US MANAGED LANES

# How do you put a price on roads?

The roll-out of increasingly sophisticated road-pricing solutions presents particular challenges for toll road investors, as Robert Bain explains

The US Federal Highway Administration defines managed lanes as *"freeway lanes that are set aside and operated using a variety of fixed and/or real-time strategies* (such as variable or 'value' pricing) *responding to local goals and objectives"* (such as the maintenance of a certain level of service for users). A typical example – in fact, the earliest deployment of priced managed lanes – is SR-91 in California where tolls vary by hour, by direction and by the day of the week to provide users with a reliable, reduced-congestion environment.

For many, the *priced* managed lane concept – the focus for this article – pushes important planning and policy buttons. It acknowledges the futility of trying to 'build our way out of congestion' and, instead, turns to solutions that derive from smarter asset management. Hence the recent mini-explosion in applications of and interest in managed lanes across the US.

In tandem, a number of states are examining what private infrastructure investors can bring to the table and the two worlds are colliding. Investors are being asked to assess managed lane projects in terms of their risk appetite, pricing and hurdle rates – often with full exposure to demand and revenue risk. This brings traffic forecasts centre stage in terms of being able to understand and test the commercial proposition. But given the forecasters' track record with simple toll schedules – let alone tariffs which can vary, often dynamically, based on asset use – is this a risk too far for private investors?

## IN THE BEGINNING

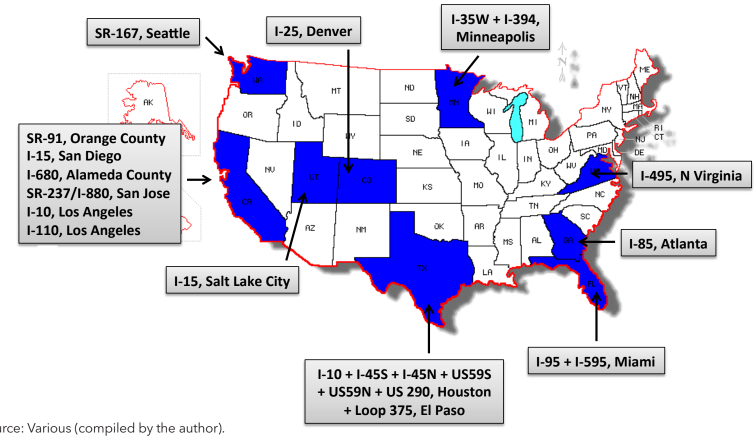
In their broadest sense, the earliest managed lanes in the US can be traced back to exclusive busways developed in the late 1960s. In response to the oil price shocks of the early 1970s, a number of these busways were subsequently opened to carpools. The concept of the 'high occupancy vehicle' (HOV) lane followed, gaining traction in the 1980s and 1990s thanks to increasing concerns about emissions and air quality. Today, with over 3,000 lane-miles in operation, the HOV lane is the most prevalent form of (non-priced) managed lane in the US.

The first priced managed lanes appeared in the mid-late 1990s as electronic toll collection (ETC) technologies matured and interest turned to the role and use of price in terms of demand management. In 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA) specifically allowed for variable-priced tolls to be imposed on the interstate system on a demonstration-project basis.

California led the way with its SR-91 priced managed lane project (opened in December 1995). This was soon followed by a small number of HOV conversions; i.e., opening up under-utilised HOV lanes to toll-paying single occupant vehicles (known as high occupancy/toll or 'HOT' lanes). These included I-15 in San Diego, California (1996), and I-10 (Katy Freeway) and US 290 (Northwest Freeway), both in Houston, Texas, in 1998 and 2000 respectively. Subsequent applications – variants, in reality – have followed across California and Texas, as well as in Colorado, Florida, Georgia, Minnesota, Utah, Virginia and Washington (see Figure 1).

These variants differ in terms of geometric configuration, eligibility, access control, times of operation, if (and how) tolls are applied/adjusted, and their policy objectives. Some are designed to maximise throughput (for selected or all vehicles) or to service their financial obligations. Others focus on maintenance of free-flow conditions or revenue maximisation. And this – neatly – demonstrates the key, upfront requirement for investors to understand exactly what a managed lane

FIGURE 1: **US MANAGED LANES IN OPERATION**




Source: Various (compiled by the author).

project has been designed to deliver and how. Not all managed lane projects are revenue-optimal; cash flow may be sacrificed to achieve broader policy goals.

