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SECTOR IN-DEPTH
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Toll Roads - US

Strong resiliency and liquidity offset some of coronavirus's credit negative effects

Since the coronavirus spread to the US, social distancing and subsequent statewide shelter-in-place orders coupled with the initial economic fallout have resulted in material traffic and revenue (T&R) declines for all US toll roads. However, most US toll roads have strong resiliency and liquidity to cushion the credit impact of these material short-term T&R declines. Toll roads generally maintain strong financial metrics to allow them to absorb changes in demand, contributing to the sector's overall long-term credit strength.

» **Coronavirus is causing material traffic and revenue declines.** We expect most issuers that we rate to experience 50% to 80% total traffic declines for about three months during the peak of the crisis in mid-March to mid-June in the US. Slow economic recovery will suppress traffic and revenue growth in the second half of 2020 and into 2021.

» **Most publicly owned US toll roads we rate can absorb a 30% revenue cut and privately managed concession based toll roads we rate can absorb over a 50% revenue cut in 2020 before debt service coverage ratios (DSCR) reach 1.0x.** Our base stress case for 2020 is a 30% revenue decline and a 10% cut to O&M for publicly owned toll roads and a 50% revenue decline and 10% O&M cut for privately managed and all dynamically priced managed lanes.

» **Nearly all US toll roads we rate have a debt service reserve fund (DSRF), a key lender protection against default risk during shocks like the coronavirus.** Publicly managed toll roads typically have a 12-month cash funded DSRF and most privately managed toll roads also have a 12-month DSRF because of lender requirements.

» **Strong balance sheet liquidity coupled with continued modest revenue collection ensures nearly all rated US toll roads can operate at breakeven levels for several years without using their DSRF.** Nearly all US toll roads require monthly deposits of a proportional amount of the upcoming debt service payment into a trustee-controlled debt service account after paying monthly operating expenses. These monthly set asides ensure sufficient funds are available for debt service payments.

» **Key factors — ownership, commercial/passenger traffic, fiscal year ends — will differentiate credit effects across the sector.** Credit pressure will be highest for toll roads with a pressured government owner that may look to the toll road as a source of funds. Issuers with 31 December fiscal years will absorb the full financial impact in one audited period, potentially leading to rate covenant trips, while issuers with a 30 June fiscal year can spread the financial impact over two audited reporting periods.

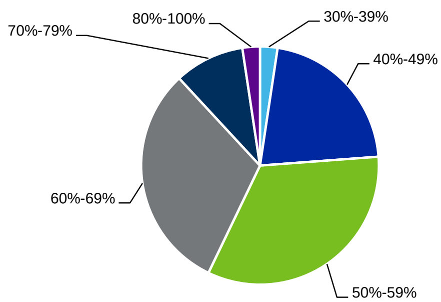
Coronavirus response causing material traffic and revenue declines

Since the coronavirus outbreak spread to the US, social distancing and subsequent statewide shelter-in-place orders coupled with the initial economic fallout have resulted in material traffic and revenue declines for all US toll roads.

Most issuers we rate will likely experience 50% to 80% total traffic declines for about three months during the peak of the crisis in mid-March to mid-June in the US. In the last week of March, the majority of toll roads we rate experienced 40% to 70% year-over-year total traffic declines (see Exhibit 1). In April, the declines worsened, but traffic appears to have settled at a lower level now, evidencing a base level of demand for essential services. The slow economic recovery will suppress traffic and revenue growth in the second half of 2020 into 2021. Long-term traffic and revenue growth will continue to be largely driven by population, employment and GDP growth.

Exhibit 1

Most of the toll roads that we rate experienced traffic declines of 50% to 70% in the last week of March 2020 compared to the same week in 2019. April traffic worsened, but traffic has settled at a lower base level for most.



Sources: Moody's Investors Service, EMMA filings and issuer reported

Our base case stress scenario expects material traffic declines from mid-March to mid-June, or about three months, before the slow recovery begins. By December, we expect traffic to settle at a level 10% below 2019 levels. In 2021, traffic then remains 10% below 2019 levels because of changing user behavior related to the coronavirus outbreak that are likely to persist for some time.

Traffic declines will continue as long as social distancing is required and this could extend through the middle of June for many locations. In parts of Asia, where regions are slowly reopening from similar shelter-in-place orders, there has yet to be a strong rebound in traffic. Our base case does not incorporate a reemergence of the coronavirus in the fall of 2020, which would lead to even more severe stress with revenue losses of 50% or more if similar public health measures recur.

We publicly rate 54 tolled roadways, bridges and turnpike systems in the US. Most, 49, are publicly owned and managed with local unregulated control over their toll rates that can be adjusted as needed. Of the six privately managed toll roads we rate in the US, three are operating dynamically priced managed lanes, two are dynamically priced managed lanes under construction and one is a mature operating traditional toll road. All are privately managed pursuant to the terms of a long-term concession with a state department of transportation.

Most publicly owned US toll roads we rate can absorb a 30% revenue cut and privately managed toll roads we rate can absorb over a 50% revenue cut in 2020 before DSCRs reach 1.0x

Under our base stress scenario, nearly all US toll roads that we rate can withstand the coronavirus shock and slow recovery while covering all costs and maintaining at or near a 1.0x DSCR (Appendix B). We consider this a heavier stress scenario than the 30% may indicate because it assumes only a 10% cut to operating and maintenance (O&M) expenses, which only partially accounts for the expense savings from processing fewer transactions and modest maintenance cuts but not the material cuts to capital investment that many toll roads are already implementing now.

If any toll road's actual DSCR falls below 1.0x, their strong balance sheet liquidity will ensure all costs are covered before tapping the DSRF. This can continue for several years, assuming flat debt service costs, per our run rate calculations (Appendix C).

Privately managed roads can withstand the same level of decline for decades before drawing on the DSRF because of strong liquidity

Many privately managed toll roads in the US are dynamically priced express lanes that provide congestion relief in urban centers. We have always expected these assets to experience higher traffic losses during economic contractions when traffic congestion declines and the value proposition of the express lane shrinks. Moreover, given the dynamic pricing, when congestion declines, so does the toll rate, so revenue declines are amplified.

As such, we incorporated material stress cases into our baseline assessment of the credit risk — and rating — of each issuer. Therefore, all of managed lanes we rate can withstand at least a 50% decline in budgeted revenues and a 10% O&M cut while still maintaining total DSCRs above 1.0x. In addition, under this stress scenario the rated issuers can last for several years, assuming flat debt service, yet we know debt service amortization rises for all of them over the next 30 years (see Exhibit 2). In fact, only two issuers use a modest amount of liquidity in our 50% revenue and 10% O&M cut scenario, evidencing the resiliency of each asset and the importance of its liquidity to its credit profile.

