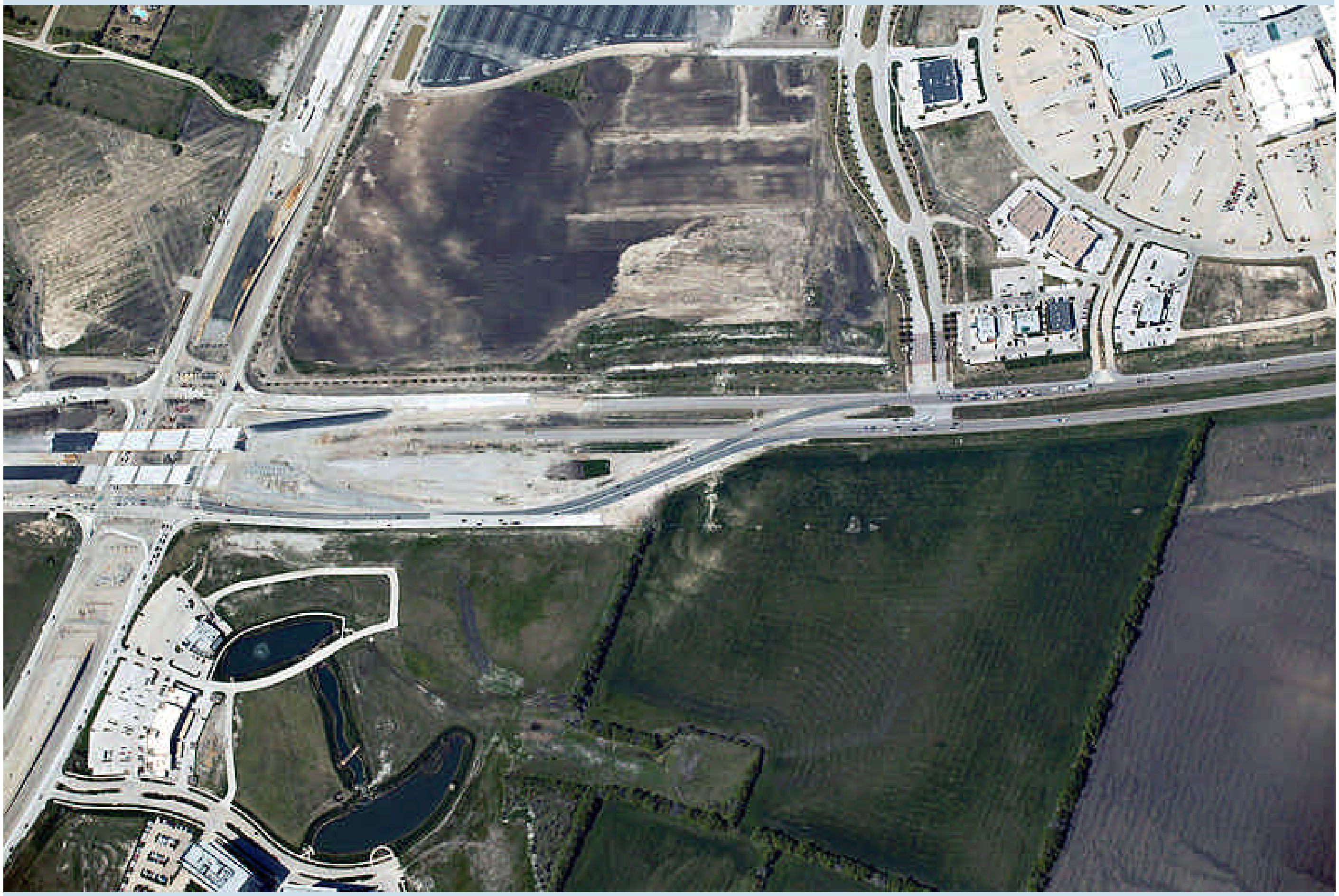
Two Futures for Collin County:

Incremental Versus Leveraged

(SH 121 Feasibility Study Report)

April 2005



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Introduction

State Highway 121 (SH 121) in Collin County is at a crossroads. As Collin County's principal route to the Dallas-Fort Worth International Airport, and a vital east-west corridor connecting US 75 in McKinney to Denton County and points west, SH 121 continues to become more congested and more strained every day. Anyone who has traveled the corridor recently, especially during the peak period, can easily identify the need to improve the corridor, as it currently cannot meet the needs of today, let alone the needs of 20 years from now.

