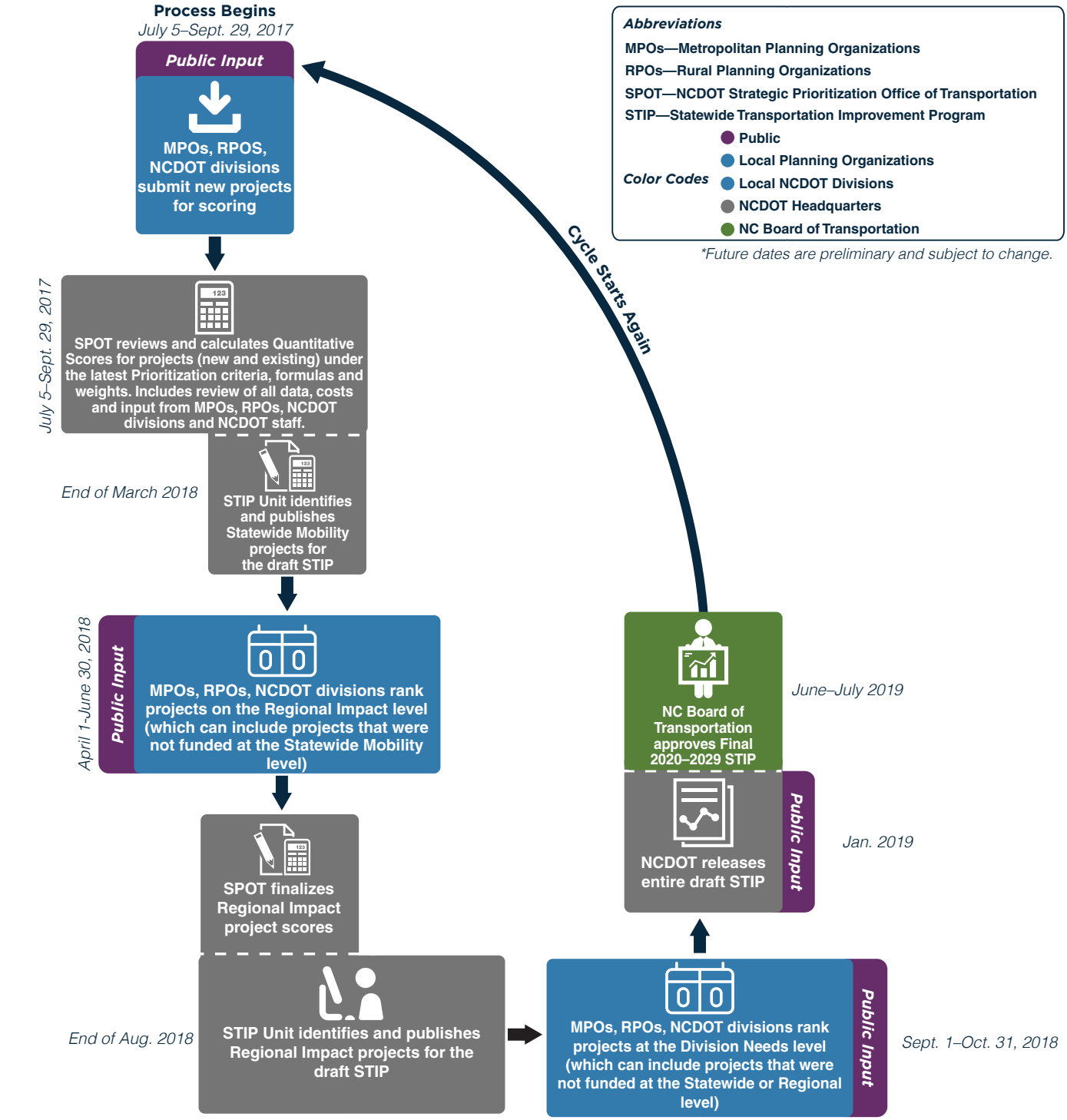
STATE TRANSPORTATION IMPROVEMENT PROGRAM DEVELOPMENT

The State Transportation Improvement Program (STIP) is the North Carolina Department of Transportation's (NCDOT) 10-year construction schedule for projects. The schedule is updated every two years based on a data-driven process called Prioritization, as well as the latest state and federal financial situation, and the status of preconstruction activities. Schedule development must adhere to the Strategic Transportation Investments (STI) law, which mandates ongoing evaluation and improvement to ensure the process continues to be responsive to North Carolina's diverse needs. Developing a STIP is accomplished through ongoing collaboration with our regional planning partners—metropolitan and rural planning organizations—and public input is a key component.