Exhibit 2

Privately managed toll roads' strong resiliency can absorb 50% revenue losses before 1.0x DSCRs are approached and before the strong liquidity would be used

Rating and outlook	Ba1 (Sr), Stable	Baa3 (Sr), Positive	Baa2 (Sr), Stable	Baa3 (Sr), Baa3 (Sub), Stable
Liquidity	$3.8 million in unrestricted balance sheet liquidity >12 month DSRF sized to MADS ($84.7 million) $7.5 million operating reserve fund $11.6 million special improvement fund Early redemption reserve fund $121.3 million	$234 million in unrestricted balance sheet liquidity >12 month PABS DSRF 12 month TIFIA DSRF ($61.5 million) $232 million operating and distribution account $20 million Major Maintenance Reserve Account (MMRA)	$35.2 million in unrestricted balance sheet liquidity 12 month DSRF ($54.5 million) $102.1 million Major Maintenance Reserve Account	$112.7 million in unrestricted balance sheet liquidity 12 month PABS DSRF ($27.4 million) $20 million Major Maintenance Reserve Account
Run Rate Liquidity Analysis based on No revenue, 10% O&M Cut, flat debt service (number of months)				
Unrestricted Balance Sheet Liquidity	0	35	5	39
Unrestricted Balance Sheet Liquidity + MMRA	37	39	22	46
Unrestricted Balance Sheet Liquidity + MMRA + DSRF	59	48	31	56
DSCR Analysis based on 50% revenue and 10% O&M Cut				
Moody's pre coronavirus 2020 forecast DSCR	4.08x/ 2.13x	2.92x/ 2.28x	2.54x	3.35x
Issuer pre coronavirus 2020 forecast DSCR	1.26x/ 1.23x	3.06x/ 2.38x	2.54x	4.93x
30% Operating Revenue Cut and 10% O&M Cut to Moody's forecast	2.95x/ 1.53x	1.88x/ 1.51x	1.62x	2.51x
50% Operating Revenue Cut and 10% O&M Cut to Moody's forecast	1.82x/ .95x	1.20x/ .96x	1.06x	1.56x

Toll Road Investors Partnership II DSCRs are Mandatory DSCR / Scheduled DSCR
LBJ Infrastructure Group DSCRs are Senior DSCR / Senior + Subordinate DSCR
NTE Mobility Partners, LLC only has senior debt service
NTE Mobility Partners Segments 3, LLC only has senior debt service now as the subordinate TIFIA loan interest is capitalized in the first five years of operations
Source: Moody's Investors Service

Managed toll lanes typically have a large equity cushion and a flexible subordinate transportation and infrastructure finance (TIFIA) loan that result in higher coverage levels in the early and most uncertain years of operation. These higher DSCRs can withstand larger declines in traffic. In addition, nearly all of the privately managed toll roads we rate benefit from a 12-month DSRF and other indenture-required maintenance or operating reserves, except for the two that have not yet opened. These two unopened roads benefit from very large ramp-up reserves that support the toll road for several years under a zero revenue scenario.

Equity owners of these privately managed concession based toll roads are also highly incentivized to contribute additional equity to cover costs, including debt service, if there is a short-term cash flow need. The long-term financing structure typically has a multiyear concession tail after the debt matures, incentivizing equity to support the project through short term periods of weakness if necessary. This provides additional flexibility in case a refinancing is needed, whereby the private owner could refinance the debt by pushing out the principal repayment period further into the concession tail while reducing annual debt service costs.

Nearly all toll roads we rate have a 12-month DSRF, but nearly all toll roads can operate at breakeven levels for several years without using those funds

The current crisis has highlighted the value of the credit protection a DSRF provides. DSRFs provide time for the asset to weather through unknown event risks like we are experiencing now with the coronavirus outbreak. We do not expect issuers to tap their DSRFs in the normal course of business, but instead to use them to help reduce default risk during times of severe distress.

Nearly all publicly owned US toll roads have a 12-month DSRF with only a handful having a weaker indenture-required DSRF (see Appendix A). Those with weaker requirements typically maintain very strong balance sheet liquidity, which has justified the weakening of DSRF requirements over the years. However, the current crisis highlights the importance of liquidity in all forms for demand-risk assets, especially reserves that are dedicated to lenders only, which reduces default risk.

US privately managed toll roads we rate also usually have a 12-month DSRF, primarily because of the vintage of the debt issuance or the TIFIA subordinate lender's requirement. Two privately managed roads that we rate have a six-month DSRF, but both are still under construction and both benefit from other strong indenture-required liquid reserves.

Strong balance sheet liquidity coupled with continued modest revenue collection ensures nearly all rated US toll roads can operate at breakeven levels for several years without using the DSRF

Nearly all US toll roads that we rate require monthly deposits of a proportional amount of the upcoming debt service payment — one-sixth of interest and one-twelfth of principal — into a trustee-controlled debt service account after paying monthly operating expenses. These monthly set asides ensure sufficient funds are available for the debt service payment when due. This mechanism provides another level of liquid lender protection while also using more of the issuer's balance sheet funds as these debt service set asides cannot be reduced like operating expenses.

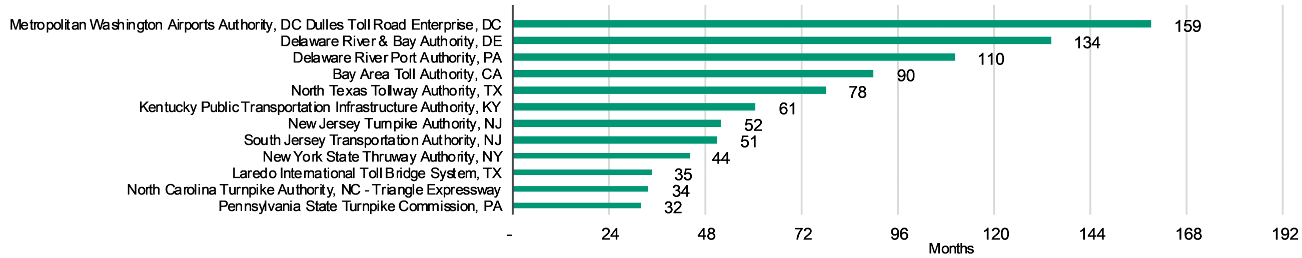
As a result of this operating profile, we have calculated a liquidity duration run rate metric that combines both resiliency and liquidity to determine how many months a toll road can last with lower revenues before exhausting balance sheet liquidity and needing to use the DSRF. We used recent audited results to estimate average monthly revenues, excluding seasonality, compared to average monthly operations and maintenance (O&M) and debt service costs. When the average monthly revenues are below the average monthly O&M and debt service costs, balance sheet liquidity is required to fill the gap. If the reverse is true, no liquidity will be used unless it is used for capital expenditures not included in O&M costs. We note this assumes flat O&M and debt service costs, which will rise and fall for all issuers over time.

