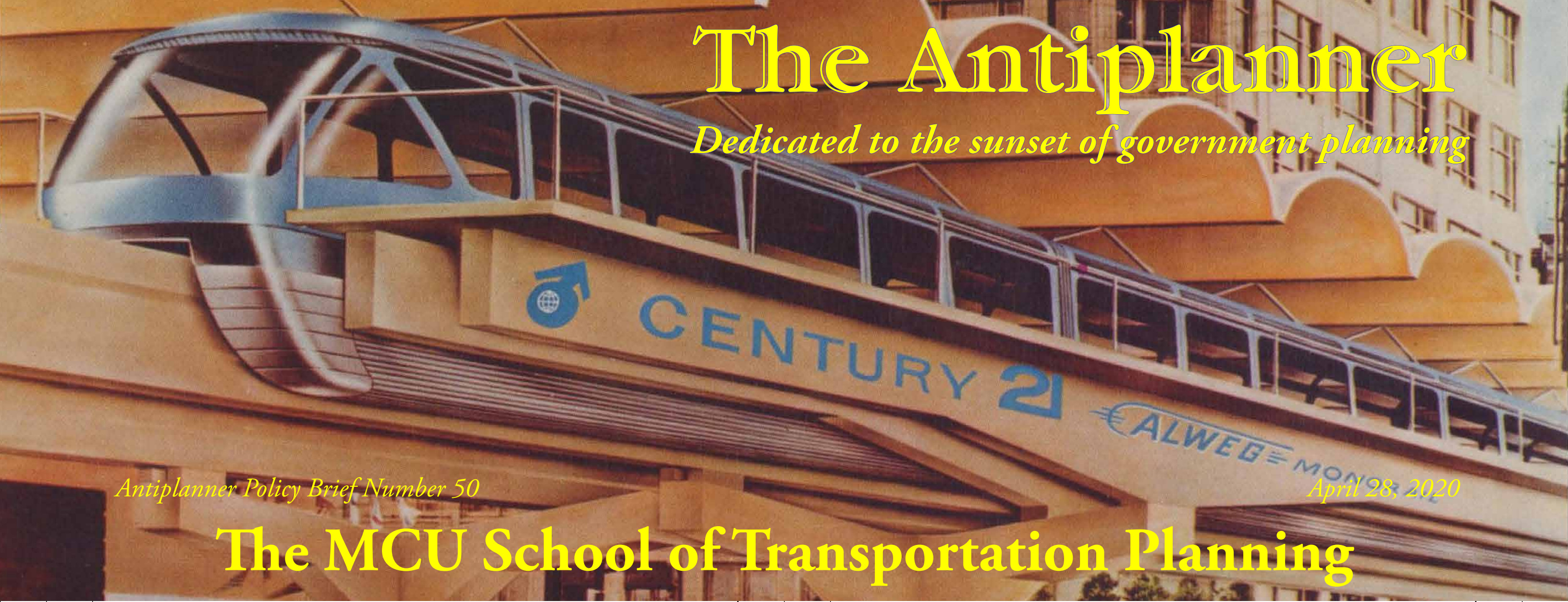

The Antiplanner

Dedicated to the sunset of government planning

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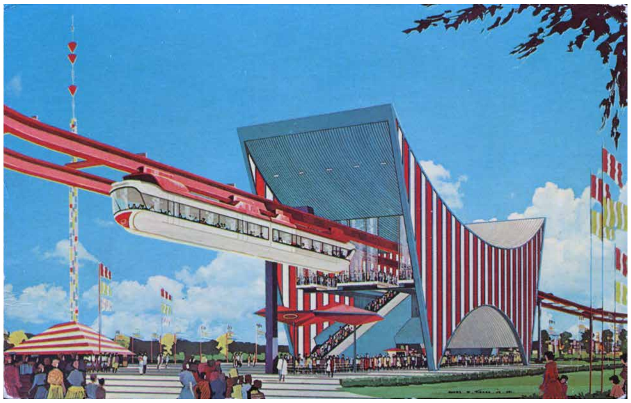
The MCU School of Transportation Planning

Why do so many science fiction & fantasy visions of future cities have monorails?

- Starting as early as 1918, *Popular Mechanics* and similar magazines often pictured monorails on their covers.
- Fritz Lang's 1927 classic, *Metropolis*, showed a possible monorail on a slender bridge at least 50 stories above the ground.
- Walt Disney added a monorail to Tomorrowland in 1959.
- A monorail (shown above as an artist's conception) was one of the stars of Seattle's 1962 Century 21 Exposition.
- New York's 1964-65 world's fair had to have one too.
- Numerous movies and television shows have included monorails.



The monorail at the 1964-65 New York World's Fair was built by AMF, the same company that makes bowling balls, so you know it was good.