## WHAT'S HAPPENING TODAY

There are currently 22 priced managed lane projects operational in the US. The major players are Texas (seven) and California (six). Although the first commenced operations back in the mid 1990s, almost half of them have opened since 2012; underscoring the recent nature of these initiatives and the limited track record associated with them. And the portfolio of operational projects is certainly heterogeneous. Comparative data compiled by the Texas A&M Institute demonstrates how these managed lanes differ in terms of:

- **Number of lanes (capacity).** This ranges from a single lane, such as I-680 (Alameda County, California) to four - ie. 2x2 - lanes on SR-91 (Orange County, California).
- **Directionality ('tidality').** Some of the facilities operate reversible lanes, such as US 290 in Houston which has three or four general purpose lanes in each direction and a one-way reversible HOT lane in the median.
- **Eligibility (toll-free usage).** The majority allow HOV-2+ vehicles (with a minimum of two occupants) to travel for free – or at a discount – yet others, such as I-495 in Virginia, restrict occupancy-related toll-free travel to HOV-3+ vehicles.
- **Segregation (separation of travel lanes).** This varies from soft measures (such as lineage) to active segregation (physical barriers); employing a range of separation widths. Experience demonstrates that, even with significant enforcement, violation rates relating to non-barrier separated managed lanes can be considerable.
- **Hours of operation.** Two-thirds of all managed lane projects confine their operations to weekday peak periods whereas one-third operate continuously (24/7).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- **Market capture (percentage of total corridor traffic using the managed lanes).** This is challenging to compile as a number of facilities do not publish operational statistics, however estimates range widely from 3 percent to 40 percent (with 10 to 20 percent being typical).

## LOOKING FORWARD

The exact number of managed lanes currently under construction across the US is difficult to verify. Different state agencies use different terminology – some using phrases such as 'in development' or 'being implemented' to refer to construction works or extension projects; others use the same terms to cover projects under construction and those in planning. In terms of facilities currently being built, the number appears to lie between 15 and 20; spread across 10 or so states.

Texas continues to champion the priced managed lane concept. The North Central Texas Council of Governments (NCTCOG) – just one of 24 Texas 'regions' – alone identifies four projects currently under construction: the DFW Connector, the LBJ Express, the North Tarrant Express and IH-30 Managed Lanes. And in California, SR-91 is presently being extended into Riverside County.

However, fast joining those early adopters is Florida with its 'Express Lanes' initiative; building on the success of existing facilities (on I-95 and I-595). Projects listed as being 'under construction' (June 2014) include I-95 Phase 2, the Palmetto Express and HEFT (Holmstead Extension of Florida's Turnpike) Express (both in Miami-Dade County) and Veterans Express Lanes (in Tampa). Plans are reported to be well advanced on two other projects: the 21-mile 'I-4 Ultimate' (*"in negotiations"*) and I-295 in Duval County (procurement recently brought forward to early 2015).

