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October 6, 2014

Robert Rangel Jr.
Director of Financial Planning and Analysis
North Texas Tollway Authority
5900 W. Plano Parkway, Suite 100
Plano TX 75093

Subject: NTTA System Traffic and Revenue Forecast Update

Dear Mr. Rangel:

Pursuant to your recent request, CDM Smith is pleased to provide you with a letter update of the traffic and revenue (T&R) forecasts for the North Texas Tollway Authority System (NTTA System). It is our understanding that this letter update is intended to support the upcoming refunding of the Series 2008A, 2008E-3 and 2008F bonds, scheduled for November and December 2014 (collectively referred to as the "Series 2014 Bonds"). Currently, the NTTA System consists of the Dallas North Tollway (DNT), the President George Bush Turnpike (PGBT), the President George Bush Turnpike Eastern Extension (PGBT EE), the Sam Rayburn Tollway (SRT), the Addison Airport Toll Tunnel (AATT), the Mountain Creek Lake Bridge (MCLB) and the Lewisville Lake Toll Bridge (LLTB).

Background

CDM Smith completed the NTTA System Comprehensive Traffic and Toll Revenue Study report in March 2014 (the "March 2014 Study"). The North Central Texas Council of Governments (NCTCOG) adopted a new Metropolitan Transportation Plan (MTP) in June 2013 called the Mobility 2035 – 2013 Update. The updated travel demand networks of the new MTP were incorporated into the March 2014 Study. It also included an assessment of current economic conditions and other key factors influencing forecasted traffic and revenue on NTTA System facilities. This effort included an independent economic review of the Mobility 2035 – 2013 Update demographics along NTTA System corridors as well as comprehensive traffic count and travel time data collection.

Since the completion of the March 2014 Study, the following new information has become available, which has warranted minor changes to the NTTA System T&R forecasts:

- The anticipated completion dates for several NTTA capital improvement projects and other regional projects have been changed since the completion of the March 2014 Study

- TollTag/ZipCash transaction distribution and ZipCash revenue recovery assumptions have been updated based on recent trends
- Refinements to the traffic and revenue forecasting models were made by CDM Smith to reflect recent growth trends on the NTTA System

This letter incorporates the above new information and includes updates to the NTTA System T&R forecasts from years 2014 through 2063.

It should be noted that NCTCOG is currently working on an amendment to the current MTP (this new amendment will be referred to in this document as the Mobility 2035 – 2014 Amendment), which is expected to be adopted by the Regional Transportation Council (RTC) in November 2014. Our understanding is that this new amendment will not involve changes to the regional official demographics, but will include some changes to the background transportation project assumptions. A section is included at the end of this letter that talks about the Mobility 2035 – 2014 Amendment and the potential impacts to NTTA System T&R projections.

Our understanding is that once the Mobility 2035 – 2014 Amendment is adopted by the RTC, NCTCOG staff will begin work on a new MTP, the Mobility 2040 Plan, which will involve an update to the official regional demographics, the background transportation project assumptions and the regional travel demand models. This Mobility 2040 Plan will most likely be adopted by the RTC in late 2015 or early 2016.

The remainder of this letter covers the following topics:

- Underlying demographic forecasts and economic climate
- Comparison of year-to-date estimated and actual transactions
- Key assumptions
- Updated long-term traffic and revenue forecasts
- Sensitivity tests
- Conclusion and recommendations

Underlying Demographic Forecasts and Economic Climate

The underlying demographic forecasts remain the same as presented in the March 2014 Study. The March 2014 Study incorporated results of an independent economic review by Research and Demographic Solutions (RDS) of NCTCOG's latest official demographic forecasts. CDM Smith feels that no additional modifications are required to these revised set of demographics and thus they are deemed valid for continued use.

As can be seen in **Figure 1**, the national real Gross Domestic Product (GDP) has seen consistent positive growth since mid-2011, except for a drop in the first quarter of 2014 by 2.1 percent,

which was partly attributed to the bad weather in early 2014. The second quarter GDP has bounced back, showing a 4.2 percent annualized increase. CDM Smith tracks the monthly Economic Forecasting Surveys published by The Wall Street Journal (WSJ). Also illustrated in **Figure 1** are the average GDP change monthly forecasts from July 2012 through September 2014. It is forecasted that the national GDP will continue to show positive growth through the end of 2015. The latest GDP forecasts made in September 2014 project slightly lower GDP growth rates than the forecasts made in March 2014.

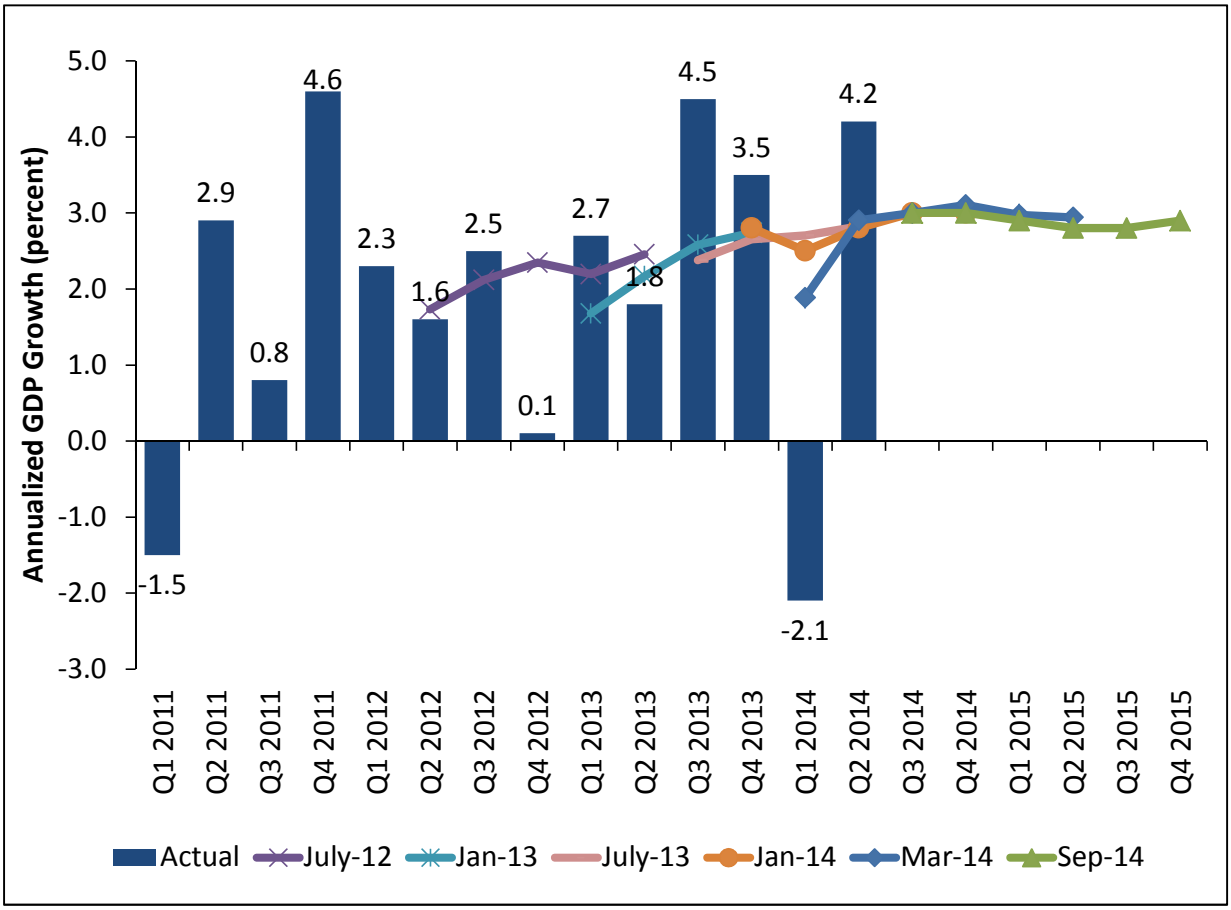

Figure 1. Historical and Forecasted GDP Growth Comparisons by Date of Forecast

Source: Wall Street Journal Economic Forecasting Survey, US Bureau of Economic Analysis (Accessed in September 2014)

Texas continues to experience a stronger and faster recovery from the recession than the national average. Economists have referred to this as the "last in-first out" effect. **Figures 2 and 3** illustrate that the Dallas-Fort Worth (DFW) area has been performing better than the rest of the nation in terms of unemployment rates and employment growth. Unemployment in DFW has been below six percent since mid-2013, and the North Texas area has seen consistently strong employment growth since 2010. Recently, Toyota announced that it is establishing a new headquarters in Plano (near the DNT/SRT interchange) for its North American operations. In the next three years, around 4,000 Toyota employees are expected to work at this headquarters.