Currently, the SH 121 corridor experiences severe congestion during both the morning and evening commute periods (the NCTCOG Commuter Traffic Report is available to confirm observed congestion values). Traffic counts have more than doubled between 1995 and 1999, and they have more than tripled at the intersection of SH 289/Preston Road. As southwest Collin County continues to grow in both employment and population, the SH 121 corridor will continue to experience exponential growth in traffic.

Unfortunately, improving the mobility needs on SH 121 is not a cheap or easy undertaking. Current estimates place constructing a 6-lane (three lanes in each direction) facility between the Dallas North Tollway (DNT) and US 75 at over $100 million (as of 2004). Additionally, the construction of freeway-to-freeway interchanges at both the DNT and US 75 are estimated at over $100 million apiece.

Approximately $30 million has already been allocated to construct the main lanes and grade separations between the DNT and Hillcrest Road. However, no funding is available for at least the next ten years to construct the rest of the corridor, including the freeway-to-freeway interchanges. As the North Central Texas Region continues to experience unprecedented growth, and motor-fuel tax revenues made available for transportation continue to decrease in purchasing power, the construction of SH 121 as a traditional freeway could be several decades away.

SH 121 is currently under construction from west of the DNT to Tarrant County, upgrading the facility from a 4-lane divided arterial to a 6-lane limited access toll road. The tolling of the Denton County portion of SH 121 has resulted in the expedited funding for this and other transportation projects adjacent to or near the corridor. As the main lanes of SH 121 open to traffic, a significant increase of individuals traveling SH 121 in Collin County will occur. This corridor now finds itself at a critical crossroad.

Vehicles cue up during the morning commute at SH 121 and Custer Road.

In order to address this mobility deficiency, the Collin County Commissioners Court has asked the regional planning authorities to assist the County in conducting a feasibility study on the Collin County portions of SH 121 in order to study roadway options and funding strategies. An SH 121 feasibility study team was assembled which included representatives from Collin

County, the North Central Texas Council of Governments (NCTCOG), the Texas Department of Transportation-Dallas District (TxDOT), the North Texas Tollway Authority (NTTA), and the impacted cities along the corridor. This report was authored by NCTCOG staff. The "Traffic and Revenue Study Results" section was authored by Wilbur Smith Associates/RBC Dain Rauscher.

Planning Process

In order to conduct a feasibility study for the Collin County portions of SH 121, a technical planning process was mapped out and followed. The outlined tasks are as follows:

- *Identify the problem/purpose and need for the study;*
- *Develop the project scope, goals, and objectives;*
- *Develop the evaluation criteria and performance measures;*
- *Begin the local government information process;*
- *Develop the travel and financial models;*
- *Generate the roadway and financial alternatives;*
- *Evaluate the roadway and financial alternatives;*
- *Conduct the traffic and revenue study (financial forecast);*
- *Produce the feasibility study report;*
- *Present the feasibility study findings to the Collin County Commissioner's Court; and*
- *Initiate local government and public information processes (led by Collin County).*

Derived from NCTCOG's Continuous Transportation Planning Process, this planning process was developed and started in the fall of 2004, and scheduled for completion the in spring of 2005. Several meetings of the SH 121 feasibility study team took place during this time to monitor and discuss the results of each task. SH 121 serves an important regional need for mobility and access which warrants that all potential roadway considerations and funding options be studied in order to alleviate congestion and provide reliability in the transportation system.

Study Corridor and Project Back-ground

SH 121 is a southwest-to-northeast-oriented roadway in North Central Texas that stretches from SH 78 in Bonham to Interstate Highway (IH) 35W in Fort Worth. Through the Dallas-Fort Worth Metropolitan Area, the roadway travels across portions of Collin, Denton, Dallas, and Tarrant Counties, and it provides direct access to and from the Dallas-Fort Worth International Airport, one of the area's largest and most important economic engines. This feasibility study evaluates the section of SH 121 in southern Collin County from the DNT to US 75, where it travels through portions of the cities of Allen, Frisco, McKinney, and Plano. The length of the study corridor is approximately ten miles.