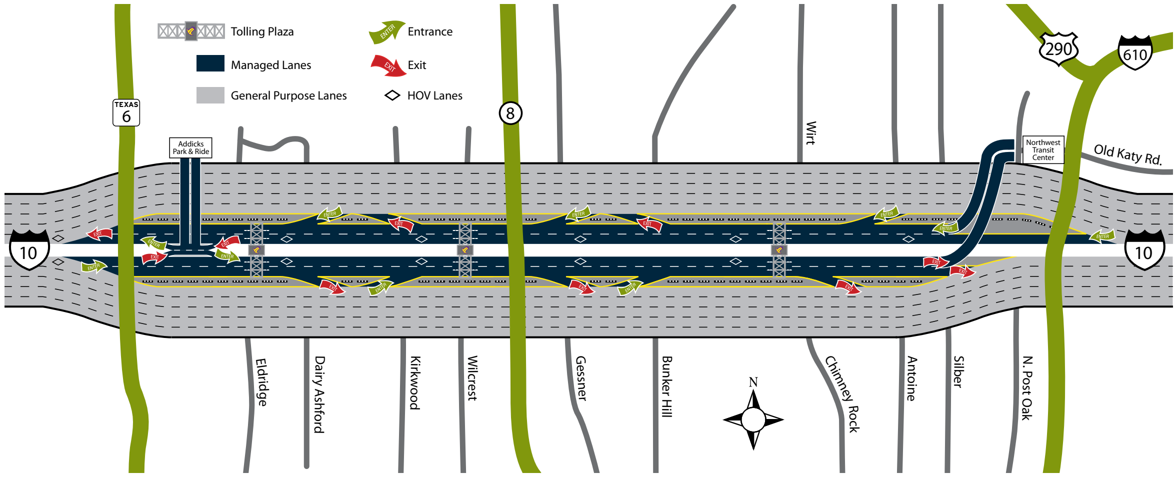
However, the most significant development currently taking shape is the fact that – particularly in Texas and Florida – managed lanes are evolving from single corridor-based initiatives to entire networks. The same is planned for California. The San Francisco Metropolitan Transportation Commission estimates that, by 2035, the Bay Area will have over 500 miles of 'Express' lanes; the first stage of which will involve converting 150 miles of HOV lanes into managed lanes. And an – albeit recently scaled-back – ambitious managed lanes 'system' and associated system-wide implementation strategy has also been proposed in Georgia.

Returning to managed lane projects presently under construction, works are advancing across the US in Colorado (US-36), Virginia (I-95/I-395), Minnesota (I-35E), Maryland (I-95 north of Baltimore) and Texas (Loop 1, Mopac) – to mention just a few. Looking further ahead, a review of reports, newspaper articles and Department of Transportation (DoT) websites found more than 30 priced managed lane projects at various stages of planning or being considered through feasibility studies.

## WHAT EXACTLY DO THEY LOOK LIKE?

Sometimes characterised as 'a freeway within a freeway', priced managed lanes traditionally run within an existing highway corridor yet remain physically separated from the toll-free (general purpose) lanes.

FIGURE 2: **A TEXAN EXAMPLE: I-10 KATY FREEWAY TO THE WEST OF HOUSTON'**




Source: Harris County Toll Road Authority

Figure 2 shows an example from Texas. Access is controlled through design; some operating as a long, express pipe or 'land bridge' (with limited entrances/exits) whereas others have multiple entrances/exit points for users. In terms of pricing, some operate as traditional, fixed-rate toll lanes whereas, on others, the tariffs vary by time of day (pre-set according to a schedule – commonly subject to periodic revision – or dynamically in response to, for example, levels of congestion).

Turning to hours of operation, some managed lanes run 24/7 whereas others operate for limited periods only (typically weekday peak hours). All of the design and operating characteristics are developed in response to local policy priorities and objectives: maintenance of vehicle flow or speeds, maximising transit or HOV throughput, revenue maximisation and so forth.

These policy priorities also dictate which vehicle classes are charged – and at what rate – and which may travel toll-free or at a discounted rate (carpools or low-emission/alternative-fuel vehicles, for example). Access is commonly prohibited for heavy commercial vehicles. An example of a priced managed lane toll schedule is shown in Figure 3.

With so many options it is perhaps unsurprising that no two priced managed lane projects are identical. This, combined with the fact that most projects are relatively new, makes benchmarking (discussed later) challenging and underscores the fact that prospective investors have to make very sure that they understand exactly what the project does – or has been designed to do – how it does it, and why.

## THE TRAFFIC FORECASTING CHALLENGE

Having personally reviewed seven priced managed lane projects recently, it is clear that different modelling techniques are being employed on different studies by different traffic consultants. The general approach is to use a traditional – i.e. sequential 'four-step' – model augmented by one or more off-model spreadsheets. Off-model (or post-processing) spreadsheets are required in conventional toll road studies – if only to calculate project revenues. However, their use has become more widespread in recent years as consultants attempt to compensate for acknowledged weaknesses in the traditional modelling architecture.

For example, spreadsheets often handle toll diversion ('trip assignment') – allowing for a wide range of behavioural influences to be incorporated to explain route choice. And reflecting deficiencies in terms of time-of-day modelling, spreadsheets are often used to capture the impact of future-year peak spreading (although the degree of sophistication varies enormously).