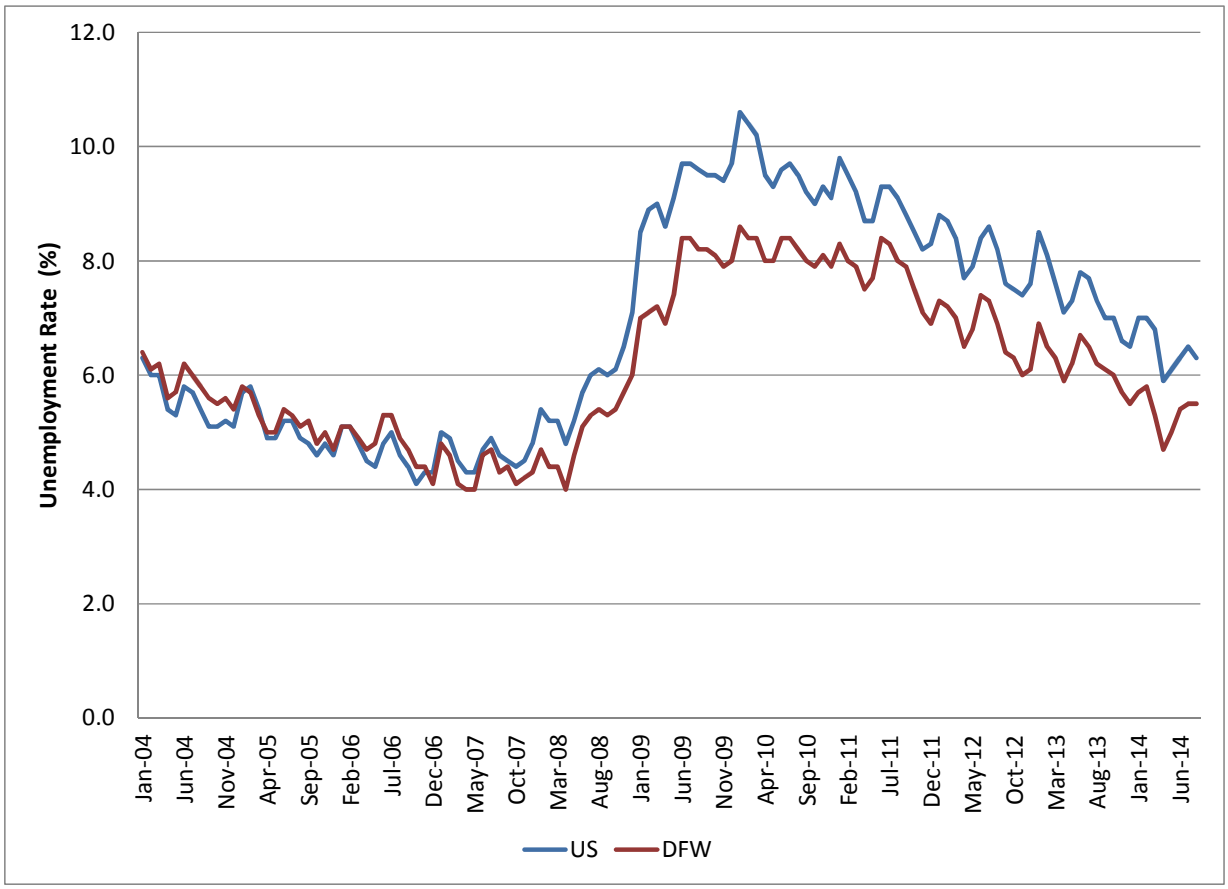

Figure 2. Unemployment Rate Comparisons

Source: Texas Workforce Commission (Accessed in September 2014)

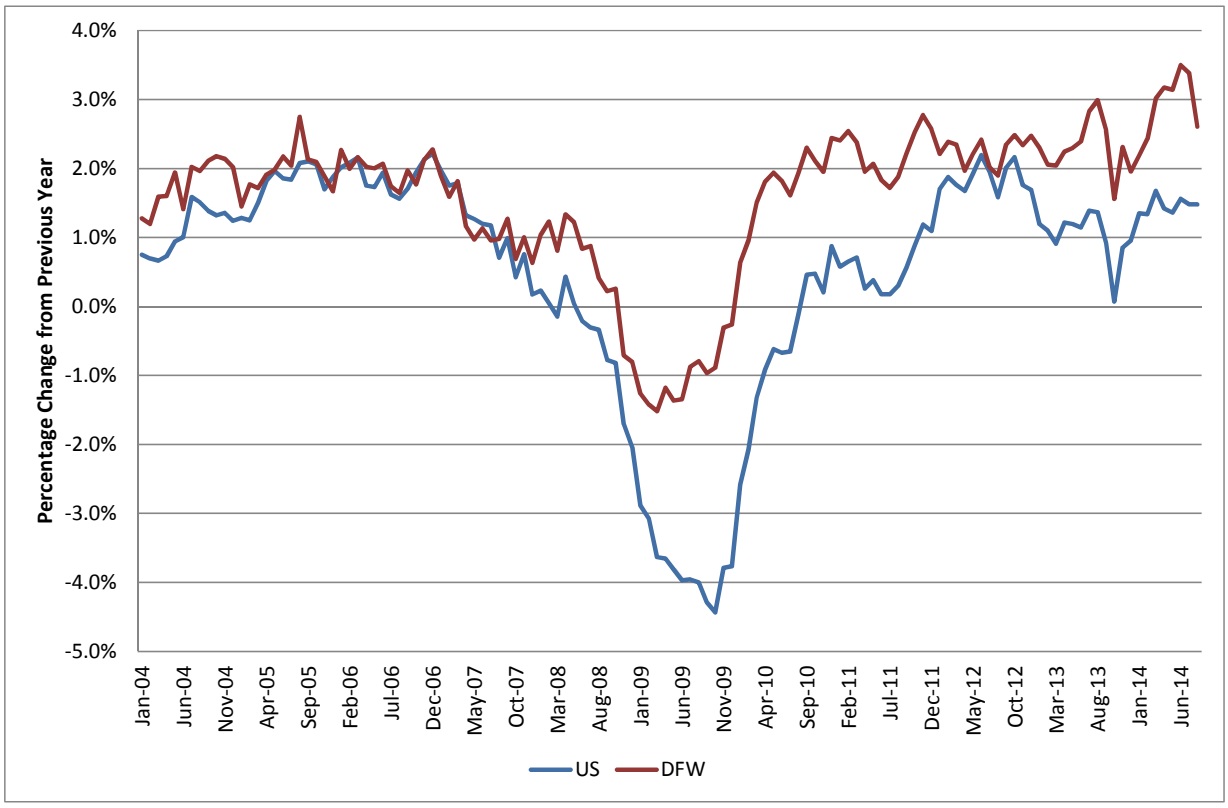

Figure 3. Employment Growth Comparisons

Source: Texas Workforce Commission (Accessed in September 2014)

Figure 4 shows the total number of residential building permits issued annually in the DFW area since 2000. After being severely impacted by the recession, new residential construction has seen significant growth since 2010, and the data through August 2014 suggests that the growth trend is continuing in 2014. **Figure 4** also includes the annual average months of inventory for the housing markets in four local areas (Dallas, Fort Worth, Collin County and Denton County). This metric indicates the average amount of supply (i.e., houses) available for purchase during the year. As shown in **Figure 4**, the average months of inventory in the DFW area has steadily declined since 2011, indicating an increase in demand and a strengthening housing market.

