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COVER PHOTO:
Green Field Under White and Blue Clouds.
Photo: Kostiantyn Stupak





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DISCLAIMER: The opinions expressed herein are those of the authors and not necessarily those of WTPP, the WTPP Editorial Board or TCSC.

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Thanks to all who helped us revive the publication of this journal, especially to John Whitelegg, who trusted us with his vision, and to Marianna Grossman, vice president of Transportation Choices for Sustainable Communities (TCSC), without whose seed grant we could not have attempted such a daunting project.

Thanks to the many friends and colleagues who volunteered to do all kinds of tasks from helping us trademark the name, to designing the logo, to answering numerous questions about a variety of topics: **Dave Campbell, Carol Levine, and Marivic Montilla**. Thanks also to the **Principals Working Group — Chris, Charles, and Rick** — who helped to steer amongst the many decisions that came with the re-start of the journal.

Of course a journal of this kind is dependent on the dedication and expertise of an editorial board and a vast invisible team of peer reviewers; such a team is an essential component of a professional journal. **We thank all of you.**



*The Peace Pole, Lake Chabot Regional Park, CA USA.
Photo by Michelle DeRobertis.*

Welcome back to both the readers of World Transport Policy and Practice and to WTPP itself.

On behalf of the Board of Transportation Choices (TCSC) (transportchoice.org), we are pleased to announce that TCSC is now the publisher of World Transport Policy and Practice. Professor John Whitelegg founded WTPP in 1995 in order to highlight policies and practices that focus on successful sustainable transportation policies and practices. We are grateful that he has entrusted his journal to us. His storied career and accomplishments are presented in the first article of this issue.



John Whitelegg and Jeff Kenworthy in Bremen, Germany

John Whitelegg’s vision for the journal was to present ideas, policies and practical initiatives that will bring about a reduction in global dependency on cars, as well as on trucks (lorries) and aircraft.

John wrote in a February, 1997 editorial that:

“WTPP has a philosophy based on the equal importance of academic rigour and a strong commitment to ideas, policies and practical initiatives that will bring about a reduction in global dependency on the car, the

lorry and the aircraft. WTPP has a commitment to sustainable transport which embraces the urgent need to cut global emissions of carbon dioxide, to reduce the amount of new infrastructure of all kinds and to highlight the importance of future generations, the poor, those who live in degraded environments and those deprived of human rights by a planning system that puts a higher importance on economic objectives than on the environment and social justice. WTPP will put people at the centre and welcomes creative debate.

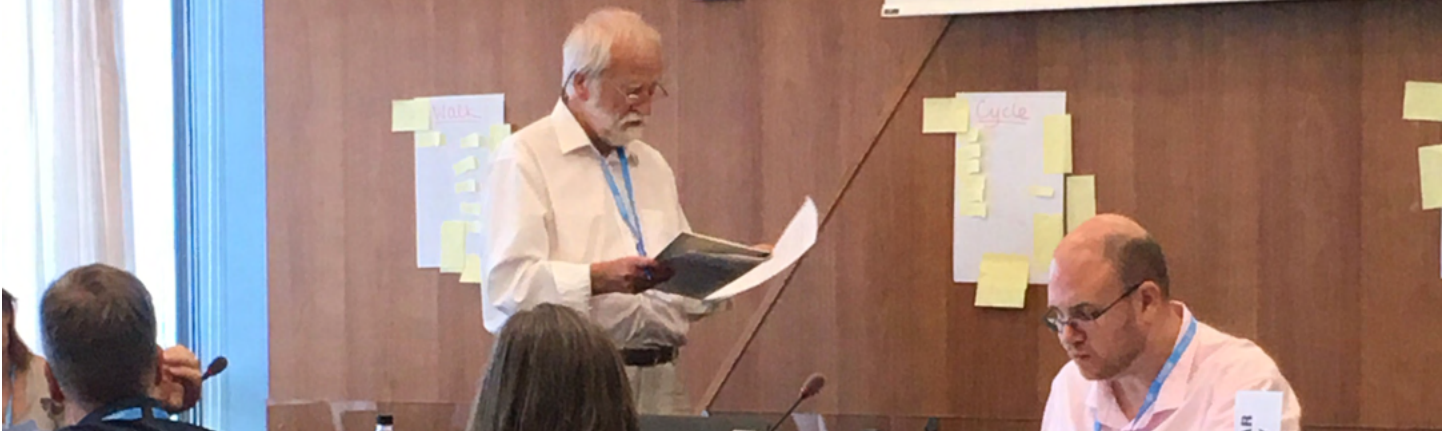
In a 2015 speech, John further articulated some goals that would help shift the discourse from mobility for mobility’s sake to that of an accessibility paradigm. These goals are minimizing the following harms:

- Zero deaths and serious injuries in the road traffic environment.
- Zero carbon transport.
- Zero air pollution in cities from transport.

These goals may be achieved by maximizing the following:

- Maximum possible number of trips on foot, by bike and by public transport in all settlement types including rural areas in all countries.
- Maximum possible public use of public space and social interaction between friends and neighbours on streets that prioritise people and that are not designed for cars.

Transportation Choices shares the philosophy that reducing car use by increasing the use of walking, biking and transit are imperative to address other social ills such as environmental degradation and injuries and fatalities from traffic crashes. While arguably it is discouraging that 27 years after the first volume of WTPP, the world is still grappling with these issues, there



John Whitelegg at World Health Organization meeting on physical activity, Geneva

has been progress. Since 1995, there has been an explosion in attention to livability, sustainability, and the need for safer pedestrian and bike infrastructure. On the downside, climate change remains a threat that has not been adequately addressed; far too many people are still dying in automobile crashes worldwide; and public transport often does not get the attention it deserves, especially in the US. Thus, TCSC feels there is still a need for a journal whose focus is to highlight effective policies and successful practices in line with these goals.

These issues resonate with me personally and professionally. After 30 years of working in bicycle and pedestrian transportation planning (mostly in California), biking or taking transit to work, and allowing (they might say “forcing”) my children to walk to school, I moved to Italy to complete a doctoral dissertation evaluating the improved livability that results from the implementation of traffic-limited zones in historic city centers. Such zones have been implemented for over 50 years in over 350 Italian cities and towns, both large and small. Since my research question was about improved livability, the performance measures that I chose to evaluate were human-focussed. I settled on measures to assess three

impacts on humans. I evaluated whether and how reducing traffic in the city center:

- Improved health and safety (e.g., fewer auto crashes, harmful effects of air and noise pollution on human health, etc.).
- Reduced annoyances from automobiles on the senses of smell, hearing and sight.
- Improved ambiance or pleasantness of the outdoor urban environment due to fewer cars.



Bike in Harleem, NE. Photo: Sue Prant

Of course, reduced traffic (i.e., reduced car use) has other benefits, most notably for planet Earth through a reduction in air pollution, carbon output, paved impermeable surfaces, loss of habitat, solid waste, and the other externalities and adverse impacts of fossil fuel extraction and dependency.

After reading John’s three zeros and two maxima, I realized how much these overlap with my research. Thus as editor, I am proud to be able to curate papers that present policies and practices that promote reduced car dependency and that result in one or more of the four benefits described above. These succinctly describe the range of paper topics that we hope to publish.

In this issue, we are also honored to publish research funded by the European Parliament and contracted by DG MOVE (the Directorate-General for Mobility and Transport of the European Commission) (https://ec.europa.eu/info/departments/mobility-and-transport_en) on the many ways that cities in Europe are reducing car dependency through strategies that fall under the umbrella of UVARs- Urban Vehicle Access Restrictions. We will be publishing more about these strategies in future issues.

We also present a summary and update of an article by Patrick Kinnersly from the May 2014 issue- **Curse of the Zombie Roads (WTPP 20.2-3: 63-96)**, since the inability to kill seriously defective road projects appears to be a continual problem globally. On the positive side, we highlight the pending publication of a new Recommended Practice

of the Institute of Transportation Engineers (ITE) **Multimodal Transportation Impact Analysis for Site Development**. This new report is a large departure from past practice where ease of automobile flow was the primary consideration. It provides much needed guidance on addressing transit, bicycle, and pedestrian access as well as context sensitivity and infill development.

We hope to announce other examples of new and evolving practices that support sustainable transportation. Accordingly, this issue plants seeds for future articles. One article presents several themes that we would like to give more attention to in future issues. A second article highlights research needs that emanated from recent research projects that the principals of Transport Choices have conducted. We are particularly interested in receiving articles that address these research needs.

By continuing the publication of WTPP, we hope to foster a community to share ideas and debate the best ways forward, for communities large and small, urban and rural.

Please visit our new website and subscribe at worldtransportjournal.org to be notified of when new issues are available. This website also contains the instructions for how to submit an article for consideration.

Welcome back everyone!

Michelle DeRobertis

Editor



www.andysinger.com

ABSTRACTS AND KEYWORDS

RESEARCH NEEDS TO INSPIRE FUTURE RESEARCH EFFORTS

Michelle DeRobertis, Christopher Ferrell and Richard W. Lee

ABSTRACT

This article describes suggested future research that was revealed in six recent research projects in the area of livable cities, transit-friendly cities, regional transit coordination and green streets.

KEYWORDS

City best practices, transit coordination, green streets.

URBAN VEHICLE ACCESS REGULATIONS (UVARS)

Lucy Sadler, Cosimo Chiffi, and Bonnie Fenton

ABSTRACT

Urban Vehicle Access Regulations (UVARs) are a useful tool used widely in Europe that help the move towards people-friendly cities and help reduce transports climate impact. They include pedestrian zones, low emission zones, congestion charging, traffic limited zones, pedestrian priority zones and spatial interventions. This article gives an introduction to the main types of UVAR and where more information on UVARs can be found.

KEYWORDS

Pedestrian zone, limited traffic zone, low / zero emission zone, congestion charge zone, spatial interventions.

CURSE OF THE ZOMBIE ROADS – THE STORY CONTINUES

Patrick Kinnerly

ABSTRACT

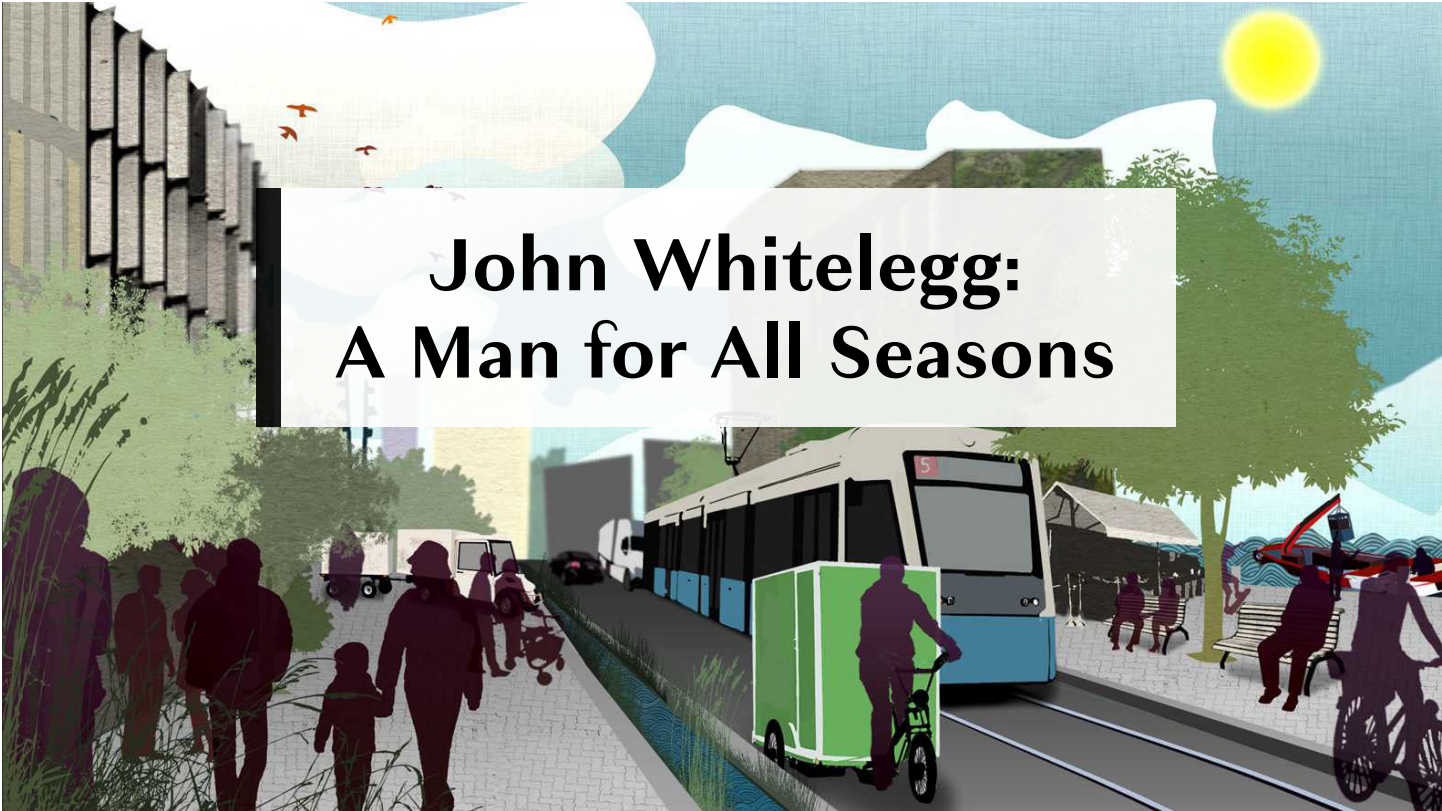
The paper updates and expands on a paper from Issue 20. 2-3 that described the 20+ year history of road proposals along two transport corridors in South West England – the A350 Westbury Bypass and the A36 Salisbury bypass. Thanks to massive efforts by environmental groups, both schemes have been decisively rejected by the planning system and the government. This article questions why such road proposals continue into the 21st Century when the environmental constraints on further increases in road traffic should rule them out of consideration? This article exposes the false cost-benefit appraisal analysis that supports such proposals and it also highlights other misguided policies that led to the resurgence of the Westbury bypass and other road schemes in England.

KEYWORDS

Consultation, climate change, cost-benefit analysis, globalisation, government policy, railways, road building, Wiltshire.