Other model weaknesses commonly compensated for through the use of spreadsheets can include congestion-related trip suppression – as traditional models seldom incorporate any feedback from trip costs to trip generation and (noted above) revenue calculations.

Revenue calculations themselves can become complex as consultants attempt to accommodate different toll payment technologies (such as transponder penetration and growth assumptions) – for which different tariffs may apply – and violation-related impacts (such as revenue leakage or added revenue from the processing fees associated with fines).

The foregoing comments often apply to traditional toll road modelling, a non-trivial undertaking at best. Add the increased operational complexity and sophistication associated with priced managed lane projects and the modelling/forecasting challenges ratchet-up considerably:

- Some (perhaps multiple) user/vehicle

## FIGURE 3: **TOLL TARIFF SCHEDULE FOR I-10 KATY FREEWAY, TEXAS**

| VEHICLE TYPE | MONDAY - FRIDAY HOV HOURS 5 am - 11 am | MONDAY - FRIDAY HOV HOURS 2 pm - 8 pm | ALL OTHER TIMES INCLUDING WEEKENDS |
|---|---|---|---|
| **EXEMPT VEHICLES** METRO buses and school buses | Free | Free | Free |
| **MOTORCYCLES** | Free | Free | $0.30 to $0.40 per tolling plaza |
| **HOV** 2+ car, truck, van or SUV | Free | Free | $0.30 to $0.40 per tolling plaza |
| **SOV** 1 car, truck, van or SUV | $0.30 to $3.20 per tolling plaza | $0.30 to $3.20 per tolling plaza | $0.30 to $0.40 per tolling plaza |
| **3+ AXLES** commercial vehicles or vehicles towing trailers | $7.00 per tolling plaza | $7.00 per tolling plaza | $7.00 per tolling plaza |

Source: Harris County Toll Road Authority

classes may travel toll-free or at a discounted rate and the definitions can be very specific e.g. low emission (hybrid/CNG/electric) vehicles and/or carpools – according to various minimum occupancy rules. Furthermore, these definitions can change, for example, by time of day.

- The toll schedule itself can be complex with different rules/rates applying to different project sections or directions, or both. Tariffs may be distance-related. And tolls can vary – by time period or the day of the week, for example – dynamically or according to pre-defined schedules. In terms of schedules, the periodicity of adjustment differs from project to project. With dynamic tolling ('value pricing'), the price may change according to different rules/triggers – commonly within set ranges – however, as before, the periodicity of adjustment is different for different projects and the rules/triggers can change in time (e.g. in future years or when certain criteria are met).

For these reasons, instead of spreadsheets being simple 'bolt-ons' used to convert traffic into revenue, in priced managed lane studies off-model workings become elevated in status with massive spreadsheets doing much of the heavy lifting. And as spreadsheets proliferate, transparency commonly suffers – to the extent that forensic analysis may be required by third parties just to understand exactly what is going on, and why!

Notwithstanding these comments, there are attributes of managed lane projects which work in traffic forecasters' favour. These are generally brownfield projects, typically constructed within established, heavily-congested travel corridors. This provides a history of demand and, sometimes, insight into possible levels of suppressed demand.

Another feature is that they represent an attractive product – although this clearly has to be set against price and demand elasticity with respect to price. Managed lane projects are often congestion-relievers serving strong commuter markets. They hold the potential to offer significant time savings (and much improved reliability) to users.

Two other features are helpful in this context. First, a number of managed lane projects operate in a relatively simple, contained competitive context. They are effectively highways that compete with themselves; the managed lanes competing with the general purpose lanes in a single corridor. Second, they tend to ramp-up quickly as the conditions on the competing facilities are clearly visible to drivers. One caveat is that, on projects which incorporate capacity enhancement of the whole corridor, managed lane take-up may be moderated until congestion builds back up on the general purpose lanes themselves.