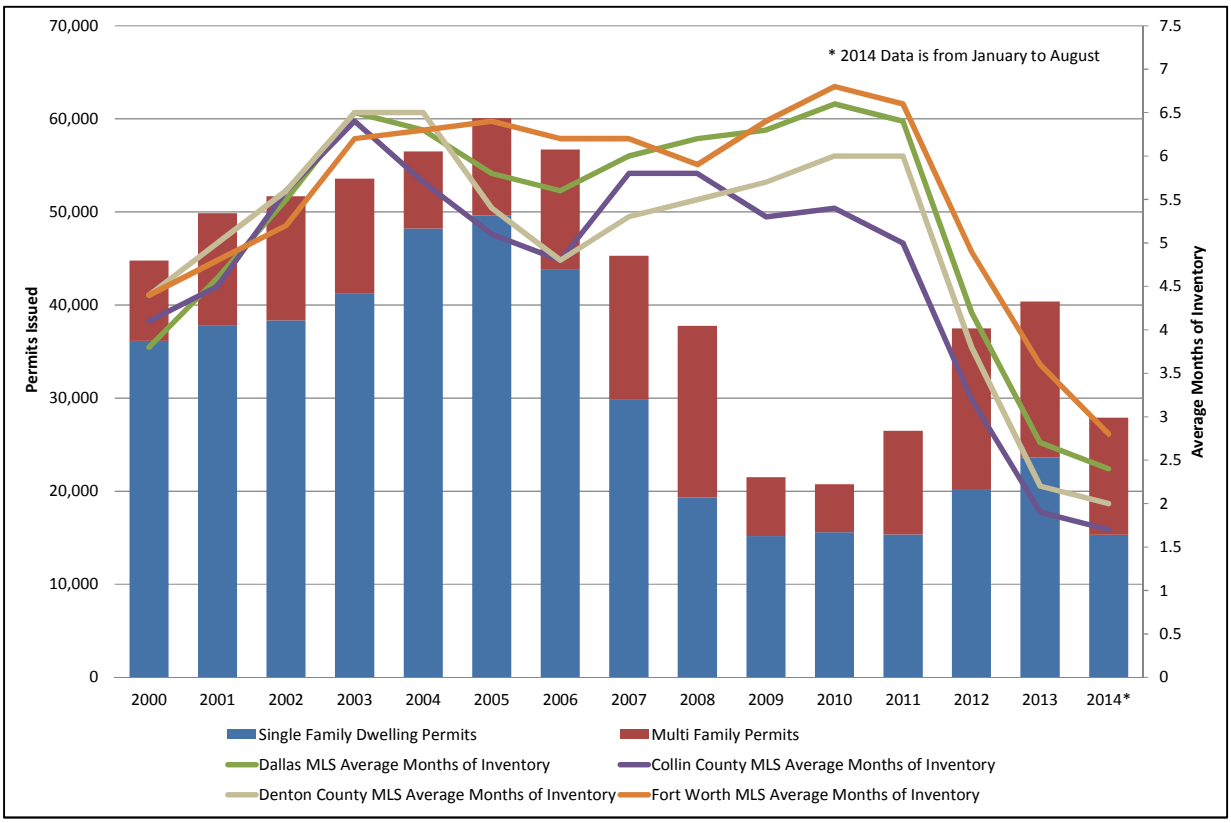

Figure 4. DFW Area Residential Building Permit Trends and Inventory

Source: Real Estate Center at Texas A&M University (Accessed in September 2014)

Year-to-Date Estimated versus Actual Transactions

Figure 5 shows the estimated 2014 monthly transactions for the NTTA System as included in the March 2014 Study as well as the actual transactions through August 2014. As shown in the figure, actual transactions on the system have greatly exceeded the March 2014 Study forecasts. The bulk of this difference is contributed by the continued strong growth in transactions on SRT, DNT north of SRT and PGBT Eastern Extension. Through August, actual transactions have exceeded projections by 2.3 percent. This recent trend has been incorporated into the current analysis to modify and update the total forecasted T&R for 2014 and subsequent years.

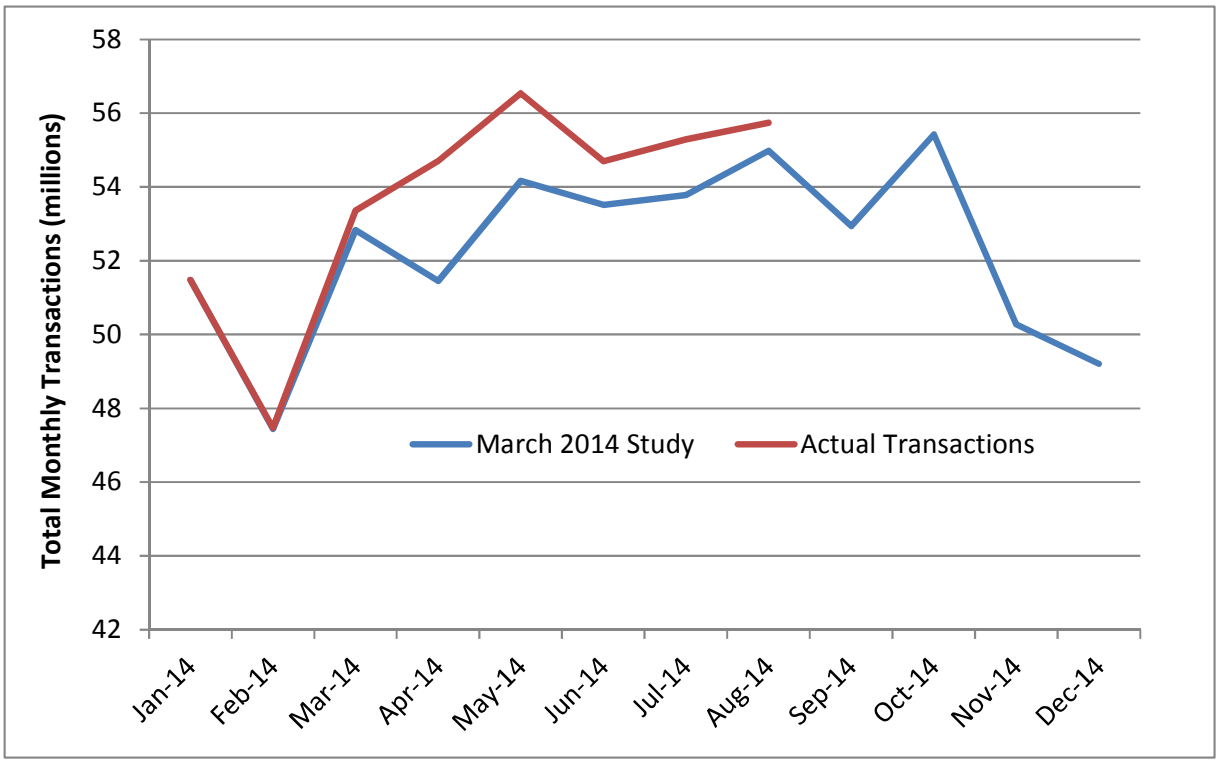

Figure 5. Actual vs. Estimated NTTA System 2014 Transactions

Key Assumptions

As part of the current study, the key input assumptions to the T&R forecasting process were reevaluated and updated as needed. Most of the assumptions either remained consistent with the March 2014 Study or were modified only slightly. However, some changes were made to the planned completion dates of certain capital improvement projects on and near the NTTA System. **Table 1** lists the planned completion dates for some of the key capacity improvement projects that were considered as part of the current study.