As a testament to the roadway's regional significance, SH 121 in southern Collin and Denton Counties has been targeted for large-scale improvements for several decades, identified first in 1986 as a limited-access freeway or parkway in the Regional Transportation Council's <u>Mobility 2000: The Regional Transportation Plan for North Central Texas</u>. Design schematics for SH 121 as a limited-access facility were produced as early as 1989 by TxDOT, and they indicated that the corridor would carry six mainlanes and six frontage road lanes. However, the Denton County portion of SH 121 was the first to receive sufficient funding for some construction elements, and the most significant improvement performed prior to the turn of the century was the completion of the Lewisville Bypass frontage roads in 1999.

By 2002, though, new detailed design initiatives were completed throughout the corridor, and additional funding had been secured to allow the full limited-access facility and frontage roads to be built between the west end of the Lewisville Bypass and Hillcrest Road in Frisco. Between Hillcrest Road and US 75 in McKinney, however, only frontage roads were funded, except for a lone grade separation project at FM 2478 (Custer Road). Construction began in earnest the following year along various segments of SH 121, and this phase of activity is expected to conclude by the fall of 2007.

Despite the intense construction efforts underway, a major turning point in the future of SH 121 occurred in October 2004. The Regional Transportation Council (RTC), through a regional partnership program with TxDOT, Denton County, and the cities of Carrollton, Coppell, Frisco, Lewisville, and The Colony, took action to fund and construct SH 121 as a toll facility as a part of the RTC- initiated Partnership Program in conjunction with the development of the Texas Metropolitan Mobility Plan. This proposal was enacted to reprogram gas tax supported funding for SH 121 toward large-scale improvements demanded for IH 35E in Denton County, which had previously been unfunded, and it enabled anticipated toll funds for SH 121 in Denton County to help expedite the construction of several important arterials in the affected cities. This development served as a catalyst for debate among jurisdictions in Collin County whether or not a similar partnership program should be pursued, and in January 2005, by an order from the Collin County Commissioners Court, a new toll feasibility study was initiated for the SH 121 segment between the DNT and US 75. This report serves as the product of that study.

