad and utility corridors for drone delivery purposes. Between Federal Aviation Administration regulation of the airspace and state and local trespass and nuisance laws, the Amazons and Googles of the world must thread a narrow needle to find the appropriate physical space and favorable legal rules to make a drone highway feasible. In the 1980s, railroads, environmental groups, and the courts had to navigate the legal minefields of 19th-century railroad law when repurposing railroad corridors for recreational trails under the railbanking process. Much can be learned from that experience as new technology promises a futuristic world of near-instant gratification of consumer desires. But without a firm understanding of the pitfalls and promises of railroad property law, the logistics of federal preemption, and the niceties of state trespass and nuisance, the 21st-century technology is likely to be held back by the arcane twists and turns of 19th-century property law. In exploring these issues, we provide a framework for analyzing the legal challenges facing development of a large-scale drone delivery network and offer some helpful tools to get this technology off on the right track.

1. Drone Airspace in Railroad Corridors.

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I. INTRODUCTION

One night after a hard day's work, you venture outside for a stroll only to accidentally drop your phone through a storm-drain grate, where it is whisked off to dark caverns unknown. As it slips beneath the oozing muck, you remember you have an online deposition tomorrow that will require dual authentication with a phone. Was it truly an accidental mishap? Only *The*

Shadow knows that.² But thanks to a confluence of 19th-century infrastructure and 21st century technology, a remedy is at hand. You race home, log in to your laptop, and order your new phone immediately. The website reports that you can pick it up within two hours at your local locker destination.

Enjoying the cool evening air, you decide to ride your bike to the pickup site, since it is less than two miles away,³ adjacent to a defunct railroad corridor. Even at this late hour, a blurred column of high-speed insectile delivery drones⁴ are zipping silently by, glinting in the moonlight 200 feet above the tracks. You pedal up, scan the credit card linked to your account and are directed to a locker. While you locate the locker, a platoon of drones peels off from the column, almost unsettlingly intelligent as they gracefully exit the stream of drone commuters, which continue down the tracks toward the next town. The drones slow and begin their landing programs, off now in some part of the delivery complex you cannot see. You arrive at your locker, one of a gigantic bank of steel doors set against the outside of the complex wall, scan your credit card again, hear a mechanical scrape as it is accessed from inside. Within moments, you open it and reach inside to retrieve your brand-new phone. Clutching it safely as you pedal home, you utter a brief prayer to whatever gods of technology could have created such a wonder. Although you may be up all night waiting on updates and getting it set up, you know you will make your meeting in the morning; and it is all thanks to drones.

Corporate internet marketers have been predicting the widespread use of drone delivery for small-weight packages for decades.⁵ Promising virtually instant gratification, they have taunted us with visions of drones dropping

2. "The Shadow" was a radio drama that was broadcast from 1930 to 1954 containing the iconic introduction: "Who knows what evil lurks in the hearts of men? The Shadow knows!" *The Shadow: Radio Mystery*, WRIGHT OPERA HOUSE, <https://thewrightoperahouse.org/events/theater/the-shadow-radio-mystery> [<https://perma.cc/2HJX-KGWN>] (quoting the catchphrase from THE SHADOW (1954)).

3. Rails-to-Trails Conservancy, the leading non-profit advocating for multimodal transportation infrastructure, estimates that "more than half of all [transportation] trips . . . are within a 20-minute bike ride or less, and more than one in four . . . are within a 20-minute walk or less." TORSHA BHATTACHARYA, KEVIN MILLS & TIFFANY MULALLY, ACTIVE TRANSPORTATION TRANSFORMS AMERICA: THE CASE FOR INCREASED PUBLIC INVESTMENT IN WALKING AND BIKING CONNECTIVITY 1 (2019), https://www.railstotrails.org/media/869945/activetransport_2019-report_final_reduced.pdf [<https://perma.cc/72FV-Z52M>] (analyzing data from U.S. DEP'T TRANSP.: FED. HIGHWAY ADMIN., 2017 NATIONAL HOUSEHOLD TRAVEL SURVEY (2018)).

4. Drones are technically referred to unmanned aerial vehicles, or UAVs for short. John F. Guilmartin, *Unmanned Aerial Vehicle*, BRITANNICA (July 15, 2020), <https://www.britannica.com/technology/unmanned-aerial-vehicle> [<https://perma.cc/Q5L8-YX72>]. We refer to them here as drones simply because that is the more common term used.

5. See Aarian Marshall, *No, Amazon Won't Deliver You a Burrito by Drone Anytime Soon*, WIRED (Sept. 5, 2020, 7:00 AM), <https://www.wired.com/story/amazon-wont-deliver-burrito-drone-soon> [<https://perma.cc/4KSW-MFBT>].

your new iPad on your front porch within a few hours of hitting that submit button. Yet it has not happened—it has not even come close.⁶

Private property and public safety concerns have effectively blocked what is a technologically feasible development.⁷ Establishing a drone highway from warehouses to local distribution sites has faltered on the altar of private property and Federal Aviation Administration (“FAA”) regulation of the airspace. If the drones fly too low, they risk trespassing on the private airspace of landowners who abide by the common law adage of *dominus soli dominus est coeli et inferorum*.⁸ If drones fly too high, they invade commercial airspace and pose a risk to federally regulated air traffic.⁹ If drones fly over interstate highways, or even residential streets, they risk distracting drivers or malfunctioning and dropping packages onto moving vehicles, pedestrians, or

6. In fact, Amazon only received limited FAA approval in August 2020 for limited drone delivery trials. Annie Palmer, *Amazon Wins FAA Approval for Prime Air Drone Delivery Fleet*, CNBC (Aug. 31, 2020, 3:03 PM), <https://www.cnbc.com/2020/08/31/amazon-prime-now-drone-delivery-fleet-gets-faa-approval.html> [<https://perma.cc/BX2M-592Q>]. FAA approval for commercial drone use has been notoriously slow, leading some commercial entities to move to Canada or overseas to develop their commercial drone business, which can include agricultural, filming and entertainment, fire and natural resources management, as well as ecommerce delivery. See Gina Y. Chen, Note, *Reforming the Current Regulatory Framework for Commercial Drones: Retaining American Businesses’ Competitive Advantage in the Global Economy*, 37 NW. J. INT’L L. & BUS. 513, 524, 527 (2017); Robert Glenn Olsen, Note, *Paperweights: FAA Regulation and the Banishment of Commercial Drones*, 32 BERKELEY TECH. L.J. 621, 650–51 (2017); Joshua Kohler, Note, *The Sky Is the Limit: FAA Regulations and the Future of Drones*, 15 COLO. TECH. L.J. 151, 154–55 (2016).

7. As noted below, the safety issues of drones falling out of the sky, the trespass and nuisance issues of private property, and the logistics of accommodating an entirely new transportation technology into our already developed world pose significant barriers to development without concerted state and federal intervention and assistance. See Corinne Dowling Burzichelli, Note, *Delivery Drones: Will Amazon Air See the National Airspace?*, 42 RUTGERS COMPUT. & TECH. L.J. 162, 186–90 (2016).

8. This colorful Latin phrase roughly means “whoever owns [the] soil, [it] is theirs all the way [up] to Heaven and [down] to Hell.” *United States v. Causby*, 328 U.S. 256, 260–61 (1946); Samantha J. Hepburn, *Ownership Models for Geological Sequestration: A Comparison of the Emergent Regulatory Models in Australia and the United States*, 44 ENV’T L. REP. NEWS & ANALYSIS 10310, 10313–14 & n.42 (2014) (alteration in original) (citation omitted). References to Hell were dropped by the respectable English jurists who adopted the rule in the 16th century. See *Bury v. Pope*, 78 Eng. Rep. 375, 375 (1587). Less colorful language was first used in England by Sir Edward Coke in *Bury v. Pope* and that language has made its way into American jurisprudence of airspace rights. *Id.* As Justice Douglas explained in *United States v. Causby*: “It is ancient doctrine that at common law ownership of the land extended to the periphery of the universe—*Cujus est solum ejus est usque ad coelum*,” which roughly translated means that ownership of land entails ownership to the heavens and to the center of the earth. *Causby*, 328 U.S. at 260–61; 1 EDWARD COKE, THE FIRST PART OF THE INSTITUTES OF THE LAWS OF ENGLAND: OR, A COMMENTARY UPON LITTLETON: NOT THE NAME OF THE AUTHOR ONLY, BUT OF THE LAW ITSELF L.1. C.1 § 1 (4a) (London, James & Luke G. Hansard & Sons, 19th ed. 1832). Of course, even the proper English jurists did not believe that any meaningful property rights extended into outer space or into the molten center of the earth, but rather extended to all usable space and resources that could be reached from the surface of the land, which would be any accessible sub-surface minerals or the airspace only so high as one could build a structure. See COKE, *supra*, at L.1. C.1 § 1 (4a).

9. See *infra* Section II.A.

private property. Safety concerns have effectively forestalled drone use over roadways,¹⁰ and the only way to traverse the last mile is to fly over private property or over residential streets, each with its own legal liabilities.

But recall from your first-year property class the doctrine of commercial easements in gross. These special easements arose during the 19th-century boom in transportation and utility infrastructure, primarily for the benefit of railroads, telegraph, telephone, and electric lines.¹¹ Most common law easements are nonexclusive and nontransferable unless they run with the land.¹² The typical driveway easement is fixed and limited to the uses originally envisioned by the servient tenement holder, can be used by both servient and dominant tenements, and has limited scope for expansion to accommodate new and changing technologies.¹³ But commercial easements in gross were newfangled innovations of the 19th-century common law; they represented a legal evolution that accommodated and facilitated the unique needs of a rapidly developing industrial country.¹⁴ Railroads, utility easements, high-voltage power line corridors, and the like were rapidly assembled to transfer people and goods long distances before the Model T was a gleam in Henry Ford's eye.¹⁵ The 19th-century common law adapted to the necessity of this new technology with the recognition of special commercial easements in gross, a form of easement that William Blackstone could barely foresee.¹⁶ This brainchild of 19th-century jurists allowed for the transcontinental railroad, which positioned the United States as an industrial powerhouse, and enabled it to turn the tide in two World Wars and become the leader in technology

10. See Burzichelli, *supra* note 7, at 186–90.

11. See RESTATEMENT (FIRST) OF PROP., §§ 489–93 (AM. L. INST. 1944); see also 4 MICHAEL ALLEN WOLF, *in* POWELL ON REAL PROPERTY ¶ 34.16 (2021).

12. WOLF, *supra* note 11, ¶¶ 34.02[2][d], 34.18–20.

13. *Id.*

14. See Danaya C. Wright, *Doing a Double Take: Rail-Trail Takings Litigation in the Post-Brandt Trust Era*, 39 VT. L. REV. 703, 740–46 (2015); WOLF, *supra* note 11, ¶ 34.16.

15. See Danaya C. Wright and Jeffrey M. Hester, *Pipes, Wires, and Bicycles: Rails-to-Trails, Utility Licenses, and the Shifting Scope of Railroad Easements from the Nineteenth to the Twenty-First Centuries*, 27 ECOLOGY L.Q. 351, 366–71 (2000). The first railroads in the United States emerged in the 1830s, 75 before the Model T was introduced in 1908. *Id.*; *Model T*, DETROIT HIST. SOC'Y (2022), <https://detroithistorical.org/learn/encyclopedia-of-detroit/model-t> [<https://perma.cc/C34U-RRRX>]. They had emerged in England even sooner, in the 1820s. Sarah Left, *Key Dates in Britain's Railway History*, GUARDIAN (Jan. 15, 2002, 9:27 AM), <https://www.theguardian.com/world/2002/jan/15/transport.uk>.

16. See *infra* Section III.A.

that it is today.¹⁷ And it may provide the answer to climate change, our next-generation challenge.¹⁸

All across the country there are nearly 200,000 miles of active and defunct railroad corridors and hundreds of thousands of miles of power-line easements, each with their unique potential to host a drone highway capable of getting goods to within a few miles of the majority of the population.¹⁹ Rails-to-Trails Conservancy (“RTC”) sought to convert defunct railroad corridors into recreational trails because those corridors, if properly repurposed, were located within a few miles of the vast majority of the population, thus enabling school kids to ride their bikes to school without having to venture on to treacherous roads.²⁰ Although railroad corridors may not solve the last-mile problem,²¹ they have the potential to bring goods via drone to within a mile or two of most people’s homes, and utility easements have the potential to bring goods directly to the front porches of a sizable percentage of the population.²² And they can do that because commercial easements in grass

17. See Martin Kelly, *Effect of Railroads on the United States*, THOUGHTCO (Oct. 30, 2020), <https://www.thoughtco.com/effect-of-railroads-on-the-united-states-104724> [<https://perma.cc/TX6U-VMTE>] (discussing the economic impact of the first U.S. railroads); *10 Ways Freight Rail Supported During Wartime*, ASS’N OF AM. R.R.S., <https://www.aar.org/article/10-ways-freight-rail-provides-support-wartime> [<https://perma.cc/D8DC-Y3NK>] (discussing the railroad’s contribution to American war efforts).

18. Transportation of goods is one of the leading contributors to greenhouse gas emissions. At 29 percent of total greenhouse gas emissions in the United States in 2019, transportation is the highest contributor. *Sources of Greenhouse Gas Emissions*, U.S. ENV’T PROT. AGENCY (July 7, 2021), <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions> [<https://perma.cc/WSV7-62H6>]. Of course, not all of this has to do with transportation of goods, but numerous studies have identified the costs of long-distance transportation in the price and environmental impact of goods. See, e.g., *id.* Trucks in the European Union are only two percent of the vehicles on the road, but contribute 22 percent of emissions on roads. *Trucks*, TRANSP. & ENV’T, <https://www.transportenvironment.org/challenges/road-freight/trucks> [<https://perma.cc/24R2-R436>].

19. At its peak in the 1920s, the United States boasted over 270,000 miles of railroad corridor. Danaya C. Wright, *A Brief History of Railroad Development and Regulation Leading Up to the Rail-Trail Movement*, in 4 POWELL ON REAL PROPERTY ¶ 78A.03[2][c] (Michael Allan Wolf ed., 2021). By the 1970s, almost half had been lost. *Id.*

20. See Megan Kimble, *Hiking Where Locomotives Once Chugged*, L.A. TIMES (Mar. 17, 2014, 3:40 AM), <https://www.latimes.com/travel/la-tr-railtrails-20110705-story.html> [<https://perma.cc/QLX4-NUF9>]. Considering the 270,000 miles of railroad corridor that existed in 1920, with virtually every small town in American connected through a dense web of railroad lines, most people living in an urban area, even a small town, are likely to live within just one or two miles of a railroad corridor. See Wright, *supra* note 19, ¶ 78A.03[2][c]. To put this into perspective, the U.S. interstate highway system is less than one-fifth the length of the national rail network, being less than 47,000 miles. Laura Hale, *Happy 60th Birthday, Interstate Highway System!*, INFRASTRUCTURE REP. CARD (June 29, 2016), <https://infrastructurereportcard.org/happy-60th-birthday-interstate-highway-system> [<https://perma.cc/B29D-5TZZ>].

21. The last mile problem is the logistics of getting packages from transportation corridors to the customer’s home through residential streets. See *infra* note 38 and accompanying text.

22. Most electric and phone utility agreements permit running lines through a customer’s private property to attach to the house or other structure. See James Chen & Suzanne Kvilhaug, *Easement*, INVESTOPEDIA (June 2, 2021), <https://www.investopedia.com/terms/e/easement.asp>

are exclusive; they do not have to contend with landowners, drivers, pedestrians, or even livestock on the ground below.

Although the infrastructure exists in these commercial easements in gross to bridge the 19th and 21st centuries, the legal system of private property rights remains stuck in a 20th-century quicksand of outdated takings jurisprudence, misunderstood notions of non-freehold property interests, and a philosophy of absolute property rights reminiscent of the *Lochner* era.²³ Yet those are the cards we have been dealt by a conservative Supreme Court and a quintessentially American private property rights movement that sets our mythic rugged individualism against our new globalized interconnectedness.²⁴ While this interconnectedness occasionally brings us a global pandemic, it has the potential to improve the quality of life for millions thanks to the resilience of the common law.²⁵ The commercial easement in gross embodies the virtue of the common law's flexibility and adaptability to new ideas and new needs, even if it was the product of a vastly different world. Repurposing the commercial easement in gross in railroad and utility corridors for the 21st century is an entirely feasible and logical task for an innovative legal system that strives to make property serve the needs of the

[<https://perma.cc/G2AC-TMFA>]. In most cases, therefore, a utility easement along a residential street could be used to reach a customer's yard, and the utility access license could permit the drone to enter the yard to deliver the package. Only in cases where utility lines are piggy-backed from one structure to another, as is often the case in congested urban areas, would we likely run into problems where the electric or phone line easement would not run directly to private landowners' doorsteps. *But see* Adam Hoffman, *What Is a Utility Easement?*, GODFREY, HOFFMAN & HODGE, LLC (Sept. 19, 2016), <https://ghhllc.com/blog/civil-engineering-bid-263835-what-is-a-utility-easement> [<https://perma.cc/F32R-5UGU>] ("While it is rare to have multiple utility easements on a property, water lines and electrical lines do, in some cases, run along different easements.").

23. *See generally* *Lochner v. New York*, 198 U.S. 45 (1905) (epitomizing a period during the early 20th century when judges continued to strike down protective regulations). The American legal system has a complicated relationship with private property rights, rights that are created by state law, protected by the Constitution, and yet constantly evolving under the common law. *See generally* Danaya C. Wright, *Eminent Domain, Exactions, and Railbanking: Can Recreational Trails Survive the Court's Fifth Amendment Takings Jurisprudence?*, 26 COLUM. J. ENV'T L. 399 (2001) [hereinafter *Eminent Domain*] (analyzing various legal avenues used to effectuate the rails-to-trails program under the Supreme Court's takings jurisprudence); Danaya C. Wright, *The Shifting Sands of Property Rights, Federal Railroad Grants, and Economic History: Hash v. United States and the Threat to Rail-Trail Conversions*, 38 ENV'T L. 711 (2008) [hereinafter *Shifting Sands*] (analyzing the contrast between the Federal Circuit's opinion in *Hash v. United States* and the U.S. Supreme Court's prior jurisprudence regarding the railbanking act); Danaya C. Wright, *A Requiem for Regulatory Takings: Reclaiming Eminent Domain for Constitutional Property Claims*, 49 ENV'T L. 307 (2019) [hereinafter Wright, *A Requiem for Regulatory Takings*] (arguing that the Supreme Court should rely on the common law understanding of eminent domain when analyzing the constitutionality of regulatory takings).

24. *See infra* notes 257–67 and accompanying text; *see also* Wright, *A Requiem for Regulatory Takings*, *supra* note 23, at 332–35.

25. *See* Wright, *supra* note 14, at 715–16.

living, not the dead hand of the past.²⁶ But as with any innovative use of law, there are dangers. The railbanking train-wreck of the late 20th century sounds a warning to those seeking to leverage old laws to new uses.²⁷ Nonetheless, the most feasible path linking the near-instant gratification of commercial impulses with the environmental and economic benefits of reduced transportation costs points us toward the commercial easement in gross and the pre-existing infrastructure of railroad and utility corridors.

We argue that commercial easements in gross provide an opportunity to completely redesign the commercial marketplace and relieve the nightmarish logistics and environmental harms involved in the transportation of goods via internal combustion engines. But it is not as simple as waving a wand or having goods apparate²⁸ from the warehouse to the front porch. We must understand the origins and limits of the commercial easement in gross. We must also understand the role of the railroads and utility infrastructure in the pantheon of property rights. We then have to fit the new technology within the current jurisprudence of federally regulated airspace, state-law trespass and nuisance, the evolving law of drones, and accept the lessons learned from the railbanking experiment. What many thought was a sensible program to recycle abandoned railroad corridors to recreational trails turned into a nightmare of takings litigation, millions of dollars spent in class-action challenges and compensation, and the ultimate loss of thousands of miles of priceless railroad corridor.²⁹ But there are important lessons from that process that can be applied to this new technology as we set our sights to the future. It will take a complex convergence of federal and state law, drone technology, and some high-level infrastructure to bring about what we tentatively title the “DARC” (“Drone Airspace in Railroad Corridors”) Project.³⁰ The lesson of a thousand years of common law property is that the law must adapt or, like feudalism itself, it will be washed away in the relentless march of progress.

II. THE CURRENT STATE OF DRONE TECHNOLOGY AND AIRSPACE LAW

Drone technology is already advanced, and rapidly developing further. Sophisticated drone technology, global logistics chains, identification software,

26. See generally *State v. Shack*, 277 A.2d 369 (N.J. 1971) (“Property rights serve human values.”).

27. Although thousands of miles of abandoned railroad corridors have been successfully converted to recreational trails, the costs have been unprecedented, and the legal implications for future uses of these corridors have been disastrous thanks to narrow interpretations of railroad purposes from state and federal courts. See Wright, *supra* note 19, ¶ 78A.03[2][d].

28. In the legendary world of Harry Potter, the environmental harms of transportation are eliminated for the most part as witches and wizards apparate from one place to another, or use the floo network which might, indeed, involve a small amount of chimney dust that is potentially an environmental toxin but is surely far less damaging than the internal combustion engine. See, e.g., J. K. ROWLING, *HARRY POTTER AND THE ORDER OF THE PHOENIX* 51 (2d ed. 2003).

29. See Wright, *supra* note 19, ¶ 78A.03[2][d].

30. See *infra* Part V.

and supply and demand for products exist.³¹ In fact, the entire technological and economic infrastructure exist for almost immediate delivery of goods.³² Currently, next-day and even same-day delivery is available in many urban areas, with billions of dollars invested in airplanes, trucks, vans, and even bicycle messengers who can courier small packages within a few hours—however, those services are heavily dependent on the internal combustion engine, with UPS trucks and FedEx airplanes spewing tons of greenhouse gases every day.³³ And as anyone who has idled in rush-hour traffic can attest, the roads and streets of our major metropolitan areas serve as a logistical bottleneck that even the tech giants cannot seem to solve.