That said, a number of forecasting challenges remain:

- A key requirement from traffic forecasters is to predict 'market capture' (the proportion of total corridor traffic that will use the managed lanes) and this is complex (see separate panel on 'Capture Rates').
- Traffic forecasters have to ensure that they are using the appropriate value(s) of time – as this dictates usage and hence feeds directly through to the revenue line. A number of studies have suggested that the value(s) of time are different for managed lane projects than for traditional toll roads, by some margin (see separate panel on 'Values of Time').
- The geometry of the project can compound the forecasting challenge. All things being equal, express pipes – with one entrance and one exit – are easier to forecast than projects with multiple access points.
- As mentioned earlier, eligibility is often occupancy-related. Traditional traffic models do not accommodate vehicle occupancy – to any level of detail – well.
- Empirical evidence demonstrates that the demand for managed lanes is very sensitive to conditions in the general purpose (GP) lanes, with small changes in GP lane volumes having a magnified impact in terms of managed lane usage. In a similar vein, relatively modest traffic re-assignment to managed lanes can lead to a material improvement in GP

lane performance. And the demand for managed lanes – and hence their revenue take – is disproportionately sensitive to increases or decreases in total corridor traffic.

- A related point is that drivers adapt their behaviour (such as making route choice decisions) according not to reality or measurements such as time savings plugged into traffic models – but to their *perceptions* of reality. These perceptions are commonly incorrect and may be subject to revision (see the 'Values of Time' panel).
- The pricing regime employed on managed lanes with, typically, high peak-period tolls can dramatically increase the sensitivity of revenue to traffic. In terms of cash flow analysis, this is a major concern – as is the inter-relationship between price and demand (demand dictates price which, in turn, dictates demand). This is exacerbated by the fact that speed/flow relationships are non-linear. At high rates of flow, small volume increases can degrade speeds dramatically (and toll price hikes may be speed-triggered).
- High peak-period tolls can cause drivers to re-time their travel. Indeed, this may be a key policy objective – yet this is difficult if not impossible for most traditional traffic models to accommodate without some assumptions-driven 'off-model' manipulations.
- Priced managed lanes are a relatively recent development. Over half of the existing projects today have opened since 2010. This provides a thin evidence base for benchmarking and sense checking (and not everyone behaves or drives as they do in California)!

## LESSONS FOR INVESTORS

My own reviews suggest that, compared with regular toll facilities, priced managed lane projects simply require a deeper, more resource-intensive level of commercial due diligence. The fact that (a) this is a relatively young, immature sector develop-

## Differences from regular toll roads

Although priced managed lane projects come in a variety of shapes and sizes, they generally incorporate a number of characteristics that distinguish them from regular toll roads.

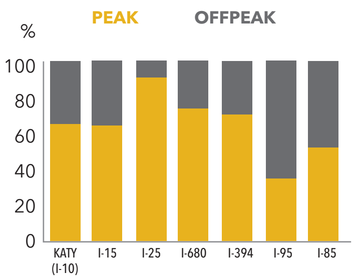
| Characteristic | Traditional Toll Road | Managed Lane Project |
|---|---|---|
| History | Old concept dating back to the 1700s! | New concept. Half of all managed lanes have opened since 2012. Limited track record. |
| Location | Can be a greenfield or brownfield site. | Generally a mature traffic corridor with established/high demand. |
| Competitive Environment | Toll road competes with other (toll-free) roads. | A managed lane competes with itself (general purpose lanes) and other toll-free roads. |
| Operations | Generally simple. | Often complex involving (possibly) traffic monitoring, dynamic tolling, violation tracking systems etc. |
| Eligibility | All users pay a toll. | Some (possibly many) users are exempt from tolls. |
| Pricing | Generally simple. Price dictates demand. | Sophisticated. Demand may dictate price (and tariffs can be significantly higher – especially during peak periods). |
| Demand / Revenue Relationship | Generally simple. | Complex with the potential for higher revenue volatility. |
| Demand Modelling | Generally simple. Traditional (four-step) model for traffic and spreadsheet for revenue. | Can become extremely complex (and opaque) with most of the critical calculations happening 'off-model' (in very large spreadsheets). |
| Demand Forecasting | Similar to forecasting demand for a product. | Similar to forecasting demand for a brand. |
| Forecasting Challenge | Difficult to predict demand. | In the extreme, very difficult to predict demand. |

Source: Fitch Ratings (November 2013)

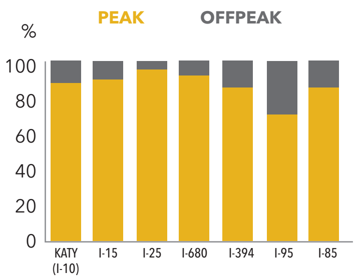
In all but one aspect (network context), managed lanes compound the forecasting challenge – however that one aspect is often a (if not the) key credit strength. The fact that many managed lanes operate along already-congested, mature corridors means that an established market of potential users already exists. Under certain circumstances, this can mean that managed lane projects have a lower investment risk profile than their greenfield (traditional) toll road counterparts.