Purpose of the Proposed Action

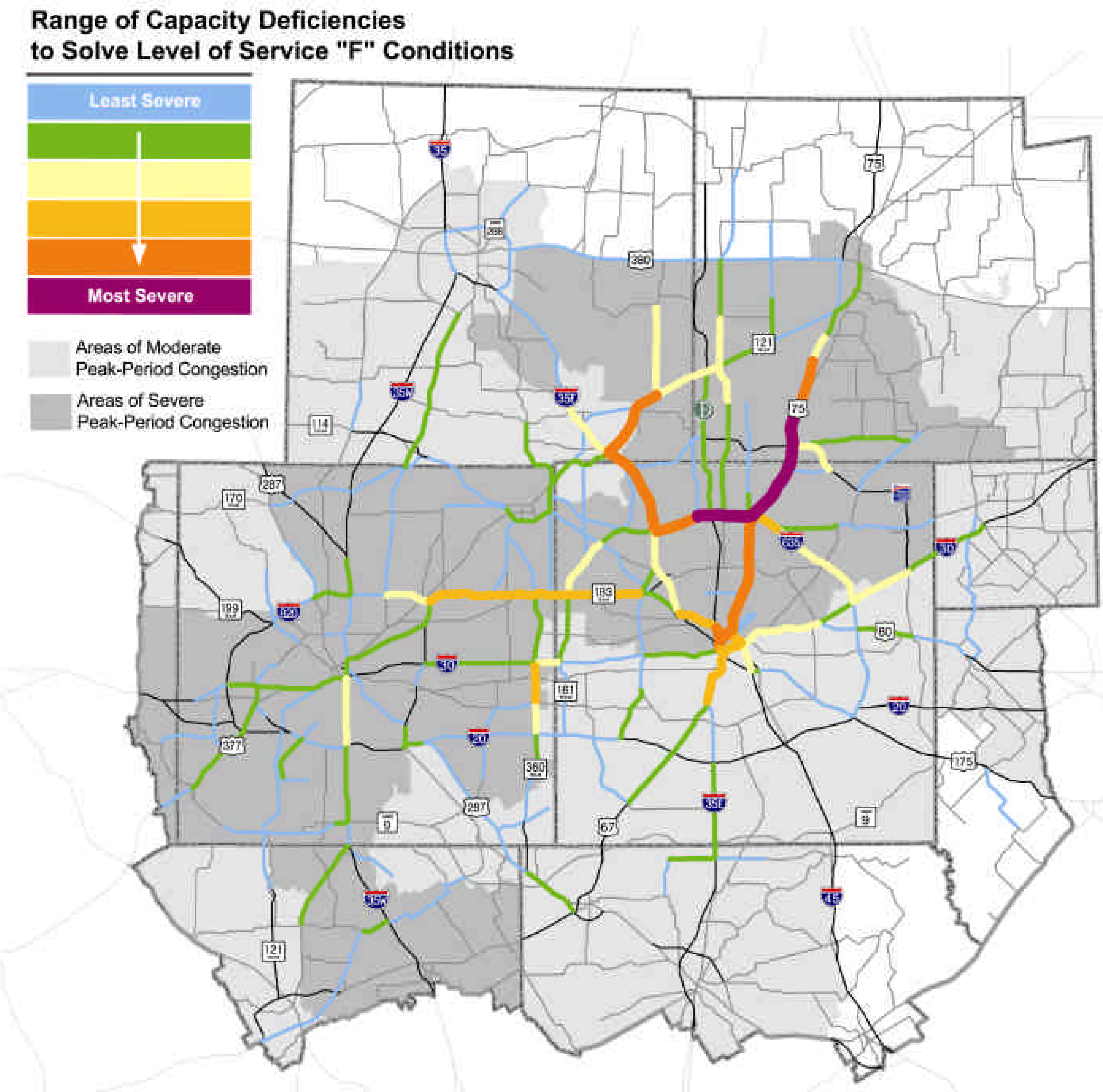
The purpose for the construction of SH 121 as a limited-access facility through southern Collin County is to address numerous transportation, mobility, and quality-of-life issues that have continually been identified in the area. As stated above, this segment of SH 121 would be constructed to a typical-section capacity of six mainlanes and six frontage road lanes with interchanges at the following cross-streets: DNT (with several potential direct flyover ramp connections), Parkwood Boulevard, Preston Road, Ohio Drive, Hillcrest Road, Coit Road, Independence Parkway, FM 2478 (Custer Road), Alma Drive, Stacy Road, Lake Forest Drive/Watters Road, Hardin Road, and US 75 (with several potential direct flyover ramp connections).

Since 1986, seven long-range regional transportation plans have identified SH 121 as a critical transportation component not only for Collin County, but the Dallas-Fort Worth Metropolitan Area as a whole. The section of SH 121 between the DNT and US 75, integrated with the planned improvements of SH 121 in Dallas, Denton, and Tarrant Counties, would create a large and long-distance freeway/tollway facility that would serve a rapidly expanding population and employment base, and help to alleviate ever-increasing burdens on a highly capacity-constrained roadway system. In fast-growing suburban areas like Collin County, the imbalance between travel demand and roadway supply results in substantial increases in congestion and roadway maintenance needs, and funding to support widespread construction and maintenance has been unable to keep pace. For those travelers who would use SH 121, as well as for users of other streets in the study area, improvements to the corridor will help to improve mobility, reduce congestion, increase safety, offer travel time savings, and enhance access to/from employment, retail, and entertainment centers.

SH 121 Corridor Growth Trends

The effects of traffic congestion in the Dallas-Fort Worth Metropolitan Area are widespread, and they directly affect the mobility of people and goods through the region, as well as significantly impact the overall quality of life. These effects include increased travel time, increased fuel consumption, lost productivity of people and businesses, and diminishing air quality. The current long-range transportation vision for the region, Mobility 2025: The Metropolitan Transportation Plan, 2004 Update, indicates that in 1999, congestion cost the Dallas-Fort Worth region $5.3 billion. The Plan also projects that even after all of its targeted and fiscally-constrained investments have been completed, which are anticipated to total $45 billion, the regional annual cost of congestion by 2025 will more than double to $11.8 billion. This figure takes into account the completion of SH 121 as a limited access facility through southern Collin County, so the longer SH 121 remains unimproved, the more dire the consequences of congestion impacts to the region and county.