Currently you can have a couriered package delivered as quickly as someone can drive it to your designated location, but at a steep cost, a cost that is not feasible for most items of merchandise we are consuming at unprecedented levels during the pandemic.³⁴ If Amazon can promise delivery of your new book in time for bedtime at a cost less than starting your car and driving to the bookstore, this technology promises to help the have-nots perhaps more than the haves. The fact is that minority and working-class communities are underserved by grocery stores, department stores, and other retail suppliers, forcing that population to spend more hours in inefficient transportation to acquire lower quality goods.³⁵ The equalizing power of this

31. *The Evolution of Delivery Drones in Logistics*, TRANSMETRICS BLOG, <https://web.archive.org/web/20200918222302/https://transmetrics.eu/blog/delivery-drones-logistics>.

32. *Id.*

33. Fed Ex delivered roughly 6.6 million packages per day in 2021. E. Mazareanu, *Total Average Packages Delivered Daily by FedEx Express Between FY 2016 and FY 2021*, STATISTA (June 29, 2021), <https://www.statista.com/statistics/878354/fedex-express-total-average-daily-packages> [<https://perma.cc/X5QB-4FYY>]. UPS delivered roughly 22 million per day globally in 2019. *UPS Fact Sheet*, UPS PRESSROOM, <https://web.archive.org/web/20200923002210/https://pressroom.ups.com/pressroom/ContentDetailsViewer.page?ConceptType=FactSheets&id=1426321563187-193> [<https://perma.cc/2SHE-7HK8>]. UPS owns or leases over 500 aircraft, owns more than 125,000 vehicles, and has approximately 528,000 employees globally. *Id.* UPS reports that “it emitted 13.8 million metric tons of CO₂ while delivering [its] 5.1 billion packages in 2017,” and FedEx reports “15.1 million metric tons.” Erica Pandey, *The Climate Stakes of Speedy Delivery*, AXIOS, (June 21, 2019), <https://www.axios.com/fast-delivery-climate-change-amazon-walmart-target-40dob733-ado6-4b88-9a07-5ac9b6a5c03b.html> [<https://perma.cc/P778-TXZY>]. “The U.S. Postal Service emitted [roughly] 4.3 million metric tons of CO₂ in 2016,” and that says nothing about the climate effects of the packaging or the effects of the manufacturing of the vehicles that bring our packages to our doorsteps. *Id.*

34. Charles Riley, *Online Shopping Has Been Turbocharged by the Pandemic. There’s No Going Back*, CNN BUS. (Oct. 13, 2020, 9:33 AM), <https://www.cnn.com/2020/10/11/investing/stocks-week-ahead/index.html> [<https://perma.cc/P32U-NHAV>].

35. Even despite similarities in economic status, African American residents had to travel farther to supermarkets than their white counterparts in Detroit and Baltimore. *The Grocery Gap*, THE FOOD TR. (2012), <http://thefoodtrust.org/administrative/hffi-impacts/the-grocery-gap> [<https://perma.cc/UL74-NNBQ>]. “According to the 2012 study, *Searching for Markets: The Geography of Inequitable Access to Supermarkets in the United States*, African-Americans are 2.49 times and Latinos are 1.38 times more likely than Whites to live in neighborhoods without access to a full-service grocery store.” *Id.*; see also Muhammad Yunus, Frédéric Dalsace, David Menascé &

cheap delivery technology that is more environmentally friendly has not been seen since the Montgomery Ward catalogue brought its plethora of merchandise to the rural hinterlands via the U.S. Postal Service.

Drone delivery will not solve all our transportation issues, however. Drones can only carry relatively small packages, under 10 pounds for the most rugged drone, and under 5 pounds for the average drone.³⁶ Drones also have a limited flight distance before they need to be recharged. Airplanes, trains, and semi-trailer trucks will still be necessary to move large quantities of goods from manufacturing facilities to distribution centers, most of which are located near railroad infrastructure, as trains continue to be the most efficient mode of moving heavy freight long distances over land.³⁷ Once packages are sorted, it may still be more energy efficient to move them via plane or truck to sortation centers or urban areas where they are then put onto trucks for delivery to homes and businesses. This final stage, termed the “last mile,” is where delivery trucks drive through residential neighborhoods and double-park on city streets, while the driver has to get out and scurry to the front porch or up the elevator to the receptionist’s desk.³⁸ Drone delivery promises to alleviate some of this last-mile traffic, as well as the second-to-last mile, from regional to local sortation centers and the urban distribution center to local pick-up sites, which are currently the least energy-efficient stages.³⁹

And public-private partnerships are driving this newest technology. Google and Amazon, with support from NASA, have invested heavily in the computer

Bénédicte Faivre-Tavignot, *Reaching the Rich World’s Poorest Consumers*, HARV. BUS. REV. (Mar. 2015), <https://hbr.org/2015/03/reaching-the-rich-worlds-poorest-consumers> [<https://perma.cc/6R6F-M5HL>] (noting that many people in rural communities rely on aging automobiles to obtain basic goods and services, and if those automobiles “[break] down[,] [they] may be out of work as a result”).

36. Although there are larger unmanned aerial vehicles proposed for delivery of goods. *Delivery Drones Are Taking Off!* (Infographic), SUPPLY CHAIN GAME CHANGER (Feb. 13, 2020), <https://supplychaingamechanger.com/delivery-drones-are-taking-off-infographic> [<https://perma.cc/XQT7-T82G>]; *The Issues with Drone Delivery*, FW LOGISTICS, <https://fwlogistics.com/the-issues-with-drone-delivery> [<https://perma.cc/GW7B-FUSP>]; see *The Evolution of Delivery Drones in Logistics*, *supra* note 31.

37. *Why Trains Are the New Trucks for Transporting America’s Goods*, JLL (Sept. 3, 2018), <https://www.us.jll.com/en/trends-and-insights/investor/trucks-trains-transportation-america> [<https://perma.cc/65AQ-UEVS>]; see *Fuel Efficiency: Modes of Transportation Ranked by MPG*, TRUE COST (May 27, 2010) [hereinafter *Fuel Efficiency*], <https://truecostblog.com/2010/05/27/fuel-efficiency-modes-of-transportation-ranked-by-mpg> [<https://perma.cc/835H-57F6>].

38. It is estimated that the last-mile counts for half of the total transportation cost of delivery. Shelagh Dolan, *The Challenges of Last Mile Delivery Logistics and the Tech Solutions Cutting Costs in the Final Mile*, BUS. INSIDER (Jan. 11, 2022, 3:17 PM), <https://www.businessinsider.com/last-mile-delivery-shipping-explained> [<https://perma.cc/XV2M-ETWE>]; see *Fuel Efficiency*, *supra* note 37.

39. Using drones for the last mile could reduce emissions by 23 percent to 54 percent compared to trucks. Devittmatthew, *Are Automated Drone Deliveries the Sustainable Future of Logistics?*, ECOBAHN (Oct. 1, 2020), <https://thecobahn.com/logistics/30-minutes-or-less-are-you-ready-for-e-commerce-automated-drone-deliveries> [<https://perma.cc/GQY3-9QG6>].

systems needed to support a Universal Traffic Management (“UTM”) system for unmanned drones over the past few years.⁴⁰ Like the FAA’s Air Traffic Management system that helps manage airplane traffic, the UTM would help develop protocols, software functions, and other information infrastructure necessary to keep a drone highway running smoothly.⁴¹ Yet even with the collective brainpower of Silicon Valley, throwing technology and money at the problem of speeding up the pace of delivery is not going to solve the transportation logjam because the roadblocks are not technological but rather political and legal. That is, while Big Tech is certainly equipped to solve the engineering problems connected with air traffic control of commercial drones, those are not the only problems that need to be solved. Amazon and Google are investing now because they are betting that eventually large-scale drone delivery will make good business sense. But until Amazon’s in-house counsel can tell the company’s shareholders that it is safe and legal to fill the sky with drones, it is unlikely to do so.⁴² And to do that, they must juggle a complex patchwork of federal and state regulations with common law tort and property rules, which are outlined below.

A. LEGAL FRAMEWORK FOR A COMMERCIAL DRONE HIGHWAY

Considering the fact that it took decades to develop the legal and physical infrastructure for our modern air transit system as well as for the interstate highway system, it is unlikely that a commercial drone highway will take off quickly, even if the technology and the laws miraculously aligned.⁴³ Federal regulations are spotty, state regulations are virtually nonexistent, and common law rules are a patchwork across different states. But understanding where the gaps lie will allow for building a solid infrastructure bridge across the different jurisdictions which might enable a legal framework to come into existence before the technology has become obsolete.

1. Federal Regulation

It is a truism that jurisprudence is always playing catch up with what ordinary people find prudent. In technology fields this is especially so, and the development of the law for drone usage is no different. For example, Congress called for a digital licensing system for drones in 2016, the FAA did not release the final regulation until 2021, and the regulation will not be

40. Daniel Thompson, Note, *Rethinking the Highway: Integrating Delivery Drones into Airspace Above Highways*, 95 IND. L.J. SUPPLEMENT 8, 12 (2020); see also Fed. Aviation Admin., *Unmanned Aircraft System Traffic Management (UTM)*, U.S. DEP’T TRANSP. (Aug. 20, 2021, 10:52 AM), https://www.faa.gov/uas/research_development/traffic_management [<https://perma.cc/DD3T-8CRN>] (discussing the present and future status of UMTs).

41. Fed. Aviation Admin., *supra* note 40.

42. See *infra* Section II.B.

43. Wright, *supra* note 19, ¶ 78A.03[2].

implemented until 2023.⁴⁴ The new system will require most “drone[s] [to] broadcast [their] serial number[s] during flight. It will also include information on the location of the drone, its altitude, speed, and direction of flight People on the ground who are equipped with a smartphone will be able to use an app to receive the message and find information about the aircraft and the pilot.”⁴⁵ This is a welcome addition to the state of play for drones and, when combined with a nationally regulated UTM system, secures another important plank in the regulatory framework that will eventually allow further development of America’s nascent drone infrastructure network. But as one industry leader notes, “[i]f seven years is the measure of how long it took to complete Remote ID implementation,” then “[i]t’s hard to look ahead without being pessimistic.”⁴⁶

As sluggish as the pace of licensing regulation for drones is, it is nothing compared with how slow-footed development of airspace regulation has been—not least because this regulation implicates both federal and state law, and the history of aviation and the common law.⁴⁷ Under the common law, landowners enjoyed property rights *de infernus ad coelum*, or “from heaven (to hell).”⁴⁸ That is, the buyer of a parcel of land was buying a three-dimensional space, bound by property lines on all four horizontal dimensions but fictitiously extending infinitely downward and infinitely upward.⁴⁹ Although we are not aware of any Chilean landowners attempting to claim property rights in antipodal regions of China, the historical understanding has been that real property entails the minerals beneath and the air above one’s land, and that likewise the air above one’s land is solely for the landowner’s use and enjoyment.⁵⁰

44. Scott Simmie, *Brendan Schulman Reflects on His DJI Career and the Industry: A DroneDJ Exclusive*, DRONEDJ (Sept. 13, 2021, 4:00 AM), <https://dronedj.com/2021/09/13/brendan-schulman-reflects-on-his-dji-career-and-the-industry-a-dronedj-exclusive> [<https://perma.cc/4HU6-WER9>].

45. Greg Reverdiau, *FAA Releases Remote ID, the Largest Regulatory Change for Drones in Years*, NEXTGOV (Feb. 16, 2021), <https://www.nextgov.com/ideas/2021/02/faa-releases-remote-id-largest-regulatory-change-drones-years/172062> [<https://perma.cc/93XU-6CSE>]; Remote Identification of Unmanned Aircraft, 86 Fed. Reg. 4390, 4404–06 (Jan. 15, 2021) (to be codified at 14 C.F.R. pts. 1, 11, 47, 48, 89, 91, & 107).

46. Simmie, *supra* note 44.

47. See Troy A. Rule, *Airspace in an Age of Drones*, 95 B.U. L. REV. 155, 174–86 (2015).

48. Yehuda Abramovitch, *The Maxim ‘Cujus Est Solum Ejus Usque Ad Coelum’ as Applied in Aviation*, 8 MCGILL L.J. 247, 248 (1962) (alteration in original) (citation omitted); see *supra* note 8 and accompanying text; see *United States v. Causby*, 328 U.S. 256, 260–61 (1946) (discussing the *ad coelum* doctrine).

49. See *Bury v. Pope*, 78 Eng. Rep. 375, 375 (1587).

50. 2 WILLIAM BLACKSTONE, COMMENTARIES ON THE LAWS OF ENGLAND: BOOK II: OF THE RIGHTS OF THINGS *16, *18 (Simon Stern ed., 2016) (1765–69) (“Land hath also, in its legal signification, an indefinite extent, upwards as well as downwards. *Cujus est solum, ejus est usque ad coelum*[.] . . . is the maxim of the law; upwards, therefore no man may erect any building, or the like, to overhang another’s land; and, downwards, whatever is in a direct line between the surface of any land, and the center of the earth, belongs to the owner of the surface; as is every day’s experience in the mining countries. So that the word ‘land’ includes not only the face of the

The modern age of aviation has required us to throw out the old maxim. In 1946, the Supreme Court held “that [the *ad coelum*] doctrine ha[d] no place in the modern world” after a landowner sued the federal government because of military planes flying above his property.⁵¹ Upholding Congress’s definition of “navigable airspace” as space 500 feet and above, and thus within the public domain, the decision in *United States v. Causby* made it clear that the federal government could regulate this space and that landowners would not have a right of action for trespass against anyone flying airplanes or riding in hot-air balloons in that airspace.⁵² However, the Court was less than clear about who owned the airspace above private land, relying on the vague concept of “immediate reaches.” At some point the immediate reaches ended and the navigable airspace began, but where that point lay was left for future courts and regulators to determine.⁵³

After *Causby*, the rule was clear enough: All air traffic simply needed to stay above 500 feet to avoid actions for trespass and the government bought out the airspace rights below 500 feet in the landing and take-off zones of airports.⁵⁴ Litigation was rare—typically only occurring when a landowner’s property abutted an airfield.⁵⁵ Indeed, the fact that federal case law from *Causby* onward did not provide much clarity for the lower bound of legal flights did not matter in the pre-drone era because the FAA and other authorities simply promulgated “regulations . . . [to] ensure[] that most manned aircraft would fly at safe distances from people and property in high-altitude airspace.”⁵⁶ But now that “the FAA has determined that drones should be operated in low-altitude airspace, away from manned aircraft,” the allowable space for aerial drone flights above property is once again uncertain.⁵⁷ We imagine this is a recipe for indigestion among in-house lawyers at Amazon, Google, FedEx, and any other companies contemplating drone delivery logistics.

earth, but every thing under it, or over it. And therefore if a man grants all his lands, he grants thereby all his mines of metal and other fossils, his woods, his waters, and his houses, as well as his fields and meadows.” (footnote omitted)).

51. *Causby*, 328 U.S. at 260–61.

52. *Id.* at 263–66. Hot air balloons provided humans their first access to the skies, excepting Icarus’s magic wings, and prompted the first legal challenges to the *ad coelum* doctrine. See *History of Ballooning*, NAT’L BALLOON MUSEUM (2022), <https://www.nationalballoonmuseum.com/about/history-of-ballooning> [<https://perma.cc/FU2V-XFZ2>].

53. *Causby*, 328 U.S. at 266; see also Tyler Watson, Note, *Maximizing the Value of America’s Newest Resource, Low-Altitude Airspace: An Economic Analysis of Aerial Trespass and Drones*, 95 IND. L.J. 1399, 1403–04 (2020) (describing the uncertainty surrounding the ownership of airspace below 500 feet).

54. See Troy A. Rule, *Airspace and the Takings Clause*, 90 WASH. U. L. REV. 421, 427–29 (2012).

55. Watson, *supra* note 53, at 1404.

56. *Id.* at 1403.

57. *Id.*

Currently, the FAA designates low-altitude airspace for drones to be the space beneath the 500-foot maximum required for conventional aircraft; however, the FAA regulation does not provide clear rules for commercial development to take place within that space.⁵⁸ This regulation, known as Part 107, is unusual in that, “unlike regulations for manned aircraft, which set minimum safe altitudes at 500 feet and above, Part 107 sets a maximum altitude of 400 feet above ground level . . . but no minimum.”⁵⁹ This leaves drone operators rather up in the air, so to speak.

The minimum, of course, is a matter of state law.⁶⁰ Thus, unlike commercial aircraft pilots, who transit FAA-regulated airspace from Denver to Miami regardless of what states they fly over, a commercial drone operator must also contend with state laws governing low-altitude flights above landowners’ property. The FAA, primarily motivated by safety concerns for manned flights at higher altitudes, has ceded the airspace below 400 feet to state law regulation.⁶¹

The Uniform Law Commission (“ULC”) has proposed a uniform drone law (the “Tort Law Relating to Drones Act”) that would address privacy and trespass concerns under state law but has not yet agreed to a final version.⁶² Initially the ULC recommended a hard lower bound of 200 feet, meaning that drones could fly in the slice of airspace between 200 and 400 feet above the ground. But after significant industry backlash, the height limit was dropped and replaced with a “totality of the circumstances . . . test,” in which juries could consider factors such as time of day, frequency of drone flights, whether a drone caused any damage, whether it was noticed by persons on the ground, and other factors, in determining whether liability should be imposed.⁶³ This uncertainty creates real challenges to any kind of large-scale drone delivery infrastructure. Until the ULC settles on a final version, and that version is adopted by a significant number of jurisdictions (two big ifs at this point), prospective drone operators will face a patchwork of state regulation and state common law or, perhaps even worse, no state law whatsoever, through which Big Tech must navigate.⁶⁴

58. *Id.* at 1401; *see* 14 C.F.R. § 107.51(b) (2021).

59. Watson, *supra* note 53, at 1401 (emphasis omitted); *see* 14 C.F.R. § 107.51(b).

60. Watson, *supra* note 53, at 1401.

61. *See id.*

62. Mark A. Dombroff, *FAA Efforts Aim to Reduce Drone Jurisdictional Disputes*, FOX ROTHSCHILD LLP (Nov. 19, 2019), <https://www.foxrothschild.com/publications/faa-efforts-aim-to-reduce-drone-jurisdictional-disputes> [<https://perma.cc/JXJ6-XVZL>].

63. *Id.*

64. Rule, *supra* note 47, at 165 (noting that without a clear regulatory regime, drone operators are moving to other countries).

2. State Regulation

Most states have not passed legislation to specifically address property rights within the federally unregulated zero- to 400-foot zone. In Nevada, a drone operator is liable for trespass if he flies a drone within 250 feet above a landowner's property.⁶⁵ In passing drone regulations, states must consider a variety of factors, including the property rights of landowners over whose land drones fly as well as nuisance, trespass, and privacy rights of those on the ground. They may even risk a brush with federal preemption even in this space.⁶⁶ And as anyone who has experienced the annoying buzz of a drone can attest, the Second Amendment right to bear arms has taken on a new significance.⁶⁷ Thus, although states could regulate both commercial or recreational drone use below 400 feet, recent efforts by state legislatures to address drone use has been haphazard at best, and unfocused at worst. States have generally only considered trespass, nuisance, and privacy matters rather than identifying a slice of regulated airspace through which drone operators may safely fly.⁶⁸ In other words, state regulation has not anticipated a commercial drone network.

The interplay between state and federal regulation of a drone highway raises the same concerns of preemption and territorial sovereignty that arose in the 19th century in relation to railroads.⁶⁹ Congress clearly has sweeping powers to regulate and develop modes of interstate commerce, from regulation of the railroads to management of the air traffic control system.⁷⁰ But Congress generally may not usurp state legislative or judicial powers to require a particular regulatory regime or require states give up sovereign

65. NEV. REV. STAT. § 493.103(1) (2015); see Hillary B. Farber, *Keep Out! The Efficacy of Trespass, Nuisance and Privacy Torts as Applied to Drones*, 33 GA. STATE U. L. REV. 359, 375-76 (2017). See generally Robert A. Heverly, *The State of Drones: State Authority to Regulate Drones*, 8 ALB. GOV'T L. REV. 29 (2015) (discussing different states' approaches to regulating drones).

66. All of the navigable airspace above the United States is within the purview of the federal government. 49 U.S.C. § 40103(a)(1) (2018). And there are interesting preemption questions about the power of the FAA to regulate all the airspace within a state. See Mark J. Connot & Jason J. Zummo, *Everybody Wants to Rule the World: Federal vs. State Power to Regulate Drones*, 29 AIR & SPACE LAW., no. 3, 2016, at 1, 2.

67. See generally *Boggs v. Merideth*, No. 16-cv-00006, 2017 WL 1088093 (W.D. Ky. Mar. 21, 2017) (illustrating the growing propensity of ground-dwellers to shoot annoying drones out of the sky, although dismissed for lack of a federal question).

68. See Farber, *supra* note 65, at 374-405.

69. See Maureen E. Eldredge, Comment, *Who's Driving the Train? Railroad Regulation and Local Control*, 75 U. COLO. L. REV. 549, 556-58 (2004).

70. See, e.g., H.R. REP. NO. 69-572, at 10 (1926) ("The declaration of what constitutes navigable air space is an exercise of the same source of power, the interstate commerce clause, as that under which Congress has long declared in many acts what constitutes navigable or nonnavigable waters. The public right of flight in the navigable air space owes its source to the same constitutional basis which, under decisions of the Supreme Court, has given rise to a public easement of navigation in the navigable waters of the United States, regardless of the ownership of the adjacent or subjacent soil.")

authority over such matters as the power to define property rights.⁷¹ Although Congress is focused on a uniform national regulatory scheme for the smooth operation of interstate commerce, states tend to be focused on parochial matters, like individual trespasses, nuisances, or the hobbyist drone user who might be peeking into people's living rooms. State legislation, in part because it cannot interfere with the scope of Congress' interstate commerce power, has generally focused on local issues of concern and its limited scope therefore poses challenges to any commercial drone industry that needs to transport goods across state lines.