A further distinguishing feature of a number of managed lane projects is their 'peakiness' (the proportion of total users who travel during weekday peak periods). As toll tariffs are commonly highest during the AM and PM commuting times, this peakiness is amplified in terms of project revenues (see below).

### TOLL VOLUME BY PERIOD




### REVENUE SHARE BY PERIOD




Source: Fitch Ratings (November 2013)

ment with a limited track record, and (b) all projects are different, certainly makes benchmarking difficult – and this is regularly used as an excuse for not trying!

Having critiqued different consultants' reports, however, it appears that imperfect benchmarking is often better than none. It provides independent reference points which can be used to sense or logic-check the traffic and revenue forecasts. There may be very good reasons why the findings for one project differ from another but closer examination of these differences, and understanding them, is often insightful in itself. And, at the end of the day – in the absence of hard evidence – potential investors are cast adrift in the world of the hypothetical with only a black-box model telling them anything.

Focusing due diligence efforts on values-of-time is critical. Increasing evidence suggests that the decision about whether or not to use toll facilities is far more complex than a simple time-saved/price-paid trade-off may suggest. Nevertheless, in many traffic demand models values-of-time are a (if not *the*) key determinant of route choice – hence asset use and revenue generation. It may not be how people behave but it is how the models work!

Particular care should be taken with values-of-time that are higher than industry norms. They may be justified – if strong evidence and argument suggest so – but their direct impact will find expression in inflated projections of demand, particularly during weekday peak periods (when most revenue is generated).

The modelling treatment of journey time reliability merits discussion at this point. Early demand model estimation often relied on a constant (a 'modal constant') to mop up the influence of factors – other than time savings – that influenced route choice. More recent studies have sought to include reliability more explicitly in model specifications through a multiplicity of approaches – some of which are way more sophisticated than others.

This responds to the widely-held belief (and some supporting research) that the product offering may have more to do with improved reliability than reduced travel time – and slowly-emerging evidence that priced managed lanes operate best in situations where journey time *unreliability* is the norm.

The most critical part of a forecasting horizon is generally near the start. Get opening-year and early-period demand projections wrong and you may live with that legacy for years to come. Transactions can be structured to provide enhanced flexibility and accommodate departures from expectations in the near term, but if the prospects for subsequent 'catch-up' are weak, such structures will simply delay the symptoms of distress, not cure them. A key red flag is high capture rates during non-peak periods

## Case study: MnPASS Express Lanes

MnPASS is the brand name for the Minnesota Department of Transportation's electronic toll collection system. MnPASS users lease an electronic transponder that attaches to their windscreen, tolls being deducted automatically from pre-paid MnPASS accounts as vehicles pass roadside recording equipment overhead. Tariffs vary dynamically according to demand and the level of congestion in the MnPASS lanes, such that speeds are maintained at or near the posted limits (55mph for 90 percent of the time). The average toll is $1.75, but can vary from 25 cents to $5 (up to $8 in winter months when drivers are particularly keen to keep moving).


Minnesota operates two priced managed lane projects. Running from downtown Minneapolis to the city's ring-road (I-494), the 18km I-394 MnPASS Express Lanes opened in 2005 after conversion from under-utilised high occupancy vehicle (HOV) lanes. Single occupant vehicle (SOV) drivers pay a toll to access the HOV lanes. Carpoolers and transit users travel toll-free. The objective is to make better use of the HOV lanes and maximise capacity along the I-394 corridor. Another managed lane project (I-35W) opened in 2009 connecting southern communities with downtown Minneapolis. The project runs for 25kms heading into the city with a further 18kms coming out.

Minnesota has another managed lane project under construction (I-35E from downtown St Paul to just south of I-694) and is currently studying three others: an extension of I-35W further to the south, an extension of I-35E (north from the section under construction) and on I-35W to the north of Minneapolis.