When I was five years old, I had a *Jetrail Express* monorail toy. The eleven-inch-long monorail car was shaped like a rocket ship, complete with fins on the tail. It was suspended from a thin rail, about a sixteenth of an inch in diameter, that was held up by slender pylons. The toy came with enough rail to make a 3'-by-6' oval. In 1956, it cost $10, equal to about $95 in today's money. Someone must have loved me.

The *Jetrail Express* was popular enough that it is commonly sold on eBay today and probably created a false image in the minds of many impressionable young children. The rails suspending its monorail car would scale up to be about 6 inches in diameter. But the square-cube law dictates that rails holding a human-sized train would have to be much bigger. As a result, in actual practice, such as at Disneyland or the world's fairs, the structure supporting the trains dominates the viewscape.

For $9.95, children in the late 1950s could have a bright orange, battery-powered monorail zoom noisily on a slender rail.

The *Jetrail Express* may have helped inspire at least the name for a monorail installed by Braniff Airways at Dallas' Love Field in 1970. Braniff's Jetrail Fastpark system spanned the 0.8 miles between the airline's terminal with a parking lot. Instead of the 90-scale-foot-long car of the *Jetrail Express*, Braniff's was more of a personal not-very-rapid transit system, with six seats and standing room for four in each car. The cars initially went just 17 miles per hour, later increased to 36. Though the cars were small, the steel beams needed to suspend them above the ground were in some places almost as big as the cars themselves. The system operated for just four years, but when Braniff moved its hub to Dallas-Ft. Worth Airport it tried to sell it but could find no takers.

Although all of these images and implementations of monorails were presented as visions of the future of transportation, the idea of monorails actually dates back to 1825. A monorail was built for the 1876 Centennial Exposition in Philadelphia. The oldest operating monorail in the world today was installed in Wuppertal, Germany in 1901.

The 1901 Wuppertal Suspension Railway. Photo by MBDortmund.

Like other full-sized monorails, the infrastructure required to support the Wuppertal *Schwebebahn* (suspension railway) is formidable, darkening the streets and the otherwise park-like creek bottom over which it operates. The monorail is slow, noisy, and its capacity is low. Although it has switches allowing trains to go onto different tracks in the car shop, the switches move too slowly for them to be useful on the main line.

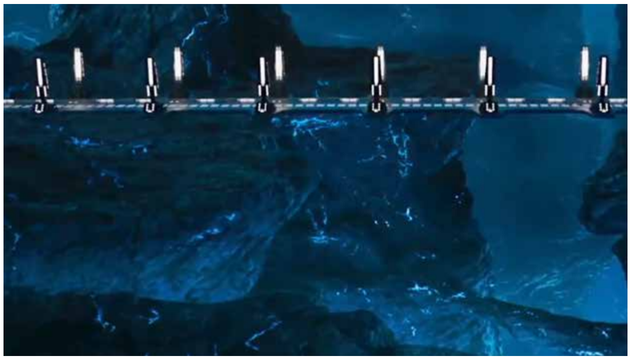
Monorail advocates claim they can make modern trains run faster with higher speed switches, but they can't solve the negative effects of monorails on the skyline. When casinos on the Las Vegas strip decided to add a monorail line to their attractions, rather than build it on the strip, where it would obstruct views of the glittering lights and stunning architecture of the hotels, they built it behind the hotels, where riders would have thrilling views of parking lots and dumpsters.

Although monorails have their adherents, most of the world's operating monorails are confined to amusement parks, zoos, and fairs. A few are in airports and shopping centers, while the majority of monorails operating as some form of urban transit are in Asia, mostly Japan and China.

In recent years, futuristic visions have replaced monorails with magnetically levitated (maglev) trains. Perhaps the best-known example in popular culture is the maglev in Wakanda, the fictional African country in Marvel Comics. The country and its maglev trains were the focus of the *Black Panther* movie.

This movie generated paroxysms of delight among transit advocates. *The Verge* called *Black Panther*'s vision of Wakanda "a transportation utopia." "There are no cars in Wakanda," gushed *Newsweek*. "Why can't we have the vibranium-powered passenger trains of the *Black Panther* universe?" whined *CityLab*'s Laura Bliss.

Ms. Bliss may not realize that one reason we can't have such trains is because vibranium is a fictional metal that gets its power from equally fictional magic. This is the same fictional universe in which a power source about the size of your fist can allow a human in a metal suit with no aerodynamic lift capabilities to fly at supersonic speeds halfway around the world, with enough power left over to shoot various offensive weapons at bad guys along the way.



The mighty (and mighty ficticious) Wakanda maglev. Image by Marvel Studios.

Beyond this, the reality is that any transportation system that needs its own dedicated infrastructure will be very expensive to build. To be competitive with automobiles, which can go anywhere on relatively low-cost infrastructure that already exists, a lot of new infrastructure will be needed. To completely replace automobiles, as in Wakanda, a whole lot of infrastructure will be needed.