Biostrips-Cherry Ave. San José CA USA (photo by Christopher Ferrell)



John Whitelegg: A Man for All Seasons

By Charles R. Rivasplata

This article explores the work and accomplishments of Professor John Whitelegg, the founder and past publisher of *World Transport Policy and Practice*. Through his example, he has provided us with the inspiration to fervently continue his quest to publish quality articles on transport, further highlighting the industry’s vital role in making the ongoing adjustments necessary for creating a more sustainable future.

To say that he has been passionately involved in envisioning a more integrated environment and making transport more sustainable is an understatement. For decades he has vigorously promoted policies and strategies aimed at coordinating investments in transport with local land use planning, striving to lower society’s dependence on fossil fuels. In response to the need to effectively reduce the negative impacts of motorisation, in 1995 he founded *World Transport Policy and Practice*, a journal focused on providing alternatives to the single-occupant vehicle and

linking transport research to the implementation and evaluation of projects

A native of Greater Manchester in Northwest England, Whitelegg initially studied Geography in Britain, earning a Bachelor of Arts degree (BA) and a Doctor of Philosophy (PhD) degree from the University College of Wales, Aberystwyth. His PhD thesis explored stochastic process modelling and spatial statistics in the analysis of the birth, death, growth and decline of firms. In addition, he earned a Bachelor of Laws degree (LLB). Throughout his professional career, he has held key posts and has led a diverse set of projects and campaigns, not only as a scholar, author and teacher, but also as an advocate and politician. In the early 1990s, he chaired the Department of Geography at Lancaster University and was Director of the University’s Environmental Epidemiology Research Unit. In the 2000s, he was a local councillor in Lancaster, and served as the Green Party’s Sustainable Development spokesperson. In



2020, he was appointed a Senior Fellow at the Federation of Integrated Transport (FIT), collaborating with Professor Phil Goodwin on topics related to transport and climate change.

As an author, Whitelegg has written over 50 journal articles and numerous books, including *Urban Transport* (1987); *Transport for a Sustainable Future: The Case for Europe* (1993); *Critical Mass: Transport, Environment and Society in the 21st Century* (1997); and *Mobility: A New Urban Design and Transport Planning Philosophy for a Sustainable Future* (2015). In the last book, he called for radically modifying the manner in which transport and land use planning are managed in Britain, citing public transport best practices in such cities as Vienna and Zurich. In the book, he also highlighted Sweden's Vision Zero policy, aimed at drastically reducing pedestrian road injuries and deaths.

Currently, he is Visiting Professor of Sustainable Transport at Liverpool John Moores University and Professor of Sustainable Development at the University of York's Stockholm Environment Institute (SEI). His research interests include transport and the environment, sustainable transport systems, transport in developing world cities (e.g., sustainable transport strategies in Kolkata), sustainable transport and human health, and development of environmental management standards. He has also worked on other projects outside of Britain, including in Denmark, Australia, Sweden, Netherlands and China.

According to Whitelegg, there are projects that exemplify his vision of what the future could look like. For example, he points out that Lund, Sweden sets a very high standard with its approach to transport decarbonisation, including a long-term strategy for transport and mobility in the city. It is a city that he has visited frequently and written about in his *Mobility* book, as well as his blogs. In addition to Lund's strategy, he cites the Baltic Sea Region Competence Centre on Sustainable Urban Mobility Plans project in Poland, as well as the Towards a Zero Carbon Vision for United Kingdom Transport project in Britain.

Furthermore, he has identified three achievements that he is particularly proud of:

- his call for strengthening the policy ties connecting transport, climate change, social justice and regional planning;

- his campaign to save the strategically significant Carlisle rail line in the north of England, which featured support from the World Health Organisation; and
- his extensive efforts to establish a 20 mile-per-hour maximum speed on local roads and streets, primarily in the northwest of England, but also in Wales and Scotland.

As editor of the journal for 25 years, Whitelegg consistently published articles based on empirical studies, tying these directly to transport policy options. These articles have explored a wide range of topics, including safety, aviation, social issues, women in transport, and freight transport. Many featured the quantification of environmental impacts, whilst others focused on transport for children and behavioral change. The present resurgence of the journal will continue to articulate and disseminate a diverse set of sustainable transport themes and issues.

Through the journal, Whitelegg has encouraged the inclusion of articles with innovative ideas and alternative ways of promoting sustainable development and mobility. Above all, he has highlighted the urgent need to promote active transport options and reduce the impacts of all forms of motorised transport, constantly striving to establish policies and encourage strategies that result in a more sustainable future for all sectors of society.

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- Whitelegg, John. *Urban Transport*. London: Macmillan Education, 1987.
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Author details:

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THEMES OF INTEREST



Call for Papers for Future WTPP Issues

By the Editor

While WTPP publishes articles within the general topic of sustainable transportation that address reducing adverse consequences of transportation on humans and the environment, we are particularly interested in papers that fit into one of the following themes. There are many aspects and issues that could be addressed within each of these themes and indeed, each theme merits a special issue. Given the lead time involved in preparing articles, we are announcing these themes in this first volume of the relaunch of the journal in the hope that potential authors are motivated to share their experiences with these concepts.

We welcome articles that describe the policies and practices within the following themes:

Evaluation Metrics

Papers that describe how cities are expanding their project evaluation metrics beyond vehicle movement to include consideration of other modes as well as environmental, social and economic benefits. Papers could focus on a single metric which has traditionally been overlooked (e.g. noise) or could focus on a single project type since different projects need a different array of performance indicators. Project types include: congestion pricing, bus-only lanes, pedestrian streets,

green streets, shared spaces, low-emission zones, traffic-restricted zones (ZTL), road diets, slow streets, bike boulevards, and woonerfs.

Before you can score, you first must have a goal.

- Greek Proverb

Critique of Standards, Guidelines, Manuals, Textbooks

Papers that describe examples of standards, guidelines, manuals, or textbooks that thwart sustainable transportation. The papers would present examples of problems a specific standard or guideline has created in the past and how it should be (or has been) rectified. If indeed the problem standard or guideline has been changed, then the article would describe the resolution, discussion of benefits, as well as any unresolved issues.

Green Streets

Papers that present Green Streets case studies describing one or more of the many issues and challenges related to their design, implementation and the ensuing quantifiable environmental benefits. These issues range from design options, needed or helpful ordinances or

legislation, and obtaining public support or overcoming resistance. Papers could present a before and after evaluation of the quantifiable benefits or describe the process to engage decision-makers and/or the community.

Livability and Transportation

Papers that address the relationship of transportation decisions on the livability of streets and neighborhoods, or on specific populations such as children, elderly, disabled and socially-economic disadvantaged communities. Papers could address how to build residential streets so they don't need to be retrofitted with traffic calming measures; highlight case studies of retrofitting a woonerf on an existing residential street; successful changes to speed limits to improve livability safety and noise; the role of public spaces and plazas in larger and small communities; ensuring transportation improvement funds are spent equitably in a community, or the special needs of elderly, children or other "transit-dependent" populations.



Bioswales on residential street, Los Angeles CA. (Photo by Christopher Ferrell)



Air pollutant monitoring point, Oakland CA USA
Photo by Michelle DeRobertis

Goods Movement

Papers that describe strategies and practices for goods movement that reduce air pollution and carbon emissions and/or reduce the incidence of collisions and other safety issues. Papers could address the environmental benefits of rail, wind (e.g. sailboats), electric vehicle or human-powered deliveries schemes, the legal and policy setting of implementing new practices such as ordinances and permits, the logistical elements implementing a new scheme or the impacts of the global economy on freight transport's greenhouse gas emissions. Specific examples range from last mile deliveries within a car-free area to using rail/ trams or sailboats/barges instead of trucks.

Transportation and Housing

Papers that address the relationship of transportation decisions on housing supply, variety and density. Papers could address Transit-Oriented Development and its relation to housing supply and affordability (a broad issue) or the effect of unbundling parking from housing (a more focused issue). In particular, is unbundling parking effective when transit service is below a certain level? Which comes first: better transit or unbundling parking? What is the relationship between housing density and transit service (both local and regional)? Updated research and data that expand on the works of Paul Mees would be welcome.

Research Needs to Inspire Future Research Efforts



By Michelle DeRobertis, Christopher Ferrell and Richard W. Lee

This article highlights several recent research projects that Transportation Choices principals have conducted. We encourage you to read the full reports for the analysis and conclusions. Below, we focus on the future research needs that these research efforts revealed. We publish them here in this first issue of the WTPP relaunch in the hope that it sparks the interest of the sustainable transportation community to either develop and conduct research in these particular areas or point us to past research that we may have missed that covers these topics. It is also hoped that the ideas presented below provide inspiration at many levels of discourse and research including Ph.D. and Masters theses, government-funded research, and city policymakers and staff who implement new policies and practices and experiment in “real time”. Please let us know if you have been inspired by one of the ideas below and how you have advanced it, either through further study or in practice.

The reports are presented in the following order:

- **City Best Practices to Improve Transit Operations and Safety.** Mineta Transportation Institute. 2021.
- **Characteristics of Effective Metropolitan Areawide Public Transit: A Comparison of European, Canadian, and Australian Case Studies.** Mineta Transportation Institute. 2020.
- **Analysis of the Benefits of Green Streets.** 2020. Mineta Transportation Institute.
- **Effective Employer Travel Demand Management (TDM) Today.** Unpublished research. 2018.
- **The Potential for Using Loyalty Rewards and Incentives Programs to Encourage Transit Ridership and Regional Transportation and Land Use Integration.** Christopher E. Ferrell, Ph.D., San Jose, CA: Mineta Transportation Institute. 2019.
- **Towards an Assessment of Livability In The ZTL: Reversing The Tragedy of The Commons of The Historic City Center; The Case Study of Brescia.** Michelle DeRobertis. Ph.D. Dissertation, University of Brescia Italy. 2019.

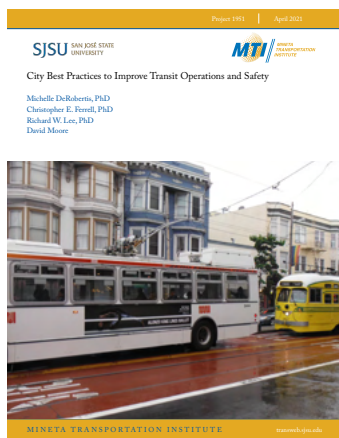
City Best Practices to Improve Transit Operations and Safety. MTI Report 21-09.

Mineta Transportation Institute,
San Jose State University, 2021.

<https://transweb.sjsu.edu/research/1951-City-Best-Practices-Improve-Transit-Operations-Safety>

Research purpose: To identify key policies and practices that help (or hinder) surface public transit that are outside the purview of the transit agency but within the

purview of cities and other local governments. This work identified specific policies and practices that local governments and other roadway owners can implement to improve public transportation given their control over the streets, intersections and sidewalks used by transit vehicles and transit passengers.



Abstract: Public, fixed-route transit services most commonly operate on public streets. In addition, transit passengers must use sidewalks to access transit stops and stations. However, streets and sidewalks are under the jurisdiction of municipalities, not transit agencies. Various municipal policies, practices, and decisions affect transit operations, rider convenience, and passenger safety. Thus, these government entities have an important influence over the quality, safety, and convenience of transit services in their jurisdictions. This research identified municipal policies and practices that affect public transport providers' ability to deliver transit services. The researchers used a comprehensive literature review, interviews and discussions with five local transit agencies in the U.S., input from five public transportation experts and from discussions with staff from five California cities. The city policies and practices identified fall into the following five categories: infrastructure for buses, including bus lanes, signal treatments, curbside access; infrastructure for riders

when walking to, bicycling to, and waiting at transit stops and stations; internal transportation planning policies and practices; land development review policies; and regional and metropolitan planning organization (MPO) issues. The understanding, acknowledgement, and implementation of policies and practices identified in this report can help municipalities proactively work with local transit providers to more efficiently and effectively operate transit service and improve passenger comfort and safety on city streets

Future Research Needs: While the primary goal of the research was to develop a list of best practices that help transit operations and passengers, it became evident that it might be more useful if the recommendations were prioritized for different contexts. This research also uncovered several related issues that merit further study. Thus, further research is recommended in five key areas:

1. Research to Refine the Master List of Recommended Practices

While some basic elements are the same across all cities, there are nuances depending on city size and context. Thus, recommended practices for creating transit-friendly cities may differ for cities of different sizes, economic conditions, and climate conditions. A large, transit-dependent city in a cold-weather climate requires substantial resources for snow removal over a large area to maintain lifeline transit services throughout the year, while a small city in the sun belt will require none. For this reason, it would be useful to develop different lists of best practices for different contexts as well as to develop a short, "must have" list. Focused research is needed to determine best practices for a variety of city contexts, to:

- Identify a short list of the most important impactful practices that would apply to all contexts. These would consist of those practices that result in the biggest improvements to transit, since the policies and practices are not of equal effectiveness. Research is needed to differentiate between the more significant and the more marginal practices.
- Identify and differentiate between practices that are more appropriate for small rural towns, for medium-sized cities, for large cities, and for suburban contexts.
- Identify which practices are appropriate for a transit agency that is a department of a single city versus a separate agency which serves multiple cities.
- While not always obvious, the needs and requirements

of building a transit-friendly city require frequent assessment of these city activities with respect to the city's vision for its future. A city that aspires to develop from a commuter suburb into a high-density employment hub will likely undertake different practices at all levels of government to support these goals than one that seeks to maintain its low-density, suburban character. Research that identifies different transit-supportive practices for cities aspiring to a variety of future development visions would help make implementation and coordination more effective.

2. Surveys to Determine the State of the Practice

Surveys of cities and transit agencies would be useful to determine not only the state of the practice but to determine which are considered key policies for various contexts. Suggestions include:

- Survey of U.S. transit agencies to determine which practices they consider to be the most impactful to their operations; stratify results by transit agency size, city size and context.
- Survey of cities to determine what they consider to be the best practices identified; stratify results by city size and type of transit agency, i.e., city-owned versus special district.
- Survey of cities to compare practices between cities with and without their own transit agency as a city department. This research could also investigate the relative prevalence of the “us versus them” relationship between the two categories of cities.