In the proposed ULC draft regulation, if adopted by a state legislature, a right of action in tort for *per se* aerial trespass would exist if a drone dropped below 200 feet above the surface of the land.⁷² If this proposal were universally adopted in the states, when combined with FAA Part 107, there would exist a nationwide slice of airspace 200 feet thick, starting 200 feet above the ground (or from homes and other structures built as improvements on that ground)—that is, the space between 200 feet and 400 feet could presumably be used for commercial drone flights without further regulation, nor fear of state aerial trespass torts against drone operators (although we should note here that the FAA could always step in and further regulate this airspace).⁷³

State legislation instead has focused primarily on the hobbyist drone users and their annoying propensity to invade privacy and disrupt government operations, such as fighting wildfires and operating airports rather than facilitating commercial drone uses.⁷⁴ Fortunately, a commercial drone highway

71. See *New York v. United States*, 505 U.S. 144, 187–88 (1992); *Printz v. United States*, 521 U.S. 898, 926–34 (1997).

72. See *Watson*, *supra* note 53, at 1404 (“A person operating an unmanned aircraft is liable to a land owner or lessee for *per se* aerial trespass, when the person, without consent, intentionally causes the unmanned aircraft to enter into the airspace below [200] feet above the surface of land or below [200] feet above improvements built upon the surface of land.” (quoting UNIF. TORT L. RELATING TO DRONES ACT § 301(a) (NAT’L CONF. OF COMM’RS ON UNIF. STATE L., Draft June 19, 2018) (alteration in original))).

73. See 14 C.F.R. § 107.51(b) (2021). The FAA has been urged by many to undertake more comprehensive regulations. See Editorial Board, *The FAA Is Taking Encouraging Steps on Regulating Drones. It Should Go Further*, WASH. POST (Jan. 25, 2019), https://www.washingtonpost.com/opinions/the-faa-is-taking-encouraging-steps-on-regulating-drones-it-should-go-further/2019/01/25/841e03c4-20da-11e9-9145-3f74070bbdb9_story.html [<https://perma.cc/6B45-BJCG>]; Dave Marcontell & Steve Douglas, *Why the Use of Drones Still Faces Big Regulatory Hurdles*, FORBES (Sept. 10, 2018, 8:08 AM), <https://www.forbes.com/sites/oliverwyman/2018/09/10/why-the-use-of-drones-still-faces-big-regulatory-hurdles> [<https://perma.cc/FPQ4-4MLW>].

74. Jan Wesner Childs, *Unauthorized Drones Interrupt Efforts to Fight California Wildfire*, WEATHER CHANNEL (Nov. 2, 2019), <https://weather.com/news/news/2019-11-02-drones-grounded-firefighting-aircraft-maria-fire> [<https://perma.cc/R8E4-XZSE>]. Twice in one month London's airports were shut down because of unauthorized drone activity. Chris Stokel-Walker, *Drones Are Causing Airport Chaos – Why Can't We Stop Them?*, NEW SCIENTIST (Jan. 9, 2019), <https://www.newscientist.com/article/2190096-drones-are-causing-airport-chaos-why-cant-we-stop-them> [<https://perma.cc/B5NQ-XMD3>]. Drones have been used to drop drugs into an Ohio prison. Craig Whitlock, *Rogue Drones a Growing Nuisance Across the U.S.*, WASH. POST (Aug. 10, 2015), <https://>

making package deliveries is not likely to collide with aircraft or interrupt fire suppression efforts, but they too may have to contend with hobbyist drones moving into their airspace or people shooting down a drone carrying someone's new iPhone. We are confident that the tech geniuses creating the drone delivery highway can program their drones to resist hackers, but they cannot always control physical trespasses just as public highways cannot always control stray deer or falling rocks that lead to accidents and delays.

3. State Tort and Property Law

Aside from direct federal and state regulation of airspace, drone operators also contend with another legal framework: state common law involving trespass, nuisance, or other interests affecting what drones can and cannot do in the airspace over private land. The definition of aerial trespass differs across different states. As one commentator has noted, "many states . . . have protected aircraft from liability for trespass unless the aircraft 'interferes substantially' with the landowner's use of the property"⁷⁵ whereas others have "h[eld] that mere interference with bare use or possession is not enough."⁷⁶

Although the state-by-state approach that is typical of our federal system may be workable for drone hobbyists, it is unlikely that commercial drones can be operated on a national scale without some homogeneity and clarity about whether they would be subject to aerial trespass litigation in various jurisdictions. Until such regulation occurs, however, drone operators are in a legal no-man's land, unclear whether legislators will follow Nevada and the ULC in specifying altitudes beneath which flights do or do not constitute trespass, or if they will leave it to the courts and the common law, where actions for trespass may invoke curtilage or other doctrines to constrict unpredictably in the legal airspace for drone flights.⁷⁷

In addition to liability for trespass, drone operators also risk liability for private nuisance under state common law and statutory schemes. If drone traffic is noisy, for example, it may interfere with the right to use and quiet

www.washingtonpost.com/world/national-security/how-rogue-drones-are-rapidly-becoming-a-national-nuisance/2015/08/10/9c05d63c-3f61-11e5-8d45-d815146f81fa_story.html [<https://perma.cc/S78Z-XEHB>]. And although the Dutch police gave up training eagles to take down drones, many advocate shooting them down or blocking their control software so they return to their home base. See *id.*; *Eagles Trained to Take Down Drones*, BBC (Mar. 8, 2016), <https://www.bbc.com/news/av/world-europe-35750816> [<https://perma.cc/9F3N-LUYV>].

75. Farber, *supra* note 65, at 384 & n.198.

76. *Id.* at 384 & n.199.

77. Farber reads a comment in the Restatement (Second) of Torts as indicating "that flights fifty feet above one's property substantially interfere with a landowner's use and enjoyment of his property thus constituting an aerial trespass." Farber, *supra* note 65, at 386 (discussing RESTATEMENT (SECOND) OF TORTS § 159 cmt. 1 (AM. LAW INST. 1979)).

enjoyment of one's land.⁷⁸ Depending on the size of the drone, the power source (electric or internal combustion engine), and frequency of flights, it is not hard to imagine a court awarding damages to a landowner for frequent flights beneath the FAA-regulated threshold of 400 feet. As Hillary Farber notes, "[t]he utility of a defendant's conduct is certainly relevant to a nuisance assessment. A defendant's activity could have high social value to the community but constitute a nuisance if it is outweighed by the gravity of the harm caused to the plaintiff."⁷⁹ Thus, even a socially valuable activity such as providing drone delivery infrastructure could subject drone operators to liability for nuisance if the harms are significant. And it is not difficult to imagine that a phalanx of buzzing drones 200 feet over one's home all night could easily be deemed a significant harm.⁸⁰

Finally, there are a number of other state laws with the potential to affect drone operators in various contexts. We might call this category the "use" category because it creates civil or criminal liability not for the mere presence of the drones, but for how they are used. For example, several states have enacted legislation that makes it illegal for drones to fly in close proximity to correctional facilities or critical infrastructure facilities.⁸¹ Iowa's statute is typical:

A person shall not operate an unmanned aerial vehicle knowing that the unmanned aerial vehicle is operating in, on, or above a facility and any contiguous real property comprising the surrounding grounds of the facility, unless the unmanned aerial vehicle is operated by a law enforcement agency or the person has permission from the authority in charge of the facility to operate an unmanned aerial vehicle in, on, or above such facility.⁸²

Several states have also enacted statutes prohibiting specific activities by drones, from voyeurism,⁸³ to hunting,⁸⁴ to warrantless surveillance of citizens by law enforcement.⁸⁵ Thus, most of the state legislation and case law in the

78. Nuisance doctrine provides a remedy for landowners when their use and enjoyment of land is disrupted by noise, odors, or other disturbances on neighboring lands. *See* RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR ECONOMIC HARM § 17 (AM. L. INST. 2020).

79. Farber, *supra* note 65, at 395 (footnotes omitted).

80. Airplane flights that scare chickens or noises that turn mink infertile have been considered nuisances. *See generally* *United States v. Causby*, 328 U.S. 256 (1946) (discussing chickens); *Lahar v. Barnes*, 91 N.W.2d 261 (Mich. 1958) (discussing mink).

81. Florida, Iowa, South Carolina, Vermont. FLA. STAT. § 330.41(2)(a)(8) (2021); IOWA CODE § 719.9 (2022); S.C. CODE §§ 24-5-175, 24-1-300 (2022); VT. STAT. ANN. tit. 20, § 4625 (2021).

82. IOWA CODE § 719.9(b)(2).

83. S.D. CODIFIED LAWS § 22-21-1 (2021).

84. OR. REV. STAT. § 498.128 (2022).

85. *See, e.g.*, IND. CODE § 35-33-5-9 (2021); TENN. CODE ANN. § 39-13-609 (2021); IOWA CODE § 808.15 (2022); ME. STAT. tit. 25, § 4501(1) (2021); FLA. STAT. § 934.50(3)(a) (2022).

“use” category has responded to specific issues facing various communities in those jurisdictions, rather than attempted to create a comprehensive legal framework for appropriate drone use. In other words, state law has continued to be reactive to emerging legal issues rather than proactive.

Certain themes become apparent when one looks at state regulations, however. For example, of the at least 31 states which currently have drone statutes, 16 of these are targeted at private drone operators,⁸⁶ and many were passed in response to citizens’ privacy concerns.⁸⁷ Although we do not foresee this, nor any of the criminal statutes, as a major obstacle for companies wishing to use the skies for drone delivery infrastructure, the point for our purposes is that drones are on the radar of state legislators and, as issues arise in various municipalities and states, the web of regulations, and barriers to orderly development of drone delivery services, will only grow denser. Moreover, large-scale drone delivery operations will not be feasible if the operators may find themselves liable to end up in front of unpredictable state courts interpreting state common law nuisance and trespass rules, which may be applied differently from city to city, or even neighborhood to neighborhood.⁸⁸ That is why a solution using existing transportation corridors is far preferable to simply opening up a slice of the sky below 400 feet and telling Amazon to have at it.

B. OBSTACLES TO LARGE-SCALE DRONE USE

A clearly designated slice of commercial drone airspace covering the entire country is exciting to imagine, but we do not believe it will entirely solve the problem. The commercial drone industry has not given support to the proposal for a variety of reasons.⁸⁹ For our purposes, it is enough to point out that even if every state legislature adopted the ULC’s aerial trespass doctrine *in toto*, flying a massive quantity of delivery drones through the allowed airspace would probably still not be commercially feasible. For one thing, the sheer number of drones that would be flown at low altitude, through populated areas, could still result in unacceptable tort liability for commercial operators.

Commentators have not taken sufficient notice of the scale of the problem nor the associated risks. To give the reader an idea of the potential quantity of drones in the sky, as compared to conventional airplane flights, consider that there are approximately 16 million flights per year in FAA-

86. Farber, *supra* note 65, at 374–75.

87. *Id.* at 377.

88. For example, in determining liability for the tort of private nuisance, “[n]eighborhood characteristics and customs are factors in determining whether a defendant’s conduct constitutes unreasonable and substantial harm.” *Id.* at 394.

89. Watson, *supra* note 53, at 1405–07.

regulated airspace.⁹⁰ Each year, there are approximately 200 fatal accidents, and hundreds of other incidents that do not result in significant damage.⁹¹ By comparison, Amazon Logistics, Amazon's in-house delivery service, ships 2.5 billion packages a year; FedEx ships 3 billion, and UPS ships 4.7 billion.⁹² Over the next few years all these numbers are expected to go up significantly, with the number of Amazon Logistics packages more than doubling, to 6.5 billion.⁹³ If we imagine that a significant portion of these packages could eventually travel at least some portion of their journey via drone, it is not unthinkable that the number and frequency of drone flights would rise exponentially, as might the rate of accidents. And while I might not object to a new iPhone dropping into my yard accidentally (Whee—Christmas in July), I would certainly object to a 20-pound bag of potatoes hitting my child as she is cycling to school.

Drones will therefore need to be flown in areas where there is a reduced risk of damage to people and property on the ground to reduce tort liability to an acceptable level for widespread delivery use. In the 19th century, John James Audobon reported flocks of passenger pigeons, of biblical proportions, blocking the sun for days.⁹⁴ Some estimated that there were around five billion passenger pigeons in eastern North America at their height, soon to be reduced to extinction from overhunting and habitat loss by 1913.⁹⁵ Imagine a passenger-pigeon-flock-sized cloud of Amazon drones passing over the North American continent. In addition to liability for blocking out the sun or creating noise or other nuisances, accidents happen. Some drones will end up crashing, destroying your new iPhone before you ever have a chance to be frustrated with iOS updates. Will they also destroy a car? A swimming pool? An occupied house? Will a falling package distract a driver who then runs into a peloton of cyclists?

Because accidents inevitably happen, commercial drones, like airplanes, will need to be flown in areas where there is a reduced risk of damage to people and property on the ground in order to reduce tort liability to an

90. Fed. Aviation Admin., *Air Traffic by the Numbers*, U.S. DEP'T TRANSP. (Nov. 2, 2021, 10:52 AM), https://www.faa.gov/air_traffic/by_the_numbers [<https://perma.cc/PCG6-4ZVE>].

91. Fed. Aviation Admin., *General Aviation Safety*, U.S. DEP'T TRANSP. (July 30, 2018), https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=21274 [<https://perma.cc/7ASR-Y82K>].

92. Andria Cheng, *Amazon Ships 2.5 Billion Packages a Year, with Billions More Coming, in a Major Threat to UPS and FedEx*, FORBES (Dec. 12, 2019, 6:36 PM), <https://www.forbes.com/sites/andriacheng/2019/12/12/how-serious-is-amazons-threat-to-ups-fedex-study-finds-it-could-soon-beat-them-in-us-package-delivery-volume>.

93. *Id.*

94. Annette Scherber, *Flocks that Darken the Heavens: The Passenger Pigeon in Indiana*, IND. HIST. BLOG (Feb. 14, 2017), <https://blog.history.in.gov/flocks-that-darken-the-heavens-the-passenger-pigeon-in-indiana> [<https://perma.cc/R9RL-TCHB>].

95. *Id.*

acceptable level for widespread delivery use.⁹⁶ Even supposing that drone routes were mapped to minimize travel above populated areas, it is safe to say that commercial drone operators would be exposed to significant tort liability from property owners on the ground even if they only transported a fraction of their current volume via drones.

Additionally, the 200- to 400-foot slice of airspace may contain aerial obstacles, such as other drones, birds, hang gliders, kites, parachuters, hot-air balloons, and the like. That is, since airspace below 400 feet is not controlled by the FAA, there is currently a nonzero chance that there are hobbyist drones in the way of a hypothetical fleet of Bezos drones in that same airspace.⁹⁷ If my neighbor and I are both drone hobbyists, we are unlikely to have problems sharing the airspace, even if we are both flying our drones at the same time. But imagine that passenger-pigeon-flock-sized cloud of Amazon drones flying through the same airspace. As no flight plans are filed for hobby drones, or anything else that might happen to be in that airspace, mid-air collisions would be almost inevitable.

Thus, an essential goal of any mass commercial drone infrastructure project will be to avoid other things that might be in that airspace and, if some drones crash, to make sure they do not damage property or hurt anyone. Doing so will require channeling commercial drones into certain physical flyways so they are not spread out everywhere like pixie dust.

A recent law journal article suggested a drone infrastructure plan that might address these concerns. Daniel Thompson proposed designating the space above highways for commercial drone flights by using an extant transportation infrastructure system such as the interstate highway system, which would have several advantages.⁹⁸ First, the interstate highway system is already federally regulated, and is a transcontinental network: “[A]greements between the Secretary [of Transportation] and the State Transportation Department . . . control the use and access to the right-of-way on the Interstate System.”⁹⁹ In other words, while the states own the highways, the federal government, which funds most highway construction, regulates their use. Additionally, “most of the optimal highway airspace for commercial drone deliveries ostensibly exists above Interstates.”¹⁰⁰ We take this overall point to be that, while drone operators would still need to negotiate property rights with states and municipalities which own highways, much of the heavy lifting, for the most extensive parts of the network, might be done by working with the U.S. Secretary of Transportation to come up with a federally sanctioned agreement for drone operation over the Interstate Highway System. Second,

96. See Fed. Aviation Admin., *supra* note 90.

97. See *supra* notes 72–73 and accompanying text.

98. Thompson, *supra* note 40, at 30.

99. *Id.* at 19.

100. *Id.* at 18.

the low-altitude airspace above highways is predictably clear of obstacles.¹⁰¹ In fact, it is illegal under Part 107 to fly drones over highways unless the operator has obtained a waiver from the FAA.¹⁰² And third, noise or nuisance would not be an issue for existing property owners, as highways are already full of noisy nuisances.¹⁰³

Thus, Thompson's proposal is, at first blush, not a bad approach. We like the idea of building drone airspace corridors over an extant federally regulated transportation network where obstacles are unlikely to appear. However, as Thompson acknowledges, directing the bulk of the nation's drone traffic over busy highway arteries would arguably contravene Congress's intent when it passed the Interstate Highway Act:

Pursuant to the Act, drone delivery operations could not "impair the full use and safety of the highway" or "interfere in any way with the free flow of traffic on the Interstate System." Unlike rest stations or vending machines, drone delivery could pose a unique and significant risk to the Interstate System. Falling packages and malfunctioning drones would interfere with the free flow of traffic, but how the Secretary would weigh that risk has yet to be determined.¹⁰⁴

Thompson thinks this is a problem that could be overcome by persuading the Secretary of Transportation; we think it makes the entire proposal dead on arrival. Drone crashes on I-95 would certainly interfere with the free flow of traffic—but more importantly, the tort liability for drone operators of a drone highway over the interstates would likely make Amazon's in-house counsel dyspeptic enough to recommend against any such plan. And even if Congress cooperated and passed a bill limiting liability for drone companies when they accidentally drop a package on a car or distract a driver, states may still step in and impose liability for harms occurring on real property that is subject to their jurisdiction.

C. BENEFITS OF A COMMERCIAL DRONE HIGHWAY

All is not doom and gloom, however. If the technology and legal landscape can coalesce to make it feasible to use drones for commercial delivery of goods, there could be tremendous environmental and accessibility benefits. Of course, it can be difficult to predict the future consequences of any legal or technological scheme. One need merely consider the 8-track tape collection in one's garage or the fate of Betamax video tapes to realize that

101. See 14 C.F.R. § 107.3 (2021).

102. See *id.*; *id.* § 107.39.

103. See, e.g., *Sperry v. State*, 374 N.Y.S.2d 421, 423 (App. Div. 1975), *aff'd*, 359 N.E.2d 700 (N.Y. 1976) ("Where there has been no partial taking of property by appropriation, an owner whose property adjoins a public highway is not entitled to damages resulting from the depreciation of his property due to noise of cars and trucks passing on the highway.")

104. Thompson, *supra* note 40, at 20 (citation omitted).

even good technology can fail.¹⁰⁵ Yet even without concrete proof of salutary effects, removing trucks from roads must be an improvement from an environmental and safety standpoint, and reducing the environmental and economic costs of delivering goods is certainly likely to have important accessibility benefits.

1. Environmental Implications

The environmental impact of shifting part of the delivery logistics chain to drone delivery on railroad corridors could be significantly positive, especially in rural areas. To understand this, it is necessary to briefly summarize the links in the logistics chain and describe which of them might be replaced with drone operations. Consider Amazon as an example.

Currently, when Amazon makes a two-day delivery (through their Prime membership program) to a rural area, the package begins in a fulfillment center, then is sorted and taken to a nearby air hub with all the other packages destined for that region, where it is then flown to an airport adjacent to a sortation center for sorting by zip code.¹⁰⁶ From there, it goes by truck to a local delivery station, from where it is brought to the recipient's home by an Amazon driver or one of Amazon's delivery partners.¹⁰⁷

Although it is likely not efficient to replace the first two of the links in this logistics chain with drones, the journey from the sortation center (by truck) is ideal for this purpose. Amazon currently has 49 sortation centers for the entire country;¹⁰⁸ if you live in a rural area, there are a still lot of amber waves of grain and open highways to traverse for your package's penultimate journey.¹⁰⁹ That is a lot of particulate matter and CO₂ emissions from those trucks going from your sortation center to your local delivery station.

One of the fastest-growing market segments in the small-package drone industry is in long-range drones; that is, drones that can handle journeys over 20 kilometers (about 12.4 miles).¹¹⁰ The new generation of drones can carry

105. See Derek Kompare, *Publishing Flow: DVD Box Sets and the Reconceptation of Television*, 7 TELEVISION & NEW MEDIA 335, 335-36 (2006) (discussing technological changes and the fate of VCR tapes).

106. Don Davis, *Amazon Is the Fourth-Largest U.S. Delivery Service and Growing Fast*, DIGIT. COM. 360 (May 26, 2020), <https://www.digitalcommerce360.com/2020/05/26/amazon-is-the-fourth%E2%80%91largest-us-delivery-service-and-growing-fast> [<https://perma.cc/7LTD-X4TK>].

107. *Id.*

108. *Id.*

109. For example, Florida has three sort centers; Iowa has none. See *Amazon Sort Center Locations*, TAXJAR (July 2020), <https://blog.taxjar.com/wp-content/uploads/2020/07/amazon-sort-centers-map.jpg> [<https://perma.cc/FGV2-UDSQ>]; Jennifer Dunn, *Where Are the Amazon Sort Centers?*, TAXJAR (July 23, 2020), <https://www.taxjar.com/blog/retail/amazon-sort-centers-locations> [<https://perma.cc/48YT-BDC3>].

110. Miriam McNabb, *Autonomous Delivery: Long Range Drone Delivery Emerges as Fast Growing Segment*, DRONE LIFE (Oct. 12, 2020), <https://dronelife.com/2020/10/12/autonomous-delivery-long-range-drone-delivery-emerges-as-fast-growing-segment> [<https://perma.cc/5V4R-KA7G>].

ten pounds of cargo more than 50 miles and are entirely electric.¹¹¹ Replacing many of these second-to-last-mile truck hauls to zero-emissions electric drone flights could provide significant environmental benefits while allowing even more rapid delivery (since trucks would not have to be filled, drones could simply be sent out as needed, buzzing along railroad corridors from the sortation center to the local delivery station).