Table 1. Planned Completion Dates for Key Improvement Projects

Facility	Limits/Location	Improvement	Planned Date		Change
			March 2014 Study	Current Study	
LLTB	Corridor Segments 4, 5 and 6	Corridor Expansion	August 2014	March 2015	Delayed 7 Months
SH 161	SH 183 to Belt Line Road	Expansion	January 2015	July 2015	Delayed 6 Months
DNT	Rockhill Parkway	Rockhill Toll Ramps	July 2015	January 2016	Delayed 6 Months
DNT	Keller Springs to PGBT	Lane Expansions	January 2017	April 2017	Delayed 3 Months
PGBT	IH 35E to DNT	Lane Expansions	January 2019	April 2019	Delayed 3 Months
PGBT	DNT to US 75 (Eastbound)	Lane Expansions	January 2019	July 2016	Advanced 30 Months
PGBT	US 75 to SH 78	Lane Expansions	January 2019	April 2019	Delayed 3 Months
DNT	US 380 to FM 428	Phase 4A	January 2020	January 2023	Delayed 3 Years

Based on a review of the recent TollTag shares and revenue recovery trends, CDM Smith has also updated the related assumptions in this forecast. A majority of the V-Toll transactions (transactions that are originally identified as ZipCash transactions but are subsequently determined to be TollTag transactions), pay the TollTag rate. Some V-Toll transactions are charged the ZipCash rate when they are deemed to be habitual V-Toll transactions. In this forecast, the share of V-Toll transactions that pay the ZipCash toll rate was decreased from 1.2 percent to 0.7 percent based on recent trends. In addition, a surprising dampening of the growth in the overall TollTag transaction share on the NTTA System facilities is being seen in recent months, in spite of several efforts over the past few months by the NTTA staff to improve the TollTag shares. We anticipate that this is a temporary phenomenon and that the TollTag share growth will revert back to the assumed growth in the March 2014 Study forecast. To account for this, a one-year lag was applied to the TollTag share growth rates in this new forecast compared to what was assumed in the March 2014 Study.

Below are the key assumptions used as part of this traffic and revenue update, including both those developed collaboratively with NTTA staff and those determined by CDM Smith:

Assumptions Developed Collaboratively with NTTA

- NTTA System-wide toll rate increases on July 1 of every odd year by applying an annual toll increase of 2.75 percent. This is in accordance with the NTTA Board's adopted toll rate policy
- The SRT Project Agreement between NTTA and Texas Department of Transportation (TxDOT) permits the Authority to implement congestion pricing if certain capacity improvement triggers are met, which is anticipated to occur by January 1, 2019. Congestion pricing is assumed to begin on SRT on July 1, 2019. The following are toll rates assumed on SRT:

  - Peak periods (6:30 a.m. – 9:00 a.m. and 3:00 p.m. – 6:30 p.m.): 1.30 x Maximum Base Toll (MBT)
  - Low-volume periods (weekdays from 11:00 p.m. – 5:00 a.m.): 0.80 x MBT
  - Off-peak periods (all other times), including holidays and weekends: 1.00 x MBT
- Under the PGBT EE project agreement with TxDOT, NTTA retains 80 percent of the AVI transaction revenue generated by the PGBT EE, and the remaining 20 percent of the AVI transaction revenue is paid to TxDOT. NTTA retains 80 percent of the revenue collected from the ZipCash transactions at the AVI rate, but NTTA retains 100 percent of the toll surcharge collected on ZipCash transactions
- DNT's Rockhill (previously Virginia Parkway) Ramps – toll gantries added to accommodate City of Frisco building Rockhill Parkway; assumed to be complete by December 31, 2015
- DNT expansion to four lanes in each direction between Trinity Mills Road and PGBT (northbound) and between Frankford Road and south of Keller Springs Road (southbound) assumed to be completed by March 31, 2017. The project construction is assumed to begin on September 1, 2015
- Expansion of DNT to four lanes in each direction between Sam Rayburn Tollway and PGBT, including improvements to the DNT/PGBT interchange and opening of the new Windhaven Parkway toll ramps, assumed to be completed by April 1, 2018. There is a ramp reversal between Windhaven and Parker Road. Plano Parkway ramps are assumed to be tolled starting April 1, 2018. Project construction is assumed to begin in April 2015
- DNT Extension Phase 4A between US 380 and FM 428 opens by January 1, 2023
- Expansion of PGBT from three lanes to four lanes in each direction between DNT and US 75 assumed to be completed by July 1, 2016. This project's construction is assumed to begin from January 1, 2015. Expansion of PGBT from three lanes to four lanes in each direction from IH 35E to DNT, and US 75 to SH 78 is assumed to be completed by April 1, 2019. This project's construction is assumed to begin on October 1, 2016
- Capacity improvements on SRT from Denton Creek to DNT from three lanes to four lanes in each direction are assumed to be completed on January 1, 2019. This project's construction is assumed to begin on July 1, 2016. Capacity improvements on SRT from DNT to US 75 from three lanes to four lanes in each direction are assumed to be completed on January 1, 2022. This project's construction is assumed to begin on January 1, 2019
- SH 161 between SH 183 and Belt Line Road is assumed to operate with an additional lane in each direction during weekday peak periods (6:00-10:00 am and 2:00-7:00 pm)

starting on July 1, 2015. This section is assumed to be expanded to eight lanes by January 1, 2018. From January 1, 2018 the two new lanes added in each direction on this facility are assumed to operate as tolled managed lanes

- SH 190/East Branch from IH 30/PGBT EE to IH 20/Loop 9 opens by January 1, 2028 (as recommended by NCTCOG's Mobility 2035 - 2013 Update)
- Automatic Vehicle Identification (AVI)/Video toll transactions splits are applied on a plaza by plaza basis. AVI (TollTag) shares assumed for T&R forecasting purposes include AVI shares at the lane and all types of V-Toll transaction shares with a three-month lag. Based on the actual data and recent trends, the average NTTA System TollTag share is assumed to be 78.6 percent in 2014. The following are the assumed AVI shares for 2014, shown separately for each facility:

DNT	79.4%
PGBT	78.7%
SRT	78.6%
PGBT EE	73.9%
AATT	79.0%
MCLB	47.7%
LLTB	75.4%
NTTA System	78.6%

- Due to the continued efforts by NTTA staff to improve the AVI transaction shares, it is anticipated that the average AVI transaction shares on all NTTA System facilities will ramp up based on a logistic function from 78.6 percent in 2014 to an average of 81.2 percent in 2020, 83.5 percent in 2030, 84.4 percent in 2040, 84.8 percent in 2050 and 84.9 percent in 2060 and thereafter
- The average NTTA System ZipCash effective revenue recovery rate at one year after the transaction occurred (includes invoiced and un-invoiced transactions and excludes all V-Toll transactions) to be 38 percent in 2014, based on the actual data and recent trends. This estimate is expected to grow to 43.2 percent in 2015, 48.8 percent in 2016 and 49.4 percent in 2017 and thereafter, reflecting the continued efforts by NTTA staff to increase the ZipCash revenue recovery. The effective revenue recovery from TollTag transactions is assumed to be 99.5 percent in all forecast years, based on historical observations
- Projected annual toll revenues included in this letter are revenues projected to be collected in each year (i.e., cash basis) after applying the above-described revenue recovery assumptions to the projected toll transactions for the year
- 2058 is the fiftieth year of operation of SRT as part of the NTTA System. SRT is expected to be returned to TxDOT at the end of August 2058

CDM Smith Assumptions

- Background network for travel demand modeling is based on NCTCOG's Mobility 2035 – 2013 Update
- Trip tables are based on NCTCOG's MTP 2035-2013 Update demographics, updated to reflect independent economic review by RDS in 2013
- Truck transaction shares are applied on a plaza by plaza basis and averages for each facility for 2014 are as shown below. It is assumed that these truck shares remain constant throughout the forecast period:

DNT	1.2%
PGBT	2.5%
SRT	3.2%
PGBT EE	2.4%
AATT	0.7%
MCLB	1.0%
LLTB	2.6%
NTTA System	2.1%

- NTTA will employ business rules to encourage increases in TollTag shares on its facilities and to increase the ZipCash toll revenue recovery
- In accordance with the existing practice of the Authority, all NTTA System facilities will be well-maintained, efficiently operated, and effectively signed to encourage maximum usage
- Growth in vehicle operating costs (which include fuel, maintenance, and tires) will not significantly deviate from the assumed inflation rate in the March 2014 Study
- Growth in traveler values of time will not significantly deviate from the assumed rates in the March 2014 Study
- No local, regional, or national emergency will arise which would abnormally restrict the use of motor vehicles

Updated Long-Term Traffic and Revenue Forecasts

The updated long-term traffic and revenue forecasts for each NTTA System facility from 2014 to 2063 are shown in **Table 2** and **Figure 6**. The transaction projections have been updated based on the information available for the March 2014 Study and the recent transaction data provided by NTTA since the completion of that study.