3. Development of a Best Practices Handbook

A handbook of guidelines for municipalities and transit agencies that describes when, where and how to use the policies and practices identified in this research would be very useful. It could include design illustrations and dimensions, as well as describe typical applications. For example, it could describe:

- Bus stop dimensions for expected volumes of buses and bus type (regular, articulated, etc.).
- Passenger amenities at bus stops by expected passenger volumes.
- Under what conditions (land use, traffic levels, street type) certain infrastructure is appropriate (e.g., bulbouts, transit boarding islands, TSP, bus-only lanes).

4. Institutionalization

This research identified a variety of policies and practices on the part of multiple city departments to successfully

support transit operations within a city's jurisdiction. Each of these functions and tasks deserves focused research attention. The research revealed that the actual mechanism for how transit-friendly policies or practices are carried out by individual departments is very important, but that there is no single way to do it. Cities used a variety of strategies to institutionalize their policies and practices including city ordinances, corridor plans, complete streets policies, departmental policies. Often there was no written policy at all, just legacy practice. Additional research would be very helpful in revealing the array of approaches—and the most effective approaches—for ensuring that the policies are implemented. Additional research is recommended for the following in particular:

- Determine which institutional strategies are most suitable for specific practices:
- for example, city ordinance versus area-wide plans versus adopted design standards versus departmental policies.
- Identify best practices for coordinating transit agencies and city functions across the spectrum of city operations and departments: This would identify options and strategies for encouraging inter-departmental collaboration and coordination for improving transit.
- It may first need to explore the questions, “Why are there coordination issues between cities and transit operators?” and “Are there process reforms that could help achieve better cooperation on the part of cities to implement policies and practices that help transit providers?”
- Determine state of the practice regarding whether and how cities are directing developer fees to fund public transit: This would also investigate whether or not other cities might benefit from the improvements.
- Opportunities and constraints for a regional transit benefit district: This would be similar to a city benefit district or Pro-Rata Share District (PSD) but the funds would go to the regional transit provider, and would come from all cities who would benefit from improved transit.

5. Mutual Adoption of Transit-Related Guidelines

Many transit agencies have developed written internal guidelines and some have even published documents intended for the cities they serve. It is unknown, however, how many cities have indeed adopted city guidelines that correspond with those of the (outside) transit agency. Two potential research projects are:

- Research to determine which cities have adopted their transit agencies' guidelines. Issues include curbside bus stop design, bus bulb-outs, passenger waiting areas at bus stops, signal and intersection design issues, zoning density, etc.
- AC Transit Guidelines Adoption Case Studies: Research to determine how many of the thirteen cities served by AC Transit adopted any of the design guidelines described in AC Transit's guidelines published in 2004.

Characteristics of Effective Metropolitan Areawide Public Transit: A Comparison of European, Canadian, and Australian Case Studies. MTI Report 20-42. Mineta Transportation Institute, San Jose State University, 2020. <https://transweb.sjsu.edu/research/2001-Effective-Metropolitan-Transit>

Research purpose: To identify the replicable factors in metropolitan public transportation that make transit an effective competitor to the private motor vehicle.

Abstract: This research project investigates the replicable characteristics, policies, and practices of successful metropolitan areawide public transportation networks that contribute to high usage and make transit an effective competitor to the private motor vehicle. The research method involves the qualitative and quantitative analysis of ten international (non-U.S.) case studies. The principal methods employed were web-based research and data collection, as well as telephone interviews with transit agency staff or regional planners as needed. The case studies were limited to developed western countries with similar metropolitan conditions to those in the United States.

This research focuses on key characteristics of highly effective regional transit systems from the perspective of the metropolitan area, not the individual transit operators. These characteristics fall within three broad categories: the setting of the metropolitan area; the customer-apparent transit service features; and the behind-the-scenes or institutional characteristics.

Key findings are: (1) all ten case studies have a metropolitan areawide regional transit coordinator



(RTC); (2) RTCs yield benefits in terms of ridership and operating efficiencies that are discernable from the effects of high transit funding and subsidies; (3) all case studies had some degree of fare integration, and most had complete regionwide fare integration; and (4) transit service was

frequent, abundant, and affordable in all cases. The features of excellent regionwide transit systems that have been identified in this research can be applied to U.S. metropolitan areas with multiple players, yielding effective, efficient, and high mode share transit at the regional level. The research can help U.S. policy makers and planners begin to improve the appropriate aspects of their own regional transit systems, including by improving coordination and organizational structures.

Future Research Needs: The findings of this study suggest the following areas for complementary research.

1. A comparison of specific U.S. metropolitan area transit networks with the findings of this research, particularly with respect to the coordination of agencies within the same metropolitan area and institution of single unified fare policies across operators.
2. An analysis of the relation between regional transit coordination and regional Governance.
3. Case studies of successful regional governance models particularly in regions with rings of suburban communities surrounding medium and large cities.
4. Identification of the key elements that Regional Transit Coordinators need in their authorization that give them both the mandate and the tools to be effective.
5. Presence and density of several layers of rail transit (urban and regional) in metropolitan areas with excellent transit (e.g., kilometers of rail lines,

reflecting spatial coverage, and vehicle-kilometers, reflecting amount of service per square kilometer and per capita), and the role of complementary versus redundant service.

6. Comparison of bus-only lane networks of various metropolitan areas with excellent public transit.
7. Cost savings that accrue from coordination endeavors such as savings from procurement of rolling stocks and single websites for marketing and travel planning.
8. Travel time comparison of transit trips versus automobile trips in various metropolitan areas.
9. Travel time comparison of total public transit trips, including transfers and waiting times, in areas with excellent public transit.
10. Comparison of investment in rail transit into expanding and extending rail lines: light rail, metro, and suburban rail. This should consider both absolute miles and miles normalized per population and per square kilometer.
11. Sources of public funding for transit systems in areas with excellent public transit.
12. In areas with complete fare integration, especially those areas that also have multiple system owners, what are the policies for allocating fare revenue among the different modes and systems?
13. Comparisons of when and how rural and low-density areas have public transit, including regional public transit, in various western countries.
14. Techniques and management strategies to ensure schedule adherence, particularly for timed transfer connections. Are there differences when there is consolidation versus coordination?
15. Analysis of transit driver pay and performance bonuses as well as operations staffing levels in areas with excellent public transit. How do these features relate to schedule adherence?
16. For areas with multiple transit system owners, analysis of how labor rules and other management issues are reconciled among the different transit system owners under Regional Transit Coordination.
17. Case studies of win/win situations: where improved transit labor rules also improve transit reliability and

customer experience (e.g., adequately staffing real-time monitoring and dispatching, bonuses for driving the most challenging routes, bonuses for beginning scheduled routes on time after taking rest breaks).

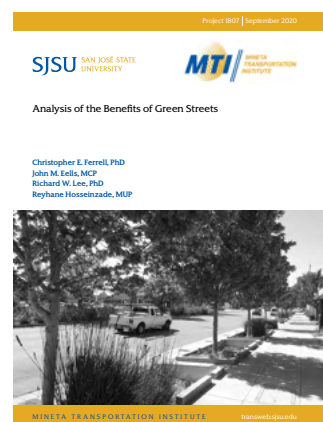
18. Ensuring the viability of public transit in the wake of COVID-19 and the ramifications for transit agencies that may stem from the pandemic.

Analysis of the Benefits of Green Streets. MTI Report 20-32. Mineta Transportation Institute, San Jose State University, 2020. <https://transweb.sjsu.edu/research/1807-Green-Streets>

Research purpose: To identify available, “off-the-shelf”, analysis tools that the California Department of Transportation (Caltrans) can use in their planning, engineering, and administrative processes to evaluate the benefits of Green Streets infrastructure.

Abstract: Green streets, as defined by the Environmental Protection Agency, are streets that incorporate different kinds of vegetation and permeable surfaces “...to slow, filter, and cleanse storm water run-off from impermeable surfaces.” Unlike

traditional streets, green streets retain runoff at the source rather than discharging runoff off-site. Green streets offer many other potential benefits that include improving water quality, absorbing carbon (sequestration), and reducing urban heat island effects. This report summarizes: (1) the research team’s analysis of 14 tools



calculating green streets benefits; and (2) the results of applying the two most promising calculators to a select group of green streets case studies. The report presents the results of the case study analyses, with an emphasis on carbon sequestration benefits estimated using the i-Tree Design calculator, and improvements to pedestrian levels of service estimated using a Highway Capacity Manual (HCM)-based (the “Landis”) method.

Trees absorb carbon dioxide and other pollutants from the air, reducing the costs of future climate change mitigations and medical care. Key findings obtained using i-Tree Design suggest that the monetary value (CO₂ and air quality) of planting street trees is small but significant, with total estimated benefits from street trees on seven case study sites ranging from a low of \$1,466 to a high of \$9,420 over a 20-year period. On a per tree basis, the lowest benefits come from site 3A (Cherry Avenue in San Jose) with \$10 per tree, and the highest come from site 1A (San Pablo Avenue in El Cerrito) at \$175 per tree.

While the Landis PLOS method accounts for the benefits of short street tree spacings (i.e., a high number of trees) and of having a continuous biostrip or planter strip serving as a pedestrian buffer, the method does not appear to be sensitive to tree spacings, though it is very sensitive to buffers. Therefore, the importance of having a biostrip or planter strip buffer between the sidewalk and street traffic is also reflected in the PLOS findings in this study. While the measurable benefits of a handful of street trees may seem small, this study suggests that using i-Tree Design to add together the trees planted by local and state agencies has the potential to provide a compelling picture of the carbon sequestration benefits across California. Similarly, the use of Highway Capacity Manual (HCM)-based pedestrian level of service methods by transportation professionals can bring significant gains in the appreciation of green streets' benefits.



Typical ZTL sign, Italy. Photo by Michelle DeRobertis

Future Research Needs:

- Identify the metrics, methods, and models that are needed to capture the full range of potential green streets infrastructure benefits.
- Create a unified tool that is capable of measuring these benefits on the geographic scale(s) needed by local, state, and federal transportation agencies in their planning, engineering, and administrative processes.

Effective Employer Travel Demand Management (TDM) Today

(unpublished research)

Research purpose: To answer the question: Given social and economic changes since the Great Recession, what does an effective employer-based travel demand management look like?

Abstract: Through a literature review and case studies, a research team attempted to identify best TDM programs at a range of employment centers circa 2015. The range of employment centers included corporate work sites, multi-firm office parks, commercial districts, and educational/institutional campuses. While the study was terminated due to a shift in priorities by the sponsor, initial findings determined that tech companies in the San Francisco Bay Area had robust multi-faceted TDM programs. Moreover, elements of these programs had potential for transfer, e.g. tailored ridematching through smartphone applications.

Future Research Needs:

1. Case studies of successful employer-based TDM programs under post-COVID-19 pandemic conditions for different types of employment centers (e.g., single firm/multi-firm, corporate educational/institutional campuses, etc.) in both urban and suburban areas, in a variety of national settings.
2. Through case-studies, determine important TDM program elements, with an emphasis on transferable elements.
3. Quantitative and qualitative data collection measuring outcomes of post-pandemic TDM programs (e.g. mode split/mode shift, cordon counts, program participation statistics, etc.).

“The Potential for Using Loyalty Rewards and Incentives Programs to Encourage Transit Ridership and Regional Transportation and Land Use Integration.” Christopher E. Ferrell, Ph.D., San Jose, CA: Mineta Transportation Institute. 2019.

Research purpose: To evaluate the potential for using transit smart cards as a tool for increasing transit ridership, retail sales in transit-oriented developments (TODs) and eventually, increasing retail development in TODs.

Abstract: This report provides a compilation and analysis of the literature, and of three case studies, on the potential for rewards- and incentives-based programs in the North American transit industry. The initial inspiration for this research came from the idea that transit smart cards could be used as a tool for increasing transit ridership, increasing retail sales in transit-oriented developments (TODs) and eventually, increasing opportunities for retail development in TODs.

This might work by expanding the scope and capabilities of transit smart cards to include “customer loyalty rewards” capabilities, thereby increasing patronage of retail businesses located in TODs. Instead of providing separate loyalty rewards for each store, or chain of stores, such cards would provide loyalty rewards—in several possible forms, including free transit ride credits, cash rewards, retail purchase discounts, sweepstakes rewards—to all transit riders who patronize TOD retail businesses. Additional rewards could also be given to transit riders who live, work, and shop in TODs, and even to riders who take transit for specific shopping trips in TODs. In this way, smart cards and transit loyalty programs could become not only useful tools for increasing transit ridership, but also tools for targeted economic development of individual TODs, a means to increase economic opportunities and equity for low-income residents and shoppers in inner-city commercial zones, and in their most fully-realized expression, as tools for regional planners to concentrate retail, services and housing in priority development areas consistent with smart-growth planning principles.

From this initial inspiration, a plan was developed to gather research literature on the relationships between smart cards and transit ridership, between transit ridership and retail activities, and between retail sales and retail development in TODs. In the process of this literature search, examples were identified of programs that have been implemented in three North American transit agencies. Case study profiles were developed from a combination of source publication materials, traditional and electronic media, and telephone interviews with program representatives. Three topics discussed in the literature are central to this research (sometimes referred to here as “the benefits”): 1) the best economic development practices and outcomes for retail; 2) the ridership effects of transit smart card programs; and 3) the effects of incentives programs, membership and other rewards programs on retail and travel behavior. An overview of the literature in these topic areas follows, highlighting subjects that are either relatively new or not as well-known in the transportation planning community. This overview and analysis of the literature is followed by summaries of three case studies of transit rewards and/or loyalty programs in North America: Montreal, Canada; Minneapolis/ St. Paul, Minnesota; and the San Francisco Bay Area, California.



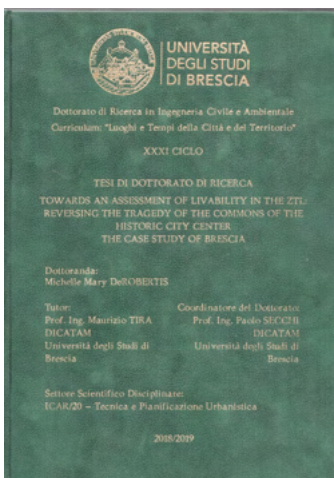
Multimodal Public Transit Tickets
Photo: Michelle DeRobertis

Future Research Needs:

1. More practice-driven research and experimentation is needed on transit rider rewards and loyalty programs. In particular, research to identify the best practices for the ownership, management and administration of loyalty rewards programs would be helpful to determine the degree public sector administration, contracting-out, or outright privatization yields the most effective and sustainable outcomes.
2. Market segment analysis is needed to understand the most effective rewards for the variety of transit riders according to socio-economic characteristics, lifestyle preferences, and corresponding transit system capabilities (both existing and future).