Certainly, more study is needed to analyze the complete environmental impact, as all parts of a drone's life cycle must be considered. One study in Thailand found that while electrical delivery drones produced negligible environmental impacts in flight, as compared to deliveries done via internal combustion engine vehicles, the environmental impact of the production of drones—particularly the batteries—was significant, both in terms of CO₂ emissions and other toxic products of manufacturing.¹¹² Nevertheless, another study found that the reduction in emissions from drone delivery in rural areas was 13 times greater than in urban areas.¹¹³

Although a full analysis of the environmental impact of adopting drones for one or more links in the delivery supply chain is beyond the scope of this article, the current cultural and regulatory trend is increasingly toward requiring zero emission vehicles,¹¹⁴ and drones already meet this criterion. We suspect that replacing a link in the logistics chain entirely with zero-emissions drones will, on balance, have a positive environmental effect. After all, building those UPS and FedEx trucks also has a negative environmental impact.¹¹⁵ It is too soon in the development of this technology to know for certain how many drones will be needed to replace a single UPS truck, especially when we need to factor into the equation the environmental costs of producing gasoline and shipping it to local service stations to keep those trucks on the road delivering the latest new gadgets. But we argue there will be minimal incentive to even experiment with the technology if the legal and regulatory framework puts up too many roadblocks.

111. Miriam McNabb, *Cargo Delivery Drones: Volansi Signs Deal with NC DOT, Helping to Shape the Future*, DRONE LIFE (Aug. 6, 2020), <https://dronelife.com/2020/08/06/cargo-delivery-drone-volansi-signs-deal-with-nc-dot-helping-to-shape-the-future> [<https://perma.cc/PS6g-TAHG>].

112. See generally Jarotwan Koiwanit, *Analysis of Environmental Impacts of Drone Delivery on an Online Shopping System*, 9 ADVANCES CLIMATE CHANGE RSCH. 201 (2018) (assessing drone delivery in Thailand).

113. Jiyeon Park, Solhee Kim & Kyo Suh, *A Comparative Analysis of the Environmental Benefits of Drone-Based Delivery Services in Urban and Rural Areas*, SUSTAINABILITY, Mar. 20, 2018, at 1, 8.

114. See Andrew Baker, *Biden Orders Federal Agencies to Buy 100% Carbon-Neutral Electricity by 2030, Zero-Emission Vehicles by 2035*, NATURAL GAS INTELLIGENCE (Dec. 9, 2021), <https://www.naturalgasintel.com/biden-directs-largest-u-s-energy-consumer-the-government-to-buy-100-carbon-neutral-energy-by-2030> [<https://perma.cc/YXV5-LHUE>].

115. *Controlling Industrial Greenhouse Gas Emissions*, CTR. FOR CLIMATE & ENERGY SOLS., <https://www.c2es.org/content/regulating-industrial-sector-carbon-emissions> [<https://perma.cc/HC6C-58FQ>] (“Almost a quarter (23 percent) of U.S. greenhouse gas emissions come directly from industrial sources, such as manufacturing, food processing, mining, and construction.”).

2. Efficiency and Accessibility

Perhaps even more importantly, replacing links in the delivery logistics chain with more efficient drone service holds promise for rural and lower-income communities, potentially allowing rural consumers access to everything from food to healthcare supplies in delivery times comparable with those expected by online shoppers in Silicon Valley. When a truck has to drive 40 miles to make a single package delivery, it is not unreasonable to charge more for that delivery and to assume that the environmental cost of that single package is unreasonable. That charge, added to the cost of the consumer item, could deter rural residents from having access to the same goods and services available to the urban resident.¹¹⁶

The wealthy, urban elite have always had access to an array of information and goods from the comfort of their homes. As early as the 1870s, bicycle messengers in Paris were delivering messages and packages between Versailles and the city center, able to cover the 10-mile journey in less than an hour.¹¹⁷ And even before Amazon, the phenomenon of (daredevil!) bike messengers facilitating delivery of nearly any object in record time in 20th- and early 21st-century Manhattan was common (as New Yorkers, or fans of the film *Premium Rush*,¹¹⁸ can attest). Those of us who live in less accessible areas or who cannot afford the cost of premium delivery, however, often must wait extra days and sometimes even weeks for delivery of goods that are available in the stores or via delivery in large urban centers.

Logistics technology such as drone delivery promises to bring this convenience to everyone, democratizing same-day or next-day accessibility to everything from essential consumer goods to fresh food and life-saving medicine. In 2009, the USDA estimated “that 23.5 million people [in the United States] live . . . further than one mile from a . . . supermarket,” which constitutes a food desert in urban areas.¹¹⁹ Lack of transportation exacerbates the lack of access to fresh foods: The FDA also showed that “[a]bout 2.3 million, or 2.2 percent, of households in the continental United States live more than a mile from a supermarket and do not have access to a vehicle.”¹²⁰

116. See *supra* note 35 and accompanying text.

117. See DAVID V. HERLIHY, *BICYCLE: THE HISTORY* 177 (2004).

118. *PREMIUM RUSH* (Columbia Pictures 2012).

119. PAULA DUTKO, MICHELE VER PLOEG & TRACEY FARRIGAN, U.S. DEPT. OF AGRIC. ECON. RSCH. SERV., *CHARACTERISTICS AND INFLUENTIAL FACTORS OF FOOD DESERTS* 1, 5 (2012) (referencing U.S. DEP'T OF AG., *ACCESS TO AFFORDABLE AND NUTRITIOUS FOOD: MEASURING AND UNDERSTANDING FOOD DESERTS AND THEIR CONSEQUENCES* 21 (2009)).

120. Michele Ver Ploeg, *Access to Affordable, Nutritious Food Is Limited in "Food Deserts,"* U.S. DEPT. OF AGRIC. ECON. RSCH. SERV. (Mar. 1, 2010), <https://www.ers.usda.gov/amber-waves/2010/march/access-to-affordable-nutritious-food-is-limited-in-food-deserts> [https://perma.cc/5T3F-7ZY2].

Although later studies have found that the ultimate effect of lack of grocery store access on nutrition is uncertain,¹²¹ and eating “habits, and tastes,” are likely part of the picture as well,¹²² we note that reducing the delivery time and cost in rural and lower-income areas—thus providing access to fresh food even in areas without grocery stores—would certainly remove at least one potential barrier to healthier eating habits in poorer and rural communities. Riding the bus to the grocery store for high-caloric foods or waiting an extra day for a much-needed prescription or medical supply could be a relic of the past in a drone-mediated future. The 1925 dog sled race to bring diphtheria antitoxins nearly 700 miles to Nome Alaska in five and a half days will always remain a dramatic feat of human and canine heroism deserving of its place in the record books,¹²³ but with the prospect of drone delivery to inaccessible locations, the next pandemic remedy could reach people faster than the disease itself.

III. HIDING IN PLAIN SIGHT: RAILROAD AND UTILITY CORRIDORS

If only there were another transcontinental, federally regulated interstate transportation system that links the rural hinterlands with urban centers and covers metropolitan areas in a web of limited-access, multimodal transportation corridors. Fortunately, as another commentator has already noted, there is: the railroad! Jonathan Kathrein proposed that “[d]rone operators . . . use the low-altitude airspace above railway corridors” for drone flights.¹²⁴ The advantage of this approach is that a drone operator can “negotiat[e] [one] big agreement” with a railroad, rather than “many small . . . ones” with a patchwork of property owners.¹²⁵ And, of course, a drone flying above a railroad track—even one still in use—is unlikely to cause significant damage or any loss of life in the event of a crash. In the “rock, paper, scissors” of drone accidents, a 200-ton locomotive beats a 50-pound drone 100 percent of the time.

But despite the aesthetic simplicity of Kathrein’s proposal, railroad corridors are not homogeneous property rights, like interstate highways.¹²⁶ In fact, they are comprised of a variety of proprietary interests, from fee simple absolute interests that would extend well into the airspace under the *ad coelum* doctrine, to ephemeral use rights and easements that may terminate upon

121. Mary MacVean, *Food Deserts May Not Be Key in What People Eat, Study Says*, L.A. TIMES (March 27, 2013), <https://www.latimes.com/health/la-xpm-2013-mar-27-la-heb-food-deserts-20130326-story.html> [https://perma.cc/NY9T-GVU6].

122. See Ver Ploeg, *supra* note 120.

123. AKC Staff, *The Real Story of Amblin’s Balto*, AM. KENNEL CLUB (Aug. 12, 2016), <https://www.akc.org/expert-advice/lifestyle/balto> [https://perma.cc/Q6GV-FNDM].

124. Jonathan Kathrein, *The Future of Drones Is the Railroad*, 21 U.S.F. INTELL. PROP. & TECH. L.J. 127, 127 (2017).

125. *Id.* at 128.

126. See Wright & Hester, *supra* note 15, at 376–77.

expansion to non-railroad uses.¹²⁷ As was discovered with the rails-to-trails program, the railroad's property rights can be woefully inadequate for the purpose, the state and federal regulatory framework may not accommodate different railroad interests, and private landowners are unlikely to donate even the tiniest sliver of their potential property rights if they think there is a profit to be made in holding the technology hostage.¹²⁸ Nineteenth-century landowners certainly sought to game the system and extract windfalls by refusing to negotiate with the railroads and the utility companies and there is no reason to assume 21st-century landowners will not do the same.¹²⁹ The answer today, as it was then, is the power of eminent domain.¹³⁰ But to understand the complexity and the full panoply of issues surrounding the use of railroad and utility easements in gross, we must step back in time to the early-19th century, when some of the biggest decisions Congress made were whether to invest in canals or railroads.¹³¹ Fortunately, Congress chose railroads to invest in, so now Amazon won't have to package everything in watertight containers.

127. *Id.*; see *supra* note 8 and accompanying text.

128. *Id.* at 357. We saw this with the class-action lawsuits against the railroads when they authorized fiber optic cable installation in their corridors. See *generally id.* (“With regard to railroad corridors, twenty-five class action suits have been filed by landowners adjacent to rail corridors challenging the railroad’s ownership interests . . . and the rights of utilities to lay cables . . .”).

129. Not surprisingly, landowners in the 19th century would rush out ahead of a railroad to stake a claim to land before the surveyors could reach it if they thought the railroad might be heading their way. *E.g.*, *Minneapolis, St. Paul & Sault Suite Marie Ry. v. Doughty*, 208 U.S. 251, 254–55 (1908). This happened quite frequently, which one can see simply by looking at the facts of a few cases. For instance, in *Minneapolis, St. Paul & Sault Suite Marie Railway v. Doughty*, “the [railroad] made a preliminary survey” in October 1891, “and on May 13, 1892[] completed its final survey, . . . fixing the [definite] line of” location with survey “stakes driven into the ground.” *Id.* The map was filed on July 20, 1892 and approved October 14, 1892. *Id.* The line was constructed “[i]n the latter part of July, 1892.” *Id.* The plaintiff, however, filed his homestead application for the land on June 25, 1892 and took up residence on July 1, 1892 under the Homestead law. *Id.* “[A] patent . . . was issued” to him on November 4, 1899. *Id.* The Court held that even though the railroad had constructed its road, it was “the approval thereof by the Secretary of the Interior” in October, 1892 that perfected the railroad’s rights. *Id.* at 257. And since that occurred after the settler had taken up residence, the settler’s rights prevailed. *Id.* at 254. See *generally* *Lilienthal v. S. Cal. Ry.*, 56 F. 701 (S.D. Cal. 1893) (The plaintiff’s “settlement initiated a right . . . and perfected in him the title as of that date.”); Darwin P. Roberts, *The Legal History of Federally Granted Railroad Rights-of-Way and the Myth of Congress’s “1871 Shift,”* 82 U. COLO. L. REV. 85 (2011) (discussing a circuit split regarding whether “the federal government retain[s] ownership of the public land underlying federally granted railroad rights-of-way” and how this may impact “private landowners”).

130. Eminent domain is a power reserved to the sovereign to acquire private land or other property for public uses. See 1 PHILIP NICHOLS, *THE LAW OF EMINENT DOMAIN: A TREATISE ON THE PRINCIPLES WHICH AFFECT THE TAKING OF PROPERTY FOR THE PUBLIC USE* §§ 60, 65–74 (Matthew Bender & Co. 2d ed. 1917). It was granted to railroads and utility companies to enable them to overcome recalcitrant landowners who would otherwise hold up public infrastructure projects. See *id.*

131. See *infra* note 132 and accompanying text.

A. *BUILDING A VAST TRANSPORTATION INFRASTRUCTURE*

In the first three decades of the 19th century, toll roads, plank roads, and canals connected inland rivers to provide transportation corridors for goods and people settling the new continent.¹³² But by the 1830s, a small handful of railroads were being built in Maryland, Massachusetts, and New York, first to haul mining products and later to haul freight and farm products to the markets of Baltimore, Boston, and New York City.¹³³ These railroads were chartered by the state legislatures that, for the most part, could not afford to build the infrastructure necessary to meet the demands of a growing population.¹³⁴ Private investment was key to opening up new frontiers to settlement and to building the iron road that would fuel the American economy for over a century. Agents for state-chartered railroads would head into the heartland to purchase land rights and survey the least treacherous route for a rapidly expanding network of roadways.¹³⁵ Driven by competition, these agents would purchase strips of land through farms, along rivers, and across undeveloped wastelands, often just a few days ahead of the surveyors and road crews.¹³⁶ Where landowners were compliant, the railroads paid cash and obtained deeds, allowing them to locate their roads “over, across, and through” a particular parcel of land.¹³⁷ Where landowners could not be found, they entered anyway, built their roads, and waited for the owners to cry foul and demand compensation.¹³⁸ Landowners who were recalcitrant found themselves at the end of a complaint filed in eminent domain to condemn the necessary corridor land.¹³⁹

For a half century, the legal system facilitated the development of private railroads throughout the country. Lawyers drafted thousands of private deeds transferring land from farmers to the railroads, and when landowners balked at selling, courts and judges assembled local landowners to assess the value of

132. Paul Stephen Dempsey, *Transportation: A Legal History*, 30 *TRANSP. L.J.* 235, 243–51 (2003); Daniel B. Klein & John Majewski, *Turnpikes and Toll Roads in Nineteenth-Century America*, *ECON. HIST. ASS'N* (Feb. 10, 2008), <https://eh.net/encyclopedia/turnpikes-and-toll-roads-in-nineteenth-century-america> [<https://perma.cc/4TYU-VMQQ>].

133. See JAMES W. ELY, JR., *RAILROADS AND AMERICAN LAW* 1, 11 (2001).

134. See *id.* at 2–3.

135. See Wright, *supra* note 19, ¶ 78A.06[2][b].

136. See *id.* ¶ 78A.06.

137. See ELY, *supra* note 133, at 35–39, 189–200; see also Wright, *supra* note 19, ¶ 78A.06 (discussing railroads’ eminent domain power and agents of railways).

138. This was the origin of the doctrine of inverse condemnation. A public entity would enter land and possess it and wait for the landowner to sue in inverse condemnation. See NICHOLS, *supra* note 130, § 209. As railroads abused this process, however, many states passed legislation or amended their constitutions to require railroad tender compensation before entry. See Wright, *supra* note 19, ¶ 78A.06.

139. See ELY, *supra* note 133, at 35–39, 189–200; see also Wright, *supra* note 19, ¶ 78A.06 (discussing railroads’ eminent domain power and condemnation orders).

land to be taken by eminent domain.¹⁴⁰ When state-chartered railroads had difficulty connecting across state lines, Congress stepped in and began to charter interstate railroads, granting vast quantities of land to private railroad companies to sell to raise construction funds.¹⁴¹ Congress also passed hundreds of private bills chartering interstate railroads and granting them “rights-of-way” across public lands for location of their roads.¹⁴² Landowners who stood in the way might receive damages or compensation, but they never received injunctions to force removal of the tracks.¹⁴³

The frantic pace of development throughout the 19th century resulted in the construction of over 270,000 miles of railroad track by 1916.¹⁴⁴ With the invention of the telegraph, railroad corridors became the ideal location for utility line placement because these corridors connected most cities and towns, ran long distances across multiple states, and utility poles could be located in the shoulders of the newly developing roadway system without interfering with the primary railroad use.¹⁴⁵ The expansion of electric and telephone service was possible, in large part, because of the preexisting railroad network. A single license from a railroad company for access to its corridor was far simpler for a utility company than assembling its own utility-line corridor.¹⁴⁶ And of course, both electric and telephone service were critical to the railroads for sending signals of oncoming trains and for servicing switches, lights, and other communications infrastructure.¹⁴⁷

Throughout most of the 19th century, courts were extremely welcoming to the railroads. They interpreted private landowner deeds to convey fee simple absolute interests to the railroads, they permitted the exercise of eminent domain even when the railroads had not offered compensation or asked permission to enter the land in advance, and they interpreted the scope of railroad easements to be exclusive as against the landowner and transferable to other railroad entities.¹⁴⁸ Although the common law could

140. State statutes provided procedures for assessing the fair market value of lands taken by railroads and utilities. See Wright, *supra* note 19, ¶ 78A.06[1].

141. See PAUL W. GATES, HISTORY OF PUBLIC LAND LAW DEVELOPMENT 341–86 (1968) (detailing the various grants of land to railroads by Congress).

142. *Id.* at 357; Wright, *supra* note 19, ¶ 78A.06.

143. ELY, *supra* note 133, at 37–38.

144. RAILS-TO-TRAILS CONSERVANCY, RAILBANKING AND RAIL-TRAILS: A LEGACY FOR THE FUTURE 1 (2006), <https://parks.ny.gov/documents/recreation/trails/RailbankingAndRailTrails.pdf> [<https://perma.cc/L43N-833T>].

145. The Florida statute of 1903 was typical of this period, authorizing telephone and telegraph companies to condemn space in railroad corridors for location of lines. FLA. STAT. ANN. § 362.02 (LexisNexis 2021); 2 BYRON K. ELLIOTT & WILLIAM F. ELLIOTT, A TREATISE ON THE LAW OF RAILROADS § 1230 (3d ed. 1921). See generally Wright & Hester, *supra* note 15 (discussing why vacant railroad land is ideal for trails).

146. See Wright & Hester, *supra* note 15, at 414–32.

147. *Id.*

148. ELY, *supra* note 133, at 35–39; see Wright & Hester, *supra* note 15, at 365–73.

certainly accommodate these developments easily, the recognition that a commercial easement in gross was exclusive, divisible, apportionable, and transferable was a profoundly important step.¹⁴⁹

The common law of William Blackstone recognized appurtenant easements—like driveways and private in-gross rights—like the entitlement to certain church pews.¹⁵⁰ The former were termed appurtenant easements, and the latter were called “rights in gross analogous to easements.”¹⁵¹ In Blackstone’s day there was no such thing as a private easement in gross that was not attached to a dominant parcel of land. As a result, most deeds to railroads in the early 19th century granted a “parcel of land,” “possession,” or “title.”¹⁵² Yet as the century progressed, and problems arose with railroads not actually being constructed, courts became sympathetic to landowners who had sold strips of land that bisected their farms that could not be returned to them if the railroad was never built.¹⁵³ Worse, these strips might be sold to others resulting in permanent partition of lands. But common law easements that would disappear upon abandonment were inadequate for active railroad corridors because they were nonexclusive, i.e., the servient landowner was also entitled to use the land.¹⁵⁴ Yet if the landowner granted a fee interest to the railroad that would entail exclusive possession, then he could not get it back if the railroad went defunct—the problem was unique to the development of a private network of roads that were heavily invested with the public interest.¹⁵⁵ If the railroad’s property interests could be treated like a fee interest if the railroad was in possession and operating trains, but reverted upon abandonment or forfeiture, then all problems were solved.¹⁵⁶ Thus arose the commercial easement in gross. As one commentator explained:

[I]f the railroad’s interest is construed as an easement, it is very different from the usual easement. It is a commercial easement in gross, which can be freely assigned. The railroad is entitled to exclusive

149. See generally George Kloek, *Assignability and Divisibility of Easements in Gross*, 22 CHI-KENT L. REV. 239 (1944) (discussing the development of easement law through the lens of railroad operations); Alan David Hegi, Note, *The Easement in Gross Revisited: Transferability and Divisibility Since 1945*, 39 VAND. L. REV. 109 (1986) (explaining the nature and development of the easement in gross as a property doctrine).

150. Wright, *supra* note 14, at 741.

151. *Id.*; W.R.V., Comment, *Assignability of Easements in Gross*, 32 YALE L.J. 813, 814–15 (1923) [hereinafter *Assignability of Easements in Gross*].

152. Wright, *supra* note 14, at 730 & n.118 (quoting *Snoddy v. Bolen*, 25 S.W. 932, 933–34 (Mo. 1894) (citation omitted)).

153. *Id.* at 714–16.

154. See *supra* notes 11–13 and accompanying text; see Wright, *supra* note 19, ¶ 78A.06[3][b].

155. In Blackstone’s day, there were public ways that characterized roads and footpaths, but these were notably public. See Wright, *supra* note 14, at 741. There were private nonexclusive easements like driveways. See *id.* And there were in gross private rights that were non-alienable and non-apportionable. *Id.*

156. See *supra* notes 11–13 and accompanying text.

possession of the land, and can bring ejectment, even though an easement is not a possessory estate in land. And while possession of the fee by a servient owner is not usually considered adverse to the owner of an easement thereon, nevertheless the servient owner of the fee under a railroad easement can adversely possess parts of the railroad right of way. These similarities between the railroad easement and possessory estates in land are a cause of a great deal of the confusion in this whole area, and should be kept carefully in mind.¹⁵⁷

The Restatement (First) of Property explained in 1944 that easements in gross would be deemed freely alienable, divisible, and apportionable if they were exclusive commercial easements.¹⁵⁸ The commercial easement in gross provided the perfect solution to the problem of railroads in this country. Because railroads were private entities and needed exclusive control over their corridor lands, they needed a fee-like possessory right to exclude both the public trespasser as well as the servient estate owner's livestock or other encroachments.¹⁵⁹ This was a critical safety concern.¹⁶⁰ But it was also against public policy for railroads to claim more property rights than they needed, especially if they acquired them through eminent domain.¹⁶¹ If the railroad went belly-up, it should not be able to sell its corridor land to private owners, although selling to a viable railroad would be best because doing so served the public good. As a result, commercial easements in gross needed to be alienable to ongoing commercial owners but should revert upon abandonment or forfeiture of the railroad altogether. Only an easement provided that automatic return to the land from which the corridor was taken, unless the landowners (and the railroads that prepared most deeds) were prescient enough to grant only a fee simple determinable to the railroad, thus retaining a possibility of reverter.¹⁶²

The commercial easement in gross was the perfect solution to the unique situation of public infrastructure being constructed by private entities that were granted eminent domain powers to act in the public interest but ultimately held their land as private owners.¹⁶³ Railroads and utilities, therefore, represented a unique American solution to the unique American

157. Philip A. Danielson, Comment, *The Real Property Interest Created in a Railroad upon Acquisition of its "Right-of-Way,"* 27 ROCKY MTN. L. REV. 73, 74-75 (1954) (footnotes omitted).