For more information, visit www.ncdot.gov/strategictransportationinvestments/

STRATEGIC TRANSPORTATION INVESTMENTS LAW

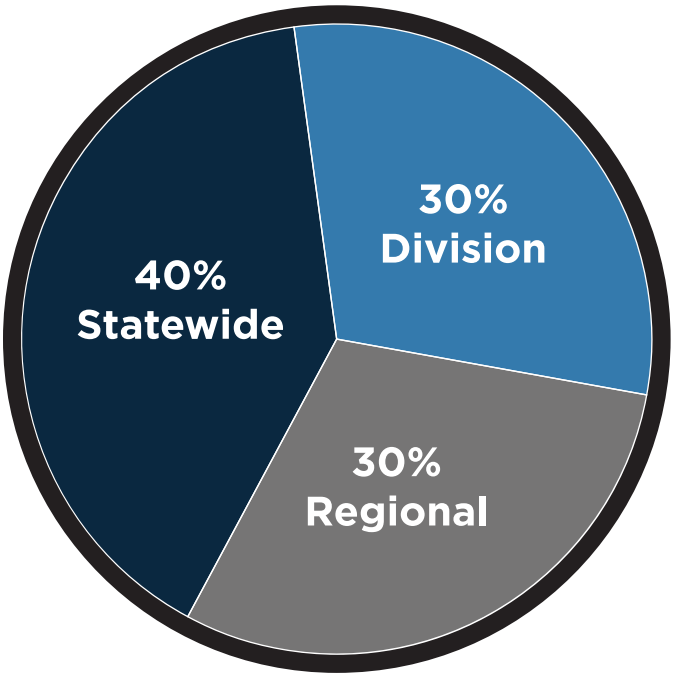
Passed in 2013, the Strategic Transportation Investments Law (STI) allows NCDOT to use its funding more efficiently and effectively to enhance the state's infrastructure, while supporting economic growth, job creation and a higher quality of life. This process encourages thinking from a statewide and regional perspective, while also providing flexibility to address local needs.

STI established the Strategic Mobility Formula, which allocates available revenues based on data-driven scoring and local input. It was used for the first time to develop the 2016–2025 State Transportation Improvement Program (STIP), which schedules the projects that will be funded during a 10-year period. While federal law requires it to be updated at least every four years, NCDOT updates the STIP every two years.

PRIORITIZATION

NCDOT uses a transparent, data-driven method for prioritizing transportation investment decisions. Through the process, called Prioritization, potential transportation improvement projects are submitted to NCDOT to be scored and ranked through the Strategic Mobility Formula at the statewide, regional and division levels, based on approved criteria such as safety, congestion, benefit-cost and local priorities. These scores and other factors are used to determine whether a project receives funding. Project prioritization occurs every two years. The current round of Prioritization is referred to as P5.0, because it is the fourth iteration of this process.

REVENUE DISTRIBUTION



HOW THE STRATEGIC MOBILITY FORMULA WORKS

The Strategic Mobility Formula funds projects in three categories:

- Division Needs
- Regional Impact
- Statewide Mobility

Division Needs

Projects in this category receive 30 percent of the available revenue, shared equally over NCDOT's 14 transportation divisions, which are groupings of local counties. Project scores are based 50 percent on data and 50 percent on rankings by local planning organizations and the NCDOT transportation divisions.

Highway projects in this category are analyzed according to five criteria:

- Congestion (15 percent)
- Benefit/cost (15 percent)
- Safety (10 percent)
- Freight and military) (5 percent)
- Accessibility/Connectivity (5 percent)

Regional Impact

Projects in this category receive 30 percent of available revenue. Projects on this level compete within regions made up of two NCDOT transportation divisions, with funding divided among the regions based on population. Data makes up 70 percent of the project scores in this category. Local rankings account for the remaining 30 percent.

Regional Impact projects are analyzed according to five criteria:

- Congestion (20 percent)
- Benefit/cost (20 percent)
- Safety (10 percent)
- Accessibility/connectivity (10 percent)
- Freight and military (10 percent)

Statewide Mobility

Projects in this category receive 40 percent of available revenue. The project selection process is based 100 percent on data.