The projections extend from 2014 through 2063, and include the revenue forecasts for DNT, PGBT, AATT, MCLB, LLTB, PGBT EE and SRT. In each case, forecasts for each of the facilities are based on modeled traffic forecasts at each toll collection location, through the year 2035. The

average toll at each location was based on the current mix of passenger car and commercial vehicle traffic, and the current average tolls, modified in future years to reflect changing assumptions in the proportion of TollTag and ZipCash transaction shares. Toll rates for ZipCash transactions are 50 percent higher than the rates for TollTag transactions (with a minimum differential of $0.23 in 2013 dollars) in each case.

Forecasts beyond year 2035 are based on nominal assumptions regarding future traffic growth with assumed periodic toll rate increases. As shown in **Table 2**, the estimated annual revenue on the DNT is expected to increase from $203.5 million in 2014 to $337.4 million by 2025 and $504.1 million by 2035. Revenue on the PGBT is expected to be $187.9 million in 2014, increasing to $307.2 million by 2025 and $470.2 million by 2035. Revenue on the SRT is expected to be $127.3 million in 2014, increasing to $257.9 million by 2025 and $421.1 million by 2035. As FY2058 is the end of the fifty-year operational agreement of the SRT between NTTA and TxDOT, revenue from SRT is estimated through August 31, 2058, while the other facilities are assumed to generate revenue for NTTA in perpetuity. The PGBT EE toll revenue included in **Table 2** is the NTTA's share of the toll revenue. Under the PGBT EE project agreement with TxDOT, NTTA retains 80 percent of the AVI transaction revenue generated by the PGBT EE, and the remaining 20 percent of the AVI transaction revenue is paid to TxDOT. NTTA retains 80 percent of the revenue collected from the ZipCash transactions at the AVI rate, but NTTA retains 100 percent of the toll surcharge collected on ZipCash transactions. NTTA's share of the revenue on the PGBT EE is expected to be $24.7 million in 2014, increasing to $50.0 million by 2025 and $82.5 million by 2035. Together, the DNT, PGBT and SRT account for the majority of revenue generated by the NTTA System.

Revenue from the AATT, MCLB and LLTB combined is expected to be about $6.7 million in 2014. By 2025, this is estimated to reach a combined $12.8 million and increase in 2035 to $21.7 million, still a very small share of total NTTA System revenue.

Table 2. Updated NTTA System Annual Toll Revenue Forecasts by Facility

Year	DNT	PGBT	SRT*	PGBT EE**	AATT-MCLB-LLTB	NTTA System
2014	$203,544,500	$187,937,400	$127,274,200	$24,672,100	$6,727,900	$550,156,100
2015	$214,358,800	$199,430,600	$139,867,300	$27,546,700	$7,331,000	$588,534,400
2016	$226,615,100	$208,084,700	$152,070,300	$30,149,800	$7,941,300	$624,861,200
2017	$236,871,500	$215,234,900	$160,180,800	$32,262,100	$8,452,700	$653,002,000
2018	$250,336,300	$221,944,100	$167,899,900	$34,339,600	$8,967,000	$683,486,900
2019	$261,862,700	$232,443,800	$183,734,300	$36,204,100	$9,419,000	$723,663,900
2020	$273,111,000	$244,524,700	$200,991,600	$38,247,900	$9,917,500	$766,792,700
2021	$284,633,300	$255,957,400	$210,277,200	$40,359,200	$10,425,000	$801,652,100
2022	$297,419,300	$268,602,500	$221,354,900	$42,679,800	$10,995,400	$841,051,900
2023	$310,666,900	$280,500,600	$232,925,700	$44,942,000	$11,570,500	$880,605,700
2024	$324,139,000	$293,479,900	$245,301,200	$47,425,700	$12,208,100	$922,553,900
2025	$337,439,500	$307,158,900	$257,854,500	$50,024,100	$12,831,100	$965,308,100
2026	$352,101,700	$322,223,200	$271,443,700	$52,856,100	$13,519,600	$1,012,144,300
2027	$366,804,100	$336,532,000	$285,058,200	$55,666,000	$14,194,900	$1,058,255,200
2028	$383,000,000	$352,236,700	$299,695,500	$60,669,700	$14,937,700	$1,110,539,600
2029	$397,861,700	$367,031,300	$314,324,400	$63,692,900	$15,769,300	$1,158,679,600
2030	$414,331,200	$383,305,900	$329,166,700	$66,813,100	$16,696,800	$1,210,313,700
2031	$430,794,400	$399,241,700	$345,421,800	$70,033,500	$17,552,900	$1,263,044,300
2032	$448,920,400	$416,658,700	$363,004,200	$73,499,800	$18,485,000	$1,320,568,100
2033	$466,225,800	$434,283,100	$381,162,900	$76,937,000	$19,476,100	$1,378,084,900
2034	$485,162,700	$453,419,200	$400,604,100	$80,599,100	$20,558,200	$1,440,343,300
2035	$504,123,200	$470,228,900	$421,053,000	$82,505,000	$21,697,500	$1,499,607,600
2036	$524,964,000	$490,817,400	$442,916,100	$86,504,500	$22,950,300	$1,568,152,300
2037	$545,615,800	$510,678,100	$464,783,700	$90,615,300	$24,170,900	$1,635,863,800
2038	$568,361,700	$532,328,000	$488,284,000	$95,010,100	$25,502,500	$1,709,486,300
2039	$591,418,300	$554,282,500	$512,337,100	$99,539,100	$26,906,200	$1,784,483,200
2040	$616,498,800	$577,982,200	$537,846,600	$104,332,900	$28,429,100	$1,865,089,600
2041	$637,512,200	$598,942,300	$560,943,900	$108,579,200	$29,683,900	$1,935,661,500
2042	$660,372,700	$621,614,000	$585,447,900	$113,044,400	$31,032,400	$2,011,511,400
2043	$683,300,900	$644,321,200	$611,087,800	$117,633,500	$32,316,700	$2,088,660,100
2044	$708,572,400	$669,169,000	$638,547,000	$122,496,900	$33,707,000	$2,172,492,300
2045	$732,482,500	$693,839,800	$665,035,100	$127,547,700	$35,128,100	$2,254,033,200
2046	$757,687,600	$720,756,200	$693,356,600	$132,548,500	$36,589,400	$2,340,938,300
2047	$782,060,400	$747,383,000	$722,939,500	$137,487,300	$38,078,100	$2,427,948,300
2048	$808,551,100	$776,245,700	$754,445,000	$142,674,800	$39,687,800	$2,521,604,400
2049	$834,140,800	$805,194,000	$786,223,600	$148,005,600	$41,216,700	$2,614,780,700
2050	$862,372,500	$836,883,700	$820,186,200	$153,646,900	$42,871,600	$2,715,960,900
2051	$889,628,800	$866,500,300	$852,886,300	$159,394,600	$44,457,300	$2,812,867,300
2052	$919,430,100	$898,482,400	$887,498,000	$165,434,100	$46,167,200	$2,917,011,800
2053	$949,000,100	$929,821,700	$923,486,400	$171,631,700	$47,775,300	$3,021,715,200
2054	$981,539,300	$964,036,500	$961,932,800	$178,190,200	$49,512,300	$3,135,211,100
2055	$1,012,659,300	$998,108,700	$1,000,707,600	$184,964,000	$51,343,400	$3,247,783,000
2056	$1,046,921,300	$1,035,369,200	$1,042,020,500	$192,096,100	$53,334,400	$3,369,741,500
2057	$1,079,933,400	$1,071,580,900	$1,082,988,200	$199,256,000	$55,181,500	$3,488,940,000
2058	$1,116,585,600	$1,111,433,400	$749,899,600	$206,887,300	$57,192,600	$3,241,998,500
2059	$1,152,669,800	$1,150,800,800	$0	$214,555,600	$59,290,400	$2,577,316,600
2060	$1,192,321,600	$1,193,344,600	$0	$222,646,800	$61,564,200	$2,669,877,200
2061	$1,230,339,300	$1,233,886,800	$0	$231,022,200	$63,712,200	$2,758,960,500
2062	$1,271,816,900	$1,277,745,600	$0	$239,790,800	$66,020,200	$2,855,373,500
2063	$1,312,585,800	$1,320,777,300	$0	$248,762,700	$68,400,900	$2,950,526,700