We used the most recent available audited or publicly reported financial results as a starting point. We then reduced revenues by 30% for traditional toll roads and 50% for managed lanes while also cutting O&M by 10%. The monthly margin was then measured against the unrestricted and discretionary liquidity reported in the most recent audit. We did not use the DSRF in any cases because this would provide even more protection from this downside scenario. This also assumes no toll rate increases or other offsetting actions.

The results in Exhibit 3 and 4 indicate that nearly all publicly owned US rated toll roads can last for 12 months in a no revenue and 10% O&M cut scenario (Exhibit 4) before using all of their balance sheet liquidity and before using their DSRF. In Exhibit 3, under Moody's base stress case scenario only a handful of toll roads cannot last indefinitely under a 30% revenue and 10% O&M cut scenario. Even these that cannot last indefinitely can last for at least 32 months.

Exhibit 3

Liquidity run rate analysis under Moody's base stress of 30% revenue and 10% O&M cut with flat debt service evidences that only the issuers listed below will exhaust their balance sheet liquidity over the number of months cited while maintaining 1.0x DSCRs and not using the DSRF. Others do not use balance sheet liquidity under these conditions.

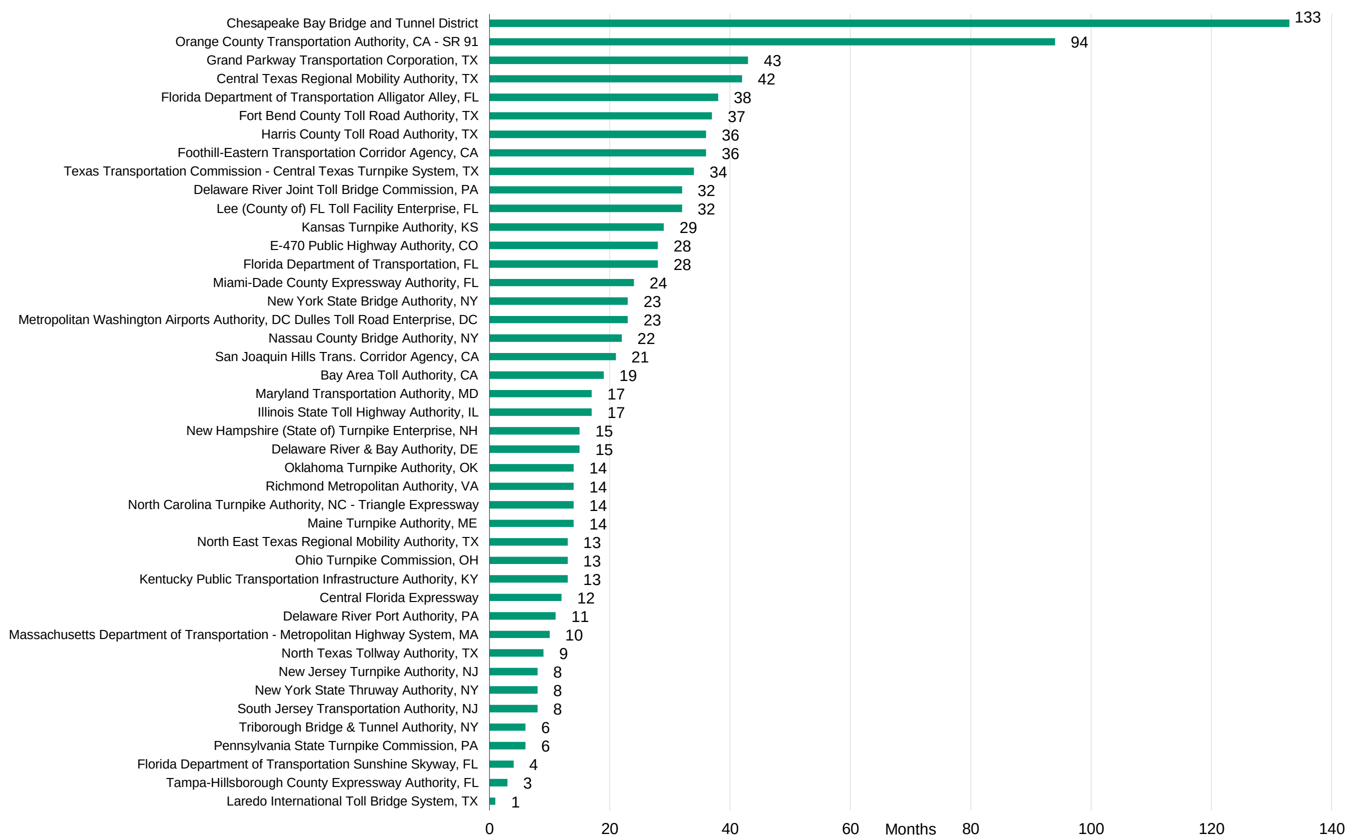


Source: Moody's Investors Service and issuers' recent audited financial statements

These calculations are conservative as most US toll roads improved their liquidity levels through February 2020 and nearly all have also been able to cut expenses and capital to reduce O&M costs by more than just the 10% we have assumed. This provides some cushion should the credit impact be worse or should another crisis occur in the fall or winter. In addition, there are other forms of credit support for some in the form of parent government support for O&M if needed, reduced transfers to the public owner in tandem with a reduction in expenses, or the potential passage of publicly announced large near term rate increases.

Exhibit 4

If no revenue is collected and monthly O&M and debt service deposits continue to be made, the majority of publicly owned toll roads we rate can last for at least 12 months before using all balance sheet liquidity. The below assumes no use of the DSRF.



Grand Parkway Transportation Corporation's (GPTC) liquidity includes prepaid debt service
Texas Transportation Commission- Central Texas Turnpike System's (CTTS) liquidity includes prepaid debt service and prepaid operating expenses
Triborough Bridge and Tunnel Authority's (TBTA) parent, the Metropolitan Transportation Authority, manages cash across all of its component units, including TBTA's balance sheet liquidity
Sources: Moody's Investors Service and issuers' recent audited financial statements

Port Authority of New York and New Jersey (PANYNJ Aa3, negative) is a bi-state entity that provides most of the regional transportation infrastructure including bridges, tunnels, airports and ports within the Port District of New York and New Jersey

We changed the PANYNJ's rating outlook to negative on 9 April because of the unprecedented coronavirus restrictions globally that are expected to continue to lead to a substantial decline in traffic and passenger volumes across the Port Authority's infrastructure assets including the airports, the tunnels and bridges, the PATH and the ports. Air travel will likely recover more slowly than traffic volumes at its other infrastructure assets. The Port Authority generates most operating income with the airports and the tolled bridges and tunnels.

The Port Authority estimates that it will receive around $450 million in federal stimulus funding under the 2020 CARES Act for its airports. However, this amount will likely not be sufficient to fully mitigate the expected revenue decline across its infrastructure assets in 2020. It is uncertain if the Port Authority will receive additional federal funding for its tolled crossings or the PATH system.