158. See RESTATEMENT (FIRST) OF PROP. § 493 cmt. a-c (AM. L. INST. 1944).

159. Wright & Hester, *supra* note 15, at 397-99.

160. *Id.*

161. See NICHOLS, *supra* note 130, § 150.

162. Some landowners did this, noting that upon railroad abandonment the land would revert, but that number was relatively small. Wright, *supra* note 19, ¶ 78A.07[4][c].

163. See *Assignability of Easements in Gross*, *supra* note 151, at 814-17; Klock, *supra* note 149, at 258-60; Gerald E. Welsh, *The Assignability of Easements in Gross*, 12 U. CHI. L. REV. 276, 276-77 (1945); Hegi, *supra* note 149, at 110-11.

problem of needing immediate transportation options for a country that was just starting out on the path to private property and where governments lacked the resources to develop necessary public infrastructure to support its developing economy. Settlers needed access to the rapidly developing western domains, but states did not have the public funds to build their own roads, bridges, or public harbors until the state was settled and had a thriving economy.¹⁶⁴ Private railroads offered the ideal solution for speeding up the settlement of the western frontier, and the common law quickly adapted to a quasi-public form of property rights in these quasi-public entities.

Not surprisingly, courts ruled favorably toward the evolution of the commercial easements in gross, as they protected both the public interest (in providing a network of roads to serve communities) and the national interest, while also protecting private landowners with reversionary interests and compensation through eminent domain.¹⁶⁵ The Supreme Court explained that:

A railroad's right of way has, therefore, the substantiality of the fee, and it is private property[,] even to the public[,] in all else but an interest and benefit in its uses. It cannot be invaded without guilt of trespass. It cannot be appropriated in whole or part[,] except upon the payment of compensation. In other words, it is entitled to the protection of the Constitution, and in the precise manner in which protection is given. It can only be taken by the exercise of the powers of eminent domain¹⁶⁶

Just as the commercial easement in gross provided the solution to the 19th-century problem of American frontier expansion with a public-private partnership for developing transportation infrastructure, the commercial easement in gross is the solution to the 21st-century problem of the transportation and delivery of goods to a widely settled populace with the least environmental and public safety impact. Drone use of these multi-purpose corridors takes belching trucks off the roads and avoids the distractions, nuisance, and trespass of drone delivery over public roads and private property.

164. See ELY, *supra* note 133, at 19–30.

165. See Kloek, *supra* note 149, at 247 (“One type of easement that has been favored above all others, however, is the one given to a railroad [I]t is in the interest of public safety and convenience that the railroad should be permitted to exclude all persons from the right of way including even the owner of the underlying fee.”). Notably, these commentators are identifying the commercial easement in gross after the courts had been recognizing them for decades. See Wright, *supra* note 19, ¶ 78A.o6[3][b].

166. *W. Union Tel. Co. v. Pa. R.R.*, 195 U.S. 540, 570 (1904); *Midland Valley R.R. v. Sutter*, 28 F.2d 163, 165 (8th Cir. 1928) (citing *W. Union Tel. Co. v. Pa. R.R.*, 195 U.S. 540, 570 (1904)). The leading treatise on railroad law also pointed out the important role of the railroad easement and its unique legal character. ELLIOTT & ELLIOTT, *supra* note 145, § 1158 (“The easement is not that spoken of in the old law books, but is peculiar to the use of a railroad, which is usually a permanent improvement, a perpetual highway of travel and commerce, and will rarely be abandoned by nonuser.” (quoting *Smith v. Hall*, 72 N.W. 427, 428 (Iowa 1897))).

But while the common law evolves to meet the needs of the people it serves, it also devolves as time passes. Unfortunately, the commercial easement in gross is a concept rarely taught and barely understood by most late-20th-century property professors and their students who go on to litigate or judge the intricate nuances of property rights in transportation corridors.¹⁶⁷ During the 20th century, railroads and the utility companies that were often located on their corridors, developed complex licensing agreements that rarely relied on the subtle details of the sharing of property rights between railroads and servient landowners.¹⁶⁸ The Rails-to-Trails movement, which sought to convert unused railroad corridors to recreational trails, slammed into a legal system that failed to understand the flexibility of the commercial easement in gross.¹⁶⁹ As the nation faced a crisis of unbridled development and the need for greater and greater environmental regulation, many sought a return to the *Lochner*-Era of heightened protection for private property.¹⁷⁰ In the 1980s, the private property rights movement began its unwavering mission to use the Takings Clause to resurrect some mythical conception of sanctified private property, and they found adherents in the Supreme Court appointments of Justices Scalia, Thomas, and Alito.¹⁷¹ The common law's quality of resilience and adaptability became its downfall, and the public treasury was forced to pay hundreds of millions of dollars to landowners whose predecessors had already been compensated for the property rights taken for railroad uses.¹⁷² Shifting from railroad to recreational trail use was seen as a taking of private property as litigants on both sides gradually realized that they were litigating issues that would have been summarily dismissed a century earlier. If drones are going to fly over railroad and utility corridors, we must come to grips with

167. In perhaps one of the most significant examples of this, Chief Justice Roberts's decision in *Brandt Trust v. United States* collapses the distinction between the railroad easement and a typical common law easement that is nonexclusive and easily lost by nonuser. See Brandt Revocable Tr. v. United States, 572 U.S. 93, 104–06 (2014); see also Justin G. Cook, Comment, *How the Supreme Court Jeopardized Thousands of Miles of Abandoned Railroad Tracks with a Single Opinion* [Brandt Revocable Trust v. United States, 134 S. Ct. 1257 (2014)], 54 WASHBURN L.J. 227, 239 (2014) (critiquing the interpretation of the railroad easement as a common law easement).

168. WOLF, *supra* note 11, ¶¶ 34.16, 34.26.

169. See Wright, *Eminent Domain*, *supra* note 23, at 455–68; Wright, *supra* note 19, ¶ 78A.13.

170. Many concerned that constitutionally protected property rights have been eroded viewed the decision in *Lucas v. South Carolina Coastal Council* as a watershed opportunity to revive the kinds of substantive due process protections the Court recognized during the *Lochner* Era. See, e.g., Bill Want, *The Lucas Case: The Trial Court Strategy and the Case's Effect on the Property Rights Movement*, 27 STAN. ENV'T L.J. 271, 287 (2008); see *supra* note 23 and accompanying text. See generally *Lucas v. S. Car. Coastal Council*, 505 U.S. 1003 (1992) (requiring a total taking for just compensation and deciding in Lucas's favor).

171. Many people have written about the rise of the private property rights movement, which author Danaya Wright has summarized in Wright, *Eminent Domain*, *supra* note 23, at 472–77; see also Jacqueline Vaughn Switzer, *Property Rights Movement*, POLLUTION ISSUES, <http://www.pollutionissues.com/PI-Re/Property-Rights-Movement.html> [<https://perma.cc/HW9X-YZEF>] (citing authors such as Richard Epstein, Charles R. Wise, Bruce Yandle, and Robert Meltz as authors in this field).

172. See *infra* Part IV.

the history of the Rails-to-Trails litigation and navigate a viable path through it.

IV. LESSONS LEARNED FROM RAILBANKING

In the 1960s and 1970s, as railroads faced unprecedented competition from the heavily subsidized trucking and airline industries, they consolidated their lines, removed and recycled valuable trackage, and ultimately abandoned thousands of miles of unprofitable rail corridors.¹⁷³ In 1980, Congress passed the Staggers Rail Act, which made it easier for railroads to shed unproductive routes.¹⁷⁴ But a slow-growing movement of environmental activists, railroad buffs, bicyclists, and pedestrians formed coalitions to save these corridors and use them for recreational trails. In 1983, worried that invaluable rail corridors were being lost, Congress amended the National Trails Systems Act to encourage railroads and trail groups to enter into voluntary agreements allowing the trail group to operate interim trails on the land until the railroad might need it back.¹⁷⁵ This process of allowing interim trails was called “railbanking,” and the key element was that the railroad corridor would continue in the national rail network subject to federal regulatory jurisdiction during the interim trail use.¹⁷⁶ Because the possibility of future railroad use continued, state-law property rights of servient fee or reversionary interest owners would not be triggered. The idea was simple—maintain federal regulatory control over an out-of-service rail corridor and keep it intact for future transportation needs, but permit public trail use in the interim.

Almost immediately after passage of the railbanking statute, adjacent landowners complained. They had grown accustomed to having railroads simply abandon their corridors and walk away from the land, allowing adjacent landowners to absorb the land on which the rails had been removed.¹⁷⁷ And railroads generally did not care who got the land. If they could sell it, they would. But if no one would buy, they simply walked away and would not challenge landowners who may have been encroaching onto their corridors for years.¹⁷⁸ But with the prospect of railbanking, railroads could sell their entire corridors to a trail group (a private non-profit entity, a city, a state parks department, or even a state highway department) and retain

173. Abandonment is a process heavily regulated by the ICC, now STB, and entails filings, findings, and hearings. *See* Wright, *supra* note 19, ¶ 78A.10.

174. Staggers Rail Act of 1980, Pub. L. 96-448, 94 Stat. 1895 (codified as amended at 49 U.S.C. § 10101).

175. 16 U.S.C. § 1247(d) (2018).

176. *See generally* *Railbanking*, RAILS-TO-TRAILS CONSERVANCY, <https://www.railstotrails.org/build-trails/trail-building-toolbox/acquisition/railbanking> [<https://perma.cc/BY6H-K3LQ>] (describing the history and policy justifications of railbanking).

177. Wright, *supra* note 19, ¶¶ 78A.04–05.

178. *Id.*

a right to reenter if they needed it.¹⁷⁹ It was a win-win situation for the federal government that wanted to preserve invaluable multiuse corridors, railroads that wanted to be free of liability immediately but could retain the right to reactivate, and trail users who had safe and scenic byways for recreational multiuse trails.

But landowners adjacent to these trails did not always view them as a win.¹⁸⁰ The ideal solution to them was that the railroad would abandon and they could simply absorb the extra land behind their homes and farms, fencing it off and gradually acquiring fee title.¹⁸¹ Next best was that the railroad would sell these lands to them for a pittance; next was if the railroad continued to own these corridors but rarely if ever actually used them.¹⁸² For many, the worst outcome was that rarely used corridors would be converted into active and popular trails with hundreds of cyclists, pedestrians, skaters, and dog-walkers traversing behind their homes every day. Although many landowners realized that rail-trails actually increased their home values and did not bring the parade of horrors that some predicted—from criminal trespassers to rapists and murderers—some landowners simply could not support the idea.¹⁸³ And as the property rights movement was gaining steam in the 1980s, these landowners turned to the courts.

The first stage of litigation began as quiet title actions by landowners against railroads and trail groups, often alleging slander of title and conversion as railroads claimed they had sufficient property rights to transfer them to the trail group.¹⁸⁴ But individual quiet title actions were expensive and did little to stop a trail. Soon, class action cases began to be filed by a handful of landowners claiming to represent all adjacent landowners to all railroad corridors in a particular state.¹⁸⁵ State-wide class actions in Indiana

179. *Railbanking*, *supra* note 176.

180. See Rita Cain, *Unhappy Trails—Disputed Use of Railroad Rights-of-Way Under the National Trails System Act*, 5 J. LAND USE & ENV'T. L. 211, 211, 214–15 (1989); Roger M. Stahl, *Smoke Along the Tracks: The Constitutionality of Converting Rails-to-Trails Under 16 U.S.C. § 1247(d)*, 16 WM. MITCHELL L. REV. 861, 861–62 (1990).

181. Wright, *supra* note 19, ¶¶ 78A.04–05; see also *supra* note 180.

182. See *supra* note 180.

183. DAVID P. RACCA & AMARDEEP DHANJU, RAILS-TO-TRAILS CONSERVANCY, PROJECT REPORT FOR PROPERTY VALUE/DESIRABILITY EFFECTS OF BIKE PATHS ADJACENT TO RESIDENTIAL AREAS PREPARED FOR DELAWARE CENTER FOR TRANSPORTATION AND THE STATE OF DELAWARE DEPARTMENT OF TRANSPORTATION 2–9 (2006), <https://www.railstotrails.org/resourcehandler.ashx?name=project-report-for-property-valuedesirability-effects-of-bike-paths-adjacent-to-residential-area&id=4482&fileName=bikepathfinal.pdf> [<https://perma.cc/EEF4-VN2Y>] (discussing the results of numerous case studies on crime rates and property values of bike paths).

184. See the *Preseault* saga that began with a 1981 quiet title suit that went to the Vermont Supreme Court twice, to the U.S. Supreme Court, and then garnered two more opinions from the Court of Appeals for the Federal Circuit. *State v. Preseault*, 652 A.2d 1001, 1002–03 (Vt. 1994); see also Wright, *Eminent Domain*, *supra* note 23, at 449–54 (describing “[t]he Preseaults’ twenty-year legal battle”).

185. See Wright, *supra* note 19, ¶ 78A.12.

and Ohio dragged on for years as the lawyers for the railroads and the landowners fought over each source deed to each parcel of land.¹⁸⁶ Railroads rightly claimed that they had received fee simple absolute title to most of their corridor lands; landowners rightly claimed that in some instances the railroad only had a railroad easement that would terminate upon abandonment of railroad use.¹⁸⁷ Determining which parcels were held in fee simple absolute and which parcels were held as mere easements would take more time and expense locating the deeds and analyzing them than the land itself was worth in many cases. But where the railroad had not gone through the railbanking process permitted by federal statute, parcel-by-parcel analysis was the only answer.

Amendments to the National Trails System Act in 1983 provided a clever solution to the problem of the conflicting property rights of landowners and railroads.

[I]n furtherance of the national policy to preserve established railroad rights-of-way for future reactivation of rail service, . . . in the case of interim use of any established railroad rights-of-way . . . , *if such interim use is subject to restoration or reconstruction for railroad purposes, such interim use shall not be treated, for purposes of any law or rule of law, as an abandonment of the use of such rights-of-way for railroad purposes.* If a State, political subdivision, or qualified private organization is prepared to assume full responsibility for management of such rights-of-way and for any legal liability arising out of such transfer or use, and for the payment of any and all taxes that may be levied or assessed against such rights-of-way, then the Board . . . *shall not permit abandonment or discontinuance inconsistent or disruptive of such use.*¹⁸⁸

The railbanking statute provided that if the railroad and the trail group entered into a voluntary agreement whereby the railroad had the right to re-enter and reactivate railroad service, the interim use was to be considered a continuing railroad purpose and state-law property rights, like rights of re-entry, servient fee, and reversionary interests, would not vest, but would remain in limbo, just as they had during active railroad use.¹⁸⁹ Railbanking, therefore, offered the perfect answer to the parcel-by-parcel analysis necessitated by the early quiet title actions because state-law property rights of adjacent

186. See, e.g., *Clark v. CSX Transp., Inc.*, 737 N.E.2d 752, 755-57 (Ind. Ct. App. 2000); *State ex rel. Firestone v. Parke Cir. Ct.*, 621 N.E.2d 1113, 1113-15 (Ind. 1993); *Hefty v. All Other Members of the Certified Settlement Class*, 638 N.E.2d 1284, 1287 (Ind. Ct. App. 1994); *Hefty v. All Other Members of the Certified Settlement Class*, 680 N.E.2d 843, 846-48 (Ind. 1997); *Maas v. Penn Cent. Corp.*, 2007-Ohio-2055, *P1 (Ct. App. 2007); see also *Wright*, *supra* note 19, ¶ 78A.12 (“These class actions began initially as suits against the railroads, claiming that the railroads did not have the property rights to [landowners’] corridors.”).

187. *Wright*, *supra* note 19, ¶ 78A.06[3].

188. 16 U.S.C. § 1247(d) (2018) (emphasis added).

189. *Id.*; see *Wright*, *supra* note 19, ¶ 78A.11.

landowners were to remain inchoate during the period of interim trail use.¹⁹⁰ And for a while, courts simply dismissed cases against railroads or trail groups by adjacent landowners if the corridor lands had been banked under the federal program.¹⁹¹ Railroads and trail groups quickly got the memo that railbanking a corridor made it much more likely to avoid litigation and that railroad corridors could more easily be converted to other public transportation uses if they were railbanked. In 1986, Rails-to-Trails Conservancy was founded to help facilitate the railroad/trail group partnerships that would permit the preservation of these invaluable corridors.¹⁹²

Not content that federal regulatory supervision of railroad corridors through the period of interim trail use should preempt state property rights, the same lawyers who brought the early class-action suits against the railroads brought suit against the federal government under the Tucker Act, alleging that the railbanking statute “took” their private property without just compensation.¹⁹³ They argued, in essence, that but for the possibility of railbanking, the railroad would have abandoned its corridors and the landowners would have been able to reclaim possession of that land.¹⁹⁴ The railbanking statute forestalled a windfall that these landowners had hoped to acquire, and that required compensation.¹⁹⁵ The challenges begged the question, however, as to who owned the property in the first place. If the railroad owned it in fee, then no taking had occurred; but if the railroad owned only an easement, a taking might have occurred.¹⁹⁶

In 1990, after extensive litigation in Vermont involving a railbanked trail along the shores of Lake Champlain, the Supreme Court held that the railbanking statute, designed to preserve railroad corridors for future reactivation, was a permissible exercise of Congress’ Interstate Commerce Power.¹⁹⁷ But in a gesture to the property rights movement, the Court also went on to hold that, in some circumstances, the operation of the statute might take private property rights.¹⁹⁸ This decision, flying in the face of Congress’ clear intention to hold state-law property rights intact during the railbanked period, led to a flurry of challenges in the Court of Federal Claims

190. 16 U.S.C. § 1247(d); Wright, *supra* note 19, ¶ 78A.11.

191. See *Glosemeyer v. Missouri-Kansas-Texas R.R.*, 685 F. Supp. 1108, 1122 (E.D. Mo. 1988), *aff’d* 879 F.2d 316 (8th Cir. 1989); *Victor Oolitic Stone Co. v. CSX Transp., Inc.*, 852 F. Supp. 721, 724 (S.D. Ind. 1994); *Schneider v. Union Pac. R.R.*, 864 F. Supp. 120, 124 (D. Neb. 1994).

192. See *History of RTC and the Rail-Trail Movement*, RAILS-TO-TRAILS CONSERVANCY, <https://www.railstotrails.org/about/history> [<https://perma.cc/E7WZ-EWTR>] (discussing the founding of the RTC).

193. See Wright, *supra* note 19, ¶ 78A.13; Bryson Smith, *A Program Derailed: The Inefficiencies of the Federal Railbanking Process, and How to Get It Back on Track*, 42 *TRANSP. L.J.* 81, 92–93 (2015).

194. See Wright, *supra* note 19, ¶ 78A.13.

195. See *id.*

196. See *id.*

197. See *Preseault v. Interstate Com. Comm’n*, 494 U.S. 1, 5 (1990).

198. See *id.* at 13.

alleging that landowners' rights were taken by operation of the statute and that compensation was due from the federal government, not from the railroads.¹⁹⁹

Throughout the 1990s, these issues were fiercely opposed by the Department of Justice, which alleged that preservation of a railroad corridor, even though it was not being actively used to run trains, was a continuing railroad use that precluded the triggering of state-law property rights.²⁰⁰ Landowners, however, insisted that they had the right to retake adjacent railroad corridors upon discontinuation by the railroads and that the statute had interposed a new and different public use on these lands, burdening them with cyclists and pedestrians who would not have been permitted on the land had it remained in the control of the railroad.²⁰¹ In the end, these cases required parcel-by-parcel analyses to determine if the railroad owned fee title to its lands, in which case adjacent landowners had no property rights that required compensation, or if the railroad only had easements, for which the landowner held the servient fee and was presumably entitled to compensation for the new, recreational trail use.²⁰²

To date, hundreds of millions of dollars have been paid out in compensation to class-action lawyers and adjacent landowners for postponing possessory property rights during the period of interim trail use and railbanking.²⁰³ And the cases continue. Not satisfied with attacking the property rights of railbanked corridors, lawyers representing adjacent landowners have

199. See Wright, *supra* note 19, ¶ 78A.13 (discussing cases challenging the railbanking statute in the Court of Federal Claims).

200. This argument was correct, as all state laws provided that nonuse of an easement was not sufficient to constitute abandonment. See *id.* ¶ 78A.10[2]; WOLF, *supra* note 11, ¶ 34.20[2].

201. This was a question of scope of the easement—whether bikes or recreational trails were included in a railroad easement. See WOLF, *supra* note 11, ¶ 34.12 (discussing different ancillary uses that can be made of an easement).

202. The concurrence in *Preseault* argued that conversion to trails constituted a new, additional burden of a trail easement, and the Federal Circuit concurred in *Toews v. United States*. *Preseault*, 494 U.S. at 20 (O'Connor, J., concurring); *Toews v. United States*, 376 F.3d 1371, 1380–81 & n.6 (Fed. Cir. 2004).