Statewide Mobility projects are analyzed according to six criteria:

- Congestion (30 percent)
- Benefit/cost (25 percent)
- Economic competitiveness (10 percent)
- Safety (15 percent)
- Multimodal and military (5 percent)
- Freight and mobility (15 percent)

Alternate Criteria

To provide more flexibility, STI allows regions and divisions to develop alternate criteria tailored to their individual needs. To do so, the metropolitan and rural planning organizations, and the NCDOT divisions within the region must unanimously agree on the criteria.

9 Lenders' Downside Case

9.1 Definition Lenders' Downside Case

The Lenders' Downside Case (LDC) was developed in August 2014. In order to develop the LDC, we reviewed the LBC assumptions further to consider the potential downside of a number of forecasting parameters. A summary of the LDC assumptions are provided in **Table 32**.

The LDC includes a 10% reduction to the LBC assumption for the VoT. DOT[5] guidance suggests uncertainty around the VoT that can be up to 30% lower than mean values. On the basis that the values used by C&M for cars were considered to be comparable with average values and similar to other sources of data, we believe that a 10% reduction is a reasonable assumption of the potential downside on the VOT. This reduction was also applied to light trucks.

In relation to the escalation assumptions used for the VoT, analysis of the difference between median household income in North Carolina and CPI was undertaken over a 50 year period. The period covered 1990 to 2040 and included both historic and forecast changes (for 2011 onwards, based on Moodys May 2013 data) and indicated that there was a real change of broadly 0.3% in household income growth. This rate was applied for car classes and no escalation applied to light trucks (as per the LBC).

The capacity adjustment factors and validation adjustments used in the LBC were based on ensuring the model validation was more representative. The capacity adjustments factors ensured and that costs in the MD and NT periods were more appropriate given the longer time periods. The validation adjustments ensured any over representation of traffic in the model was corrected. As these were both validation adjustments, it was not considered appropriate to alter these assumptions for the LDC and so the LBC assumptions were retained.

The toll diversion parameters were adjusted to consider more of a downside scenario by using a multiplier of 1.5 compared with 1.25 adopted in the LBC. This implied that users would be more sensitive to paying tolls. As an example, a driver choosing to pay for a 12 minute time saving (as expected in the PM period, NB direction in 2035 for travelling the length of the concession) would pay around 10% less in the LDC compared to the LBC.

The socio economic growth rates used for the LDC were dampened by 15% from the LBC for both population and employment. This is based on review of historic variations for population and employment and plausible variations in the growth rates. Given the uncertainty about specific TAZ allocations of development, growth rates were applied uniformly for all forecasts years for each district. The resulting CAGRs adopted are shown in **Table 33**.

The tolls underpinning the LDC were optimized through the traffic model runs undertaken by C&M. The resulting toll rates are shown in Appendix G.

Table 32: Lenders' Downside Case assumptions

Item	Description and LBC Assumption		LDC Assumption
Value Of Time by Trip Purpose (2012 Dollars)	**Purpose**	**2012**	**2012**
	Home-Based Work	$13.56	$12.20
	Home-Based Other	$12.26	$11.03
	Non-Home-Based	$18.58	$16.72
	Light Truck	$27.00	$24.30
Value of Time Escalation	**Purpose**	For 2012 to 2018 use 0.8% for car classes and 0% for light trucks. Beyond 2018 use 1% for car classes and 0% for light trucks.	For 2012 to 2018 use 0.3% for car classes and 0% for light trucks. Beyond 2018 use 0.3% for car classes and 0% for light trucks
	Home-Based Work		
	Home-Based Other		
	Non-Home-Based		
	Light Truck		
Application of Capacity Adjustment Factors	Model Time Periods		As per LBC
	AM	Applied	
	MD	Not applied	
	PM	Applied	
	NT	Not applied	
Toll Diversion Model	Multiply the ASC, cost and time coefficients by 1.25 for the 2018 and 2035 models.		Multiply the ASC, cost and time coefficients by 1.5 for the 2018 and 2035 models.
Validation adjustments	See **Table 28**.		As per LBC
Socio economic assumptions	See **Table 29**.		See **Table 33**.
Annualization	Transaction Factor - 318.6		As per LBC
	Revenue Factor - 287		277
Network Improvements	Run the 2018 and 2035 years with updated schemes as per the 2040 LRTP list of approved schemes. For 2018 include all 2014-2015 schemes & the US21 widening (i.e. projects 70, 78 and 103 from the 2040 LRTP for 2016 to 2025 period). For the 2035 run include all schemes through to 2040 excluding the I-77 widening, i.e. project 72		As per LBC
Ramp up	2018 = 50%, 2019 = 70%, 2020=90%, 2021+=100%		2018 = 50%, 2019 = 65%, 2020=80%, 2021=90%, 2022+=100%
Growth between 2018 and 2035	Linearly interpolated.		Linearly interpolated.
Long term growth	Extrapolated based on 2033 to 2035 change in growth rates.		See section 9.2.