“Towards An Assessment Of Livability In The ZTL: Reversing The Tragedy Of The Commons Of The Historic City Center; The Case Study Of Brescia.” Michelle DeRobertis, Ph.D. Dissertation, University of Brescia Italy. March 2019.

Research purpose: To quantitatively and qualitatively measure the improvement in livability due to the implementation of traffic limited zones (ZTLs) in the historic city center of Brescia, Italy.



Abstract: Traffic-Limited Zones (ZTL) in Italy have been used for decades to improve the ambiance of historic city centers from the onslaught of motor vehicles, their noise and pollution. This thesis evaluates the effectiveness of Traffic-Limited Zones in improving the ambiance and the quality of life for both residents and visitors

to the historic city center of Brescia. Since there is no single standard for defining “livability” and “quality of life”, especially for city centers, the methodology included a review of research by others on indicators

for measuring city livability. Many potential indicators were identified and 12 livability-ambiance indicators were selected to evaluate whether and how ZTL have improved livability in the city center. The methodology also included an opinion survey of both residents and visitors to the city center.

The City of Brescia was used as the case study to analyze these indicators to determine whether livability has improved in the city center since ZTLs were implemented. Although impossible to isolate only the effect of the ZTL, it was found that all indicators showed an improvement in livability. These indicators may also be useful to evaluate the ZTL of other cities and to evaluate other strategies and interventions that reduce traffic volumes.

Key findings include:

- Not only ZTL but also the number of pedestrian streets has increased. Over 2 km of pedestrian streets were initially ZTLs, demonstrating that ZTLs are a first step to the implementation of a pedestrian street.
- Traffic volumes decreased not only on ZTL streets but in the entire city center.
- After the implementation of the ZTL, both the number of collisions and collision rates declined proportionately more than that of the reduced traffic volumes; this is also true for the entire city center not just ZTL streets.
- Families are returning to the city center and those who live in the ZTL rate the quality of life at least as good or better as those who live outside the city center or outside of the city of Brescia.
- Only 1/3 of ZTL residents would reduce either the hours or the extent of the ZTL.
- Within the city center, there is more outdoor seating at bars and restaurants on streets with less traffic; pedestrian streets/ piazzas have the most, followed by ZTL streets, and open streets have the least.

Future Research Needs:

This research raised far more questions than it answered. Many avenues of future research are recommended. These have been organized into five main themes.

1. Further research on the history and evolution of ZTL.
2. Opinion survey of ZTL benefits – qualitative assessment
3. Objective measures of ZTL impacts and benefits - quantitative assessment
4. Development of better analytical tools to assess livability
5. Related planning issues

1. ZTL History and Current Extension in Italy

The review of the literature revealed conflicting information regarding where and when ZTL originated in Italy. It also revealed that there exists a lack of knowledge as to which have had any evaluation of any kind. Furthermore there is no single definitive list of which cities currently have ZTL; the most complete information comes from two private websites.

A research effort to document the history and evolution of the ZTL in Italy would be warranted. One possible strategy to document not only the history but the current state of the practice would be to conduct a survey of existing cities with ZTL. to determine not only the timing but also whether or not there have been unanticipated problem If there have been unanticipated benefits. The findings of such a nationwide survey could help city officials in cities with ZTL in designing the extent and hours of future expansions of ZTLs. The findings could also help other cities that do not have ZTL, both within and outside of Italy, decide whether and how to implement ZTL or similar strategies.

For example this research has determined that the extent of the ZTL in Brescia was rarely constant for more than a few years for most of its 45-year history. The size of the ZTL mostly continued to expand until it reached a peak in 2003 of 22 km, then shrank a bit. It is not known if this type of growth for a ZTL over 40 years is typical for other cities in Italy or if it is a uniquely Brescian experience. For example, Bologna also began with a smaller ZTL but then it soon expanded to be essentially within the old city wall, and the ZTL area has remained fairly constant for decades. Research on the growth of the ZTL in other medium to large Italian cities and how the current ZTL extent compares to the boundaries of the centro storico and /or old city walls, if any, would be interesting from the perspective of urban planning.

2 Statistically Significant Opinion Survey

It would be very informative to have a statistically significant survey of the residents and visitors to a ZTL. Questions about livability aspects that are difficult to quantify would be particularly useful, such as bothersome traffic fumes and noise and general attractiveness and livability. Questions on opinions of the disadvantages as well as advantages of living and visiting the ZTL would be useful as well. Any future survey

should clearly ask the nonresidents of the ZTL if they think the ambiance of streets have improved since the ZTL restrictions have been implemented and how. This one question was not asked as part of this research and therefore this perspective is missing from our analysis.

Moreover, a survey that could truly assess opinions of both the before and after ZTL conditions within a short timeframe would be extremely valuable. For example, if a new ZTL is about to be implemented or if a ZTL is about to be significantly expanded, a survey before the new ZTL is implemented could assess what residents think about traffic noise and fumes presently, and this would be followed by an after survey. Alternatively, a survey could ask a question along the lines of Question 8 from this research: “If you lived here before it became a ZTL, have the following gotten better or worse?” This would be extremely useful to assess what people who live in ZTL and are old enough to remember prior conditions, think about the benefits and impacts of the ZTL.

A statistically significant survey of a single city could corroborate some of the findings of this research e.g. that traffic fumes and noise are less bothersome and that most people, both residents and nonresidents, would choose to keep the ZTL. But in addition, simultaneous surveys of multiple cities would be useful as well. Surveys of cities of different sizes would help to determine if there are differences in the opinions of the respondents between small, medium and large cities or between cities with many tourists versus cities with few tourists. However when comparing different cities, the selected cities should be similar in both the hours that the ZTL is in effect and the types of exemptions.

The purpose of these surveys would be to:

- help planners in cities with ZTL in designing the extent and hours of future expansions of ZTLs and also in how to ameliorate some of the perceived disadvantages.
- help other cities decide whether and how to implement ZTL or similar strategies.

3. Objective Measures of ZTL Impacts

- More research is needed on objective measures of how the ZTL has improved livability. There are numerous approaches, including:
- Before-after case studies to measure the benefits of ZTL (or other auto-restricting strategies).

- Comparison of ZTL historic city center to non-ZTL historic city center.
- Determine characteristics of a successful ZTL
- Comparison of ZTL to Other Strategies such as pedestrian-only streets, low emission zones, 30 km/hr zones, pie/cell zones, opposing one-way streets, barricades/cul de sacking, and pricing strategies such as congestion charges, cordon pricing, or road pricing.

4. Develop Better Tools to Measure the Benefits of Auto-restricting Strategies

The purpose of this research would be to develop better ways to measure the effects of strategies that restrict and reduce traffic volumes. These methods could apply to ZTLs as well as other strategies such as zone and collar, opposing one-way streets, and street barricades or blockages such as cul de sacking.

Specific criteria that need better tools are:

- measuring improved human health from less traffic exhaust.
- measuring annoyance from less traffic fumes.
- measuring annoyance from less traffic noise.
- measuring annoyance from less visual incursion.
- measuring attractiveness with objective indicators.

Also there may be merit in including some economic indicators but they would need to be carefully selected to ensure that they do not measure only the benefits to one socio-economic group.

5. Related Planning Issues

A few other ideas might be worthy of further evaluation. These are:

- **Role of the city center in facilitating social interactions.** The opinion survey revealed that the city center is an important social center not only for city center residents but also for residents of the whole city and even the province (Figure 8.7). This aspect is worthy of further investigation. Future surveys could ascertain the role of the city center for different age groups such as teenagers, young adults, families, and elderly. Another variable would be to determine the specific types of social engagement that the city center affords to different groups of people and how ZTL facilitates the provision of these types of interactions.



Piazza Loggia, Brescia as a meeting place.

Photo: Michelle DeRobertis

- **Where and how the location of outdoor seating is provided.** A lesson from this research with respect to outdoor seating is to account for the width of both the street and sidewalk since the sidewalk width and the presence of a parking lane affect whether or not there is even space to put outdoor seating (Figure 8.8). Thus future surveys should control for both these variables. These variables may also affect other future indicators that measure attractiveness. Future study could also determine under what conditions some sort of barrier between the tables and the traffic lane is provided.
- **Role of on-street parked cars in a city scape.** The literature revealed a few studies whose premise was that parked cars on the street contribute to the degradation of livability due to their adverse visual impacts. It is recognized that some studies in the U.S. have adopted the opposite point of view and in fact specifically recommend on-street parking as a benefit to pedestrians since they provide a buffer between the sidewalk and the moving lane of traffic (Novak, 2013). This is directly contrary to the concept of parked cars as an eyesore that diminish the ambiance of the setting as held by Buchanan and City of Brescia. An area of further research is to investigate which settings benefit from on-street parking and which areas are degraded by the presence such parking. Factors to consider in such future research could be the degree to which it is an historical setting, the speed of adjacent traffic, land use frontage, amount and type of pedestrians, functional classification of the road, width of the road, and building-to-building width. This research should also differentiate between Italian/European contexts and American/Canadian contexts.



Traffic-limited zone in Moena, Trento, Italy.
Photo by Michelle DeRobertis

- **Role of parking in attracting people to the city center.** This research would investigate the role of peripheral parking garages in attracting nonresidents to the city center, particularly city centers with traffic restrictions. This could address both the economic vitality of the city center as well as its role as a social gathering spot i.e. taking into account both shoppers and people who come to the city center and don't necessarily spend money but their presence serves to enhance the sense of vitality in the center. Are peripheral parking garages equally important for both groups of people?
- Another aspect of parking would be to investigate how important on-street parking is to the economic vitality of the retail sector in the city center, or is parking in a garage at the periphery sufficient? Many complain of the distance in walking if one cannot park on-street (both in a city center and suburban context). But this begs two or more questions:
 - 1) What are the odds of an on-street parking space being available in front of one's destination? How often is one able to park on the same block let alone in front of one's destination? Indeed, how far does the average shopper walk when going to a business in those locations when there is on-street parking?
 - 2) How do these walking distances in city centers with traffic restrictions and peripheral parking garages compare to those walked at suburban shopping malls? One can rarely park in front of one's destination in this latter context either.

This parking research would also be useful to the USA context since most American shopkeepers would also insist that they need on-street parking in front of their store. But it is unknown what percentage of their sales actually come from someone who parked within 10 to

50 meters of their store. And even if they did, it would be useful to know how many times they circled the block in order to find said parking place.

- Correlate ZTL Research to Buchanan's Environmental Capacity Methodology. Appendix 1 of *Traffic in Towns* determined an upper limit of traffic volumes for residential streets, i.e. environmental capacity. The methodology was developed from the observations of 50 residential streets which were analyzed to determine the ADT at which the delay for pedestrians wishing to cross the street becomes unacceptable. From these observations, nine nomographs were developed depicting the environmental capacity, based on three variables: roadway width, "vulnerability" of the pedestrians (i.e. their age and abilities), and "protection" for pedestrians (street design and built environment aspects). It would be an interesting intellectual exercise to compare the ADT of ZTL streets to these nine nomographs of environmental capacity.

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By Lucy Sadler, Cosimo Chiffi, Bonnie Fenton

Introduction

Many European cities restrict access to an area, road, or portion of a road to all, or to specific vehicle categories of, motor vehicle traffic. This is done to improve issues such as safety, health, the environment or mobility (such as reducing congestion or air pollution, or increasing sustainable mobility). When such restrictions are implemented in urban and metropolitan areas, they are referred in general terms to **Urban Vehicle Access Regulations** or **UVARs**.

In describing UVARs, we mostly refer to a zonal application covering an area that includes several streets, an entire neighbourhood, municipality or urban area. They can be permanent, temporary or for certain set times of the day/week/year. Most UVARs are where access to the area is regulated or restricted when certain conditions are met (for example being a specified vehicle or trip type, or after the payment of a charge/fee). The UVAR area usually has road signs at entry/exit gates explaining the rules that apply to all the roads inside the area. There are also some kinds of UVARs where the uses of the road space can be specified (such as loading and unloading or parking), in others the driving style (i.e. speed or priority for pedestrians/cyclists) is changed, to give increased priority to sustainable mobility modes (such as cycling, walking, public transport).

Over 700 UVARs are currently in place in roughly 500 cities across Europe. These are shown in Figure 1, with more details available at www.urbanaccessregulations.eu¹, where further details on these UVARs can also be found.

1 Sadler 2022, www.urbanaccessregulations.eu

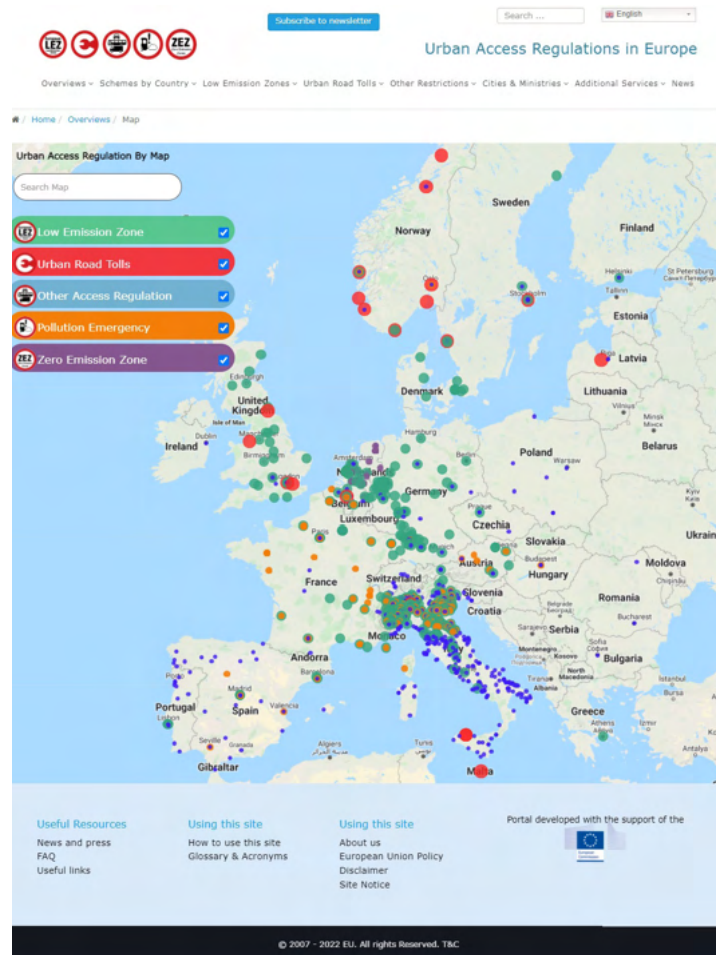


Figure 1: UVARs across Europe as shown on www.urbanaccessregulations.eu



Figure 2: Road space consumed by on-street parking in Freiburg, Germany; more space is given to parked cars than to either pedestrians or travelling vehicles (photo: Lucy Sadler)

Why UVARs?