We expect the Port Authority will remain flexible to reduce capital expenditures and preserve liquidity until revenue recovers. However, the essentially of its infrastructure assets for an eventual economic recovery in the region will limit reductions in capital expenditures and operating expenses.

Key factors — ownership, commercial/passenger traffic, fiscal year ends — will differentiate credit effects across the sector

The depth and extent of a toll road's traffic and revenue decline will depend on a variety of factors, including the asset's location and local public health decisions. Most of the large traffic declines of up to 80% will be short lived, but the effect will vary among the issuers we rate. Large statewide turnpike systems and regional roadway networks are likely to rebound well over time from any short-term shock because of their strong market position and rate-raising ability. Smaller single-asset toll roads or bridges will be more affected, but they typically have higher coverage and liquidity levels to balance this risk or they have lower ratings that incorporate their more limited market position and flexibility during economic declines.

Once recovery begins, there will likely be changes to user behavior. In urban areas with mass transit, there may be an increase in driving if transit users prefer to drive to maintain social distancing. For commuter roads, there may be an increase in telecommuting that could reset commuter traffic to levels not seen for five years or so before returning to normal growth rates in line with GDP growth.

Public ownership includes rate raising flexibility that privately managed toll roads lack

Government-owned, or publicly managed, toll roads in the US have local control of their toll rates and adjust them annually by policy linked to the (consumer price index) CPI or periodically when needed. This local rate-setting ability is a key mitigant to demand variability and a primary credit driver that results in most having an investment grade credit profile.

Large one-time toll rate increases during past economic downturns helped many toll roads maintain their strong credit quality. These types of increases may be politically difficult now given the heavy economic impact of the coronavirus outbreak, especially as some toll road operators remove late fees while some toll roads have removed tolls temporarily. Moreover, because publicly managed toll roads are not profit maximizing, they typically maintain a good amount of headroom in their toll rates that enables them to grow revenues quickly while limiting traffic losses given typically inelastic demand profiles.

However, for publicly managed roads, a pressured government owner can cause credit pressure. We have revised the outlook on three toll road assets to date because of the pressure on their parent government — Triborough Bridge and Tunnel Authority (Aa3 negative), Illinois State Toll Highway Authority (A1 negative), and the Port Authority of New York and New Jersey (Aa3 negative) that is a combined enterprise. Other issuers may also experience credit pressure if their parent governments revenue profile weakens and they look to the toll road as a source of funds. This was a key risk for a handful of US toll roads during the slow economic recovery after the Great Recession a decade ago.

Privately managed toll roads operate under long-term concessions that typically contain certain contractual limitations on their ability to raise toll rates. These limits are typically linked to regional GDP, CPI or some fixed minimum like 2%. They can also defer capital and cut other operating costs to help offset weak demand.

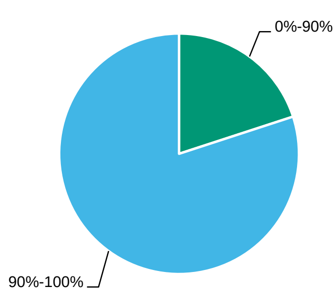
Toll roads with a higher share of commercial revenue helps moderate total revenue losses given notably lower commercial traffic losses

While most transactions for rated toll roads are from passenger vehicles, commercial vehicles pay higher toll rates and comprise an outsized share of revenue compared to their share of annual transactions (see Exhibit 5). Passenger vehicle traffic declines have been larger ranging from 30% to 85% compared to the same point in 2019. Commercial vehicle declines have been lower in the 5% to 20% range and essential services like grocery stores remain open and commercial activity continues as more shopping moves online. That being said, we have seen commercial traffic declines begin to increase as the economic shutdown works its way through the supply chain; we expect commercial traffic declines to increase further over the coming months before bottoming out.

The relatively more muted declines in commercial traffic will reduce total revenue losses for those with a larger share of commercial vehicle revenue. About one-third of the toll roads we rate receive over 40% of their annual revenues from commercial vehicles (see Exhibit 6). This has risen over time with the continued rise in e-commerce that has only increased in recent weeks. While commercial traffic will decline and subsequently recovery along with the US economy, we expect a potentially larger share of online shopping in a post-coronavirus operating environment that could raise the base level of commercial traffic demand across the portfolio. This new commercial traffic is unlikely to be as volatile as manufacturing, food and building materials related commercial traffic because the newer commercial traffic growth is related to daily living needs versus parts for manufacturing of automobiles or building materials for new construction that fluctuate more with variable economic cycles.

Exhibit 5

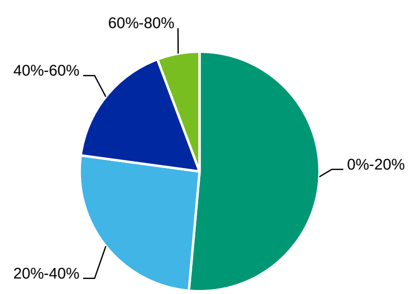
Passenger transactions account for over 90% of total transactions for about 80% of the rated portfolio with only one in five rated toll roads having a passenger transaction share below 90%



Source: Moody's Investors Service

Exhibit 6

About one-quarter of the toll roads we rate receive 40% or more of their annual revenue from commercial vehicles, while about half of rated toll roads receive 20% or less from commercial vehicles



Source: Moody's Investors Service

Audit timing differentiates which issuers will be able to spread the initial financial shock of the coronavirus in one or two fiscal years

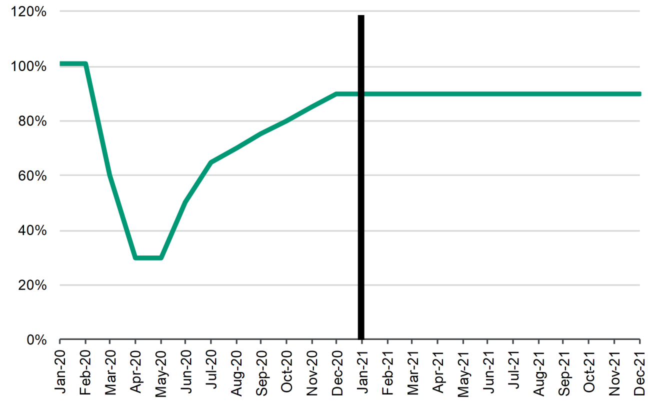
Our base stress scenario results in a 30% revenue decline in 2020 for issuers with a 31 December fiscal year-end and a 15% revenue decline in fiscal year end 30 June 2020, followed by another 15% to 20% revenue decline in fiscal year-end 30 June 2021 (see Exhibits 7 and 8). For issuers with an earlier fiscal year end, we expect a lower revenue decline because of the additional months of typical revenue generation.