Table 33: Lenders' Downside Case socio economic assumptions

Sub Area	Population		Employment	
	2012 to 2018	2018 to 2035	2012 to 2018	2018 to 2035
South Iredell	1.68%	1.79%	3.62%	1.77%
North Iredell	1.57%	2.29%	2.92%	2.59%
Central Charlotte	2.22%	1.44%	1.79%	1.50%
West Mecklenberg	3.56%	2.44%	1.87%	1.96%
NW Mecklenberg	1.80%	0.99%	2.26%	1.56%
N Mecklenberg	2.66%	2.04%	2.66%	2.09%
NE Mecklenberg	1.34%	0.81%	1.55%	1.55%
E Mecklenberg	2.09%	1.38%	1.85%	2.52%

The transaction factor for the LBC was retained for the LDC as we believed the value adopted was reasonable. The revenue factor was reduced to 277 from the 287 adopted in the LBC. This was calculated based on the assuming the weekend and holiday revenue was 40% of the weekday (compared with 55% in the LBC). This was estimated based on considering the NT yield compared with the average daily yield.

In relation to network improvements no changes to LBC assumptions were made for the LDC. We reviewed the latest Metropolitan Transport Plan (April 2014) which confirmed the schemes tested in the LBC were still relevant. Sensitivity test 3a demonstrated that including transport improvements resulted in lower transactions and revenue as congestion is reduced elsewhere on the network. Any delay in the delivery of the schemes is likely to cause increases in revenue and is therefore not relevant to consider for the LDC.

We adopted a more conservative assumption for the LDC for ramp up by lengthening the period of ramp up. The assumptions we adopted were:

- 2018 – 50%
- 2019 – 65%
- 2020 – 80%
- 2021 – 90%
- 2022 – 100%

9.2 Lenders Downside Case projections

The LDC transactions and revenues projections for 2018 and 2035 were reviewed at the same level as the LBC. The review indicated that the LDC profile of transactions across the day was very similar to the LBC but lower in scale. The proportion of transactions and revenue within each time period for each of the forecast years was very similar to the LBC. This is to be expected as the LDC assumptions do not affect individual time periods differently. The split of

transactions and revenue by segment for 2018 and 2035 is also very similar to the LBC.

Appendix G includes a summary of the average speeds per segment for both the GP and HOT lanes for each time period for 2018 and 2035 for the LDC. These show a similar deterioration of speeds in the GP lanes in the northern segments during the AM southbound and PM northbound directions as the LBC. The operating speeds of the GP lanes in 2035 are likely to be higher than in the LDC indicating a lower level of congestion than in the LBC. They also demonstrate that the speeds in the HOT lanes generally maintain the speed limit and operate in free flow conditions when considered across the time period.

Table 34 shows the annual growth rates for total traffic on the I-77 for each segment for the LDC. This, as expected, shows a slower growth rate compared with the LBC.

Table 34: LDC annual growth in daily two way traffic on the I-77

		CAGR		
		2008 to 2012	**2012 to 2018**	**2018 to 2035**
1	E of Church St/I-77	-	-0.1%	0.4%
2	I-277/Cindy Ln	1.0%	0.5%	0.7%
3	Cindy Ln/Lakeview Rd	0.6%	0.3%	0.9%
4	Lakeview/N of Hambright Rd	0.6%	0.3%	0.9%
5	N of Hambright Rd/N of Sam Furr Rd	2.1%	3.1%	1.0%
6	N of Sam Furr Rd/N of Langtree	2.0%	2.7%	1.5%
7	N of Langtree Rd/N of River Hwy	-	4.8%	1.9%

Note: 2008 to 2012 CAGR based on NCDOT count data where available.