* SRT revenue for year 2058 includes revenue from January to August only, because FY 2058 is the end of the fifty-year operational agreement of the SRT between NTTA and TxDOT

** NTTA's share of the revenue collected from PGBT EE.

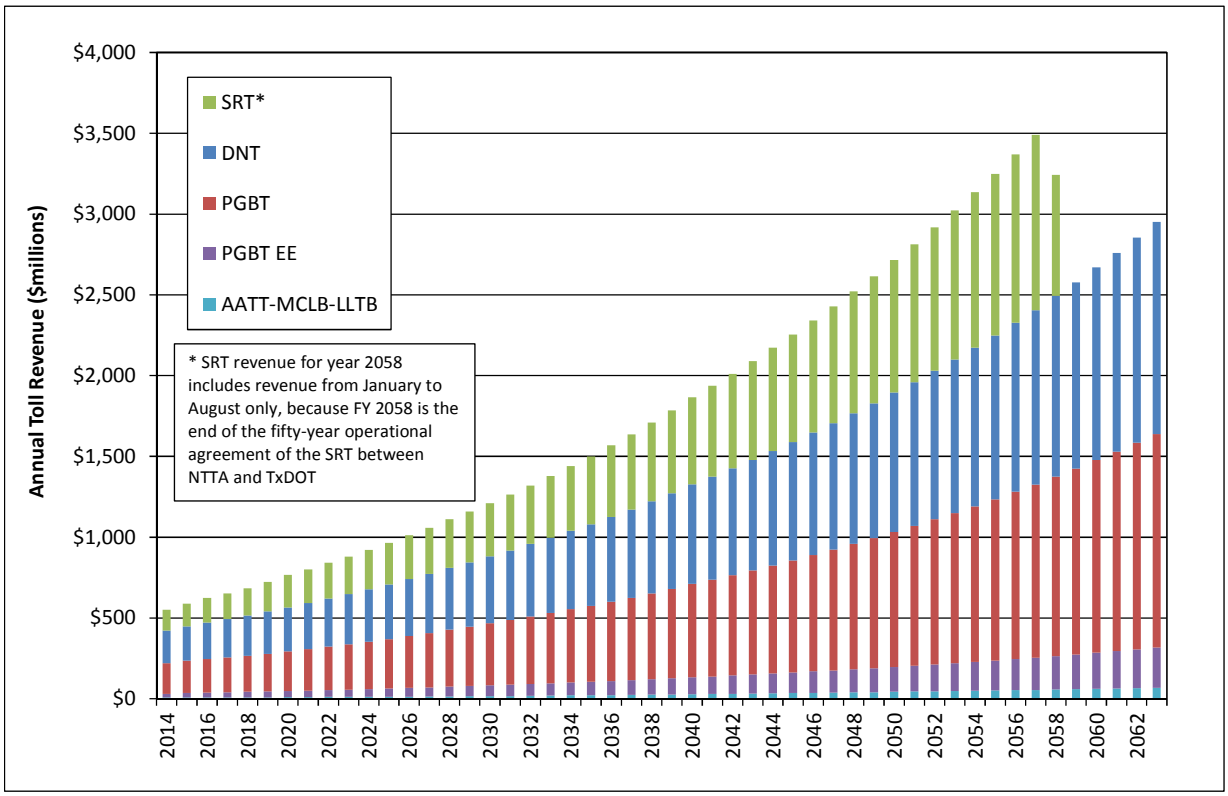

Figure 6. Updated NTTA System Toll Revenue Forecasts by Facility

The estimated annual transactions and toll revenue for the NTTA System are shown in **Table 3**. Total revenue on the existing NTTA System is expected to increase from about $550.2 million in 2014 to $965.3 million in 2025 and $1.50 billion in 2035. Driven by nominal traffic growth and continued assumed modest inflationary adjustments in toll rates, annual revenue on the NTTA System is expected to reach more than $2 billion per year by 2042.

Table 4 shows the projected annual transaction and revenue growth rates on the NTTA System. Annual transaction and revenue growth rates from 2014 through 2020 are equal to 1.8 percent and 5.7 percent, respectively. The transaction growth during this period captures the demographic growth, continued traffic ramp-up on the SRT and PGBT EE, and the impact of capacity improvements along sections of the DNT, PGBT and SRT that are expected to be implemented in the 2015-2019 timeframe. Revenue growth during this period includes traffic growth, toll rate growth and improvements to effective revenue recovery (due to improvement in AVI transaction shares and the ZipCash revenue recovery); also included are impacts of congestion pricing on SRT which is assumed to start from July 2019. Annual transaction and revenue growth rates from 2020 through 2030 are equal to 1.7 percent and 4.7 percent,

respectively. The annual transaction growth rates progressively decrease to 1.5 percent between 2030 and 2040, and to 1.0 percent between 2040 and 2050. The corresponding annual growth rates in revenue are 4.4 percent and 3.8 percent respectively, which incorporate the traffic growth and the assumed toll rate increases.

Table 3. Updated NTTA System Annual Toll Transactions and Revenue Forecasts

Year	Toll Transactions	Toll Revenue	Year	Toll Transactions	Toll Revenue
2014	641,789,700	$550,156,100	2040	979,826,500	$1,865,089,600
2015	654,792,600	$588,534,400	2041	989,916,800	$1,935,661,500
2016	663,701,200	$624,861,200	2042	1,000,151,200	$2,011,511,400
2017	671,427,300	$653,002,000	2043	1,010,617,300	$2,088,660,100
2018	685,604,900	$683,486,900	2044	1,021,270,600	$2,172,492,300
2019	700,063,000	$723,663,900	2045	1,031,782,400	$2,254,033,200
2020	712,450,500	$766,792,700	2046	1,041,554,300	$2,340,938,300
2021	724,389,300	$801,652,100	2047	1,051,388,100	$2,427,948,300
2022	737,245,900	$841,051,900	2048	1,061,212,500	$2,521,604,400
2023	750,855,600	$880,605,700	2049	1,071,473,900	$2,614,780,700
2024	763,887,400	$922,553,900	2050	1,081,794,500	$2,715,960,900
2025	777,396,700	$965,308,100	2051	1,091,068,300	$2,812,867,300
2026	791,213,100	$1,012,144,300	2052	1,100,106,500	$2,917,011,800
2027	805,302,500	$1,058,255,200	2053	1,109,557,000	$3,021,715,200
2028	820,895,400	$1,110,539,600	2054	1,119,137,400	$3,135,211,100
2029	833,062,600	$1,158,679,600	2055	1,128,836,900	$3,247,783,000
2030	845,428,500	$1,210,313,700	2056	1,138,714,200	$3,369,741,500
2031	858,048,700	$1,263,044,300	2057	1,148,324,400	$3,488,940,000
2032	870,950,900	$1,320,568,100	2058	1,060,072,800	$3,241,998,500
2033	884,287,900	$1,378,084,900	2059	872,832,500	$2,577,316,600
2034	897,688,800	$1,440,343,300	2060	879,008,000	$2,669,877,200
2035	909,084,800	$1,499,607,600	2061	884,964,500	$2,758,960,500
2036	922,510,800	$1,568,152,300	2062	890,810,500	$2,855,373,500
2037	936,514,700	$1,635,863,800	2063	896,588,000	$2,950,526,700
2038	950,719,500	$1,709,486,300	**Total**	**45,435,559,400**	**$92,147,238,700**
2039	965,238,000	$1,784,483,200			