Among our issuers, 31 December and 30 June each account for 42%. The remaining 8% have fiscal year ends throughout the year.

Exhibit 7

Our stress scenario reflects material traffic declines through mid-2020 and a slow recovery to a level that is 10% below 2019 traffic levels by year end 2020

This stress results in a 30% revenue decline in 2020 and a 10% decline in 2021

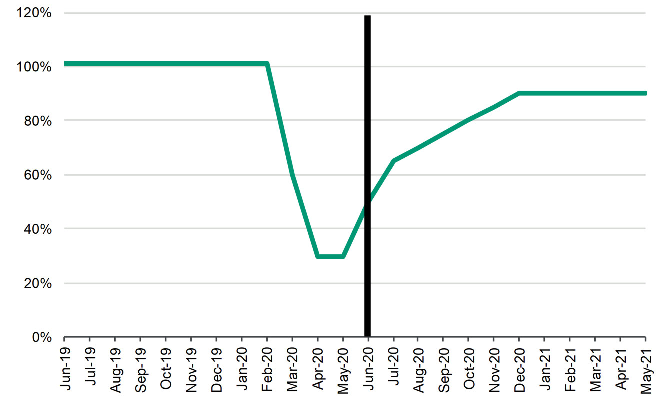


Line represents % of 2019 levels.

Source: Moody's Investors Service

Exhibit 8

Issuers with 30 June fiscal year end will have a 15% revenue decline in fiscal year ending 30 June 2020 and about a 15% to 20% revenue decline in fiscal year ending 30 June 2021



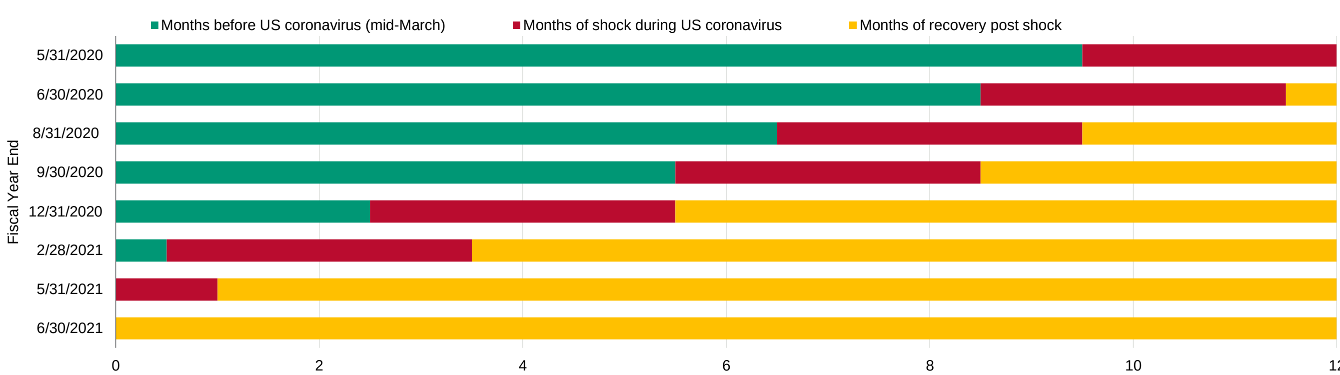
Line represents % of 2019 levels.

Source: Moody's Investors Service

Issuers with 31 December fiscal year will absorb the full financial impact in one audited period, potentially leading to a trip of a financial rate covenant, while issuers with a 30 June fiscal year can spread the financial impact over two audited reporting periods (see Exhibit 9). Tripping a coverage financial covenant because of the coronavirus is credit negative, but temporary because of this unusual event risk. We would expect any covenant breach to be rectified in 2021. The consequences of violating a rate covenant is typically to hire a rate consultant to determine how much to adjust rates to meet the covenant in the future.

Exhibit 9

Issuers fiscal year determines how much of the three-month coronavirus shock affects financial results and rate covenant compliance



Source: Moody's Investors Service

Toll roads under construction will have time to recover before opening, but also have strong government support and liquidity

New toll roads under construction or operating toll roads with a large expansion project are adequately protected from the coronavirus outbreak because of their strong contractual protections, available liquidity, parent government support and flexible debt service repayment schedules.

We expect additional construction delays even if construction has been deemed an essential service; however we expect these delays to be manageable. These delays are already occurring because of lower productivity rates, fewer workers showing up and work stoppages. The construction contractor typically provides a fixed-price, date-certain contract to complete the projects, obligating them to absorb higher costs because of delays.

However, in the case of the coronavirus, the outbreak may entitle the contractor to relief in the form of additional time or compensation given the event may be classified as force majeure. Generally, the actions in relation to the coronavirus can be filed for as relief events, but it remains to be seen if these claims will be accepted.

While new toll roads will open in a weaker economy, we typically materially haircut the early years of a traffic and revenue forecast because of typically high variability of performance during this time. As a result, issuers have added ramp-up reserves and increased their initial liquidity levels to mitigate this risk that has now materialized.

Exhibit 10

New US toll roads under construction do not open for many years, have strong liquidity to offset below forecast performance during the initial ramp-up period as well as flexible debt service or parent government support

Toll Roads Under Construction	Blueridge Transportation Group LLC	Oklahoma Turnpike Auth. - Gilcrease Expressway Proj.	I-66 Mobility Partners LLC	State Highway 249 System, TX	Orange County Transportation Authority, CA (405 Express Lanes)
Rating	**Baa3 STA**	**Baa3 STA**	**Baa3 (Sr), Baa3 (sub), STA**	**Baa3 STA**	**Baa2 STA**
Opening Date	August 2020	June 2022	December 2022	Seg 1 - Mar 2021 Seg 2 - Jan 2023	October 2023
Liquidity	$66 million ramp up reserve, 6 months DSRF and an MMRA funded at substantial completion for the senior PABs; 12 month DSRF for TIFIA funded in year 5	ODOT funds reserves starting in 2021 and over first 3 years of operations before first DS payment is due in 2025	$60 million ramp up reserve; $15 million MMR; 6 month DSRF for PABs; 12 month DSRF for TIFIA	DSRF - $24.9 million ($7.8 million of debt service year 1) Rate stabilization fund - $10 million grows to $30 million	DSRF and MMRA funded after opening from cash flow over 3 years
Other Credit Supportive Features	Ramp up reserve can cover 4.5 years of mandatory debt service or 2.5 years of scheduled debt service	ODOT provides $4M per year in cash to offset low demand risk	First debt service payment in 2023 with low flat debt service through 2026	TXDOT pays O&M until rate stabilization reaches $30M	TIFIA loan first payment due in 2027

Source: Moody's Investors Service

Exhibit 11

Operating US toll roads with large expansion projects under construction also have years until they open along with strong liquidity to offset below forecast performance during the initial ramp-up period