For more information see: www.mnpass.org

## Values of time

A stand-out feature from some recent managed lane-related research has been the high values of time (or, rather, travel time savings) derived for users – both from stated and revealed preference studies. The table below provides illustrative examples, alongside the more traditional toll road 'benchmark'.

| Managed Lane | Source | Value of Time (per hour) |
|---|---|---|
| SR-91 (CA) | Steer Davies Gleave (2010) | $27+ |
| I-95 (FL) | University of South Florida (2011) | $45 - $60 |
| I-10 (TX) | Texas A&M University (2013) | $60 - $75 |
| Various | Bain (backed-out of time savings) | $50 - $80 |
| Traditional Toll Road | Various (Bain, 2010-13) | $10 - $25 |

Various reasons are put forward for these high values:

- Managed lanes attract more middle-high income users;
- The value incorporates a price drivers place on reliability (drivers are effectively paying for an insurance policy against unreliability);
- The value incorporates a price drivers place on perceived safety;
- Values of time are generally higher in congested conditions anyway.

Notwithstanding, the key take-away is that potential investors need to make sure that they have a thorough understanding of the likely values of time of local drivers specifically for any managed lane use.

Recently, new research has suggested even higher values of time for managed lane users (Levinson & Janson, 2013).

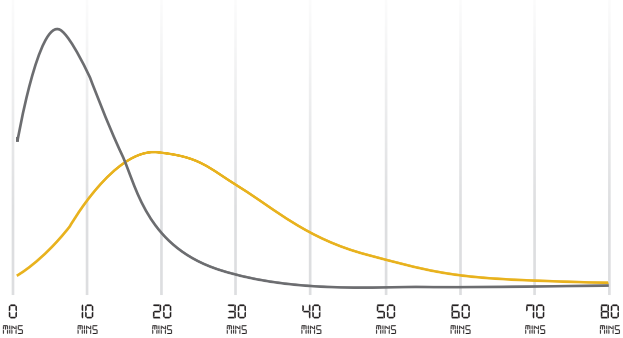
| Managed Lane | Source | Value of Time (per hour) |
|---|---|---|
| I-394 (MN) | Levinson & Janson (2013) | $90 - $105 |
| I-35W (MN) | Levinson & Janson (2013) | $60 - $125 |
| Traditional Toll Road | Various (Bain, 2010-13) | $10 - $25 |

However the study authors noted that, perversely, their research suggested that managed lane users were behaving as if the roads were 'Giffen goods' with demand increasing as the price goes up (MnPASS tolls are adjusted every three minutes).

The reason for this is that drivers were using the posted price as an indicator of congestion severity in the adjacent general purpose lanes. The higher price suggested that the managed lanes would provide even greater time savings (hence raising the toll attracted more traffic). This behaviour can only be sustained for as long as price is regarded as a proxy for time savings. If drivers 'catch on' – if, for example, real-time information about actual time savings is posted – the behaviour is likely to change. Which brings us to another key issue: drivers' behaviour responds to their *perceptions* and those perceptions may be incorrect.

Analysis conducted by the author recently compared actual and perceived time savings from a European toll road (see chart below). The average actual time saving was 9 minutes compared to a perceived time saving of (on average) 26 minutes.

### ACTUAL JOURNEY TIME SAVING **VERSUS** PERCEIVED JOURNEY TIME SAVING




Fitch Ratings (2012) observed the same. On 95 Express Lanes (FL) the actual time savings were 1 to 4 minutes whereas survey respondents reported savings of around 12 minutes.

In revenue terms, these incorrect perceptions are clearly beneficial to toll road operators. However, the impact may be transient if, as suggested above, driver information or experience narrows the gap between perception and reality.

Sensitivity tests should always be used to isolate the impact on any traffic and revenue forecasts of alternative values of time. A meta analysis of values of time conducted by the author from different toll road studies reviewed demonstrated considerable intra-jurisdictional variance (a wide range of values, often from adjacent study areas).

That work continues, however it is clear that the values of time extracted from toll road-related research can be influenced by many factors relating to the research technique(s) used, sample selection and size, how vehicle occupancy is handled, definitions applied for vehicle or journey purpose segmentation, the model form fitted and/or the treatment of time-in-congestion compared with free-flow time.

at anything other than modest tolls. Most operational managed lanes display highly 'peaky' usage patterns. They only get going when the going gets tough.