Table 4. NTTA System Transactions and Revenue Annual Growth

Period	Annual Transaction Growth (%)	Annual Revenue Growth (%)
2014-2020	1.8	5.7
2020-2030	1.7	4.7
2030-2040	1.5	4.4
2040-2050	1.0	3.8

Table 5 shows comparisons between the updated T&R forecasts included in this letter and the forecasts included in the March 2014 Study. The updated toll transaction forecasts for 2014 and 2015 are 2.3 percent and 2.4 percent greater than the March 2014 Study forecasts and 2.3 percent greater in 2016. Transactions are just 1.4 percent higher in 2017, and the difference drops to just 0.7 percent by 2020. The increase remains at less than 0.7 percent for the remainder of the forecast period. The updated toll revenue forecasts for 2014 and 2015 are 1.7 percent and 2.3 percent higher than the March 2014 Study forecasts and 2.3 percent higher in 2016. The updated toll revenue forecasts are 1.6 percent, 1.1 percent and 0.9 percent higher in 2017, 2018 and 2019, respectively. The new revenue forecasts are less than 0.8 percent greater than the previous forecasts each year from 2020 onward. Overall, from 2014 to 2063 the transactions are 0.6 percent greater and the toll revenue is 0.4 percent greater than the March 2014 Study forecasts.

Table 5. NTTA System Annual T&R Comparisons – Change from March 2014 Study T&R Forecasts

Year	Transactions	Toll Revenue
2014	2.3%	1.7%
2015	2.4%	2.3%
2016	2.3%	2.3%
2017	1.4%	1.6%
2018	0.9%	1.1%
2019	0.7%	0.9%
2020	0.7%	0.7%
2030	0.5%	0.3%
2040	0.4%	0.1%
2050	0.5%	0.3%
2060	0.4%	0.5%
2014-2020	**1.5%**	**1.5%**
2014-2063	**0.6%**	**0.4%**

Sensitivity Tests

Several sensitivity test results were included as part of the March 2014 Study to provide the traffic and revenue impacts of changes to some key variables. Two sensitivity tests were conducted as part of the current effort to supplement the tests that were included in the March 2014 Study: (a) network changes related to the Mobility 2035 – 2014 Amendment, including the proposed Blacklands toll road in Dallas, Collin and Hunt Counties and (b) the future implementation of congestion pricing on the Sam Rayburn Tollway.

Mobility 2035 – 2014 Amendment

As mentioned previously, NCTCOG is currently working on an amendment to the current MTP (Mobility 2035 – 2014 Amendment), which is expected to be adopted by the RTC in November. NCTCOG has issued a draft list of changes in the new amendment, which CDM Smith has reviewed. **Figure 7** and **Figure 8** show snapshots of the transportation network related changes expected in the Mobility 2035 – 2014 Amendment in comparison to the Mobility 2035 – 2013 Update. The majority of the updates are minor changes to the background transportation network. However, the amendment also includes the proposed Blacklands toll road, which could potentially impact the NTTA System's traffic and revenue performance. This road provides an alternate travel route to IH 30 and US 380, and directly connects to PGBT EE near the Merritt Road mainlane gantry.

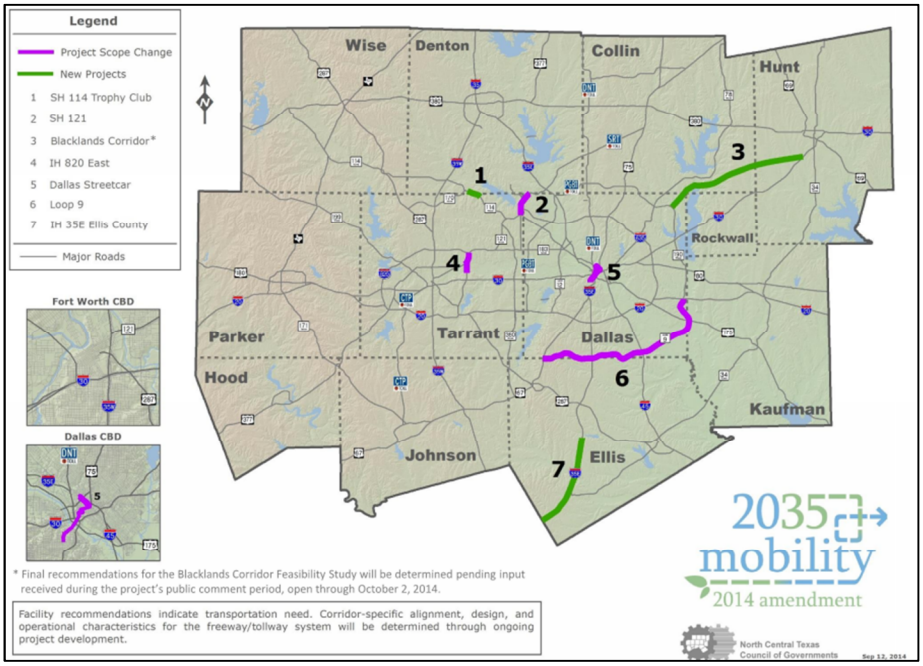

Figure 7. Mobility 2035 – 2014 Amendment Expected Transportation Network Related Scope Changes and New Projects

(Source: http://www.nctcog.org/TRANS/committees/sttc/documents/Item_3.sttc092614.pdf)