As a rule of thumb, new transportation technologies will succeed only when they can use existing infrastructure. This wasn't true in the early nineteenth century, when the only technologies were waterborne transportation and horses and wagons. At that time, America built railroads across the country because they could go where riverboats couldn't and they were far faster and less expensive than horses and wagons.

Since then, automobiles were successful because they were able to use wagon roads and streets. Airlines were successful because the only infrastructure they really need is the air and some level landing fields. Driverless cars will succeed because they can use the same roads as human-driven cars. All new infrastructure since the introduction of these technologies—freeways, traffic lights, concrete runways, air terminals with jetways—simply built on the success of the early cars and planes. In contrast, monorails, high-speed rail, maglev, personal rapid transit, and other new systems will fail because they require all new infrastructure and will be competing against established technologies that are less expensive plus either faster or more convenient than the supposed transport technologies of the future.

For example, transit planners believe most people are willing to walk a quarter mile to a transit stop. Building north-south and east-west transit lines on a half-mile grid, meaning four miles of transit routes for every square mile of land with stations at the intersections of the lines, would put most, but not all, people within a quarter mile of a station. As of 2010, the nation's urban areas with more than 50,000 people covered more than 88,000 square miles; by 2020, this has probably grown to nearly 100,000.

At a cost of $100 million a mile—conservative considering that transit agencies are currently averaging twice that much on light rail—a transit system that puts all urban residents within a quarter mile of a transit stop would cost roughly $50 trillion. With transit stops every half mile, speeds would average under 20 miles per hour; adding extra rail lines for express trains would double the cost. For comparison, replacing all urban freeways, arterials, and streets in the United States today would probably cost around $1 trillion to $2 trillion dollars.

Transit agencies can afford to spend that much per mile on rail transit today only because they are heavily subsidized by people who don't ride transit, mainly automobile users. If no one had an automobile, there would be no one to subsidize the transit system. This means that transit revenues would have to pay for the costs of construction, making fares too high for many people to ride.

Thus, we would trade our egalitarian transportation system, in which 92 percent of American households have at least one car, for an elitist transportation system, which some people could afford to use while everyone else had to walk. That's pretty much the transportation system we had between about 1890, when cities began rapidly installing streetcar systems that most people couldn't afford to regularly use, and 1925, by which time about half of American families had purchased a mass-produced automobile from Mr. Ford or one of his competitors.

America's choice: egalitarian and efficient transportation.

The lesson here is that transportation planners shouldn't base their ideas on children's toys or comic books. Unfortunately, too many seem to be graduates of the Marvel Cinematic Universe (MCU) School of Transportation Planning. Examples of MCU transportation planning are shown in the table on the next page. For comparison, I include what fiction writers would call an "alternate universe" known as the Real World (RW).

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Alternative Transportation Theories

MCU School	RW School
Transportation planning means imagining how we wished the world could be and then planning for that world.	Transportation management means finding out how people travel and then making that travel as safe and efficient as possible.
Long-run planning is needed to fix the problems we imagine will exist in the future.	Solve today's problems today to leave the future better able to solve whatever problems it will have then.
Cars are evil so we have to reduce per capita driving.	Reduce the negative impacts of cars—accident fatalities, pollution, energy—by making cars safer, cleaner, and more efficient.
If more people would ride transit it would be more energy efficient than driving. After all, a bus carrying 70 people uses far less energy than if those 70 people each drove a car.	The average transit bus had only 9 people on board in 2018 while the average car carried 1.67 people and used less than two-thirds as much energy per passenger mile as transit buses.
If we stop building freeways people will stop driving on them.	Between 1990 and 2018, the Chicago urban area added just 5 percent more freeway miles, yet saw freeway driving grow by 54 percent.

MCU School	RW School
New York City has 27,000 people per square mile and most workers there commute by transit, so we can significantly increase transit ridership by increasing the density of our city from 3,000 to 3,100 people per square mile.	Transit is more dependent on downtown jobs than population densities, and New York City has 2 million such jobs, four times as many as the next largest downtown in America and 10 times as many as all but six other downtowns.
We can use urban-growth boundaries to achieve such density increases without increasing housing prices.	Housing in most regions with growth boundaries costs two to five times as much as in regions with no growth boundaries.
Rail transit attracts people out of their cars who wouldn't ride a bus.	Transit riders are frequency sensitive; increasing bus frequencies will attract as many new riders as rail.
Transit carries less than 1% of passenger miles and 0% of freight, but it deserves half our attention and half our transportation dollars.	The test of a good transportation system is one that can efficiently and swiftly move freight to its destinations.
Our last transportation plan didn't work, so let's do more of the same. It's gotta start working sometime.	The definition of insanity is doing the same thing and expecting a different result.