There are many valid reasons for restricting motor vehicle access to urban areas. These include:

- **Reducing Pollution.** Pollution kills over seven million people each year² – especially the elderly, those with pre-existing health conditions, or even COVID-19 – and causes lung disorders such as asthma in children. It also costs our society 6.1% of global GDP³.
- **Reducing Urban Congestion.** Urban congestion causes delivery companies to send out additional vehicles (which also sit in, and add to, the congestion) and makes journeys and deliveries less reliable. In Europe congestion costs 1% of GDP⁴.
- **Improving the urban quality of life.** Converting road space for motor vehicles into recreational or commercial space results in a much-improved quality of life for residents. In the 1970s, the central squares of many European cities were filled with parked cars. Now much of that space is used for outdoor dining and recreation. The wide consensus is that areas so converted, with outside dining or shoppers as shown later in Ravensburg or Freiburg are far preferable to the town square filled with cars⁵, and are more profitable for businesses⁶.

² WHO 2022: <https://www.who.int/health-topics/air-pollution>

³ World Bank 2022: <https://www.worldbank.org/en/topic/pollution#1>

⁴ European Commission 2022: https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_22_559

⁵ Szarata et al, 2017 <https://www.sciencedirect.com/science/article/pii/S2352146517309158>

⁶ Clean Cities Campaign, 2021, <https://cleancitiescampaign.org/2021/12/09/why-fewer-polluting-cars-in-cities-are-good-news-for-local-shops-briefing>

- **Urban space is a valuable resource.** Space is limited in urban areas, particularly in cities, and due to this, the cost per square meter is usually high. At the same time, much space has been given free of cost (or for low cost) for parked and moving personal vehicles. This problem is worsening in many cities with an increase in the number and size of vehicles at the same time as an increase demand for housing in urban areas.
- **Improve fairness and equity.** People cycling, walking or using public transport travel more sustainably and consume much less urban space. Those who own no car (whether by choice or because they cannot afford one) are effectively subsidising the road space consumption and other costs caused by car drivers.
- **Because sometimes “carrots” simply aren’t enough** to achieve a city’s goals and the “stick” of an UVAR can be an effective tool to change behaviour. Even if there are good and affordable options available, many people still choose their individual motor vehicle – UVARs can help give a further ‘nudge’ in the more sustainable direction, and make driving less convenient or possible than the sustainable option. Cities cannot always afford to make public transport as cheap as each as the cost of petrol for the same trip - the cost of the vehicle is often not considered by the user – UVARs can help alter the price.

The need to reduce climate emissions to meet the goals of the Paris Agreement⁷ is an increasing driver of UVARs. While national policies can often improve the general conditions for lower emitting vehicles or fewer individual vehicles through taxes and other incentives, UVARs can help facilitate faster change in urban areas.

⁷ The Paris Agreement is a legally binding international treaty on climate change adopted by 196 Parties in Paris in 2015. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. UNFCCC 2015 <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

There are five main types of UVARs:

1. Pedestrian zone: pedestrians (and perhaps cyclists) only
2. Limited traffic zone: only certain vehicles
3. Low / zero emission zone: access according to emissions
4. Congestion charge zone: entry upon payment
5. Spatial Interventions

These are described in more detail below.

1. Pedestrian Zone

A **pedestrian zone** or **pedestrian area** is typically a square, a road or a group of contiguous roads where no motor vehicles are allowed and the whole space is reserved for pedestrians. Bicycles are sometimes also allowed; their status may be equal to pedestrians or they may be ‘tolerated’, meaning that cyclists are allowed access, but must yield to pedestrians, who have priority.



Figure 3: Examples of pedestrian zones: Centre of Ravensburg (T), Freiburg shopping centre (B), Germany (photos: Lucy Sadler)

Sometimes – but only if signposted as such – pedestrian areas might admit a very limited number of vehicle categories such as people with reduced mobility (with proof, such as a blue badge), residents who need to reach their garage, delivery vehicles (usually in a short, off-peak time window) or public transport. Parking is never allowed and permitted vehicles must travel at walking speed. Emergency vehicles may of course access pedestrian areas at any time without the need for a permit.

The overall objectives of a pedestrian zone are to make the area more liveable and safer by prioritising walking social interaction, recreation or retail, but also to protect sensitive sites such as monuments and landscapes.

Pedestrian zones quite often cover small and fragmented portions of a city, although there are examples of long corridors connecting squares as in [Varna](#)⁸, Bulgaria (see **Figure 4**) or neighbourhoods as in [Paris](#)⁹, and fully pedestrianised city cores as in [Ljubljana](#)¹⁰, Slovenia and [Pontevedra](#)¹¹, Spain. However, more and more cities are implementing pedestrian zones over large parts of the centre to ensure they remain attractive to visitors.

Pedestrian areas usually use changes to the road layout to make it clear that cars are not allowed. These include cobblestones, physical changes to the roadway, roadblocks or street furniture to transform road space into public space. Frequently, simply the presence of monuments in squares reinforces the message that motor traffic is not allowed and improves the ambience of the area.

⁸ https://visit.varna.bg/en/peshehodna_zona.html

⁹ Paris has a system of 27 pedestrian zones active on Sundays, public holidays or during summer plus some permanent corridors along the river Seine – the scheme is called Paris respire (Paris breathes). <https://www.paris.fr/pages/paris-respire-2122>

¹⁰ <https://www.ljubljana.si/en/ljubljana-for-you/transport-in-ljubljana/transport-around-the-pedestrian-zone-of-the-old-town/>

¹¹ <https://urbanaccessregulations.eu/countries-mainmenu-147/spain/pontevedra-ar>



Figure 4: The city of Varna, Bulgaria has a 1.5 km pedestrian corridor linking the entrance of its Sea Garden, the church of St Nicholas, the theatre and the clock tower. Photo: TRT, <http://www.trt.it>

2. Limited Traffic Zone (LTZ)

Similar to the objectives of a pedestrian zone (liveability, road safety, cultural and natural heritage protection, climate protection) as well as to reduce congestion, limited traffic zones (LTZ) limit access to those motorised trips that are considered necessary for the functioning and daily life of the area. Residents, garage owners/tenants, caregivers, people with reduced mobility, freight carriers, maintenance and servicing companies are commonly authorised and categorised as pre-registered users. Other categories of vehicles that are clearly marked, such as public transport, taxis and emergency/police vehicles, have automatic access.

Usually covering wider areas such as historic centres, LTZs always work with permits. These authorisations must be requested and approved in advance of access. Some permits have a longer validity (e.g., for the categories indicated above) while others may allow occasional access from other user types such as hotel guests or those visiting residents. An LTZ might (in addition or exclusively) restrict access to specific vehicle categories. Quite common are restrictions for lorries and coaches or for particular vehicle characteristics, such as type, weight, size or pollution levels (noise, air quality). The EU ReVeAL project's [UVAR Guidance: Exemptions and Permits](#)¹² gives more details on this topic.

12 <https://urbanaccessregulations.eu/news-and-press/1541-reveal-exemptions-permits-guidance-note>

Parking is often allowed, and time windows are generally used to regulate freight transport and loading/unloading operations.

The overall principle is to reduce motor vehicle traffic either to the essential level, or a significantly reduced level, depending on the number and/or categories of permits granted. The policy objective is to prioritise walking, cycling and public transport.

LTZs are widespread in Italy. The first European Limited Traffic Zone was introduced in [Siena](#)¹³ in 1965 and there are now over 350 camera-controlled LTZs in Italy, but they also exist in other European countries (see Figure 1).

The permanent car-free area of the city centre of Ghent, Belgium is made up of four LTZs, several pedestrianised streets and a [circulation plan](#)¹⁴ for the surrounding area, where through traffic is prevented by road layout, one-way streets or roadblocks.

3. Low Emission Zone (LEZ)

A focus on pollution levels and meeting the EU health-based air quality objectives has led in recent years to the introduction of many low emission zones (LEZ), also called environmental zones in some countries (e.g., Germany, the Netherlands, Sweden, Denmark).

LEZs restrict access to those vehicle categories that meet set minimum air quality emissions standards, usually following the European vehicle emission standards for exhaust emissions, often called “Euro standards” (see e.g., [Dieselnet](#)¹⁵).

Different from an LTZ, the primary objective of a low emission zone is to reduce air pollution, rather than reduce vehicular traffic. Pure LEZs rarely reduce traffic levels; their immediate effect is to accelerate the renewal of the motor vehicles within the area. However, where there is a very strict standard, for example the [London Ultra LEZ](#)¹⁶ with a Euro 6 diesel standard (vehicles post 2013-15) introduced in 2019, has led to motor traffic reduction. The guiding principle is to discriminate by air pollution contribution rather than by transport mode.

13 <https://urbanaccessregulations.eu/countries-mainmenu-147/italy-main-menu-81/toscana-tuscany/siena-ar>

14 A circulation plan is a combines road blocks, one-way streets, cycle or public transport streets to ensure that through traffic is not possible, and so traffic travels instead on more appropriate roads, such as the ring road. It is a type of spatial intervention (discussed later).

15 <https://dieselnet.com/standards/#eu>

16 <https://tfl.gov.uk/modes/driving/ultra-low-emission-zone>

This generally leads to vehicle owners exchanging their older, polluting vehicles for newer, less polluting ones, or [retrofitting with a diesel particulate filter](#)¹⁷ to meet the emissions standard.

LEZs are usually phased in, with standards becoming increasingly strict over time. The later standards are likely to have more impact but may not be feasible earlier. Announcing all phases once the LEZ is confirmed, through extensive communication and outreach activities both inside the city and outside, allows owners and vehicle operators to be compliant once the scheme starts (e.g. second hand compliant vehicle, retrofit, new vehicle or change to public transport).

Some LEZs (e.g., [London](#)¹⁸) use a charging mechanism whereby vehicles that meet the standard can travel free of charge and those that do not are subject to a high fee (the fee being at a level similar to a penalty fine would be for entering an area where they would be banned). This can also be referred to as a pollution charge, or ‘charge-as-a-ban’ (see the next section).

When only zero emission vehicles are allowed, the LEZ becomes a **zero emission zone (ZEV)**; usually implemented to reduce climate change emissions, as well as air pollution. There are different ways to achieve a ZEV, and like LEZs they are often phased in. Implementation can be done by making an existing LEZ stricter or by adding a zero emission vehicle (ZEV) requirement to an existing limited traffic zone or pedestrian area delivery access. A good practice ZEV will also aim to reduce traffic (not “just” emissions) – by combining either with an LTZ or with changes in the road layout, pedestrianisation or bus lanes to reallocate road space to other modes and recreation to improve the area as well as have a larger impact on climate emissions.

17 <https://urbanaccessregulations.eu/low-emission-zones-main/how-to-comply-mainmenu-148/diesel-particulate-filter-dpf-selective-catalytic-reduction-scr>

18 <https://tfl.gov.uk/modes/driving/>

4. Congestion Charge Zone

Motor vehicle traffic might not be restricted by vehicle/user category or emission standard but by requiring payment to enter.

Again, a combination of measures is possible to achieve both pollution and congestion reduction. A pollution charge zone is an UVAR scheme where vehicles that do not meet a set emission standard must pay a significant fee whereas compliant vehicles are free (e.g., London’s LEZs, see the text in the LEZ section), in a congestion charge zone, all motor vehicles are charged. Sometimes there are differential charges for different vehicle types, for example higher charges for lorries than for cars or for more polluting vs less polluting vehicles (e.g., [Oslo](#)¹⁹).

The Milan Ecopass pollution charging scheme (2008-2011) both accelerated renewal of vehicles in the area and reduced congestion at the start but, as the standard was not tightened, it progressively lost its congestion reducing effect as more and more vehicles were allowed free access to the zone. It was therefore converted into a congestion charge zone (called “Area C”), where all vehicles entering must pay a fee as well as being at least Euro 4 emissions standard²⁰. This incorporates an LEZ character into the main congestion charging scheme. Other cities with congestion charges include [London](#)²¹, [Stockholm](#)²² and [Valetta](#)²³.

Charging schemes are also known as urban road tolls or road charging. Enforcement is usually with cameras and Automatic Number Plate Recognition (ANPR, to check whether a payment has been made) or transponders (devices using perhaps Radio-frequency identification (RFID) to enable automatic payment). As with other UVARs, there are sometimes exemptions or discounts for some vehicle categories.

19 <https://urbanaccessregulations.eu/countries-mainmenu-147/norway-mainmenu-197/oslo-charging-scheme>

20 Emissions standards, see e.g., Dieselnets for more information

21 <https://tfl.gov.uk/modes/driving/congestion-charge?intcmp=2053>

22 <https://urbanaccessregulations.eu/countries-mainmenu-147/sweden-mainmenu-248/stockholm-charging-scheme>

23 <https://urbanaccessregulations.eu/countries-mainmenu-147/malta/valetta-charging-scheme>

5. Spatial Interventions

In all UVARs discussed so far, vehicle access regulations or charges are applied: access is regulated through legal regulations. However, there are also other types of schemes that can be considered UVARs and this is where motor traffic is regulated through changes in the spatial road layout to prioritise vulnerable road users and/or to reduce speed. The ReVeAL project refers to these as Spatial Interventions – and these also include pedestrian zones discussed above.

Spatial interventions may use combinations of aspects such as pedestrian areas, road closures, different road surfaces, traffic calming, public transport or cycling lanes, one-way streets, non-motor vehicle uses of parking spaces, changed road layouts, applied to a single square, road or a portion of the road to achieve a changed atmosphere to the street(s). The combination of these interventions results in an area with fewer vehicles, no vehicles, or ‘shared space’ - where motor vehicles share the road space with an equal priority to other road users such as pedestrians, cyclists or public transport, sometimes also called pedestrian priority zones.