Operating Toll Roads with Large Expansions	North Carolina Turnpike Authority, NC - Triangle Expressway	Chesapeake Bay Bridge and Tunnel District- New Tunnel	NTE Mobility Partners Segments 3 LLC expansion Segment 3C
Rating	**Baa2, STA**	**Baa2, STA**	**Baa3, STA**
Opening Date	2024	March 2024	September 2023
Liquidity	$82.5 million of unrestricted liquidity on balance sheet, DSFR- 50% of 3 prong test	$237 million on balance sheet; DSRF- 3 prong test	$112.7 unrestricted liquidity on balance sheet, 12 month PABS DSRF, $20 million MMR
Other Credit Considerations	No announced delays. NCDOT covers O&M or R&R reserve shortfalls if needed	Construction is delayed	Construction could be delayed but is still expected to finish early

Source: Moody's Investors Service

Appendix A

Exhibit 12

Majority of publicly owned rated toll roads maintain strong balance sheet liquidity and have DSRFs

Obligor Name	Audit Date	Unrestricted Cash and Discretionary Liquidity	Days Cash on Hand	Debt Service Reserve Fund Requirement
Laredo International Toll Bridge System, TX	09/30/2019	7,925	58	AVG annual DS
Florida Department of Transportation Sunshine Skyway, FL	06/30/2019	2,692	112	3 prong test or zero
South Jersey Transportation Authority, NJ	12/31/2018	70,313	346	MADS
New York State Thruway Authority, NY	12/31/2019	473,896	375	MADS for SR and 50% of MADS interest for JR with a 5 year fund at 20% starting in 2019
Tampa-Hillsborough County Expressway Authority, FL	06/30/2019	16,388	384	3 prong test
Triborough Bridge & Tunnel Authority, NY	12/31/2018	560,757	424	NONE
Pennsylvania State Turnpike Commission, PA	05/31/2019	649,976	448	Senior Lien: MADS, Subordinate Lien: Lesser of 3 prong
Delaware River & Bay Authority, DE	12/31/2018	132,718	541	12 months DSRF
Delaware River Port Authority, PA	12/31/2018	281,054	576	MADS or 125% AVG annual DS
Maryland Transportation Authority, MD	06/30/2019	502,833	656	3 prong test
New Jersey Turnpike Authority, NJ	12/31/2018	1,049,049	706	Maximum Interest
Nassau County Bridge Authority, NY	12/31/2018	8,015	738	3 prong test
Massachusetts Department of Transportation - Metropolitan	06/30/2019	226,767	759	3 prong test
Richmond Metropolitan Authority, VA	06/30/2019	33,930	787	12 months DSRF
Ohio Turnpike Commission, OH	12/31/2018	258,048	791	Sr- MADS; Jr- AADS
New Hampshire (State of) Turnpike Enterprise, NH	06/30/2019	120,931	794	MADS
Oklahoma Turnpike Authority, OK	12/31/2018	239,928	815	3 prong test
North East Texas Regional Mobility Authority, TX	09/30/2018	10,119	830	3 prong test
Maine Turnpike Authority, ME	12/31/2018	103,066	871	50% of MADS
New York State Bridge Authority, NY	12/31/2019	69,790	915	MADS
North Texas Tollway Authority, TX	12/31/2018	586,549	1,051	SR - avg annual DS; 2nd tier - 50% of avg annual DS
Central Florida Expressway	06/30/2019	288,526	1,057	Lesser of 3 prong test
Illinois State Toll Highway Authority, IL	12/31/2018	1,070,168	1,096	MADS
Kansas Turnpike Authority, KS	06/30/2019	160,749	1,201	MADS
Florida Department of Transportation Alligator Alley, FL	06/30/2019	39,166	1,372	3 prong test
North Carolina Turnpike Authority, NC - Triangle Expressway	06/30/2019	82,463	1,449	50% of 3 prong test
Delaware River Joint Toll Bridge Commission, PA	12/31/2018	243,610	1,477	MADS
Lee (County of) FL Toll Facility Enterprise, FL	09/30/2019	58,082	1,612	MADS or 125% AVG annual DS
Florida Department of Transportation, FL	06/30/2019	1,064,941	1,631	3 prong test
Kentucky Public Transportation Infrastructure Authority, KY	06/30/2019	54,122	1,635	MADS on a 5 year look forward basis
Bay Area Toll Authority, CA	06/30/2019	1,117,000	1,915	MADS or 125% AVG annual DS
Harris County Toll Road Authority, TX	02/28/2019	1,264,878	1,998	AVG annual DS up to MADS
Metropolitan Washington Airports Authority, DC Dulles Toll Road	12/31/2019	281,167	2,143	3 prong test
E-470 Public Highway Authority, CO	12/31/2018	350,833	2,427	MADS
Miami-Dade County Expressway Authority, FL	06/30/2019	282,342	2,590	MADS
Central Texas Regional Mobility Authority, TX	06/30/2019	252,350	2,660	MADS for sub lien
Texas Transportation Commission - Central Texas Turnpike	08/31/2019	513,546	3,387	3 prong test
Fort Bend County Toll Road Authority, TX	09/30/2019	80,767	3,610	3 prong test
San Joaquin Hills Trans. Corridor Agency, CA	06/30/2019	224,037	3,661	3 prong test
Grand Parkway Transportation Corporation, TX	08/31/2019	470,470	3,929	3 prong test
Orange County Transportation Authority, CA - SR 91	06/30/2019	191,925	4,678	3 prong test
Foothill-Eastern Transportation Corridor Agency, CA	06/30/2019	415,773	5,717	3 prong test
Chesapeake Bay Bridge and Tunnel District	06/30/2019	237,143	5,838	3 prong test

MADS = Maximum Annual Debt Service
3 prong test = lesser of 10% of par, 125% of average annual debt service, or MADS
Grand Parkway Transportation Corporation's (GPTC) liquidity includes prepaid debt service
Texas Transportation Commission- Central Texas Turnpike System's (CTTS) liquidity includes prepaid debt service and prepaid operating expenses
Triborough Bridge and Tunnel Authority's (TBTA) parent, the Metropolitan Transportation Authority, manages cash across all of its component units, including TBTA's balance sheet liquidity
Georgia State Road & Tollway Authority Northwest Corridor (Baa2 stable) is not included as the 2018 audit is only a partial year of operations and the 2019 audit is unavailable. The 30-mile, publicly owned managed toll lane project was outperforming the initial forecast by 40%, so a 50% revenue decline would be back in line with our original forecast. The project benefits from direct state support for roadway O&M and R&R, as well as contingent state support for tolling expenses if revenues fall short.
North Carolina Turnpike Authority - Monroe Expressway (Baa3 stable) is not included as the June 30, 2019 is only a partial year since it opened on November 27, 2018. Initial traffic volumes modestly exceeded issuer expectations, but Moody's sensitivity assumed a 50% revenue cut to the issuer's forecast. The toll road has a $30 million ramp-up reserve, other strong liquid reserves and a contingent guarantee by the NCDOT to pay for any O&M and R&R reserve shortfalls
Source: Moody's Investors Service

Appendix B

Exhibit 13

Revenue declines of 15% and 30% with a 10% O&M cut can be absorbed nearly all publicly owned US toll roads before their DSCRs fall below 1.0x.