In developing the long term profile of traffic and revenue for the LDC, a high level review of the future congestion levels on the GP lanes was undertaken. Whilst, under the LDC, the GP lanes on some sections of the corridor by 2035 are expected to experience congestion, this is not to the same levelas in the LBC. The congestion levels in the LDC are likely to increase over time and enable higher tolls to be charged per transaction than calculated for the 2035 scenario. To just extrapolate the LDC in the same manner as the LBC would be overly conservative.

To account for this a high level comparison of the congestion levels between the LBC and LDC was undertaken to determine when LDC congestion levels would approach that observed in the LBC in 2035. This was identified as 2041. Consequently the long term revenue profile was adjusted as follows:

- Calculate 2035 LBC yield = $1.18 per transaction (2012 prices)
- Adjust LBC yield to account for downside scenario by accounting for reduced VOT, reduced VOT escalation and increased toll diversion sensitivity tests. The equivalent LDC yield was estimated as $0.90 per transaction.
- Set LDC yield in 2041 as $0.90 per transaction.

- Interpolate (linearly) between 2035 and 2041.
- Extrapolate post 2041 based on LBC change in yield post 2035.

The resulting LDC transactions and revenue projections are provided in **Table 35**.

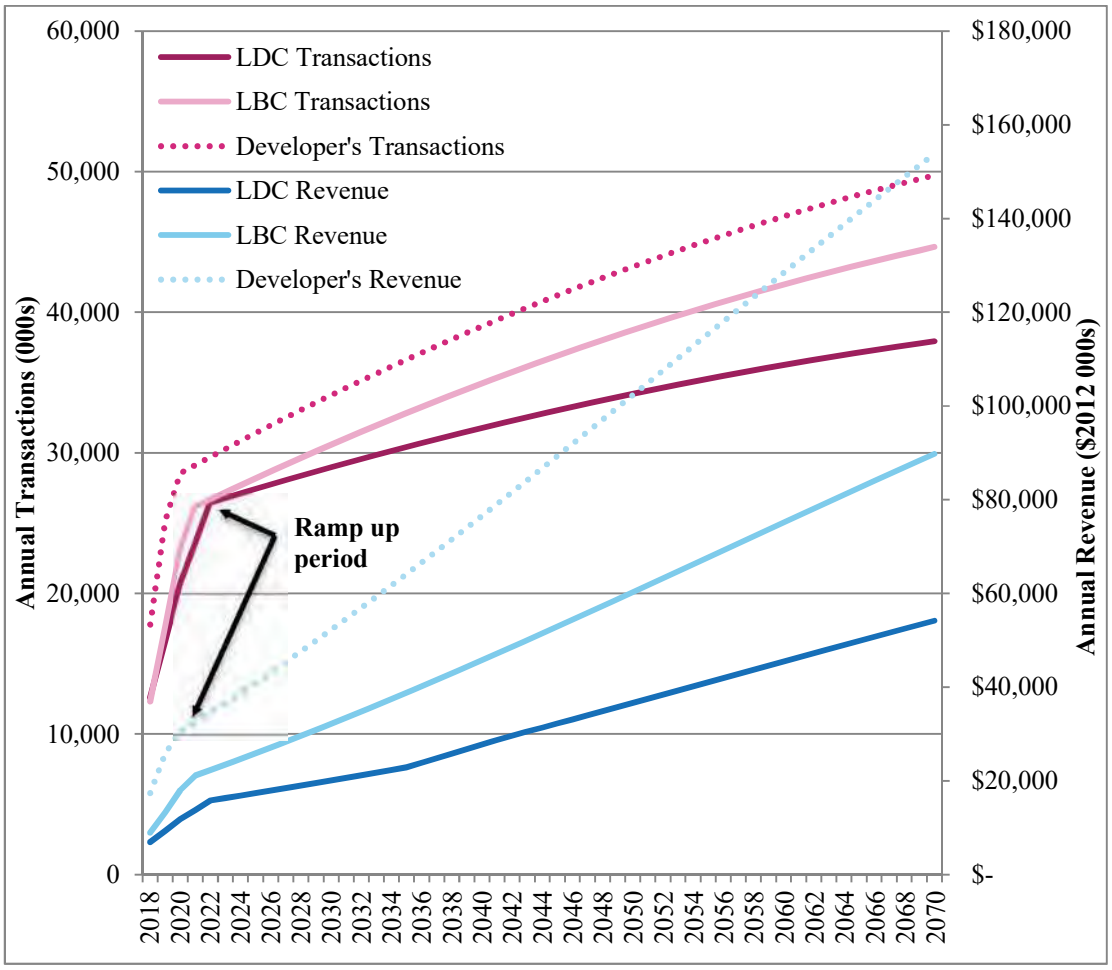
Table 35: LDC transaction and revenue projections (including ramp up)