More troublesome than the above statistics, however, is the fact that the Dallas-Fort Worth area continues to this date to be one of the fastest growing metropolitan areas in the United States. In 2000, the North Central Texas region contained approximately 5.3 million persons, a 29.1 percent increase in population, and more than twice the national growth rate, since the 1990 Census. Through the year 2005, the Dallas-Fort Worth area has retained a growth of more than 100,000 persons per year for a remarkable span of nine consecutive years, and five of those years saw a population increase of over 150,000 persons each. Furthermore, according to the NCTCOG Research and Information Services



The deficiencies shown for eliminating Level-of-Service "F" conditions after those recommendations in Mobility 2025-2004 Update have been implemented.

Department, year 2025 demographics indicate that the Dallas-Fort Worth area will grow to a population of nearly eight million persons, along with almost three million households and approximately five million jobs.

The transportation burden of such an enormous influx of population and employment activity can be translated into vehicle miles traveled (VMT) on the regional roadway system. Mobility 2025: The Metropolitan Transportation Plan, 2004 Update indicates that 125 million vehicle miles were traveled on the area's roadways in 1999. Compared to data from previous long-range planning documents, VMT in the Dallas-Fort Worth area had doubled over just a 20-year period prior to 1999. The current Plan suggests that by 2025, VMT

Location	Final Census 1970	Final Census 1980	Final Census 1990	Final Census 2000	Estimated Population 2004
Collin County	66,920	144,576	264,036	491,675	615,200
Allen	1,940	8,314	19,315	43,554	62,450
Frisco	1,845	3,499	6,138	33,714	66,400
McKinney	15,193	16,256	21,283	54,369	82,800
Plano	17,872	72,331	127,885	222,030	243,500

Table 1: Historic Population Growth

in the region will nearly double again to approximately 235 million vehicle miles. This rate of growth is faster than the projected growth in population. This phenomenon can be attributed to increased suburbanization and the longer trip lengths, greater trip frequencies, increased automobile ownership, reduced automobile occupancy, and wide dispersal of destinations that such a land-use pattern encourages. Though significant steps are being taken on a regional level to promote multimodal transportation options and sustainable development initiatives, it is likely that private automobiles and suburbanization will continue to be dominant lifestyle choices well into the future.

Location	Population Forecast 2005	Population Forecast 2010	Population Forecast 2020	Population Forecast 2030
Collin County	N/A	N/A	N/A	1,166,700
Allen	77,947	86,062	95,334	99,331
Frisco	80,969	112,725	178,558	227,911
McKinney	83,678	105,869	160,591	225,933
Plano	245,261	255,812	256,882	257,061

Table 2: Forecasted Population Growth

Perhaps nowhere in the Dallas-Fort Worth Metropolitan Area have the effects of such dramatic changes been felt more than in Collin County, and particularly along the SH 121 corridor. Collin County has borne the distinction for several years of being the fastest growing county in the State of Texas and the second fastest growing county in the nation. Table 1 outlines the extraordinary growth in population that has occurred since 1970, both for the county as a whole and the four cities adjoining the SH 121 corridor.

Without the expedited improvements of SH 121 between the DNT and US 75, such growth in population over time will generate increasing amounts of traffic that will divert to local city streets and other secondary roadways, placing unbearable traffic demands on routes not intended to function as regional or state facilities. The existing roadway network would not operate efficiently, and it is likely that area-wide accident frequency could increase, congestion would persist beyond peak travel periods, travel time reliability would all but diminish, and trip lengths would grow to undesirable levels.

Such traffic conditions also create an unfavorable climate for retaining and attracting business activity, and as Table 3 shows, employment growth in the four cities adjoining SH 121 increased substantially through the 1990's.

Location	1990 Employment	1995 Employment	1990-1995 Percent Change	2000 Employment	1990-2000 Percent Change
Allen	3,550	4,700	32.39%	9,059	155.18%
Frisco	2,550	2,950	15.69%	8,437	230.86%
McKinney	12,250	15,200	24.08%	26,293	114.64%
Plano	54,450	71,100	30.58%	115,048	111.29%

Table 3: Historic Employment Growth

Location	Final Census 2000	Employment Forecast 2005	Employment Forecast 2010	Employment Forecast 2020	Employment Forecast 2030
Collin County	204,100	N/A	N/A	N/A	517,300
Allen	9,059	14,958	21,487	40,125	45,144
Frisco	8,437	13,867	19,932	42,620	58,931
McKinney	26,293	33,410	40,189	56,312	74,750
Plano	115,048	124,181	135,391	151,412	184,205

Table 4: Forecasted Employment Growth

In fact, economic development is very much a function of mobility and accessibility. Implementation of SH 121 as a limited access facility would not only respond to on-going development, but also facilitate future development. According to the NCTCOG Research and Information Services Department, employment growth in the future is projected to occur on a much larger scale, as depicted in Table 4.