Some typical examples include **residential areas**, **home zones** **encounter zones** and **superblocks**. For residential areas, there is a specific definition, set out in the 1968 UN Convention on Road Traffic²⁴ that regulates traffic signs internationally – although the zones are often now used outside residential areas. The definition and road sign are quoted below:

- (a) Pedestrians may make use of the road over its entire width. Games are allowed.
- (b) Drivers shall proceed at very low speed, as specified by national legislation and which in no case should exceed 20 km (12 miles) per hour.
- (c) Drivers shall not put pedestrians at risks nor behave in an obstructive manner. If necessary, they shall stop.
- (d) Pedestrian shall not impede vehicular traffic unnecessarily.

24 UN 1968, article. 27 of the 1968 UN Convention on Road Traffic https://unece.org/fileadmin/DAM/trans/conventn/Conv_road_traffic_EN.pdf European Appendix <https://treaties.un.org/doc/Publication/UNTS/Volume%201731/volume-1731-A-17847-English.pdf>

- (e) Parking is forbidden, except where allowed by parking signs.
- (f) At intersection, road users emerging from a residential area shall give way to other road users, except when otherwise provided in domestic legislation.



Figure 5: A German residential area road sign (*Spielstraße*), although these are used more widely than just in residential areas (photo: Lucy Sadler)

The shared character of the road is the most relevant element, but typically the physical configuration of the area also reinforces such coexistence. Vehicle users must adapt their driving/walking style while going in/out, moving and use such areas. Traffic calming interventions and opposing one-way streets/modal filters are used to prevent through traffic. The success of the Dutch *woonerf*²⁵ concept (*woon* = residential, *erf* = yard) is due to a combination of a strict law and road design elements. In France, Switzerland, Austria and Belgium, these are named **encounter zones** (*zone de rencontre*, *Begegnungszone*). These areas can be referred as **pedestrian priority zones**. The COVID-19 pandemic has also promoted this approach, for both temporary and permanent schemes, both in Europe and elsewhere.

25 <https://www.humankind.city/post/woonerf-inclusive-and-livable-dutch-street>



Figure 6: A newly implemented shared space in Bristol, UK
(Photo: Lucy Sadler)

A 30 km/h limit is usual in such zones, and similarly, but with less emphasis on road use and design, **30 km/h (20 mph) zones** can also support these aims, particularly where the legislation does not allow other UVAR types. Of course, traffic calming elements remain fundamental and should be present in addition to the prescribed speed limit signs for drivers.

Other spatial interventions combinations do not result in shared space, and are also more easily used in larger areas, and are particularly good at removing through motor vehicle traffic and increasing cycling and walking, as well as public transport use. **Superblocks** (*Superillas/Supermanzanas*) are a type of measure pioneered in Spain that use traffic filters – such as road blocks, closed streets, one-way streets, tactical pedestrian sectors – to remove traffic rather than banning it in neighbourhood areas²⁶ and give more recreational space. **Circulation plans** use similar mechanisms but on a larger scale, as used in a significant part of central Gent²⁷.

It should be noted that these types of UVARs are not always defined as UVARs and can be implemented on a smaller scale than many regulatory UVARs.

Parking schemes and UVAR

The question of whether a parking scheme is an UVAR comes up often and the answer varies depending on the definition of UVAR you choose.

26 Barcelona 2022 <https://www.barcelona.de/en/barcelona-superblocks.html>, Vox 2016 https://www.youtube.com/watch?v=ZORzsubQA_M, Nieuwenhuijsen 2021 <https://www.youtube.com/watch?v=VUHSXmUoUrU>

27 <https://stad.gent/en/mobility-ghent/circulation-plan>

The regulation of parking is an essential component of restricting vehicle access; if there is no parking, there will (eventually) be much less motor traffic travelling into the area. So, in a broader sense, parking can be considered an UVAR (and is considered such in the EU [UVARBox project](#)²⁸ to digitise UVARs to support their use in navigation tools).

However, more usually in discussions of UVAR strategies or policies, parking is often included as an essential supporting measure that may be crucial for the functioning of the scheme, not considered as an UVAR in itself. This is largely because parking is a huge (and well-developed) field with its own guidance and expertise. Including it ‘under’ UVARs would not do it justice.

If motor vehicle access is restricted, parking spaces in the UVAR area can be re-purposed for other uses, including recreation or outdoor dining. Conversely, more parking spaces may be required at the edge of the UVAR area. Within the UVAR area, there are several ways to regulate parking. It could be 1) allowed/not allowed, 2) allowed only in signed on-street spots, 3) opened to all or reserved to some user categories (e.g., residents, people with disabilities, loading/unloading), 4) allowed in specific time windows or 5) paid/free. UVAR-related permits, exemptions and charges could also embed parking options or fees.

UVARs often regulate kerbside management, and so determining how this roadscape may be used. Options to regulate includes permits for loading/unloading of goods (or luggage), loading-only bays or lanes or passenger pick-up/drop-off activities. It often indicates time windows to limit the time available for such operations.

Equity when implementing an UVAR

When implementing an UVAR, it is important that access to *people, goods and services* is enabled, even if this may no longer be undertaken with the user’s primary choice of transport mode. There may be some categories of trip or vehicle users that may find the currently available alternatives particularly difficult. There are a number of ways to look to resolve this, using what

28 UNVARBox 2022, <https://uvarbox.eu/>

ReVeAL calls ‘complimentary measures’. These might include

- Supportive mobility options. It may be that additional public transport, cycling or walking provision is needed or would help the UVAR to be a success
- Financial incentives may help especially those on low incomes perhaps scrap their older vehicle or retrofit the vehicle. Financial incentives may be grants, differential fees/fines or public transport vouchers.
- Exemptions, can be an important part of an UVAR, to minimise potential unintended consequences – especially for the more vulnerable in society or to enable it to be more politically acceptable. They need to be carefully used, as many exemptions mean the UVAR has little impact

Enforcement and Compliance

Enforcement is a key issue; a scheme that is not enforced, or has too many exemptions, becomes a scheme on paper only. Cameras with Automatic Number Plate Recognition (ANPR), manual with enforcement officers and police, or with movable or permanent physical barriers such as bollards. A high level of compliance is the goal as opposed to making money on fines or fees. The enforcement choice is dependent on many factors, which include the size of the area, type of UVAR, level of compliance that can be expected, financial cost to both implement and operate, legal options and the experience and culture of different enforcement methods.

Conclusions

Urban Vehicle Access regulations have been found in Europe to be a useful tool to make cities more attractive and sustainable, and reduce problems such as pollution, climate emissions or congestion, as outlined in this paper. While developing such schemes needs to be well considered and designed, the result can be worth it. Removing motor traffic space is often answered by predictions of chaos by some, research suggests that “traffic evaporation” is more likely to happen, in addition to the increased recreational space that is enjoyed by many – also in Asia and the USA²⁹. We have seen during the Covid-19 epidemic that many measures, that

29 Hidalgo 2021 <https://thecityfix.com/blog/traffic-evaporation-what-really-happens-when-road-space-is-reallocated-from-cars/>

we describe in this article as spatial interventions, have been rapidly implemented around the world to enable more recreational space in cities at the expense of motor lane traffic, giving a realisation of the benefits they can bring – both during the pandemic and in the longer term towards a more attractive sustainable world³⁰.

The different types of UVAR can also complement each other – the space that is freed by the traffic reduction by an LTZ or a road charging scheme can be used for spatial interventions to make the area more attractive. Schemes increasingly combine the different types of UVAR – for example an LTZ having emissions criteria to be permitted access, permits or exemptions having (differential) fees attached to them, or the level of the road toll depending on the emissions level.

UVARs can be a useful tool for an urban traffic planner, if carefully implemented. The EU ReVeAL project is producing tools to help support the implementation of UVARs, some of which are already available from <https://civitas-reveal.eu/tools>, and all will be available by the end of November 2022. An article giving more information on the ReVeAL tools that are produced will be submitted for the November edition of this magazine.

UVAR Resources

There are a number of resources on UVARs available to support transport professionals considering them. They include:

- **ReVeAL UVAR tools:** The EU project ReVeAL is developing tools to support cities implementing UVARs. These include factsheets about a wide range of UVAR building blocks, a set of guidance documents on various aspects of UVAR and a decision support tool to help cities select appropriate UVAR building blocks and understand the aspects to consider during the implementation process. Some are already available; the full toolkit will be available in November 2022: CIVITAS ReVeAL - Regulating Vehicle Access for Improved Liveability [civitas: https://civitas-reveal.eu/tools/](https://civitas-reveal.eu/tools/). The CLARS website: <https://urbanaccessregulations.eu/> gives information on European UVARs

30 Laker 2020 <https://www.theguardian.com/world/2020/apr/11/world-cities-turn-their-streets-over-to-walkers-and-cyclists>, Combs 2021 <https://reader.elsevier.com/reader/sd/pii/S2590198221000294>

- Free CIVITAS UVAR online training program “Urban Vehicle Access Regulations (UVARs) – principles and practices”: Michelle article based on UVAR Exchange Final.docx
- The text of this article is based on text originally produced for the UVARExchange project <https://uvarbox.eu/uvar-exchange/>
- The UVARBox project, also mentioned in this article, is providing a language and tools to digitise UVAR rules for use in other digital tools, including navigation systems: <https://uvarbox.eu/>

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31 UVARExchange 2022, <https://uvarbox.eu/uvar-exchange/>



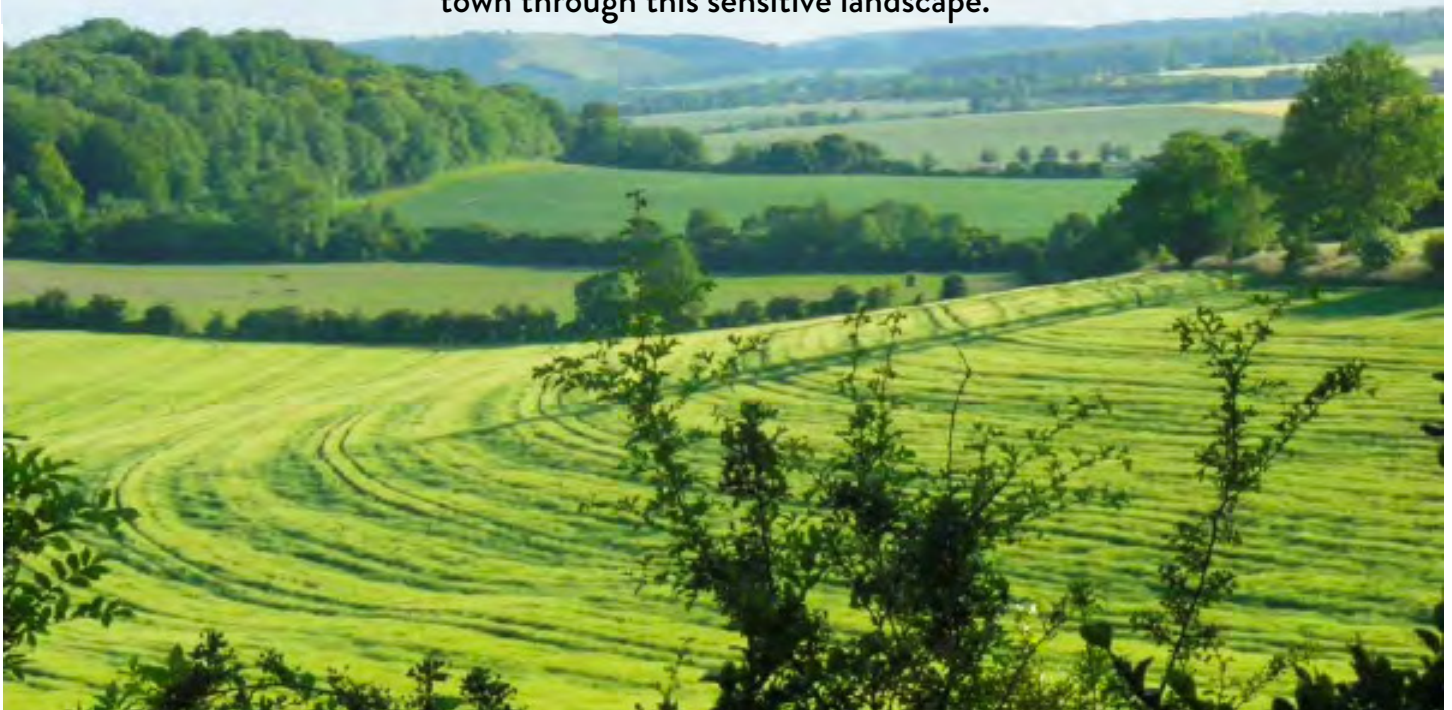
CURSE OF THE ZOMBIE ROADS

THE STORY CONTINUES ...

By Patrick Kinnersly

Is this a good place to build a highway bypass?

This is the Wellhead Valley, between the town of Westbury and the western escarpment of Salisbury Plain. The Wiltshire County Council wanted to build an eastern bypass of the town through this sensitive landscape.



(Photo credit: Jenny Raggett, June 2009)

Editor: [The Curse of the Zombie Roads](#) by Patrick Kinnersly was published in May 2014 (WTPP 20.2-3). The article below is an update from the author on the status of the Westbury bypass as well as descriptions of other misguided road schemes that will not die despite serious flaws. The sidebar highlights some of the larger policy issues that were revealed in the legal battle to fight the Westbury bypass.

The Return of the Westbury Bypass

The Curse of the Zombie Roads described the saga of the Westbury bypass from 1990 to 2014, which is summarized in the timeline in Table 1. After a long planning inquiry⁽¹⁾, in

2008 the scheme was axed by the government because the transport case was too weak to justify the damage it would have done to this tranquil landscape⁽²⁾. Opponents of the bypass had also achieved a rare

victory for public transport that had been “foreseen but not achieved by John Prescott in the heady days of 1997: money for a destructive road scheme had been switched to a rail improvement that had been awaiting



financing for years but had not received the necessary prioritisation in a regional funding process dominated by shire counties”⁽³⁾.

After seeming to accept that the scheme had been killed off, Wiltshire County’s new unitary council immediately set about reviving it, claiming that the safeguarded route survived ‘refusal of planning permission’ and so could live on as a ‘proposal’ in its new local plan for the period to 2025. When a planning inspector examined its draft plan in 2013, he accepted campaigners’ arguments and persuaded a reluctant council to delete the route.