Year	Annual Trips (000s)	Annual Transactions (000s)	Annual Revenue (000$'s 2012 prices)	Year	Annual Trips (000s)	Annual Transactions (000s)	Annual Revenue (000$'s 2012 prices)
2018	3,841	12,564	$6,897	2045	12,258	33,034	$32,238
2019	5,105	16,555	$9,290	2046	12,411	33,274	$33,112
2020	6,420	20,645	$11,837	2047	12,563	33,511	$33,987
2021	7,378	23,526	$13,774	2048	12,713	33,745	$34,867
2022	8,372	26,470	$15,818	2049	12,860	33,974	$35,748
2023	8,545	26,796	$16,336	2050	13,004	34,199	$36,628
2024	8,719	27,119	$16,859	2051	13,146	34,422	$37,512
2025	8,893	27,438	$17,387	2052	13,285	34,641	$38,396
2026	9,067	27,753	$17,919	2053	13,421	34,855	$39,281
2027	9,241	28,064	$18,455	2054	13,553	35,066	$40,167
2028	9,415	28,371	$18,995	2055	13,683	35,274	$41,052
2029	9,588	28,675	$19,538	2056	13,809	35,477	$41,937
2030	9,762	28,976	$20,086	2057	13,932	35,676	$42,821
2031	9,935	29,273	$20,636	2058	14,052	35,873	$43,707
2032	10,108	29,565	$21,190	2059	14,168	36,066	$44,591
2033	10,280	29,854	$21,746	2060	14,279	36,254	$45,472
2034	10,451	30,139	$22,306	2061	14,388	36,439	$46,354
2035	10,621	30,421	$22,870	2062	14,492	36,621	$47,234
2036	10,791	30,699	$23,828	2063	14,592	36,798	$48,110
2037	10,960	30,973	$24,796	2064	14,688	36,972	$48,986
2038	11,127	31,243	$25,774	2065	14,780	37,141	$49,858
2039	11,293	31,511	$26,763	2066	14,868	37,309	$50,731
2040	11,458	31,774	$27,761	2067	14,951	37,471	$51,597
2041	11,621	32,033	$28,769	2068	15,030	37,630	$52,461
2042	11,783	32,289	$29,631	2069	15,105	37,785	$53,322
2043	11,943	32,540	$30,496	2070	15,175	37,937	$54,180
2044	12,101	32,789	$31,366				

Notes:
4. *Annual trips relates to the number of vehicles using the HOT Lanes across a year.*
5. *Annual transactions relates to the total number of transactions made by all vehicles across all toll segments.*
6. *Annual revenue is the total revenue made by all toll paying vehicles across the year and does not account for any revenue leakage.*

Figure 26 provides a comparison of the LBC, LDC and Developer's Case. This shows that after the ramp up period (2021 onwards) LBC transactions are about 10% lower and LBC annual revenues are about 35 to 40% of the Developer's case projections. LDC and LBC transactions are similar up to 2022 although revenues are around 30% lower. By 2040, LDC revenues are around 40% lower than LBC revenues and this trend continues through to the end of the term of the CA.

Figure 26: Comparison of Lenders' and Developer's Cases



9.3 Lenders Downside Case Assumptions

The above LDC is based on the following assumptions:

- The projections are heavily linked to the socio economic assumptions and their reasonableness. County level projections have been used to cap overall growth rates but district growth rates are based on the MRM. To the extent possible, we tried to check the reasonableness of the MRM assumptions. However, it was not possible to determine the details of the proposed development at individual TAZ levels as this is not currently known. Our experience is that MPO models are generally well detailed and development assumptions based on the best available information.
- We assume that no significant improvements to public transport will occur over the concession period in the corridor.
- The MD period contributes significantly to daily transactions and is driven by future congestion levels expected by 2018.