Some of this level of growth can already be realized among the four SH 121 cities in Collin County. This is particularly true in Frisco, where the completion of Stonebriar Mall in 2000 has been the impetus for millions of additional adjacent retail square footage, millions of new office square footage in nearby Hall Office Park, a new convention center and hotel complex, and the construction of a minor league baseball facility. Examples of significant existing or soon-to-be-implemented developments in other cities include commercial expansions at Legacy Park in Plano, the development of Craig Ranch in McKinney, and the opening of the Blue Star development in Allen by Dallas Cowboys' owner, Jerry Jones. The ability for SH 121 to quickly accommodate the activity that these land uses will generate will be key to the success and proliferation of any new developments along the corridor.

Description of Transportation Roadway Alternatives and Funding Options for the SH 121 Corridor

As part of the SH 121 Feasibility Study for Collin County, it is important to identify all potential transportation roadway alternatives, as well as all potential funding options available to the County for addressing the mobility and reliability issues concerning this corridor. At an early stage in this planning process, the feasibility study team brainstormed and identified every feasible roadway and funding option available to the County. The various roadway alternatives and funding options will be identified and discussed below, and the performance results of these options will be provided in the following section to this report.

Alternative #1
Do-Nothing

The Do-Nothing Alternative is a no-build scenario in which no further improvements are assumed to be made to the Collin County portions of SH 121 beyond what is either already funded or under construction at this time. It is a baseline alternative to measure performance impacts, The no-build alternative assumes that the Denton County portions of SH 121 are tolled, consistent with Mobility 2025: The Metropolitan Transportation Plan, Amended April 2005, the soon-to-be-adopted long-range transportation plan for the Dallas-Fort Worth Region. In Collin County, the portion of SH 121 between the DNT and Hillcrest is modeled and assumed to be constructed and open to traffic as a traditional freeway section (no tolls), and from DNT east to US 75 a frontage road system is in place. The freeway-to-freeway interchanges at the DNT and US 75 are not included in this scenario. This alternative does include the grade separation already funded at Custer and SH 121. This alternative assumes only what is currently under construction or funded in the current 2006-2008 Transportation Improvement Program (TIP).

Alternative #2

Freeway from the DNT to US 75

This alternative is based on funding and constructing a traditional freeway section (no tolls) from the DNT to US 75 using a variety of funding methods. If the County and local governments wish to pursue a freeway in this corridor, it will be necessary to identify the specific method to fund these improvements. Based on current funding levels and long-term financial projections, the necessary State and federal dollars would not be available for at least 10 to 15 years, likely longer. The State's Strategic Priority Funding is unlikely as a consideration because that funding source has already been fully allocated. Because SH 121 is already congested and a solution is needed in the near term, alternative funding methods need to be examined.

The freeway-to-freeway interchanges at the DNT and US 75 have been included and modeled in this scenario, and the grade separation at Custer and SH 121 is included because funding has already been identified and programmed for that improvement in the current TIP. In order to fund a full freeway section of SH 121 in Collin County, it is necessary to examine several funding options. Those funding options are identified below:

Option A: Collin County and local governments fund the project and seek reimbursement from the Texas Transportation Commission and TxDOT

The opportunity might exist to fund SH 121 in Collin County as a freeway using local government dollars and for those entities to be reimbursed over time from the State. The Texas Transportation Commission introduced a concept referred to as "shadow tolls" which seeks to get projects constructed sooner using local dollars and then for the State to reimburse the local government entities over time based on the vehicular traffic on the facility. The name "shadow tolls" is a misnomer in that it is not the traffic using the facility that pays the tolls, but rather the State ends up paying the funding entities back annually based on the amount of traffic using the facility. The tolls are passed through to the state which then must allocate anticipated funding returns to the local governments, which will affect State funding levels over time. This is an option being considered, however, in order for this funding alternative to be eligible and allowed by the Texas Transportation Commission, SH 121 must be evaluated as a stand-alone toll road and must be shown to be not feasible as a toll road, which means that traffic revenues from tolling are insufficient to warrant and sell bonds to cover the construction and operation of a toll road. SH 121 has been evaluated as a toll road through a traffic and revenue study which will be discussed later in this report (*This option is not feasible because a toll road option is feasible*).