But the council has never given up on building this destructive and discredited road. The A350 Westbury bypass remains its top priority scheme, key to its plan for a fast highway from the M4 motorway to the port of Poole on the Dorset coast.

The Westbury bypass is one of hundreds of ‘Zombie roads’ being brought back to life as Britain defies the climate emergency to embark on yet another wave of road construction, this one backed by a budget of £28bn.

Wiltshire Council is confident that it will get its share of that money. It has been lobbying hard for it ever since the Westbury bypass was cancelled. Working with three neighbouring councils - Dorset, BCP (Bournemouth, Christchurch and Poole), Bath and NE Somerset – it produced a glossy ‘prospectus’ and an ‘economic study’ in 2017 making the case for ‘north-south connectivity’. Their lobbying paid off. In March 2020 the

government announced a new study of connections between the M4 and the South Coast. Two months later, Wiltshire Council set up a special team of officers to work on North-South corridor schemes, announcing that it would revive the Westbury bypass project. It hoped to submit an outline business case in 2024/2025.

Funding Uncertainty Again

But as government budgets tighten, funding may not be as certain as Wiltshire Council and its fellow Tory shires expected. The £12bn Local Growth Fund that subsidised local authority road schemes through Local Enterprise Partnerships (LEP) had already gone when Treasury officials admitted in December that ‘the commitment to spend £3.5bn for local road upgrades has been dropped’⁽⁴⁾. Only £1.3bn would be available for Major Road Network (MRN) and ‘local major’ projects.

In January of this year, the UK Department for Transport (DfT) wrote to councils telling them to review their roads programmes in the light of revised objectives and carbon costs and to reply by the first of March.

It was made clear that councils should not count on funding for roads that would increase carbon emissions or wouldn’t support active travel and public transport. Wiltshire offered to remove only one scheme, a junction redesign in Salisbury. No other road project was withdrawn in the ‘Western Gateway’ area⁽⁵⁾.

Did all the councils believe that all the projects they’d planned on the Major Road Network (MRN)

Policy implications and false assumptions behind decisions supporting road expansions

The following are some of the misguided policies that led to the resurgence of the Westbury bypass and other road schemes in England. For more background, see indicated pages from WTPP Issue 20.2-3.

- Current policies are based on the assumption that better transport means better roads; everything else (rail, bus, walk, cycling) is “alternative transport”. (WTPP Issue 20.2-3, p. 65)
- There is an ongoing disparity in funding between road building and public transport and active travel. (WTPP Issue 20.2-3, pp. 66, 72)
- Current policies fail to consider how investment in rail could achieve the same economic and transport goals. (WTPP Issue 20.2-3, p. 66)
- Current policies fail to consider the severe environmental damage from new roads: “The A46 section of the route is indeed unsuited to the role of trunk road. Severe environmental obstacles prevent a direct link between the A36 and 46 across the floodplain of the Avon east of Bath.” (WTPP Issue 20.2-3, pp. 69-70)
- Funding programs fail to accommodate operating costs of public transport: “Buses might seem like an easier option, but neither the council nor the developers will want to underwrite revenue costs stretching far into the future. There is no formula to demonstrate that such investments would ‘pay for themselves’ by cutting carbon emissions, removing traffic from congested roads or increasing social cohesion.” (WTPP Issue 20.2-3, p. 70)



would actually reduce carbon emissions, promote public transport and enhance biodiversity—such touching faith in the miraculous power of the zombie roads!—or that schemes would be nodded through in the old-fashioned way because the government itself was so clearly committed to the business-as-usual of economic growth on the strategic road network (SRN)?

Stonehenge Tunnel: Example of Faulty Cost: Benefit Analysis

No road is more ‘miraculous’ than the government’s own project to sink the A303 trunk road into a two-mile (3.3km) dual-carriageway tunnel under Stonehenge at a cost expected to reach £2bn. It seems that nothing can stop this road. The UN’s cultural heritage committee told the UK that the project was so damaging that it would endanger its status as a world heritage site (WHS). Notwithstanding, National Highways⁽⁶⁾ insisted the tunnel would actually enhance the ‘outstanding universal value’ (OUV) of Stonehenge. After a

lengthy Examination in Public, the Examining Authority concluded that the OUV would be harmed.

The High Court told the government that it acted unlawfully in granting planning permission for the project. The secretary of state for transport, Grant Shapps, decided to ‘re-determine’ the decision; he ordered another public consultation⁽⁷⁾ that ended on 4 April, 2022. The fact that the cost of the project – still listed at £1.7bn - has remained in the Treasury’s national construction ‘pipeline’ may suggest that re-determination is not expected to mean rejection.

The ‘miraculous’ properties of the Stonehenge scheme also granted it a special formula to satisfy the requirement to show ‘value for money’. The DfT’s established method of cost/benefit analysis (COBA) showed that the project would have a negative benefit-cost ratio (BCR); the cost of the long tunnel would outweigh the ‘benefits’ that would supposedly accrue through savings in the journey times

- Current policies favor serving new development with roads not trains

“A local authority that wants to plan something more suited to the needs of the 21st century will find it difficult to achieve. For a start, councils no longer have enough skilled staff to do all of the detailed planning. The alternative is to reach for the ‘plug-and-play’ solution: in effect you just subcontract most planning of housing, employment and transport to large developers, on condition that the local development plan will permit them to open up the large tracts of virgin farmland they put into their land banks years earlier.” It is almost inevitable that this approach to development produces large car-dependent estates remote from town centres. Small clusters of houses close to town centres take more design work and it is difficult to accumulate the housing numbers required, especially when sites are on former industrial land. The same applies to small enclaves in villages where a council might want to meet a desperate need for affordable homes for rural workers.

Supposing the council wants to do the right thing by locating new housing and employment allocations around new or improved public transport services? This classic formula for sustainable development is almost impossible for a local authority to achieve. Serving new development with new roads is a doddle by comparison. Councils cannot just put in a new railway station. It takes years of negotiation with Network Rail and train operators. Passenger numbers have to be assessed in commercial terms. Rail franchises have to be revised, extra rolling stock hired (none is likely to be available). There is no national plan for increasing



Stonehenge photo by James Jang (Pixabay stonehenge-uk-327849)



of all the drivers using it over the lifetime of the road.

The roadbuilders circumvented the negative BCR by devising a survey about how people would value moving the road further away from the Stones. They summed this all up and called it a ‘Contingency Evaluation’. Miraculously, this added more than a billion pounds to the ‘benefits’ side of the equation. Phil Goodwin, Emeritus Professor of transport policy at University College London, demolished this argument in his evidence to the Examination in Public (EiP) of the scheme. He argued that the Contingency Evaluation was predicated on the assumption that there is a cultural benefit to the scheme – the survey was asking people to value such a benefit. But the conclusion of the EiP was that the overall Outstanding Universal Value of the WHS was compromised by the scheme, as the UN’s cultural watchdog ICOMOS⁽⁸⁾ had concluded. Prof Goodwin argues that the survey should be done again with a question that reflects these conclusions, e.g.: ‘Given that this scheme is known to harm the OUV of the WHS, how would you value its cultural benefit?’ In the end, the EiP inspectors were not persuaded that a Contingency Evaluation had the magical power to turn negative to positive.

Nevertheless, National Highways claimed its scheme offered other ‘unquantified benefits’, e.g. for residents in nearby communities and for biodiversity. At time of writing, a decision by the Secretary of State is still awaited.

Stonehenge Tunnel: Lack of Analysis of Carbon Emissions

No contingency evaluation can make the Stonehenge tunnel assist us towards Net Zero. In her response to the ‘re-determination’ public consultation, Margaret Willmot, member of the A36/ A350 Corridor Alliance (ACA) since its formation in 1993 and a veteran of the campaign against the Salisbury bypass, examined National Highways’ environmental statement and found it struggling to explain away the road’s contribution to the climate crisis:

‘The document relating to Bullet Point Three – Carbon – goes to some length to find quotes from National Highways’ ‘Net Zero Highways’ and HM Government ‘Net Zero Strategy: Build Back Better’ which imply that business can continue as usual and that decarbonisation can rely on moving the vehicle fleet to alternative fuels, primarily electrification.

‘This confidence is not shared by independent assessors of the situation. The Climate Change Committee, an independent statutory body established under the Climate Change Act 2008, reported on the changes to policy which would be needed, particularly during the 2020s, to meet Net Zero targets. Their report indicated that, to meet the targets which were mandated, it was expected that 6% of baseline car demand could be avoided or switched to other modes by 2030, rising to 17% by 2050, and also that factors including improved

the capacity of the local rail network. Indeed the government has ruled out major investment in improving local rail services because it would only add to delays on the system – a constraint curiously absent from plans for upgrading and repairing the road network.”

(WTPP Issue 20.2-3, p. 70)

- Cost/ benefit analyses are faulty. WTPP Issue 20.2-3, pp. 69, 71, 72 and also in this article.
- New Road proposals ignore the true impact on carbon emissions. This is discussed in this article.
- Hidden motives behind road proposals. WTPP Issue 20.2-3, pp. 71-72 and also in the article below. Specifically, in the case of the Westbury bypass, landlocked Wiltshire sees the bypass as a vital piece of its fast route to the English Channel ports of Poole and Southampton (and its expansion) despite severe adverse environmental impacts.

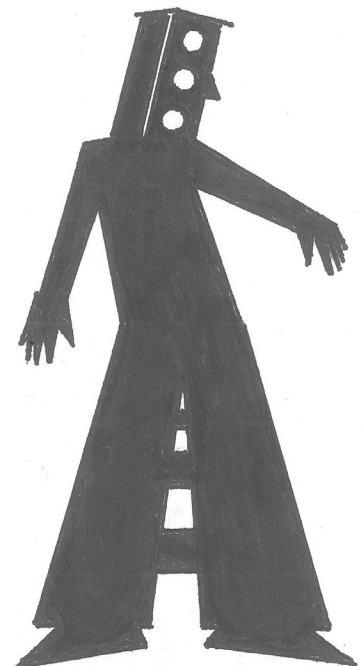


Illustration by Mark M. DeRobertis



logistics would mean that demand reductions for heavy goods vehicles (HGVs) would increase gradually to 10% for rigid HGVs and 11% for articulated HGVs by 2030, remaining at these levels thereafter⁽⁹⁾.

‘Against this background it is unacceptable to allow a scheme which not only produces considerable greenhouse gases during the construction phase but which also produces more road user emissions in operation compared to the ‘Do Minimum’ option⁽¹⁰⁾.

Chris Gillham, convenor of A36/ A350 Corridor Alliance (ACA), in his response to the public consultation on the proposed A27 Arundel bypass (see ‘other corridors’, later) says that National Highways is part of ‘the New Climate Change Denial’ which can be summarised as: ‘We don’t have to do anything because we are going to decarbonise all these trips we are generating’. Dr. Gillham continues that DfT further skirts the issue of carbon analysis by their assertion that the ‘DfT decarbonisation strategy is a plan, when all it really is the setting of targets for future government to meet.’ Dr Gillham points out that while DfT and National Highways rely on ‘the accumulation of lots of little things that is at the heart of all the Webtag economic nonsense, it is cumulative carbon that matters ... cumulative carbon is the sum of real things and is really important, whilst Webtag’s cost-benefit analysis (COBA) is the accumulation of imaginary things into an imaginary economic benefit. **The DfT has never demonstrated an overall economic benefit from road building.**’

Local authorities are also avoiding the challenge of carbon accounting. The Campaign to Protect Rural England (CPRE) has found that of the 24 local authority local plans adopted outside Greater London since the government’s net-zero target was set, only one has set out a quantified strategy for how to actually reduce their emissions – (CPRE campaign update, April 2022).

Other Indelible Roads

As we have seen in the case of the Westbury bypass, even removing a road from the map does not actually kill it off. Lobbying by a consortium of local authorities, backed by Members of Parliament, **Local Enterprise Partnerships (LEPs⁽¹¹⁾** and now *Sub-national transport bodies* can bring zombie roads back to life. The *M4 to Dorset Coast Connectivity Study* is a new venture for the blacktop wizards - to search for zombie roads that can be stitched together into a zombie corridor. The White Horse Alliance (WHA)⁽¹²⁾ responded to the public consultation

on the study by pointing out that the work had all been done before:

‘Your prospectus says you will be examining “interventions” that might result from your present study.

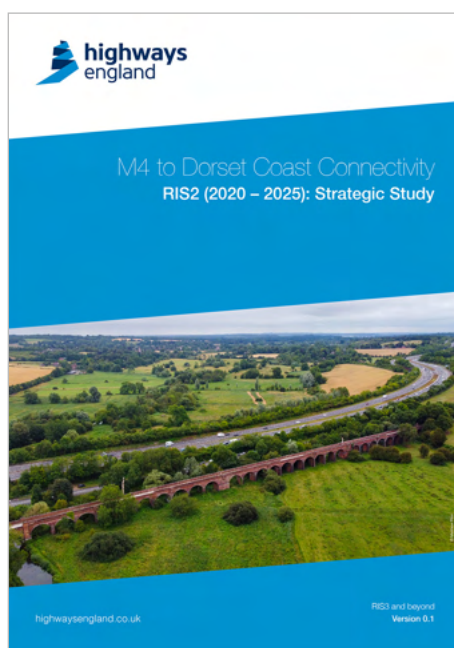
‘Every major intervention I can think of has been examined and rejected at some point over the last three decades. Many millions have been spent on planning and devising and assessing roads that turned out to be duds and had to be withdrawn or rejected.’

We referred them to previous studies covering the same ‘need’ for faster roads across the sub-region and listed three decades’ worth of schemes along the A350 and A36-A46 corridors.

Road Proposals Ignore Local Needs

The M27-A27 road along the south coast between Southampton and Hastings is another example of National Highways willfully creating what it will now call a ‘pipeline’ of schemes for delivery far into the sooty twilight of the carbon age. Heading east from Southampton, National Highways will create dual-carriageway bypasses at Arundel, Chichester and Worthing. The corridor builders have already ploughed through downland north of Brighton and cut through the southern edge of Lewes. The landscape to the north of the South Downs national park awaits further violation as ‘substandard’ roads are made into ‘world class’ highways.