- Extrapolation of traffic levels beyond 2035 indicate that traffic levels on the GP lanes are very high in future years and the assumption is that the DOT will not proceed with infrastructure improvements not committed today to ease congestion in the area.
- Extrapolation of traffic levels beyond 2035 indicates that the HOT lanes could experience some congestion during peak periods beyond 2060. It is assumed that adjustments to the toll levels at this period would be undertaken to maintain the HOT lane running speeds as required under the CA and also that some peak spreading may occur to lessen the demand levels. If this occurs, this could lead to additional revenue that is not accounted for in the LDC.
- The LDC projections do not include the 2040 LRTP proposal for providing additional free capacity on the I-77 West Catawba Ave (Exit 28) to NC 150 (Exit 36). It is assumed (based on information supplied by the Client) that if this scheme is taken forward, the NCDOT will provide compensation for any loss of revenue.
- The LDC projections assume that average tolls charged across the time periods are as shown in Appendix G.

Projects Funded Through I-77 Express Lanes Project's Bonus Allocation (BA) Funds

Location	TIP#	Description	Project Cost ($M)		Expended To Date ($M)		Construction Fiscal Year	Status
			Total Cost	BA Amount	Total Expenditures	Total BA Expenditures		
Mooresville	C-5701	Improve intersection of NC 801 and NC 150	$2.00	$0.65	$0.04		2017	Right-of-way underway.
Mooresville	R-2307B	Widen NC 150 from Greenwood Rd (Catawba County) to US 21	$127.90	$5.00	$1.75		2019	Right-of-way underway.
Mooresville	U-5817	Extend Fairview Rd over I-77 to connect with Alcove Rd	$14.50	$8.00	$0.60		2021	Right-of-way in 2019. Planning and design underway.
Davidson	I-4750AC	Construct roundabouts at Exit 30 (I-77/Griffith St interchange) ramp termini	$3.30	$3.30	$1.00	$1.00	2016	Under construction. Estimated completion 12/2018.
Davidson	U-5907	Potts-Sloan-Beaty connector	$3.90	$3.75	$0.20	$0.20	2020	Planning and design underway.
Cornelius	C-5621	Construct US 21/Catawba Ave roundabout	$9.21	$6.7	$0.30		2019	Planning and design underway.
Cornelius	U-5108	Extend Northcross Dr from NC 73 to Westmoreland Rd	$10.23	$1.50	$0.64		2020	Planning and design underway.
Cornelius	U-5767	Widen US 21 from Northcross Center Ct to Westmoreland Rd	$23.80	$0.50	$1.15		2021	Planning and design underway.
Cornelius	U-5873	Improve intersection of NC 115 and Potts St	$6.90	$6.00	$0.32	$0.32	2020	Planning and design underway.
Cornelius	U-5906	Improve intersection of West Catawba Ave and Torrence Chapel Rd	$8.26	$7.76	$0.09	$0.09	2020	Planning and design underway.
Huntersville	U-5114	Improve intersection of Gilead Rd and US 21	$15.13	$3.85	$5.59		2018	Right-of-way underway. Construction let 7/2018.
Huntersville	U-5908	Widen and realign NC 115 two-way pair; install roundabouts at NC 115/realigned Main St and NC 115/Mt Holly-Huntersville Rd	$10.10	$3.54	$0.02	$0.02	2020	Right-of-way underway. Construction let 11/2019
Huntersville	I-5405	Torrence Creek Greenway under I-77 (between exits 23 and 25)	$6.10	$6.10	$4.33	$4.33	2016-2018	Under construction.
Huntersville	I-5405B	I-77/Hambright Rd HOT lane interchange	$34.95	$34.95	$18.81	$18.81	2018	Under construction. Estimated completion 12/2018.
Charlotte	I-5405A	I-77/Lakeview Rd HOT lane interchange	$41.03	$41.03	$15.00	$15.00	2018	Under construction. Estimated completion 12/2018.
Charlotte	C-5613H	Lakeview Rd/Reames Rd roundabout intersection upgrade with sidewalk to Beatties Ford Rd	$2.80	$1.00			2019	Planning and design underway. Construction let 9/30/19.
Charlotte	U-5905	Improve Lakeview Rd from Reames Rd to NC 115, including intersection improvements of Lakeview Rd/NC 24 and Lakeview Rd/NC 115	$11.00	$11.00	$0.01	$0.01	2020	Planning and design underway.
Total			**$331.1**	**$144.6**	**$49.9**	**$39.8**		