Some of the specific challenges associated with forecasting managed lanes usage may require a change in the working relationship between client and traffic consultant. Expect conversations, not just reports. Some of the material I have reviewed has bordered on being incomprehensible – and, as a former traffic consultant, I review this material for a living.

Traffic consultants need to be considering any privately-financed managed lanes from an investor perspective and working back from there – but seldom do. Similarly, on publicly-funded projects, it is useful to consider the paymaster and take time to understand managed lane initiatives from a financing perspective. Many of my reviews are commissioned by state treasurers; not their transportation department counterparts.

At the end of the day, it is the consultant that writes the traffic and revenue (T&R) study report; dictating what others will read and where they might focus. The resource-intensive nature of managed lane due diligence extends to the client/consultant interface. In short, budget for more communication, liaison and questioning. You're going to need it. In this context, the last-minute production of forecasts becomes unacceptable. Extra time is required to interrogate traffic models and to sense-check their outputs.

Commonly the case with commercial due diligence, the devil is in the detail. However, those details multiply when one moves from regular toll facilities to evaluating priced managed lane projects. They are simply way more complex, and much of that complexity derives from their underpinning policy objectives. Understand those (what, why and how) and you are off to a good start.

Not all transportation policy imperatives will align neatly with the interests of the investor community. Other issues to watch for include any associated (embedded) obligations such as triggers requiring the construction of extra capacity (additional GP lanes, for example) and it is important to assess what is happening 'off project'; upstream or downstream from the managed lanes themselves. The facility needs to be understood from the perspective of users and in the context of their end-to-end trips (which may involve the use of other toll roads or managed lanes).

## CONCLUSIONS

Are managed lanes a risk too far for infrastructure investors? The rating agencies would certainly appear to suggest otherwise. A number of managed lane projects enjoy investment-grade ratings and Standard & Poor's recently upgraded the Orange County Transportation Agency SR-91 Express Lanes toll revenue bonds to 'AA-' making it, to this author's knowledge, the highest rated managed lane project in the world.

Indeed, each of the main rating agencies has published useful material about managed lanes – albeit that these have tended to be commentaries rather than criteria guidelines. And the messages are consistent. Despite the challenges listed earlier, investment-grade ratings are possible – but will generally require stronger credit metrics than toll road sector norms.

The trend away from single corridors to managed lane networks was mentioned earlier. Another trend which is slowly becoming evident is a future focus away from toll-exempt vehicle categories. This reflects the fact that many of the planned managed lane deployments are big-ticket new-builds (rather than HOV lane conversions), and strong revenue generation will be required in support. This is certainly investor-positive.

One cautionary note concerns pricing sophistication. Technology has gifted planners and policy-makers with the ability to develop highly elaborate tariff regimes (and detailed rules-of-the-road) for managed lane projects. This is already stretching the capability of today's traffic models. Increasing sophistication holds the potential to work against the bankability of managed lane projects if cash flow forecasting becomes challenging to the extent that future performance visibility and revenue dependability suffers.

Traffic consultants themselves need to raise their game. Of the 40+ toll road projects that I have reviewed over the past eight years, the only report that I – and my clients – completely failed to comprehend concerned a managed lane project. Technical work needs to be presented clearly and in ways that a broad investor audience can quickly grasp. We need forecasts but, most importantly, we need to hear 'the traffic story'; a concise and lucid narrative that accompanies the forecasts telling us not only what the numbers are, but why – and what they mean.

This article has focused on priced managed lanes and their development across the US. My conclusion is that this is certainly not a 'no-go' area for (informed) private financiers if caution is exercised and adequate due diligence is undertaken. The speed at which managed lanes have developed has to some extent left institutional learning playing catch-up, but if lessons are shared the evidence base grows with each successive deployment.

The bigger picture is that today's managed lanes are at the forefront of initiatives looking to use transportation pricing in more sophisticated ways than ever before – and the implications of that will ultimately stretch well beyond the US. ■

**Robert Bain** is an infrastructure investment analyst, author and former director with S&P. Today he runs RBconsult, a specialist consultancy which undertakes technical and commercial due diligence of candidate road and rail projects for international investors (see www.robbain.com).