Chris Gillham described this process in his objection to the Arundel bypass in West Sussex:





'We see staring us in the face a set of coastal towns with no obvious long corridor transport (what road builders always portentously refer to as 'strategic') need, but an awful lot of local transport needs and those needs are supposedly served by a decayed rattler of a train service, expensive and unreliable to the potential user, and rarer and increasingly expensive bus services.

'Do we solve the transport problem sustainably? Do we serve the people who live in the south coast communities? No, we get the preposterous creation of a long-distance 'strategic' corridor, by stringing together a paternoster of bypasses at vast expense. What do we do it for?'

'We know that National Highways has an eye on generating enough traffic to cause other communities elsewhere (particularly along the south coast but also in the [SW] region where we have long campaigned) to suffer sufficiently that they can be cajoled into accepting further damaging schemes.'

This persistence in pursuing such major long-distance road expansions at the expense of real local transport needs raises numerous questions:

- Why do the Department for Transport and National Highways persist in this perverse and destructive behaviour? There must be more to it than the reason suggested by Gillham, 'To keep National Highways in its continuing role of a parasite on our economy.'
- Why was the light rail / tram link between Portsmouth and Southampton cancelled by the Blair government?

- Why has a successor light rail scheme languished at the route-study stage for so many years?
- Why is the railway between Southampton and Brighton so far from the 'world-class' quality that the current government desires for airports and roads?
- Why aren't 'world-class' railways considered just as important as 'world-class' roads?

Lack of money cannot explain this public transportation deficit when the A27 Arundel bypass alone is priced somewhere between £300m and £455m and completing the whole superhighway to Hastings would cost billions. In fact the Treasury's national infrastructure 'pipeline' contains 12 road contracts worth £13.23bn⁽¹³⁾. Among these road contracts are two for the Lower Thames Crossing project – a tunnels and approaches contract listed at £4bn and a Roads North contract to connect the tunnel with existing infrastructure in Essex listed at £2bn. This latest attempt to relieve congestion at the point where the M25 motorway crosses the Thames (two tunnels and a high bridge so far) is a worked example of why we cannot build our way out of congestion.

Underlying Intentions

We must ask our government: Why are major road expansions continuing to be proposed, when managing demand is possible by transferring car drivers to other modes and moving goods by rail? The answer may be waiting just off the M27 and not far from its junction with 'our' A36-A46 Corridor. The government announced in the 2021 spring budget that Southampton, already

the second largest container port in the UK, would become a 'Freeport'⁽¹⁴⁾.

This would require the government to revive the Dibden Bay deep-water container port on the west shore of Southampton Water. This project was rejected in 2004 after a long planning inquiry found that it would damage the integrity of the special area of conservation (SAC) and special protection area for birds (SPA) designated under the EU Habitats Directive. The inquiry found that the developer, Associated British Ports (ABP), had satisfactory alternative locations to meet its needs for another container port.

ABP began to revive the project, publishing a new master plan in 2016⁽¹⁵⁾. The constraints imposed by EU biodiversity law would stop any attempt to revive the project. European nature directives were written into British law but leaving the EU means that the government could repeal the Habitats Regulations and be free at last to trash the birds and marine life of Southampton Water and the Solent⁽¹⁶⁾.

The Southampton Freeport would then become a crucial staging post



Illustration by Mark M. DeRobertis



Freight on the Westbury bypass line A trainload of stone from one of the Mendip quarries heads east. The Westbury White Horse is on the right. ST8951. © Maurice Pullin

connecting the global networks of Big Transport into what the government would clearly like to become a fast highway network carrying 80 tonne heavy trucks to warehouses and factories in every part of GB plc.⁽¹⁷⁾

Summary and Conclusion ... as of now...

This nightmare vision inspired Mrs Thatcher's 1989 Roads for Prosperity⁽¹⁸⁾ and her government's plan for a fast dual carriageway (four-lane divided highway) from the M27 near Southampton along the A36 to Bristol and the M4. In response, in 1993, we set up our Alliance against that road in Salisbury. Thanks to relentless campaigning, backed by new environmental evidence, and helped by the government's need to reduce

spending, the superhighway dream gradually unravelled and has been deflated for now. Three decades later and deep into the climate emergency, is it really possible that we will have to do it all over again?

Author details:

Patrick Kinnersly is a founder member of the A36/A350 Corridor Alliance (ACA), formed in Salisbury, Wiltshire, in October 1993. He is Secretary of the White Horse Alliance which was established in the summer of 2007 to fight the proposed Westbury eastern bypass.

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¹ Editor: A planning inquiry is usually a rather formal appeals process, much like a court procedure with expert witnesses on either side.

² <https://www.corridor-alliance.co.uk/news-july-2009.html>

³ Kinnersly, Patrick. The Curse of the Zombie Roads. WTPP 20:2-3. p67.

⁴ Highways magazine, 15 December 2021. <https://www.highwaysmagazine.co.uk/Funding-gap-as-councils-wait-for-upgrade-cash-news/8750>.

⁵ *The Western Gateway is one of the 'Sub-national transport bodies' (SNBs) set up to co-ordinate transport planning over a larger area than the Local Enterprise Partnerships established after dissolution of the SW Regional Assembly.*

⁶ A subdivision of the UK Department for Transport formerly known as the Highways Agency, then Highways England.

⁷ In the UK, a process whereby a public body issues a document for formal comment.

⁸ ICOMOS is a non-governmental international organisation dedicated to conservation of the world's monuments and sites.

⁹ <https://www.theccc.org.uk/publication/sixth-carbon-budget> - Surface Transport Report page 34.

¹⁰ A303 Amesbury to Berwick Down TR010025 APFP Regulation 5(2)(a) Planning Act 2008 Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 October 2018 6.1 Environmental Statement Chapter 14: Climate, para 14.9.5 and Table 14.15.

¹¹ Local Enterprise Partnerships (LEPs) are voluntary partnerships between local authorities and businesses. They have a board with members from the private sector, public councils, and others.

¹² WHA is a coalition of 13 organisations established in the summer of 2007 to fight the proposed Westbury eastern bypass. Members range from national NGOs, including Campaign for Better Transport, to regional and local bodies including ACA, Campaign for the Protection of Rural England (CPRE) and four parish councils.

¹³ *New Civil Engineer*, 20 September 2021.

¹⁴ A freeport is a free-trade zone where customs and other 'restraints' are relaxed so that capitalism is even less regulated. They are sold to host communities as a source of wealth and jobs but the wealth goes in and out, in this case back to Dubai Ports, the private promoter, and the jobs will not be unionised. They are parasitical on local communities, not beneficial.

¹⁵ <https://www.bbc.com/news/uk-england-hampshire-37790178>

¹⁶ Editor: The Solent is the part of the English Channel lying between the south coast and the Isle of Wight.

¹⁷ GB plc means 'Great Britain plc'. It's a common way of suggesting that the UK is run as a corporate enterprise or private limited company (plc). Tory politicians tend to use it approvingly; I use it sarcastically.

¹⁸ https://en.wikipedia.org/wiki/Roads_for_Prosperty



Table 1: Life Cycle of the Westbury Bypass.

(Between 1990 and 2022, the Westbury Bypass proposal died, returned to life, or remained on life support in tandem with national politics.)

Year	Project Alive	Project suspended/ Transit supported	Project killed
1980s	Increased car ownership.		
1989	“Roads for Prosperity” published by DfT detailing the ‘largest road building programme for the UK since the Romans’		
1990’s	Thatcher-government disinvestment in public transportation		
1995	1994-1997 British Rail privatised		
1996			DfT Standing Advisory Committee confirms “building roads just encouraged traffic growth and further congestion and did not necessarily bring economic growth”. A swath of road projects is cancelled.
1997		New Labour government, while not undoing the disastrous privations of railways, established a new superministry with the goal of shifting both passengers and freight to rail.	
2000		WC’s first Local Transport Plan embraced roads as well as progressive ambitions for reopening railway stations and even briefly considered that WC itself might hire rolling stock and run local rail services.	
2001	Roads were funded, Rail was not. The railway stations earmarked for reopening remained closed.		
2008			The road plans were appealed by a coalition of 12 nonprofits and NGOs. “After a long public inquiry in 2008, the inspector’s report was a damning indictment of the scheme.” The Bypass was cancelled.
2012		After showing the public a plan that had removed the bypass, WC included a map of the original eastern bypass in the ‘proposals map’ in Appendix H of the ‘Core Strategy’	
2013	Chancellor of the Exchequer has announced spending of £18bn on ‘the biggest road programme since the Romans’ including 221 extra lane-miles on motorways.		2013- The WHA and its member groups challenged this move at the Examination in Public (EiP) of the plan in 2013; it was ruled that “the application was a ‘departure’ from the Local Plan.
2017	WC produced a glossy prospectus and an economic study making the case for north-south connectivity.		
2020	In March the DfT announced a new study of connections between the M4 and the South Coast. Two months later WC announced that it would revive the Westbury bypass.		
2022		In January 2022, DfT told councils to reassess their roads programmes: funding should not be taken for granted if schemes would increase carbon emissions and wouldn’t provide for active travel and public transport.	

WC- Wiltshire County Council
DfT- UK Department of Transport

What's Wrong With My Traffic Study?

By Dan Hardy



Note from the Editor:

It is acknowledged that the following report is very U.S. and Canadian-focused in its approach to conducting transportation studies of land development. Nevertheless, it represents a sea-change in the past approach of traffic impact studies which focused primarily on accommodating automobiles to now ensuring accessibility for all users, particularly in urban areas. This new report provides more guidance on addressing transit, bicycle, and pedestrian access as well as context sensitivity and infill development. For this reason, we have chosen to announce this report in this journal on sustainable policies and practices. In addition, we hope that practitioners in other countries will read it, fostering a worldwide exchange of ideas potentially offer even more suggestions for improvement. If there is a similar document used by other countries and/or other policies and practices that are missing or could be improved, we would be happy to share information about them.

Multimodal Transportation Impact Analysis for Site Development: Recommended Practice

Published by the Institute of Transportation Engineers

In November 2021, the Institute of Transportation Engineers (ITE) released a Proposed Recommended Practice on Transportation Impact Analyses for Site Development. This report updates the prior edition of the document (September 2010). The update responds to evolving environmental, fiscal, and equity concerns, with a particular focus on thinking in person-trips rather than vehicle-trips and considering both the needs of all modes of travel and the interaction between modes for access and safety. For example, guidance is presented for addressing the impacts of increase vehicle traffic on transit, bicycles and pedestrians, not merely on automobile Level of Service (LOS).

The report is designed primarily as a how-to reference guide for practitioners who either prepare or review transportation impact analyses, with introductory chapters describing the “why” of site development analysis. The bulk of the report describes best practices in transportation impact analysis studies for various types of land use changes and site developments. A new chapter describes emerging practices including vehicle-miles traveled (VMT)



as a development impact metric, the potential use of pro-rata share districts as a replacement for individual studies, and recognition of the value of certain site design commitments, particularly related to parking.

The publication of a Recommended Practice encourages consistency in planning for site access, on-site circulation and parking layouts, as well as off-site improvements for new and expanding developments and fosters a better understanding of the multimodal transportation-related aspects of development planning by those who participate in the process, whether as practitioners or decision makers. As with other ITE Recommended Practices, ITE intends to refine the proposed product in response to practitioner comments, then adopt it as a recommended practice later in 2022.

Cost TBD. Anticipated publishing date: Fall 2022
ISBN: 978-1-7377661-0-0

Final document will be available at:
<https://www.ite.org/publications>

ABOUT ITE

Founded in 1930, Institute of Transportation Engineers (ITE) is international membership association of transportation professionals including transportation engineers, transportation planners, consultants, educators, technologists, and researchers, with its headquarters in Washington D.C. Through its products and services, ITE promotes professional development and career advancement for its members, supports and encourages education, identifies necessary research, develops technical resources including standards and recommended practices, develops public awareness programs, and serves as a conduit for the exchange of professional information.

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Dan Hardy is a Principal with Renaissance Planning Group in the Washington DC region. For the past four years, he has served as the leader of the committee of volunteers developing the Institute of Transportation Engineers' Recommended Practice on multimodal transportation impact analyses. He can be reached for comment at dhardy@ciesthatwork.com or 703-314-4227 (USA).



Multimodal arterial, Minneapolis MN USA. Photo by Michelle DeRobertis



UK English vs American English

We have made the editorial decision to let authors write in the English of their choice. We will not be editing word choice or spelling to either UK English or American English; we will retain the writing as is standard for their origins. This means that the articles may be inconsistent within a single issue. Therefore we provide this legend of primarily transportation terms to help not only non-native speakers but native speakers as well. However in the interest of clarity, we will try to put sidewalk in parentheses after the British use of pavement since these two words have opposite meanings in American English.

UK	USA	Canada
Word choice		
pavement	sidewalk	sidewalk
road surface	pavement	pavement
motorway	freeway, interstate	freeway
dual carriageway	divided highway	divided highway
main road	highway	highway
coach	bus	bus
Petrol, diesel	gas/gasoline	gas/gasoline
public transport	public transportation, transit	public transportation, transit
lift	elevator	elevator
boot (of a car)	trunk (of a car)	trunk (of a car)
bonnet (of a car)	hood (of a car)	hood (of a car)
barrister, solicitor	attorney, lawyer	attorney, lawyer
Lorry, artics/semi-trailer ⁽¹⁾	Truck ⁽¹⁾	truck, semi ⁽¹⁾
return (ticket) (transit context)	round trip	round trip
underground; underground railway ⁽²⁾	Subway ⁽²⁾	subway, metro ⁽²⁾
puncture	flat tire, flat	flat
tyre	tire	tire

Spelling		
kerb	curb	curb
-ence (defence, licence, offence)	-ense (defense, license, offense)	follows USA
-our (colour, honour, labour, neighbour)	-or (color, honor, labor, neighbor)	follows UK
-ise; (e.g., prioritise, organise)	-ize (prioritize, organize)	follows USA
- yse (e.g., analyse)	-yze (e.g., analyze)	follows USA

⁽¹⁾ Professional papers may differentiate between tractor-trailers, semis, and single-unit trucks

⁽²⁾ Term used is very colloquial, i.e. Tube in London, Subway in New York, the "L" in Chicago, the "T" in Boston, Metro in Washington DC. Much of Western Europe, regardless of language, calls it metro, or at least understands the word.

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km / h