203. See generally, e.g., *Voth Oil Co. v. United States*, 108 Fed. Cl. 98 (2012) (roughly \$1.3M for land plus roughly \$229K in attorney fees); *Moore v. United States*, 63 Fed. Cl. 781 (2005) (nearly \$4M award); *McCann Holdings, Ltd. v. United States*, 111 Fed. Cl. 608 (2013) (nearly \$3.2M in damages for blocking access to undeveloped land); *Childers v. United States*, 116 Fed. Cl. 486 (2014) (roughly \$5.75M in damages); *Hash v. United States*, No. 99-cv-00324, 2012 WL 1252624 (Fed. Cl. Apr. 13, 2012) (roughly \$883K for land and roughly \$2.39M for attorney fees); *Raulerson v. United States*, 108 Fed. Cl. 675 (2013) (roughly \$33M in damages for land plus roughly \$11M for attorney fees); *Haggart v. United States*, 116 Fed. Cl. 131 (2014) (roughly \$140M); *c.f.* *Brandt Revocable Tr. v. United States*, 572 U.S. 93, 117 (2014) (Sotomayor, J., dissenting) (deploring the hundreds of millions of dollars in compensation that the decision may entail). A recent empirical study of takings litigation in the Court of Federal Claims shows that over a 15-year period from 2000 through 2014, rail-trail litigation accounted for part of a significant majority of cases and a majority of the payments from the federal treasury. Dave Owen, *The Realities of Takings Litigation*, 47 BYU L. REV. 577, 581–82 (2022).

also attacked active rail corridors on which are located gas pipelines, fiber optic cables, telephone lines, and other utilities.²⁰⁴ Claiming that these additional uses are not “railroad uses” permissible in a railroad easement, landowners have found less sympathetic courts when the railroad is currently engaged in active uses.²⁰⁵

The distinction is disturbing for those who appreciate consistency in the common law. Courts have held that active railroads can engage in virtually any additional commercial activity within their corridors, even if they only hold easements.²⁰⁶ They can even allow recreational trails alongside their tracks.²⁰⁷ Every state holds that nonuse of an easement is not sufficient to deem it abandoned without evidence of intent to abandon the property rights and actions consummating that intent.²⁰⁸ Preservation of railroad use is clearly a railroad purpose. But during the period of preservation, while no trains are being run even though the railroad retains all its property rights and has not abandoned its claims, some courts have held that any other use, whether trails or utility use, exceeds the scope of the railroad easement and constitutes a new burden that must be compensated.²⁰⁹

Two points are suggested by this brief history. First, the private property rights movement of the late-20th century has fundamentally changed the narrative of railroad property rights, and successes in state and federal courts have elevated the reversionary interests of landowners adjacent to railroad

204. See *Barahona v. Union Pac. R.R.*, 881 F.3d 1122, 1125 (9th Cir. 2018); *Ctr. for Biological Diversity v. U.S. Bureau of Land Mgmt.*, No. CV 17-8587, 2019 WL 2635587, at *3-5 (C.D. Cal. June 20, 2019); *Smith v. Sprint Commc’ns Co.*, 387 F.3d 612, 613-14 (7th Cir. 2004); *Smith*, *supra* note 193, at 109-10; see also *Wright*, *supra* note 19, ¶ 78A.14 (“Another hotly contested issue is whether railroads or trail groups can authorize telecommunications or other utility uses in rail corridors when the utilities are not necessary for operating trains.”).

205. See *Wright*, *supra* note 19, ¶ 78A.14; see also *LKL Assocs., Inc. v. Union Pac. R.R.*, 17 F.4th 1287, 1291-94, 1303 (10th Cir. 2021) (noting that a railroad has plenary power “to keep its easement unobstructed” when using the encumbered property).

206. See, e.g., *Barahona*, 881 F.3d at 1131-35 (9th Cir. 2018).

207. See HUGH MORRIS, JAMIE BRIDGES & RICHARD SMITHERS, *RAILS-TO-TRAILS CONSERVANCY, RAILS-WITH-TRAILS* 5 (2000) [hereinafter *RAILS-WITH-TRAILS*], https://www.railstotrails.org/resource_handler.ashx?name=rails-with-trails-design-management-and-operating-characteristics-of-61-trails-along-active-rail-lines&id=3491&fileName=Rails-with-Trails%20Report%20reprint_1-06_lr.pdf [https://perma.cc/CW6F-WZGQ]. Indiana, for example, permits this practice. IND. CODE § 8-4.5-6-1(c) (2021); see also Matthew J. McGowan, White River Environmental Law Writing Competition Winner, *Locomotives v. Local Motives: The Coming Conflict, Statutory Void, and Legal Uncertainties Riding with Reactivated Rails-to-Trails*, 16 VT. J. ENV’T. L. 482, 511-17 (2015) (listing states that have enacted similar statutes).

208. J.A. Connelly, Annotation, *What Constitutes Abandonment of a Railroad Right of Way*, 95 A.L.R. Fed. 2d 468 § 2 (1964); Jennifer L. Romeo, Annotation, *Loss of Private Easement by Nonuse*, 62 A.L.R. Fed. 5th 219 § 2(a) (1998).

209. See *Ctr. for Biological Diversity v. U.S. Bureau of Land Mgmt.*, No. CV 17-8587, 2019 WL 2635587, at *29-33 (C.D. Cal. June 20, 2019); *Macy Elevator, Inc. v. United States*, 97 Fed. Cl. 708, 724-34 (2011); *James v. United States*, 130 Fed. Cl. 707, 724-30 (2017); see also *Smith*, *supra* note 193, at 99-102 (highlighting instances of narrowing the scope of railroad easements).

corridors to potentially compensable property interests that must be accommodated for drone use in these multiuse corridors to be feasible. Second, where railroads are engaged in active railroad use, courts are loath to limit their activities regardless of whether the railroad holds fee title or simply a railroad easement. The commercial easement in gross remains a robust, exclusive, and apportionable property right that accommodates changing technologies and evolving public needs. But anyone who enters the legal arena of railroad property rights without a clear understanding of the pitfalls of the railbanking program does so at their peril. Without explicating in excruciating detail all the fine legal points raised by the hundreds of railbanking cases, we focus on the biggest challenges and how they are likely to frame the future law involving drone use in railroad easements.

A. *OPPOSITION BY PRIVATE LANDOWNERS*

For nearly a hundred years, adjacent landowners had simply absorbed defunct and abandoned railroad corridors if the railroad chose not to assert legal property rights or chose not to sell their corridor lands for other transportation purposes. That changed with railbanking and could potentially change with drone use in out-of-service, abandoned, or railbanked corridors. Whether a railroad corridor has been abandoned is a technical legal question involving removal of federal jurisdiction through the abandonment process.²¹⁰ Currently, the Surface Transportation Board (“STB”) handles abandonments, which are granted “if . . . public convenience and necessity [do not] require” continued railroad service on a particular line.²¹¹ Once STB authorization for abandonment has been granted, the railroad may go about removing tracks and ties and disposing of its real estate.²¹² If a corridor is railbanked, it is not abandoned and federal STB jurisdiction remains over the corridor. Thus, establishing a drone highway over an abandoned or railbanked corridor will require negotiating with either the adjacent landowners, successors in interest to the railroad’s land, or whatever trail group has acquired the corridor. In any event, landowners are likely to be unhappy that the strip of land behind their homes is now home to a whizzing army of drones in addition to cyclists and pedestrians.

For any corridor that is not currently being used for an active railroad, it may be necessary to determine if the railroad has fee simple title or mere railroad easements in the land comprising its roadway. If it owns fee simple absolute title, the railroad can certainly license Amazon, Google, or a third-party intermediary to permit drone use in its airspace.²¹³ Land held in fee

210. See Wright, *supra* note 19, ¶ 78A.10[1].

211. 49 U.S.C. § 10903(d) (2018).

212. Wright & Hester, *supra* note 15, at 436.

213. Owners of land in fee simple may make whatever use of the land is permitted by local zoning and other land use regulations. Thomas W. Hamilton, *Valuing the Leased Fee Simple Estate: The Answer for Ad Valorem Taxation Issues*, 40 REAL EST. ISSUES 19, 20 (2015).

simple absolute is not limited to railroad uses and, subject only to nuisance law, the railroad can authorize any additional users in its roadway.²¹⁴ However, if the railroad only acquired an easement in the 19th century, when the road was assembled, it will be necessary to determine whether state law permits additional uses within these commercial easements in gross. As noted earlier, active railroads will have exclusive rights to possession in their roadways, but inactive railroads may find that their property rights were terminated by abandonment.²¹⁵ This may mean negotiating with this subset of landowners to permit the aerial drone highway may be necessary if the railroad is not in active use and it never railbanked the corridor.

For railbanked corridors, however, the land remains part of the national rail network and federal transportation jurisdiction remains. And although courts have been skeptical that recreational trail use is compatible or consistent with railroad uses, courts may be more sympathetic to a drone highway in that space. Drones carrying goods are engaged in the same commercial enterprise as freight trains carrying goods. Moreover, when corridors have been railbanked, compensation has arguably been paid for future interference with adjacent landowners' reversionary rights.²¹⁶ If a trail manager of a railbanked corridor has permitted utility infrastructure and uses in the old railroad bed, the landowners have rightly not been allowed to sue for additional compensation.²¹⁷ Similarly, where compensation has been paid out to landowners for public trail uses in railbanked corridors, courts should resist awarding additional sums for airspace rights. The principle behind compensating for trail uses was that the easement expanded from private commercial railroad use to public recreational use.²¹⁸ The drone highway, on the other hand, is a similar private commercial use that should be permissible as part of "the apportionability of . . . [commercial] easement[s] in gross."²¹⁹ The fact that a drone highway might not be inconsistent with railroad uses, however, does not guarantee that it might not impose an undue burden on the servient land. If drones fly too low, cause excessive noise, block the sun,

214. Because railroads are common carriers, however, they may not authorize uses that might jeopardize their primary railroad obligations. See FRANCIS P. MULVEY & MICHAEL F. MCBRIDE, RAILROADS' COMMON CARRIER OBLIGATION: ITS LEGAL AND ECONOMIC CONTEXT 11–15 (2020).

215. Wright, *supra* note 19, ¶ 78A.10. One of the disturbing trends in this area was a decision in the hotly contested *Preseault* case issued by the Court of Appeals for the Federal Circuit holding that the railroad had abandoned its state-law property easements prior to its application for abandonment authorization from the ICC (the predecessor to the STB). See *Preseault v. United States*, 100 F.3d 1525, 1544–49 (Fed. Cir. 1996).

216. See *Kaseburg v. Port of Seattle*, No. C14-0784, 2016 WL 1046092 at *2–3 (W.D. Wash. Mar. 16, 2016).

217. See *id.*

218. See Smith, *supra* note 193, at 99–102.

219. See *Henley v. Cont'l Cablevision of St. Louis Cnty., Inc.*, 692 S.W.2d 825, 825, 828 (Mo. Ct. App. 1985).

or drop packages, they might be deemed overly burdensome even if the use is within the scope of the commercial easement in gross.²²⁰

Because many courts, including the Supreme Court, seem to have forgotten their history and treat the railroad easement like a typical Blackstonian common law easement, judges have tended to resist claims that railroad easements can accommodate new and changing technologies.²²¹ Some states have adopted the shifting public use doctrine, which permits converting canals to railroads, railroads to streets, and roads to utility uses.²²² Other states have rejected it, holding that railroad easements only permit the passage of trains and not other transportation uses.²²³ Where a corridor has been railbanked, however, and compensation paid for the reversionary property rights purportedly taken by the federal statute, it would seem that the federal government should have acquired those “taken” property rights and could authorize continued commercial multimodal transportation uses.

Moreover, where railbanked or non-railbanked discontinued corridors have been litigated, the hard work of analyzing the property rights on a parcel-by-parcel basis has already been done. This means that where a corridor is perhaps only 20 percent easement, it would be a relatively simple process now to acquire additional aerial rights from those affected landowners if it were necessary to do so.

The story is different for active railroad corridors. Even if the railroad only holds commercial easements in gross, as would be the case with many long corridors in the West that were granted under the 1875 General Railroad Right-of-Way Act,²²⁴ the exclusive character of the easement, plus its apportionable quality, should allow expansion of the use to include not-inconsistent commercial uses such as a drone highway.²²⁵ Because the commercial easement in gross is exclusive, servient fee owners would have no possessory rights in the corridor land, including the airspace rights, because if they did, they could potentially authorize third parties to enter and install

220. Remember from basic property law that there are two issues in determining whether the use of an easement exceeds the bounds of the original grant; the first is when changes to the use are so significant as to be beyond the scope of the easement and the second is when a compatible or permissible use becomes so excessive as to pose an undue burden on the servient land. *See* WOLF, *supra* note 11, ¶ 34.12 (writing on scope and burden).

221. See generally Chief Justice Roberts’s discussion of the common law easement in *Brandt Revocable Tr. v. United States*, 572 U.S. 93 (2014) (explaining the history of the Supreme Court’s treatment of railroad easements in prior cases).

222. See generally *Troha v. United States*, 692 F. Supp. 2d 550 (W.D. Pa. 2010) (allowing a former railway to be used as a public recreational trail); *Moody v. Allegheny Valley Land Tr.*, 976 A.2d 484 (2009) (allowing a former railway to be used as a trail or roadway).

223. *Haggart v. United States*, 108 Fed. Cl. 70, 82, 98 (2012).

224. General Railroad Right-of-Way Act of 1875, 43 U.S.C. §§ 934–39 (2018).

225. The most recent decision on the exclusivity of railroad easements came in *LKL Assocs., Inc. v. Union Pac. R.R.*, which held that even though the easement was non-possessory it was still exclusive and that an adjacent landowner was trespassing when it built a building and a parking lot in the easement. *LKL Assocs., Inc. v. Union Pac. R.R.*, 17 F.4th 1287, 1302–04 (10th Cir. 2021).

structures in the railroad corridor.²²⁶ This could pose safety hazards and would be anathema to the railroad's common carrier duties to maintain their roadways in a safe and efficient manner.²²⁷ Courts have almost unanimously rejected claims by adjacent landowners to authorize any third party uses in active railroad corridors.²²⁸ Certainly where the railroad holds a fee interest, the adjacent landowner would have no right to interfere with aerial drone use or subsurface fiber optic use in the railroad's own land, and where the railroad has a continuing and active railroad easement, any claim by a servient landowner to authorize entry onto the corridor land would violate the exclusive character of the commercial easement in gross and would impose potential liabilities on the railroads that likely would be deemed unreasonable.²²⁹ Consequently, courts have prevented servient fee owners from interfering with secondary railroad uses like gas pipelines, fiber optic cables, telegraph and telephone lines, electric lines, water tanks and pipelines, and even bridges and other aerial uses.²³⁰

A similar analogy would exist for locating the drone highway on a utility easement. Although we might not want packages dropped onto high-power electric transmission lines, most utility easements are also exclusive commercial easements in gross.²³¹ Consequently, if the easement is still actively being used, control over the airspace belongs exclusively to the utility company. There may be concerns about drone use exceeding the scope of the utility easement or imposing an additional burden that should be compensated, but the authority to control the airspace undeniability belongs to the utility company. Moreover, if a court were to hold that drone use was an additional burden or exceeded the scope of the utility easement, the primary easement

226. Only the unusual ETSI cases allowed a servient fee owner to authorize a commercial use in an active railroad corridor, and those cases are problematic for many reasons. *See* Wright & Hester, *supra* note 15, at 397-402 (discussing limited authorization of servient landowner access); *see also* *LKL Assocs., Inc.*, 17 F.4th at 1303 (affirming the right of the railroad to keep its easement clear).

227. *See* Wright & Hester, *supra* note 15, at 398-99.

228. *Id.* at 397-402.

229. *Id.*; *See supra* note 213 and accompanying text. Because the law imposes strict liability on common carriers, they must be able to control physical access to their infrastructure. *See* *Midland Valley R.R. v. Sutter*, 28 F.2d 163, 167 (8th Cir. 1928) ("Railroad companies are public carriers, and are properly held to the highest accountability in the performance of their duties. It is highly important to the general traveling public, as well as to business interests, that such corporations have exclusive possession and uninterrupted control of all property, the use of which is necessary in the discharge of this service. If the principle of concurrent occupation of property used by such corporations in carrying on their regular traffic should obtain, the expeditious and safe performance of their duties would be difficult, if not impossible.").

230. *See* Wright, *supra* note 19, ¶ 78A.14, for a discussion of secondary railroad uses.

231. *See generally, e.g.*, *Henley v. Cont'l Cablevision of St. Louis Cnty., Inc.*, 692 S.W.2d 825 (Mo. Ct. App. 1985) (discussing cases in which utility easements were held to be exclusive easements in gross).

holder would be well-poised to negotiate to expand the scope or could exercise eminent domain against the servient fee owners.

The lessons learned from the railbanking experience are important. If a railroad corridor has been abandoned and not railbanked, adjacent landowners may have acquired fee title, or may have reclaimed possession of their servient fee interests and will likely have sufficient property rights to prevent aerial drone use.²³² This means that those wishing to establish drone uses on these corridors will need to negotiate with the landowners to purchase the relevant property rights. Where the corridor has been railbanked, however, the federal STB jurisdiction remains, the corridor continues on the active rail network, and state law property rights are held in abeyance.²³³ For those corridors, adjacent landowner property rights should be either preempted or have been already condemned and compensated. This does not mean that litigation will be avoided, but it does suggest that shifting public uses and questions about the scope of railroad easements have already been settled in favor of continued public use of these lands. And where the railroad is a continuing active use, courts have been, correctly, quite deferential to the railroads' exclusive possession and its rights to allow other incidental uses in its corridors.²³⁴ After all, a pipeline that carries oil or natural gas alongside railroad tracks is simply transporting that commodity through a continuous stream, rather than in tanker cars on the surface. The commercial transportation use is essentially the same. Utility easements, though not as easily expanded to incorporate commercial drone delivery use, are additional commercial easements in gross that may help overcome the last-mile and second-to-last-mile problem in the freight transportation process. And although utility corridors may require compensation or an exercise of eminent domain against servient fee owners, drone uses in these corridors can help fill in the gaps between railroad corridors, thereby offering better connectivity and continuity for the drone highway and perhaps enabling delivery of most packages directly to a consumer's doorstep.

*B. THE DIFFICULTY OF IDENTIFYING AND DEALING WITH PROPERTY RIGHTS
OF ADJACENT LANDOWNERS*

Without going into a lot of detail, we can state with certainty that identifying the property rights of adjacent landowners in railroad corridors is no easy task. As has been explained in greater detail in a number of earlier articles and treatise chapters, the property rights the railroads acquired in the 19th century run the gamut from robust fee interests to ephemeral leaseholds

232. Wright, *supra* note 19, ¶ 78A.14.

233. See *supra* notes 211–12 and accompanying text.

234. LKL Assocs., Inc. v. Union Pac. R.R., 17 F.4th 1287, 1300–01 (10th Cir. 2021) (affirming the right of the railroad to allow incidental uses, but not completely unrelated uses).

and non-freehold easements.²³⁵ In some states, source deeds to the railroads are interpreted strictly against the railroads²³⁶; in others they are interpreted in favor of the railroads.²³⁷ In most states, the term *right-of-way* in a deed to a railroad renders the deed ambiguous, calling for canons of construction that often conflict with each other.²³⁸ Besides source deeds, there are eminent domain proceedings, parcels acquired by prescription, and thousands of miles acquired through various governmental grants. An average mile of railroad corridor often traverses about a dozen or more parcels of land, requiring individual deed analysis of hundreds of documents simply to identify the property rights in a relatively short stretch between two towns. Property rights in cities may require thousands of deeds just to determine the property rights of adjacent landowners if the railroad does not have a clear, unambiguous fee simple interest in its lands.

Moreover, as we discovered with the railbanking litigation, just because the railroad does not have fee title does not mean that adjacent landowners have the missing sticks in the corridor bundle of rights. Some states have adopted presumptions, such as the centerline presumption, by which adjacent landowners will be deemed to own to the centerline of an abandoned railroad corridor if no one else provides better title.²³⁹ But in one state the centerline presumption was held to be an unconstitutional taking of private property.²⁴⁰ Adjacent landowners wishing to lay claim to the profits of drone use in the corridors behind their homes will usually have to prove that they have title that reaches back to the original landowner who granted the railroad its property rights.²⁴¹ The common law adage that one can only succeed in a quiet title action on the strength of one's own title, not on the weaknesses of one's neighbor's title means that undertaking a parcel-by-parcel analysis of a railroad corridor's property rights could easily entail review of thousands of deeds, court records, and other instruments of adjacent landowners as well as the original source deeds for the railroad.²⁴²

The process is usually much simpler in the case of active railroad or utility corridors because, regardless of the company's property interests, whether fee or easement, the scope of the commercial easement in gross allows the

235. See Wright, *supra* note 19, ¶ 78A.06[3]; Wright & Hester, *supra* note 15, at 376–79.

236. See Wright, *supra* note 19, ¶ 78A.07[4].

237. *Id.*

238. For instance, ambiguities are usually interpreted against the grantor, which would benefit the railroads, but are also interpreted against the drafter of the deeds, which were usually the railroads. For a lengthier discussion of these canons of construction, see *id.*

239. *Id.* ¶ 78A.08[5].

240. McDonald's Corp. v. Dwyer, 450 S.E.2d 888, 892 (N.C. 1994).

241. Wright, *supra* note 14, at 726–28 & nn. 98–106.

242. *Id.*

easement holder exclusive control over the land comprising the corridor.²⁴³ And for those railroads that acquired their corridor land from federal land grants, the property rights are somewhat settled.²⁴⁴ Even when they hold only an easement interest from a federal land grant, as is the case with grants after 1875,²⁴⁵ those easements have been interpreted to be exclusive and robust enough to permit other commercial transportation uses.²⁴⁶

But the fact that adjacent landowners do not have sufficient property rights in most railroad corridor lands themselves does not settle the matter, as they could still bring nuisance, trespass, and breach of privacy claims against a railroad that authorizes a drone highway in its corridor.²⁴⁷ Not surprisingly, a nuisance claim may be more assured if the drones are buzzing along a bucolic, little-used rural railroad bed than along a heavily travelled industrial track. And drones that fly off course could easily veer over private property, opening the drone operators to trespass liability or invasion of privacy claims. This may ultimately be the single most important consideration for drone operators who may decide it is better to pay off landowners for all potential future damages, in advance, rather than risk intermittent lawsuits and indeterminate liability in unpredictable state courts.