DSCRs below 1.0x and DSCRs below the rate covenant in Moody's base stress case of 30% revenue and 10% O&M cut are highlighted.

Obligor Name	Audit Date	Senior Lien Actual DSCR	Senior Lien DSCR (15% Operating Revenue cut and 10% O&M cut)	Senior Lien DSCR (30% Operating Revenue cut and 10% O&M cut)	Actual Senior + Sub lien DSCR / Total DSCR	Senior and Subordinate Lien DSCR (15% Operating Revenue cut and 10% O&M cut)	Senior and Subordinate Lien DSCR (30% Operating Revenue cut and 10% O&M cut)	Debt Service Coverage Rate Covenant
New York State Thruway Authority, NY	12/31/2019	1.80	1.28	0.73	1.33	0.94	0.53	1.20
North Carolina Turnpike Authority, NC - Triangle Expressway	06/30/2018	1.35	1.10	0.77	1.01	0.82	0.58	1.30
South Jersey Transportation Authority, NJ	12/31/2018	1.67	1.30	0.64	1.58/ 1.45	1.23/ 1.13	0.61/ .56	1.20
Kentucky Public Transportation Infrastructure Authority, KY	06/30/2019	1.11	0.94	0.73	1.11	0.94	0.73	1.75
Delaware River & Bay Authority, DE	12/31/2018	2.08	1.60	0.78	2.08	1.60	0.78	1.25
Pennsylvania State Turnpike Commission, PA	05/31/2019	2.91	2.42	1.76	1.34/ 1.26	1.12/ 1.05	0.81/ .76	1.30 Senior, 1.0 Sub
New Jersey Turnpike Authority, NJ	12/31/2018	1.68	1.41	1.08	1.35	1.13	0.87	1.20
North Texas Tollway Authority, TX	12/31/2018	1.64	1.37	1.05	1.38/ 1.29	1.15/ 1.08	0.89/ .83	1.35
Delaware River Port Authority, PA	12/31/2018	1.97	1.63	1.13	1.69	1.39	0.97	1.05
North East Texas Regional Mobility Authority, TX	09/30/2018	3.56	2.83	1.95	1.77	1.41	0.97	1.25 Senior, 1.10 Senior and Sub
Massachusetts Department of Transportation - Metropolitan Highway System, MA	06/30/2019	2.43	2.03	1.53	1.73	1.45	1.09	1.20 Senior; 1.15 Senior and Sub, 1.0 All debt
Bay Area Toll Authority, CA	06/30/2019	2.32	2.04	1.71	1.52	1.34	1.12	2.0 Senior, 1.30 Sub
Texas Transportation Commission - Central Texas Turnpike System, TX	08/31/2019	3.16	2.69	2.14	1.72	1.47	1.17	1.40 first tier, 1.10 second tier
Richmond Metropolitan Authority, VA	06/30/2019	1.98	1.65	1.21	1.98	1.65	1.21	1.20
Miami-Dade County Expressway Authority, FL	06/30/2019	1.83	1.55	1.23	1.83	1.55	1.23	1.20
Central Texas Regional Mobility Authority, TX	06/30/2019	2.71	2.28	1.72	1.97	1.65	1.25	1.25
San Joaquin Hills Trans. Corridor Agency, CA	06/30/2019	2.09	1.79	1.46	1.79	1.53	1.25	1.30 Senior, 1.10 all debt
Fort Bend County Toll Road Authority, TX	09/30/2019	4.23	3.59	2.84	1.88	1.59	1.26	1.25 Senior, 1.0 Sub
Ohio Turnpike Commission, OH	12/31/2018	3.80	3.19	2.37	2.05	1.72	1.28	1.20 Senior and Sub. 1.0 all costs
Foothill-Eastern Transportation Corridor Agency, CA	06/30/2019	2.04	1.79	1.48	1.80	1.59	1.31	1.30 Senior, 1.15 all debt
Delaware River Joint Toll Bridge Commission, PA	12/31/2018	2.26	1.88	1.34	2.26	1.88	1.34	1.30
Metropolitan Washington Airports Authority, DC Dulles Toll Road Enterprise, DC	12/31/2018	13.59	11.74	11.34	1.52/ 1.35	1.32/ 1.16	1.27/ 1.12	1.20
E-470 Public Highway Authority, CO	12/31/2018	2.07	1.75	1.38	2.07	1.75	1.38	1.30
New Hampshire (State of) Turnpike Enterprise, NH	06/30/2019	2.30	1.91	1.38	2.30	1.91	1.38	1.20
Tampa-Hillsborough County Expressway Authority, FL	06/30/2019	2.04	1.75	1.42	2.04	1.75	1.42	1.30
Triborough Bridge & Tunnel Authority, NY	12/31/2018	2.73	2.28	1.75	2.25	1.88	1.44	1.25
Central Florida Expressway	06/30/2019	2.32	1.96	1.54	2.22	1.87	1.47	1.20
Nassau County Bridge Authority, NY	12/31/2018	3.76	2.92	1.50	3.76	2.92	1.50	1.0
Oklahoma Turnpike Authority, OK	12/31/2018	2.38	2.00	1.52	2.38	2.00	1.52	1.20 Senior, 1.05 Sub
Laredo International Toll Bridge System, TX	09/30/2019	3.95	3.20	2.16	2.95	2.39	1.61	1.40 Senior, 1.0 Sub
Grand Parkway Transportation Corporation, TX	08/31/2019	19.07	16.68	13.89	2.30	1.95	1.67	1.50
Illinois State Toll Highway Authority, IL	12/31/2018	2.66	2.24	1.73	2.66	2.24	1.73	1.30
Maine Turnpike Authority, ME	12/31/2018	2.43	2.53	1.91	2.20	2.30	1.74	1.20
New York State Bridge Authority, NY	12/31/2019	3.14	2.57	1.75	3.14	2.57	1.75	1.75
Harris County Toll Road Authority, TX	02/28/2019	3.93	3.30	2.54	3.13	2.63	2.02	1.25
Florida Department of Transportation, FL	06/30/2019	3.79	2.91	2.29	3.38	2.86	2.25	1.20 Senior, 1.0 all costs
Lee (County of) FL Toll Facility Enterprise, FL	09/30/2019	3.59	3.01	2.30	3.59	3.01	2.30	1.20
Kansas Turnpike Authority, KS	06/30/2019	4.23	3.53	2.60	4.23	3.53	2.60	1.25
Orange County Transportation Authority, CA - SR 91	06/30/2019	4.73	4.07	3.27	4.73	4.07	3.27	1.30
Maryland Transportation Authority, MD	06/30/2019	6.02	5.00	3.68	6.02	5.00	3.68	1.20
Chesapeake Bay Bridge and Tunnel District	06/30/2019	6.61	5.65	4.50	6.61	5.65	4.50	1.50 first tier, 1.25 first and second tier, 1.15 first, second and sub, 1.0 all required deposits
Florida Department of Transportation Alligator Alley, FL	06/30/2019	8.96	7.47	5.61	8.96	7.47	5.61	1.20 Senior, 1.0 all costs

Laredo International Bridge System has a large transfer to its owner that was cut in line with the revenue cuts in addition to a 10% O&M cut.