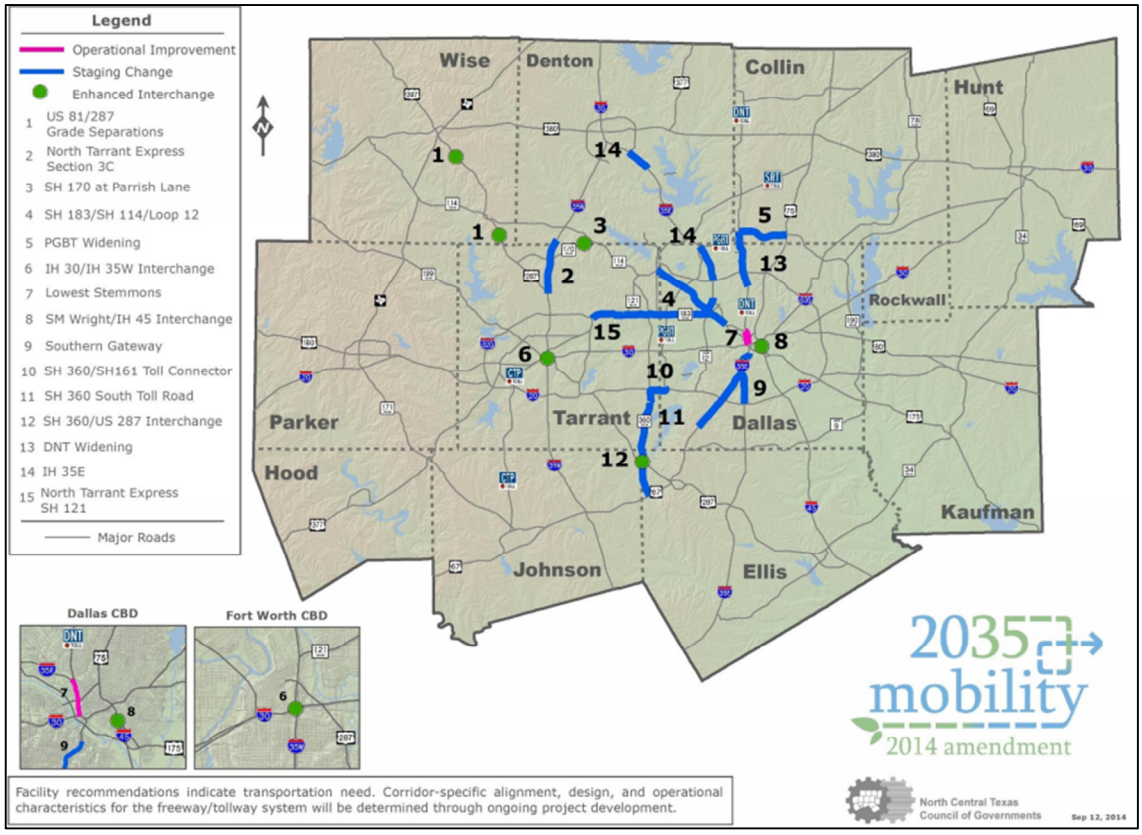

Figure 8. Mobility 2035 – 2014 Amendment Expected Transportation Network Related Staging Changes and Other Localized Improvements

(Source: http://www.nctcog.org/TRANS/committees/sttc/documents/Item_3.sttc092614.pdf)

To determine the potential impact of the proposed Blacklands toll road, a sensitivity test was completed for two years (2020 and 2035). The results of the sensitivity test are shown in **Table 6**. For this test, it is assumed that NTTA will be able to toll and collect revenue from some of the direct connectors to/from the Blacklands toll road so there is no toll-free access to/from the PGBT EE. The results of the test indicate that even though the Blacklands corridor could negatively impact traffic on the southern sections of the PGBT EE, it will increase traffic on the northern sections of the PGBT EE and PGBT, resulting in no material net negative impact to the baseline NTTA System T&R as included in this letter. Overall, impact to the NTTA System T&R is expected to be less than one percent in 2020 and 2035.

Table 6. Estimated Impacts of Blacklands Toll Road

Year	Revenue		Revenue Index	
	Base	Blacklands Corridor	Base	Blacklands Corridor
2020	$766,792,700	$766,025,900	100.0	99.9
2035	$1,499,607,600	$1,496,608,400	100.0	99.8
Year	**Transactions**		**Transactions Index**	
	Base	**Blacklands Corridor**	**Base**	**Blacklands Corridor**
2020	712,450,500	716,725,200	100.0	100.6
2035	909,084,800	914,539,300	100.0	100.6

Sam Rayburn Tollway Congestion Pricing

One of the key assumptions in the current analysis is the implementation of congestion pricing on SRT in 2019. A sensitivity test was conducted to determine the magnitude of that impact and estimate the total SRT revenue that would be generated in 2020 and 2035 if congestion pricing is not implemented. **Table 7** shows the results of the sensitivity test. If congestion pricing is not used, toll revenue on SRT is expected to be 2.0 percent lower in 2020 and 2.3 percent lower in 2035. However, due to the lower toll rates charged without congestion pricing during peak periods, a small increase in transactions is expected.

Table 7. Estimated Impacts of SRT Congestion Pricing

Year	Revenue		Revenue Index	
	Base	No SRT Congestion Pricing	Base	No SRT Congestion Pricing
2020	$766,792,700	$751,456,800	100.0	98.0
2035	$1,499,607,600	$1,465,116,600	100.0	97.7
Year	**Transactions**		**Transactions Index**	
	Base	**No SRT Congestion Pricing**	**Base**	**No SRT Congestion Pricing**
2020	712,450,500	716,725,200	100.0	100.6
2035	909,084,800	914,539,300	100.0	100.6

Conclusion and Recommendations

While the state of the North Texas economy, population and employment growth, specifically along the NTTA System corridors, are critical to the transactions and revenue on NTTA System facilities, the following are other critical parameters that will continue to have a material impact on the NTTA System T&R:

- AVI transaction shares and ZipCash revenue recovery rates
- Growth in the NTTA System toll rates, including congestion pricing (assumed on the SRT from 2019 onwards in the March 2014 Study and this letter), and toll rates on the several non-NTTA managed lane facilities that will open in the next few years

- Growth in the perceived NTTA System traveler values of time
- Gasoline prices
- Truck traffic usage on NTTA System facilities
- Regional air quality requirements and the regional MTP
- The timing of capacity improvements along sections of DNT, PGBT and SRT; impacts that the associated construction activities will have on the flow of NTTA System traffic during construction
- Improvements or openings of complementary and competing transportation facilities along the existing NTTA System corridors; impacts the associated construction activities will have on the NTTA System's traffic and revenue. The critical non-NTTA System roadway facilities/improvements that could materially impact NTTA System's traffic and toll revenue include the SH 161 Three-Mile-Section, PGBT Western Extension, DNT Extension Phase 4A/4B/5, IH 635 Project, DFW Connector Project, US 75, IH 35E Managed Lanes Project, SH 183 Managed Lane Project and State Highway 190/East Branch

In summary, based on the evaluation of the new information that has become available since the completion of the March 2014 Study, CDM Smith recommends that the NTTA System traffic and revenue forecasts included in **Table 3** in this letter be used to support the issuance of the upcoming Series 2014 Bonds.

I trust that this information addresses your current needs. In the meantime, should any questions arise, please do not hesitate to contact us.

Very truly yours,

Kamran Khan
Senior Vice President
CDM Smith, Inc.

DISCLAIMER

CDM Smith used currently accepted professional practices and procedures in the development of these traffic and revenue forecasts. However, as with any forecast, it should be understood that differences between forecasted and actual results may occur, as caused by events and circumstances beyond the control of the forecasters. In formulating the forecasts, CDM Smith reasonably relied upon the accuracy and completeness of information provided (both written and oral) by the North Texas Tollway Authority (NTTA). CDM Smith also relied upon the reasonable assurances of independent parties and is not aware of any material facts that would make such information misleading.

CDM Smith made qualitative judgments related to several key variables in the development and analysis of the traffic and revenue forecasts that must be considered as a whole; therefore, selecting portions of any individual result without consideration of the intent of the whole may create a misleading or incomplete view of the results and the underlying methodologies used to obtain the results. CDM Smith gives no opinion as to the value or merit of partial information extracted from this report.

All forecasts and projections reported herein are based on CDM Smith's experience and judgment and on a review of information obtained from multiple agencies, including NTTA. These forecasts and projections may not be indicative of actual or future values, and are therefore subject to substantial uncertainty. Future developments cannot be predicted with certainty, and may affect the forecasts or projections expressed in this report, such that CDM Smith does not specifically guarantee or warrant any estimate or projection contained within this report.

While CDM Smith believes that the projections or other forward-looking statements contained within the report are based on reasonable assumptions as of the date of this letter, such forward-looking statements involve risks and uncertainties that may cause actual results to differ materially from the results predicted. Therefore, following the date of that study, CDM Smith will take no responsibility or assume any obligation to advise of changes that may affect its assumptions contained within the report, as they pertain to socioeconomic and demographic forecasts, proposed residential or commercial land use development projects and/or potential improvements to the regional transportation network.

CDM Smith is not, and has not been, a municipal advisor as defined in federal law (the Dodd Frank Bill) to NTTA and does not owe a fiduciary duty pursuant to Section 15B of the Exchange Act to NTTA with respect to the information and material contained in this report. CDM Smith is not recommending and has not recommended any action to NTTA. NTTA should discuss the information and material contained in this report with any and all internal and external advisors that it deems appropriate before acting on this information.