And as proof that there is nothing new under the sun, this is precisely what many railroads did in the 19th century when they negotiated with landowners for corridor lands.²⁴⁸ They often included additional compensation for damages to the landowners' retained lands from, perhaps, bisecting a farm that would then require grade crossings, or from the injury to retained land from altering drainage patterns; they paid for taking timber not just to build, but in case there was a future need.²⁴⁹ Just because a neighbor does not have the property rights in the corridor land itself to exploit this new technology

243. *Barahona v. Union Pac. R.R.*, 881 F.3d 1122, 1134–35 (9th Cir. 2018); *LKL Assocs., Inc. v. Union Pac. R.R.*, 17 F.4th 1287, 1294–97 (10th Cir. 2021).

244. We say *somewhat* because they are conflicting, with some rights-of-way granted by federal statutes interpreted to pass fee simple interests, others to pass defeasible fee interests, and others to pass merely easements. See Wright, *supra* note 19, ¶ 78A.07[1][b].

245. See generally *Great N. Ry. v. United States*, 315 U.S. 262 (1942) (“The Act of March 3, 1875, from which petitioner’s rights stem, clearly grants only an easement, and not a fee.”); *Brandt Revocable Tr. v. United States*, 572 U.S. 93 (2014) (using *Great Northern Railway* to specify how the 1875 Act applies); *Ctr. for Biological Diversity v. U.S. Bureau of Land Mgmt.*, No. CV 17-8587, 2019 WL 2635587 (C.D. Cal. June 20, 2019) (“[T]he scope of uses within the easements must somehow be related to railroads. As such, the text and the purpose of the 1875 Act do not necessarily provide much guidance about the precise scope of the 1875 Act rights-of-way, except that they unquestionably were intended to foster the building of railroads.”).

246. See Wright, *supra* note 19, ¶ 78A.14; see also *Barahona*, 881 F.3d at 1135 (permitting a petroleum pipeline on land granted for the operation of a railroad); but see *LKL Assocs., Inc.*, 17 F.4th at 1301 (holding leases to transport construction materials did not satisfy the railroad purpose requirement of the incidental use doctrine).

247. See *supra* Section II.A.3.

248. See ELY, *supra* note 133, at 189–200.

249. *Id.*

does not mean the landowner does not have other valuable rights. Incompatible land uses that create conflicts are often better addressed up front than through nuisance litigation.²⁵⁰ Even if drone operators or railroads could assert eminent domain to acquire airspace rights, they might still be liable for damages to neighboring lands under nuisance or privacy doctrines.²⁵¹

The difficulty of undertaking a parcel-by-parcel analysis of the property rights, and the likelihood that there may be at least some negative impact on property values as a result of expanding railroad corridors to commercial drone use, suggests that the best approach may be to simply compensate all landowners for the potential and foreseeable harms that might occur. Jill Pearson suggested that landowners be compensated for non-railroad uses, regardless of whether they have any property rights in the corridor land itself,²⁵² and that same philosophy may operate even more persuasively with a drone highway. The quiet pedaling of bicyclists on a recreational trail is less likely to negatively affect property values than a convoy of whizzing drones 200 feet above neighboring rail-trail land. And avoiding the incredibly inefficient and expensive prospect of doing a parcel-by-parcel deed analysis of each stretch of railroad corridor may militate in favor of compensating landowners, either through a one-time payment for a license, or through a small percentage of profits based on the number of drones that pass by.²⁵³

Furthermore, high-voltage power-line easements and other utility corridors may entail property rights that are even less robust than those of railroads. If your neighborhood power-line easement runs through an alley behind neighboring homes, that easement is likely to be far narrower and less exclusive than the 100-foot railroad corridor or the high-voltage power line corridors connecting power plants to local transmission centers. And yet, these utility corridors can help bridge that last mile problem by bringing smaller and fewer drones from larger corridors to people's back yards.

At the end of the day, however, railroads and many utility companies have eminent domain power and could, if they choose, simply condemn the relevant airspace rights to permit the development of a drone highway, just as

250. Nuisance litigation is expensive and often results in inconsistent results, whereas zoning laws attempting to settle conflicting uses in advance are more successful. See Christopher Serkin, *Divergence in Land Use Regulations and Property Rights*, 92 S. CAL. L. REV. 1055, 1055 (2019); PATRICIA E. SALKIN, AMERICAN LAW OF ZONING § 44:1 (5th ed. 2021).

251. See, e.g., NICHOLS, *supra* note 130, § 117; 2 PHILIP NICHOLS, THE LAW OF EMINENT DOMAIN: A TREATISE ON THE PRINCIPLES WHICH AFFECT THE TAKING OF PROPERTY FOR THE PUBLIC USE §§ 316, 324 (Matthew Bender & Co. 2d ed. 1917) (discussing different ways in which land taken by eminent domain may inflict nuisances or incidental harms on neighboring land and the obligation to compensate for those harms).

252. Jill K. Pearson, Note, *Balancing Private Property Rights with Public Interests: Compensating Landowners for the Use of Railroad Corridors for Fiber-Optic Technology*, 84 MINN. L. REV. 1769, 1771-72 (2000).

253. DAVID CHRISTOPHERSEN, SKYRIGHTS HOLDINGS LLC, AIR RIGHTS AND DRONE+RAIL INTERMODAL 5 (2022).

they did 200 years ago to build their railroads in the first place.²⁵⁴ Doing this would possibly require legislation to expand the purposes for which these common carriers may assert eminent domain powers, or courts willing to recognize the common law's inherent ability to adapt to new situations, needs, and technologies.

C. *EMINENT DOMAIN AND JUST COMPENSATION*

The use of eminent domain by quasi-public entities like railroads and utility companies has been common and well-accepted in the law, since holdouts cannot be allowed to impede the important public progress of providing transportation and utility services to everyone. The use of eminent domain is not without risk, however, as many people feel that private companies should not take private property for their own private use.²⁵⁵ Nevertheless, railroads and utilities are common carrier entities that operate in the public interest, and their power to exercise eminent domain has rarely been questioned.²⁵⁶ Taking airspace rights to assemble a drone highway, like taking land to assemble a rail network or an airport landing zone, is not unreasonable so long as the public interest is driving the taking.

Where condemnation is used to promote commercial activities, however, the public can justifiably cry foul, even if the Supreme Court is unlikely to pay heed. Economic development was recognized as a valid public purpose for the exercise of eminent domain in *Kelo v. City of New London*.²⁵⁷ But public and quasi-public entities should be cautious in taking *Kelo* to its logical conclusion. The fact that the Court now consists of six conservative justices may mean that *Kelo* is likely to be on the chopping block in the next decade.²⁵⁸ Moreover, the public perception of the hardships of the *Kelo* decision makes eminent domain a less attractive option.²⁵⁹ Of course, if a railroad has negotiated with the vast majority of neighbors along a corridor to permit drone use, the exercise of eminent domain to overcome the recalcitrance of a few holdouts

254. See Wright, *supra* note 19, ¶ 78A.06[2][b].

255. See, e.g., Taylor Haines, Note, "Public Use" or Public Abuse? A New Test for Public Use in Light of *Kelo*, 44 SEATTLE U. L. REV. 149, 150–52 (2020). See generally ILYA SOMIN, THE GRASPING HAND: *KELO V. CITY OF NEW LONDON* AND THE LIMITS OF EMINENT DOMAIN (2015) (arguing against the vast takings power provided generally under *Kelo v. City of New London*, 545 U.S. 469 (2005)).

256. See generally *Cherokee Nation v. S. Kan. Ry.*, 135 U.S. 641 (1890) (affirming that a railroad may exercise the eminent domain power with legislative approval); *Secombe v. Milwaukee & St. Paul R.R.*, 90 U.S. 108 (1874) (affirming the same).

257. *Kelo*, 545 U.S. at 489–90.

258. See Laura Bronner & Elena Mejía, *The Supreme Court's Conservative Supermajority Is Just Beginning to Flex Its Muscles*, FIFTYTHREE (July 2, 2021), <https://fivethirtyeight.com/features/the-supreme-courts-conservative-supermajority-is-just-beginning-to-flex-its-muscles>.

259. In response to *Kelo*, some states adopted more stringent limits on the public purpose requirements for state eminent domain actions. See generally Robert H. Freilich & RoxAnne Doyle, *Taking Legislation: Misguided and Dangerous*, 46 LAND USE L. & ZONING DIG. 3, 3–6 (1994) (describing state responses); Mark W. Cordes, *Leapfrogging the Constitution: The Rise of State Takings Legislation*, 24 ECOLOGY L.Q. 187 (1997) (explaining shifts in takings positions).

would be less objectionable than simply using eminent domain right out of the starting gate to assemble a brand new corridor through a protected neighborhood, even if it would bring instant commercial gratification to its residents.

The railbanking experience also cautions against the unintended consequences of the takings clause. Landowners who challenged the railbanking statute argued that the law took their property because it intercepted a perceived immediate benefit, the right to regain possession of land that had been denied them for over a century during active railroad use.²⁶⁰ If a landowner had granted a railroad only an easement, even a robust commercial easement in gross, the landowner had retained the servient fee interest. And even though courts had valued that servient fee interest at nearly nothing, because it could not be used during the period of active rail use and because the likelihood of it ripening into actual possession was quite low, by the time a defunct rail corridor was about to be railbanked and converted into a trail, the odds had dramatically improved that the land would be returned. Intercepting it when the prize was in sight seemed much less palatable to the court of claims than when the railroad was in active use.²⁶¹ As a result, hundreds of millions of dollars were paid to landowners who had no vested legal expectation that they would regain possession of corridor lands adjacent to their property and whose own deeds even excluded all property rights in the railroad corridor.²⁶² It was almost as though the courts were punishing the government for finding a way to prevent the 19th-century technology from becoming obsolete, and for daring to repurpose that technology for the modern century. Focused backward to a supposed era of sacred property rights, the courts in these takings cases awarded compensation, not for a taking of vested property rights, but for interfering with expectations of a windfall that the landowners had no right to expect.²⁶³

Technology changes all the time, however, and if the government or a public utility has to compensate every time there is progress, it would be paying when uses shift from horse and buggies to automobiles, from

260. See *supra* Section IV.A.

261. This position was first recognized by the Supreme Court in *Preseault v. Interstate Com. Comm'n* when Justice O'Connor, in concurrence, asserted that the railbanking statute preempted state property rights and whether that action worked a taking was dependent on the rights under state law. *Preseault v. Interstate Com. Comm'n*, 494 U.S. 1, 20 (1990) (O'Connor, J., concurring). It was unnecessary to open that door to resolve the issues presented in *Preseault*. See *id.* at 24–25. Numerous cases have found a taking by the Court of Federal Claims for interference with the “reversion” of the property. See, e.g., *Rogers v. United States*, 90 Fed. Cl. 418, 428–31 (2009); *City of Ford v. United States*, 106 Fed. Cl. 136, 141–42 (2012); *Whispell Foreign Cars, Inc. v. United States*, 106 Fed. Cl. 635, 642–43 (2012).

262. See, e.g., *Marvin M. Brandt Revocable Tr. v. United States*, 572 U.S. 93, 117 (2014) (Sotomayor, J., dissenting) (“hundreds of millions of dollars”); *Haggart v. United States*, 116 Fed. Cl. 131, 149 (Fed. Cl. 2014) (roughly \$140M).

263. See *Wright*, *supra* note 14 at 728–34.

automobiles to buses, from barges to railroads, and from railroads to drones.²⁶⁴ Mail was first carried by the pony express, then by the railroads, then via fiber optic cable as the preferred mode of communication became email—now much of our communication is carried by satellites, the internet, and cell-phone networks.²⁶⁵ If courts focus on the legally significant issue of use (communications) rather than the modality (ponies, trains, or satellites), the common law can grow and adapt to changing technology while still accommodating the same human need to remain in touch with our fellow humans.

Nonetheless, the takings jurisprudence of the early-21st century is nothing like the takings jurisprudence of the early-20th century.²⁶⁶ Courts routinely award compensation when regulations limit the uses landowners most desire without recognition of the public need to regulate development and, in the case of railroad corridors, the fact that landowners were already paid full compensation when the corridors were assembled. Paying landowners for interfering with expectations rather than vested property rights is the hallmark of the private property rights movement and is a fact with which the railroads, drone operators, and government regulators will have to contend.

The railbanking experience offers some important lessons to those wishing to leverage the property rights of railroads to serve new interests and new technologies. Landowners are likely to complain that drone deliveries on railroad corridors are not permissible railroad uses, and they may prevail in some courts. But lessening the environmental impact of transportation of goods while serving the needs of the general public are policies that our governments should be able to get behind.²⁶⁷ If drone deliveries cause minimal interference with property rights, create no nuisances or trespasses, and yet can get goods to a wider swath of the population at lower cost without the belching fumes of the UPS and FedEx trucks, then everyone is a winner, even the adjacent landowners.

V. MODELS FOR THE FUTURE

As we learned with railbanking, repurposing 19th-century technology to meet the needs of the future requires a commitment from the federal and state governments, an understanding of the scope and constraints of the common law, and includes incentivizing public/private partnerships to spread the technological, economic, and environmental benefits across a wider class of people. In considering the vast and complicated legal landscape

264. See *supra* note 105 and accompanying text.

265. See generally Kim M. Thompson, *The US Information Infrastructure and Libraries: A Case Study in Democracy*, 57 LIBR. REV. 96 (2008) (describing changes in long-distance communications).

266. See Wright, *A Requiem for Regulatory Takings*, *supra* note 23, at 312–20.

267. See *supra* Section II.C.

into which drone deliveries will enter, there are a variety of ways governments can ease the transition and reduce the expense and legal uncertainty. These include a federal regulatory model similar to that used with the railbanking statute (although hopefully avoiding its pitfalls); a number of state models which we saw in response to issues raised from multiuse agreements in railroad corridors; common law principles, in particular educating judges and lawyers about the commercial easement in gross; and public/private partnerships, like land trusts whereby landowners might collaborate to license aerial rights in their lands. No one of these models is a silver bullet that will reduce all chance of litigation and settle the property rights in perpetuity. But together they identify the legal vulnerabilities and provide solutions to certain problems that, in the aggregate, may facilitate a new paradigm for the transportation of goods.

A. A FEDERAL MODEL

There are a number of things the federal government could do to facilitate drone deliveries in railroad corridors. It could expand regulation over the airspace within which drones operate. Or it could regulate the operation of drones themselves, much the way the Transportation Safety Administration regulates airlines.²⁶⁸ It could preempt certain state laws to ensure more interstate regularity in the drone industry. It could even mandate that railroads permit drone uses, much the way Congress legislated that railroads had to permit other railroads to share narrow passes where there was not room for multiple sets of tracks.²⁶⁹ Congress could heavily fund development of the infrastructure necessary for a drone highway, like it developed the interstate highway system, using its eminent domain powers and federal funds to acquire the property necessary to operate such a system. At some point, the possibilities are myriad, but the likelihood of any coming to fruition before the technology is obsolete may be a pipedream. Nonetheless, some steps in this regard are easier to take than others, and none are absolutely necessary.

Because the STB currently regulates the interstate railroad network, including regulating prices, services, and abandonment of service by common carriers, Congress could expand the STB's jurisdiction over railroads to include a commercial drone delivery highway.²⁷⁰ This would simply have the effect of granting the STB authority to make rules regarding the operation of the drone network. They could thereby insist that drones operate at a particular speed, a particular altitude, that they carry packages no greater than a particular weight, that they charge a set fee, and that they make minimal noise. The STB could also supervise the UTM system, just as the FAA

268. *Transportation Security Administration (TSA)*, MSP AIRPORT, <https://www.msppairport.com/airport/security-screening/about-tsa> [<https://perma.cc/XJ2N-BSDY>].

269. *See, e.g.*, The General Railroad Right-of-Way Act of 1875, 43 U.S.C. § 935 (2018).

270. *See supra* note 211 and accompanying text.

does with air traffic controllers who manage the commercial airspace.²⁷¹ But managing the operation of a drone delivery system is far easier than addressing the plethora of property rights through which the drones would operate.

Like the interstate highway system, which is governed by the Federal Highway Administration, Congress could create a Federal Drone Administration to set rules and facilitate the structural details of building a drone highway. Congress could exercise eminent domain to simply acquire all airspace over certain corridors below the 500-foot elevation currently regulated by the FAA, or cede the lowest 100 feet of airspace currently devoted to airplanes to a drone highway administration, or it could choose to regulate the airspace from 200 feet to 400 feet above the ground which is currently not regulated by anyone.²⁷² Imposing federal regulatory oversight over a portion of airspace might implicate takings rules if doing so interferes with the property rights of landowners, although the federal authority to control the airspace is no longer open to dispute.²⁷³

Attempts to create a national drone highway may run into takings clause challenges. As we know from history, the federal regulation of airspace 500 feet and higher did not require compensation because that space was not particularly useful to surface owners and permitting the intermittent jet to traverse land many miles above the surface did not implicate privacy or nuisance rights.²⁷⁴ Allowing drones at a much lower altitude, however, might not be so simple. In the airspace below 500 feet that is used for take-off and landing of aircraft, eminent domain was exercised and the airspace rights were purchased.²⁷⁵ Drone uses in the currently unregulated 200- to 400-foot space, or in the currently regulated 500- to 600-foot space might affect surface owners enough to require compensation. Regardless, the federal government is well-suited to undertake studies and identify the most feasible locations for this new public infrastructure.

The uncertainty of simply declaring a slice of airspace over all private property, and the potential for significant economic harms, militates against simply usurping all airspace. We will be in a vastly different world when private space pods and drones zip back and forth in the lower reaches of airspace, as we often see depicted in *Star Wars* or other futuristic movies.²⁷⁶ Considering the sheer number of drones that could conceivably be flying over private land, we could easily find ourselves looking up and finding the sun blotted out by

271. See *supra* Part II (discussing the benefits of UTM infrastructure); see Fed. Aviation Admin., *Airports*, U.S. DEP'T TRANSP., https://www.faa.gov/about/office_org/headquarters_offices/arp [<https://perma.cc/NK7H-AULR>].

272. 49 U.S.C. § 40103(a)(1) (“The United States Government has exclusive sovereignty of airspace of the United States.”).

273. *United States v. Causby*, 328 U.S. 256, 260–63 (1946).

274. *Id.*

275. See Troy A. Rule, *supra* note 54, at 428–29.

276. See *STAR WARS: EPISODE IV—A NEW HOPE* (Lucasfilm Ltd. 1977).

the 21st-century equivalent of the passenger pigeon. Channeling drones into specific corridors, such as railroad and multiuse utility easements, is the only sensible solution to avoid the countless takings suits that are likely to be filed, as well as the inevitable chaos of that many drones overtaking the skies.

As with the railbanking statute, Congress could pass legislation to facilitate the use of these corridors for multimodal drone use. It could declare that drone uses in the airspace over railroad corridors is a public purpose and regulate that space and use as part of its interstate commerce power. But simply declaring that state-law property rights in the airspace are preempted or denied is likely to subject the federal government to a spate of takings suits—only this time the lawyers will be a lot quicker on the draw, even if a federal statute declares that the airspace is subject to the sovereignty of the United States.²⁷⁷ But like the federal property rights recognized in navigable waterways, it is possible that public rights in airspace could be recognized under, for instance, the public trust doctrine.²⁷⁸ Navigable airspace, like navigable waterways, could be deemed part of the public domain, like ideas and the plays of William Shakespeare, at least for airspace above a certain altitude.

The railbanking statute declared that preservation of railroad corridors was a continuing railroad use that would preclude triggering state-law property rights. The courts disagreed, however, and viewed the interference with the state-law property rights to require compensation. They did this in large part because recreational trail use was seen as too distinct from railroad use to constitute a continuing railroad purpose. Many courts refused to accept the argument that preservation of these corridors for possible future reactivation was an ongoing railroad use, especially if, in the interim, the land would be used for cyclists and not trains. In the case of a drone highway, however, the transportation of goods carried by drones is substantially similar to the transportation of goods carried by trains. It could plausibly be argued that drones are simply the next generation of freight delivery technology. Under that theory, a federal regulatory declaration that drone use is a railroad use, such that state-law property rights are preempted, is likely to fare better in the courts than the interim trail use claims. Nevertheless, the strategy is likely to face challenges, and we need to assess the property-rights credentials of the courts to adequately predict whether drone uses would be subsumed

277. See *supra* Part II.

278. 49 U.S.C. § 40103 already recognizes that “the . . . public . . . [has a] right of transit through the navigable airspace,” but that access is subject to federal regulatory authority. 49 U.S.C. § 40103(a)(2) (2018). If the FAA were to preempt state property laws by affirmatively allowing drone operators to use a slice of airspace below the 500-foot altitude, it may face takings liability even though the United States has asserted its domain in that space. See *Causby*, 328 U.S. at 261–63; see also *id.* at 271 n.1 (Black, J., dissenting) (applying an analogy to navigable waters to dispute the majority’s takings framework).

into the greater transportation category or would be distinguished from it, thus requiring compensation or private licenses.

In the end, the federal government could enact measures that would go a long way toward facilitating a drone highway above railroad corridors, but we do not believe that federal regulations or legislation would settle the matter without potential takings liability.²⁷⁹ Even though state common law has rejected the *ad coelum* doctrine in light of modern aircraft technology, that was not a smooth and undisputed transition. Landowners took the case to the Supreme Court when the United States claimed a federal servitude in all airspace, and they were successful when the courts roundly rejected the government's expansive claims in regard to "low-level" flights.²⁸⁰ *Causby* therefore provides the basis for treating commercial aircraft differently from drones and opens up the possibility of takings liability for drone uses in the airspace over private lands. But railroads are quasi-public entities with common carrier obligations—their land is not entirely private, and their operations are heavily regulated.²⁸¹ Federal regulation over railroad corridors would be much more acceptable than over private land generally. If the railroads cooperated, by allowing the licensure of their airspace for this new technology, they might very well be able to mitigate their liability to private adjacent landowners by relying on the history of ICC regulation of the railroads as common carriers. Although this may not completely open the door to litigation-free progress, it can assist the process which will also require state-level cooperation.