Total DSCR for Pennsylvania Turnpike Commission (PTC) includes the subordinate Motor License Fund (MLF) bonds that are secured by the funds in the MLF fund which the Commonwealth must transfer to cover any shortfalls if needed.

Georgia State Road & Tollway Authority Northwest Corridor (Baa2 stable) is not included as the 2018 audit is only a partial year of operations and the 2019 audit is unavailable. The 30-mile, publicly owned managed toll lane project was outperforming the initial forecast by 40%, so a 50% revenue decline would be back in line with our original forecast. The project benefits from direct state support for roadway O&M and R&R, as well as contingent state support for tolling expenses if revenues fall short.

North Carolina Turnpike Authority - Monroe Expressway (Baa3 stable) is not included as the June 30, 2019 is only a partial year since it opened on November 27, 2018. Initial traffic volumes modestly exceeded issuer expectations, but Moody's sensitivity assumed a 50% revenue cut to the issuer's forecast. The toll road has a $30 million ramp-up reserve and a contingent guarantee by the NCDOT to pay for any O&M and R&R reserve shortfalls.

North Carolina Turnpike Authority - Triangle Expressway has a contingent guarantee by the NCDOT to pay for any O&M and R&R reserve shortfalls.

Source: Moody's Investors Service

Appendix C

Exhibit 14

Liquidity run rate analysis under Moody's base stress of 30% revenue cut, 10% O&M cut and flat debt service evidences that nearly all publicly owned toll roads Moody's rates can last at least three years with 1.0x DSCRs before exhausting their balance sheet liquidity. Most do not use any liquidity.

Run rates shown in months

Obligor Name	Audit Date	Run Rate with No Revenue, 10% O&M cut, flat debt service	Run Rate with 30% Revenue cut, 10% O&M cut, flat debt service
Laredo International Toll Bridge System, TX	09/30/2019	1	35
Tampa-Hillsborough County Expressway Authority, FL	06/30/2019	3	Liquidity Not Used
Florida Department of Transportation Sunshine Skyway, FL	06/30/2019	4	Liquidity Not Used
Pennsylvania State Turnpike Commission, PA	05/31/2019	6	32
Triborough Bridge & Tunnel Authority, NY	12/31/2018	6	Liquidity Not Used
South Jersey Transportation Authority, NJ	12/31/2018	8	51
New York State Thruway Authority, NY	12/31/2019	8	44
New Jersey Turnpike Authority, NJ	12/31/2018	8	52
North Texas Tollway Authority, TX	12/31/2018	9	78
Massachusetts Department of Transportation - Metropolitan Highway System, MA	06/30/2019	10	Liquidity Not Used
Delaware River Port Authority, PA	12/31/2018	11	110
Central Florida Expressway	06/30/2019	12	Liquidity Not Used
Kentucky Public Transportation Infrastructure Authority, KY	06/30/2019	13	61
Ohio Turnpike Commission, OH	12/31/2018	13	Liquidity Not Used
North East Texas Regional Mobility Authority, TX	09/30/2018	13	Liquidity Not Used
North Carolina Turnpike Authority, NC - Triangle Expressway	06/30/2019	14	34
Maine Turnpike Authority, ME	12/31/2019	14	Liquidity Not Used
Richmond Metropolitan Authority, VA	06/30/2019	14	Liquidity Not Used
Oklahoma Turnpike Authority, OK	12/31/2018	14	Liquidity Not Used
Delaware River & Bay Authority, DE	12/31/2018	15	134
New Hampshire (State of) Turnpike Enterprise, NH	06/30/2019	15	Liquidity Not Used
Illinois State Toll Highway Authority, IL	12/31/2018	17	Liquidity Not Used
Maryland Transportation Authority, MD	06/30/2019	17	Liquidity Not Used
Bay Area Toll Authority, CA	06/30/2019	19	90
San Joaquin Hills Trans. Corridor Agency, CA	06/30/2019	21	Liquidity Not Used
Nassau County Bridge Authority, NY	12/31/2018	22	Liquidity Not Used
Metropolitan Washington Airports Authority, DC Dulles Toll Road Enterprise, DC	12/31/2019	23	159
New York State Bridge Authority, NY	12/31/2019	23	Liquidity Not Used
Miami-Dade County Expressway Authority, FL	06/30/2019	24	Liquidity Not Used
E-470 Public Highway Authority, CO	12/31/2018	28	Liquidity Not Used
Florida Department of Transportation, FL	06/30/2019	26	Liquidity Not Used
Kansas Turnpike Authority, KS	06/30/2019	29	Liquidity Not Used
Lee (County of) FL Toll Facility Enterprise, FL	09/30/2019	32	Liquidity Not Used
Delaware River Joint Toll Bridge Commission, PA	12/31/2018	32	Liquidity Not Used
Texas Transportation Commission - Central Texas Turnpike System, TX	08/31/2019	34	Liquidity Not Used
Foothill-Eastern Transportation Corridor Agency, CA	06/30/2019	36	Liquidity Not Used
Harris County Toll Road Authority, TX	02/28/2019	36	Liquidity Not Used
Fort Bend County Toll Road Authority, TX	09/30/2019	37	Liquidity Not Used
Florida Department of Transportation Alligator Alley, FL	06/30/2019	38	Liquidity Not Used
Central Texas Regional Mobility Authority, TX	06/30/2019	42	Liquidity Not Used
Grand Parkway Transportation Corporation, TX	08/31/2019	43	Liquidity Not Used
Orange County Transportation Authority, CA - SR 91	06/30/2019	94	Liquidity Not Used
Chesapeake Bay Bridge and Tunnel District	06/30/2019	133	Liquidity Not Used

Grand Parkway Transportation Corporation's (GPTC) liquidity includes prepaid debt service

Texas Transportation Commission- Central Texas Turnpike System's (CTTS) liquidity includes prepaid debt service and prepaid operating expenses

Triborough Bridge and Tunnel Authority's (TBTA) parent, the Metropolitan Transportation Authority, manages cash across all of its component units, including TBTA's balance sheet liquidity

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Source: Moody's Investors Service

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