B. STATE MODELS

Because low-level airspace rights are considered within the domain of state law, it is likely that state remedies will also be necessary. Although state law reforms will likely be adopted piecemeal and leave gaps and uncertainty for drone operators, at least three models offer insight into how states could approach a futuristic drone highway. One model is based on the state railbanking statutes, the second is based on Florida's approach to dealing with

279. Takings liability would be offset, however, by the exercise of eminent domain. *See supra* Section IV.C. Thus, unlike in the railbanking situation, the cost of building the drone highway may fall on the railroads or commercial drone users and not the federal or state governments. As such, costs could be recouped and borne by those that primarily benefit, showing once again that public/private partnerships can be successful. If states or the federal government are held accountable for compensation, however, perhaps the costs could be offset by taxes on shippers.

280. *Causby*, 328 U.S. at 264, 267 ("We have said that the airspace is a public highway. Yet it is obvious that if the landowner is to have full enjoyment of the land, he must have exclusive control of the immediate reaches of the enveloping atmosphere. Otherwise buildings could not be erected, trees could not be planted, and even fences could not be run. The principle is recognized when the law gives a remedy in case overhanging structures are erected on adjoining land. The landowner owns at least as much of the space above the ground as he can occupy or use in connection with the land." (footnote omitted)).

281. *See supra* note 214 and accompanying text.

fiber optic cable uses in railroad corridors, and the third is based on New Hampshire's marketable title act for railroad corridors acquired by the State.

1. Mini-Railbanking Statutes

A number of states have adopted mini-railbanking statutes that permit conversion of abandoned railroad corridors to recreational trails.²⁸² Most of those, however, have been interpreted consistently with the federal statute. In Pennsylvania and Maryland, however, their state courts broadly interpreted railroad property rights and uses to permit interim trail uses without being deemed an infringement of adjacent landowners' property rights.²⁸³ The process is fairly simple. When a state legislature declares that preservation of railroad corridors is an important public policy of the state, then ambiguities should be resolved in favor of promoting that policy.²⁸⁴ When the state legislature declares that railroad purposes should be interpreted broadly to include trail use and multimodal utility uses, then the railroad easement can be construed as sufficiently robust to accommodate new and changing technologies.²⁸⁵ Pennsylvania courts have interpreted railroad easements to include trail uses and have limited claims by landowners that they have vested rights in these quasi-public roadways.²⁸⁶ They have also accepted the shifting public use doctrine that permits easements to adapt to new and changing technologies that serve the public interest.²⁸⁷ Similarly, Maryland courts have interpreted railroad easements broadly to include changing technologies because the state legislature has indicated that preservation of railroad corridors is an important public goal.²⁸⁸

Similar legislation could be passed by the states to permit drone activities. Declaring that a drone highway over a railroad corridor is an important public purpose because of its salutary economic, environmental, and accessibility impacts, and that drone deliveries constitute a similar transportation use to railroads, could go a long way toward protecting the broad scope of railroad easements. No longer do railroads simply operate trains on their iron rails;

282. Roughly 30 states have some sort of legislation concerning the conversion of railroads to recreational trails. See Wright, *supra* note 19, ¶ 78A.11 [4].

283. See *Chevy Chase Land Co. v. United States*, 733 A.2d 1055, 1093-95 (Md. 1999); *Buffalo Twp. v. Jones*, 813 A.2d 659, 667-71 (Pa. 2002); *Moody v. Allegheny Valley Land Tr.*, 976 A.2d 484, 488-93 (Pa. 2009).

284. MD. CODE ANN., NAT. RES. § 5-1010(a) (West 2021) ("The preservation of abandoned rail corridor property for use as recreational trails is in the public interest . . ."); *Chevy Chase Land Co.*, 733 A.2d at 1063-64.

285. See generally *Chevy Chase Land Co.*, 733 A.2d (holding that the recreational trail fell within the scope of easement and should be allowed); *Buffalo Twp.*, 813 A.2d (holding that use of the railroad as a trail did not violate a right-of-way easement).

286. *Buffalo Twp.*, 813 A.2d at 669-70; *Moody*, 976 A.2d at 491-92.

287. *Wattson v. Eldridge*, 278 P. 236, 239-40 (Cal. 1929); *Wash. Wildlife Preservation, Inc. v. State*, 329 N.W.2d 543, 547-48 (Minn. 1983); see also Wright & Hester, *supra* note 15, at 441-47.

288. *Chevy Chase Land Co.* 733 A.2d at 1093-95.

they have fiber optic cables buried in their subsurface, they have pipelines carrying gas and oil, they have telegraph and telephone poles parallel to their tracks, and they benefit from these services by buying diesel fuel, electricity, and communications services from these other providers.²⁸⁹ These are all part and parcel of a modern multimodal transportation network. And courts have generally recognized that these additional uses, so long as they are not inconsistent with the primary railroad use, are permissible within railroad easements.²⁹⁰ Hence, state legislation treating drone transportation of goods as equivalent to other modes of transportation, including delivery vehicles and railroads, emphasizes that these modes go together to create a comprehensive public common carrier regime to move people and goods across the state.

Of course, as with any legislation, state courts may interpret the legislation as interfering with private property rights and may order compensation. But legislatures can, through declarations of appropriate public policy, tilt the playing field in favor of particular uses since setting policy is the job of the legislative branches and courts are generally deferential up to a certain point.

2. Legislation Allowing Multimodal Uses

A state can go beyond expressing a public policy preference for infrastructure development, however, as Florida has done by passing legislation allowing third-party common carriers, like utility companies, the right to locate their utilities in railroad corridors. In *Davis v. MCI Telecommunications Corp.*, the Florida District Court of Appeal denied a landowner's claim that fiber optic cables located in a railroad corridor violated his servient fee interests.²⁹¹ The court in that case found that the public interest promoted by a state statute allowing telephone and telegraph companies to locate their lines in railroad corridors, and to exercise eminent domain against the railroad if necessary, negated the property rights of servient fee owners that would object to the technological upgrade.²⁹² The court determined that the statutory text, interests in legal uniformity, and settled expectations of the parties cut in favor of allowing the railroad to install fiber optic cables without requiring the consent of or providing compensation to the servient landowners.²⁹³

This case is not a wholesale repudiation of the rights of servient fee owners, but it does confirm that when an active railroad consents to share its

289. See generally Wright & Hester, *supra* note 15 (explaining different railroad technology innovations).

290. *Id.* at 421–25.

291. *Davis v. MCI Telecomms. Corp.*, 606 So. 2d 734, 739 (Fla. Dist. Ct. App. 1992).

292. *Id.*

293. *Id.* at 737.

corridor with another common carrier, the servient fee owner may not complain because the servient fee owner has no rights to authorize any third-party uses on his own. Because railroad easements are exclusive as against the servient fee owner, the latter cannot compel third-party access to the corridor land, nor may he deny such access permitted by the primary easement holder unless there is an undue burden on the easement.²⁹⁴

Similarly, states could enact legislation to permit railroads to allow drone highways in their corridors which could be binding against servient fee owners if the drone highway serves a similar public purpose to the railroad use. The Florida court's interpretation of its own statute rests on the history of the public partnership between railroads and telecommunications companies. Because both serve the public interest as highly regulated common carriers, the statute was deemed to override contrary state law that might treat the telecommunications use as beyond the scope of a railroad easement.²⁹⁵

3. Marketable Title Acts

Perhaps the most far-reaching statute is that of New Hampshire, which simply declares that all railroad corridors acquired by the State will be deemed to be held in fee simple absolute unless that claim is challenged within a statutory period. The New Hampshire statute provides:

All railroad rights of way and rail properties acquired by the commissioner or by the state are hereby declared to be owned in fee simple absolute. Any and all reversionary rights in railroad rights-of-way and rail properties which have been acquired by the state or are acquired by the commissioner by purchase, condemnation or otherwise are hereby declared extinguished . . . Any person damaged thereby may make claim by petition against the commissioner to the appropriate superior court within 5 years of the date of acquisition or declaration of fee simple absolute ownership.²⁹⁶

This statute is similar to marketable title acts that have been passed in numerous states to remove clouds on title, primarily reversionary and servient fee interests.²⁹⁷ Although it seems rather brazen to simply declare that railroad corridors acquired by the state will be held in fee simple, the statute was held to be constitutional by the New Hampshire Supreme Court in *Malnati v. State* because landowners who challenged this outcome had had an opportunity to

294. This is the beauty of the apportionability of the commercial easement in gross. See *Henley v. Cont'l Cablevision of St. Louis Cnty., Inc.*, 692 S.W.2d 825, 828 (Mo. Ct. App. 1985); *Crowley v. N.Y. Tel. Co.*, 363 N.Y.S.2d 292, 294 (Dist. Ct. 1975) (“Just as we must accept scientific advances, we must translate the rights of parties to an agreement in the light of such developments.”); WOLF, *supra* note 11, ¶ 34.12.

295. See *Davis*, 606 So. 2d at 739.

296. N.H. REV. STAT. ANN. § 228:60-a (2022).

297. See Jay M. Zitter, Annotation, *Construction and Effect of “Marketable Record Title” Statutes*, 31 A.L.R. Fed. 4th 11 § 2[a] (1984).

protect their interests and receive compensation.²⁹⁸ Because a state has the power to condemn any reversionary or servient fee interests in lands it acquires, it is simply setting a statute of limitations of five years for landowners to bring a claim and demand compensation; if they fail to do so, the land is deemed to be owned by the state in fee simple for a public purpose.²⁹⁹

Because railroads also have eminent domain powers, they could conceivably condemn any reversionary or servient fee interests that would interfere with their ability to license a drone highway in their airspace. But railroads would have to initiate the condemnation process, which would be burdensome and expensive as they would have to undertake a parcel-by-parcel analysis to determine which adjacent landowners possessed such interests. The New Hampshire legislature, however, simply declared that settling title is a public priority, and that establishing a limitations period would cut off challenges.³⁰⁰ Thus, if a state was intent on promoting a drone highway, it could establish that railroads would be deemed to own fee simple in their corridor lands, sufficient to authorize drone use in their airspace, and that any landowner who disagreed could bring suit within a prescribed period of time. By providing a process for settling claims, the state can ease the development and use of these lands, as well as protect the corridors for multiple future transportation uses while also protecting the property rights of servient landowners. Similar marketable title acts have been upheld in Iowa in relation to challenges to railroad uses.³⁰¹

It is interesting that few states have specific marketable title acts related to railroad corridors, while many more have passed them to cut off reversionary interests in private land to increase alienability and marketability.³⁰² Because railroads are common carriers with public functions, it would seem sensible to pass statutes that limit challenges to the property rights of these quasi-public entities. Although many people may feel that the railroads do not deserve any additional protection, we must realize that their corridor assets, like the interstate highways, were assembled with extensive public support, public dollars, and eminent domain powers and remain infused with the public interest.³⁰³ Passing statutes to clean up the title that railroad companies have, while also giving landowners an opportunity to protect their interests and receive compensation, seems like a win-win situation, especially if these corridors are going to be viable for 21st-century uses. This kind of marketable title act would be the most effective way to protect the property interests of

298. *Malnati v. State*, 803 A.2d 587, 588–90 (N.H. 2002). New Hampshire also gives the state a right of first refusal if a railroad is opting to sell off its corridor. *See* N.H. REV. STAT. ANN. § 228:60-b.

299. *Malnati*, 803 A.2d at 588–90.

300. *See* N.H. REV. STAT. ANN. § 228:60-a.

301. *Lowers v. United States*, 663 N.W.2d 408, 410 (Iowa 2003).

302. Zitter, *supra* note 297, at § 8[a].

303. *See* GATES, *supra* note 141, at 383–86.

landowners while promoting the public policy facilitating adaptation to changing transportation technologies.

C. COMMON LAW ADJUSTMENTS

As we have seen in the railbanking cases, judges have wide discretion to promote the public interest in transportation technologies or to protect private property rights at the expense of the public treasury. Reclaiming the commercial easement in gross, recognizing its invaluable characteristics, and updating it for the 21st century is clearly within the purview of the common law. And, we believe, doing so is not at odds with private property rights. For we must remember that the railroads paid for their property the first time around. In most instances, they paid full value for a fee simple absolute interest.³⁰⁴ Where land was donated, or they paid less than full value, they did so with the landowners' understanding that the location of a nearby railroad often doubled or tripled the value of retained land.³⁰⁵ Everyone wanted a railroad nearby in the heyday of rail construction.

Today, with the subsidization of roads and airports, railroads have taken an economic hit. They have struggled for most of the 20th century to remain profitable, and even still they operate on razor-thin margins. Permitting them to leverage their unique corridor interests to facilitate new technologies and more environmentally friendly modalities makes sense. As Thomas Jefferson wrote to James Madison, "the earth belongs in usufruct to the living,"³⁰⁶ and this includes people living in working-class communities who do not have access to decent grocery stores or other retail opportunities; it includes future generations who are facing the existential crisis of climate change and for whom the internal combustion engine will be their nemesis, not their savior.³⁰⁷

The commercial easement in gross was understood by lawyers and judges of the early 20th century as a unique property right that was well-suited to the unique needs of a rapidly developing nation. The Restatement (First) of Property explicated the special characteristics of the commercial easement in gross as exclusive, alienable, divisible, and apportionable.³⁰⁸ If courts revisit

304. Wright & Hester, *supra* note 15, at 388; A.E. Korpela, Annotation, *Deed to Railroad Company as Conveying Fee or Easement*, 6 A.L.R. Fed. 3d 973, § 14 (1966).

305. See *Great N. Ry. v. United States*, 315 U.S. 262, 272 (1942); Wright & Hester, *supra* note 15, at 370 n.73; see also Salvatore Massa, *Surface Freight Transportation: Accounting for Subsidies in a "Free Market"*, 4 N.Y.U. J. LEGIS. & PUB. POL'Y 285, 290 (2001) (describing what railroads could do with land); Leonard W. Levy, *Chief Justice Shaw and the Formative Period of American Railroad Law: I*, 51 COLUM. L. REV. 327, 339-40 (1951) (explaining the railroad set-off concept for increased property values).

306. Letter to James Madison from Thomas Jefferson (6 September 1789) in 12 *The Papers of James Madison* (Charles F. Hobson & Robert A. Rutland eds., 1979), <https://founders.archives.gov/documents/Madison/01-12-02-0248> [<https://perma.cc/BJ4Z-99N4>].

307. See *infra* Part II (analyzing which parts of the logistics chain might be most positively affected by large-scale replacement by drones).

308. See *supra* note 158 and accompanying text.

their property jurisprudence of the early 20th century, they are likely to find that the railroads have ample power to authorize drone uses in their corridors, even if they only have railroad easements because the commercial easement in gross is exclusive and apportionable. The doctrine of apportionability allows commercial easement holders to authorize other commercial users to access their easements so long as the use is not inconsistent with the primary use, does not impose an undue burden on the servient land, and promotes the general public character of the initial use.³⁰⁹ In speaking of the railroad easement, the First Circuit Court of Appeals prioritized its public character to justify keeping the easement alive for other public commercial purposes, even when the primary user has become defunct:

If any part of the right of way of a railroad company, telephone company, or electric power and light or a water company be acquired by condemnation the enterprise would become disrupted by the mere transfer of the property at public or private sale, or by the failure of the company, or by the expiration of the charter The service to the public which justified the condemnation would thus be made limited and precarious When a corporation fails, its easements by condemnation are assets for creditors, the court may sell them with the other property and the business may go on serving the public.³¹⁰

In other words, even if railroad use discontinues, the public interest in these assets supports converting them to other public uses. A reinvigorated understanding of the broad scope and public character of these unique commercial easements in gross, easements that were often acquired with public dollars and eminent domain powers, supports a broad reading of the property rights involved. If it is economically and environmentally more efficient to transport goods by drone than by railroad or truck, the property rights the railroad acquired with public support should accommodate these new uses and new technologies, subject of course to overarching principles like that embodied in the doctrine *sic utere tuo ut alienum non laedas*.³¹¹ Any other interpretation holds the public interest hostage to a form of private property that would be unrecognizable to the judges of the late 19th and early-20th century who developed the commercial easement in gross.

309. *Henley v. Cont'l Cablevision of St. Louis Cnty., Inc.*, 692 S.W.2d 825, 828–30 (Mo. Ct. App. 1985); see *Preseault v. City of Burlington*, 908 A.2d 419, 423–24 (Vt. 2006).

310. *Fla. Blue Ridge Corp. v. Tenn. Elec. Power Co.*, 106 F.2d 913, 916 (5th Cir. 1939).

311. Roughly interpreted as “use your own property as not to injure that of another,” this doctrine forms the basic premise of nuisance law and is a principal policy in the common law of property. See 57A AM. JUR. 2D *Negligence* § 89 (2022).

D. A PRIVATE SOLUTION—RAILROADS AND LANDOWNERS WORK IT OUT

Even if the federal and state governments do not want to play ball, and the state courts insist that private property rights of landowners should not be defined by reference to the commercial easement in gross, railroads and landowners can enter into public/private partnerships to achieve the same end. Although railroads might hesitate to negotiate with landowners because they want to avoid the inefficiencies of parcel-by-parcel analysis, a third party could bring them together by establishing land trusts along a productive corridor. Imagine if a third-party land entity approached the landowners along an active railroad corridor from, say, Chicago to St. Louis. The manager could obtain licensing rights from all the landowners that would be effective only upon reaching a satisfactory agreement with the railroad and, let's say, Amazon. Amazon would agree to pay The Union Pacific Railroad Company for access to the railroad corridor and Union Pacific would agree to pay a percentage of revenue to the land trust, which would be distributed quarterly to the landowners based on linear feet of boundary line between private property and the railroad's corridor. If there were three thousand landowners, let's say, each with 500 feet of linear boundary, they might receive only a fraction of a cent in licensing fees per drone delivery, but with the magnitude of scale between the 75 Amazon Fulfillment Centers and its local sortation centers that prepare packages for their intermediate and last-mile delivery or a locker facility where employees can deliver packages directly to customers, those fractional shares add up quickly.³¹²

A consortium of landowners could certainly establish a land trust with a trustee to negotiate the licensing fees for drone deliveries, as well as for additional commercial uses on these corridors.³¹³ This is not unheard of, as subdivisions often authorize their homeowners' associations or similar entities to negotiate with utility providers so the companies do not have to negotiate with each individual landowner.³¹⁴ Conservation easements can serve as a model, with limited development rights being set aside and managed by a corporate trustee that can negotiate with the Amazons and the Union Pacifics of the world. All of this is to say that if governments cannot work it out, the

312. To put this into perspective, consider the \$3.99 that is traditionally charged for shipping and handling of a book. Let's assume half of that fee goes to Amazon to pay for the employee to put the item into a box and attach a label. The other half, \$2.00, pays for the transportation costs. Amazon will need some of this to pay for the drone, and a portion will need to go to the railroad for access to the space. But let's say \$.05 can compensate landowners out of that \$2.00 shipping fee. At 1,000,000 packages per year in a particular corridor, that would translate to \$50,000 yearly for landowners. Although that amount may not seem significant, it may well increase over time.

313. Jill K. Pearson proposed something similar for groups of landowners negotiating with telecommunications companies laying fiber-optic cable on adjacent railroad corridors. Pearson applied the term "corridor entities," but they are essentially land trusts. Pearson, *supra* note 252, at 1802-03 & n.212.

314. See *Henley v. Cont'l Cablevision of St. Louis Cnty., Inc.*, 692 S.W.2d 825, 828-29 (Mo. Ct. App. 1985).

demand for legal drone airspace might find enterprising suppliers who can leverage the property rights in a profitable manner. With global GPS mapping software and online property records, companies could leverage AI capacity to simply compensate all affected landowners for each drone trip through or adjacent to their airspace.³¹⁵

The point is that there are many ways to facilitate wide-spread development of drone delivery technology, but the key is going to be working with landowners, railroads, and lawmakers to find a model that is efficient and cost-effective for everyone. Litigation is usually not cost-effective, and addressing the property issues up front can smooth the way for this emerging technology. Public/private partnerships that helped settle the continent with railroad infrastructure or develop COVID-19 vaccines, is a sensible approach. But where the profit is entirely private for the railroads and the Amazons, individuals are likely to feel left out, exploited, and frustrated, even if they can get their new book delivered by bedtime. Those emotions often lead to litigation. Consequently, there must be sound public benefits to such a development that, unlike the commercial development in New London, Connecticut, is meaningful and lasting for the public at large. The benefits from a drone delivery highway are both existential and immediate, environmental and social-justice oriented, if this technology alleviates the harms of climate change and makes consumer goods more accessible for rural and low-income consumers.

VI. CONCLUSION

The railroad laid the infrastructure that allowed the rapid settlement and industrialization of our continent in the 19th century. In a nation notoriously suspicious of centralized government and enamored of individual liberty, building these corridors is perhaps all the more surprising, and all the greater testament to the power of public/private partnerships. We believe that our nation's railroad network has a role to play in the 21st century that may be even more monumental, and transformative of society.

The technical problems are being solved. As each generation of drones becomes more energy-efficient and capable of longer flights, and a nationwide air traffic control system for drones is further developed, the pieces are falling into place for more links of the delivery-logistics chain to be replaced with this technology. The legal problems are likewise solvable, and we believe that revitalizing the existing railroad infrastructure offers the best solution for the rapid deployment of this technology in a way that minimizes risk for companies, customers, and the public.

Ultimately, it will take a complex organization of interests at federal, state, and local levels to bring to fruition the "DARC" Project. However, we

315. This could even be accomplished by giving landowners a tax credit if the government were to manage the drone network, as it does with commercial aircraft traffic.

believe that the incentives, and the social and environmental benefits, are self-evident, and that railroads may yet again hold the promise of transforming 21st-century America, just as they transformed 19th-century America.