Another consideration associated with this funding alternative is that local governments would have to be able to pool their monies together to fund this project entirely using local funding (*There is no agreement by the local governments to pool funds*). This could potentially put a strain on local funding sources and might affect other city functions competing for funding. If this option does prove to be available as a funding mechanism, arrangements and letters of agreement with all local governments will need to be reached regarding the amount each will have to pay in advance for this improvement, and the Texas Transportation Commission would also have to accept the responsibility of reimbursing the pass-through tolls over time, which should not be assumed to be automatically accepted and approved.

Option B: Local governments fund SH 121 without reimbursement

Another option to consider is that the local governments (Allen, Frisco, McKinney, Plano, and Collin County) jointly pool local revenues and fund this freeway project themselves without seeking reimbursement from the State. The same consideration from above applies to this scenario which means that the local governments would have to come to terms regarding how much each one is willing and obligated to contribute and if local government dollars exist in the magnitude needed to fund and possibly maintain a freeway project (*There is no agreement by the local governments to pool funds*).

Option C: Option B from above with Regional Transportation Council assistance and congressional funding

This alternative is similar to Option B above except that the local governments could request assistance with funding of the freeway construction from the RTC, serving as the policy-making board for transportation decisions within the Dallas-Fort Worth region. The RTC does not currently have any unprogrammed sources of available funding to the extent necessary to fund the improvements to SH 121, so this would not be an immediate solution. In addition, the RTC has many regional needs and priorities which SH 121 would have to compete against (e.g. US 75 in Collin County). The local governments would likely still have to contribute funding towards a local match if this option truly exists. In the House version of the next Federal transportation funding bill an earmark has been made to fund $16 million for the portion of SH 121 between Hillcrest and US 75 to fund main lanes and interchanges. This potential earmark, along with $30 million in general Collin County funds, will not cover the entire construction cost, but would be able to contribute towards the overall funding needs of the corridor. As this legislation continues through the Senate and subcommittees, there are no guarantees that this earmark will make it into the final legislative bill.

Alternative #3
Toll Road from the DNT to US 75

Option A: With Revenue Sharing Policy for off-system

This alternative is based on funding and constructing the Collin County portions of SH 121 as a toll road through a Comprehensive Development Agreement (CDA), which is a mechanism for funding which involves partnerships with private interests. The CDA process allows TxDOT to work directly with multiple competitors to provide the best solution within this corridor while maintaining control of operational and maintenance issues, as well as the tolling rates. This is a mechanism for funding made possible because of HB 3588 which brought Texas new tools for financing roadway projects sooner. This alternative would use private sector dollars to fund the improvement to the SH 121 corridor, the direct connect interchanges with the DNT and US 75 have been included.

If this option were pursued, there would potentially be (1) current and (2) out-year dollars made available due to excess revenue generation which could be split and shared among the local governments impacted to fund additional off-system roadway projects. The RTC, serving as the Metropolitan Planning Organization policy-making board, has approved a policy on excess toll revenue sharing which identifies the conditions and stipulations which must be met. This policy position is included as Appendix A of this report.

In this scenario, tolling SH 121 would bring the much needed congestion relief and roadway improvements years earlier than traditional gas-tax revenues could, and would also bring additional excess revenue which the cities and County could apply to other local needs. This is a concept which has become known as "near neighbor, near timeframe" where those local governments impacted would benefit from the revenue sharing incentive and these dollars would be made available in the near timeframe to help with other transportation needs.

Option B: With Revenue Sharing Policy for the DNT and US 75 interchanges

This alternative is similar to Option A above except that the excess revenues which exist would first go to the funding and implementation of the DNT and US 75 interchanges (either in total or initially critical movements) before being split and returned to the local governments to fund other transportation needs. This option would ensure that the proper connections exist between the SH 121 corridor and the DNT and US 75 corridors and would identify the means to fund these costly interchanges.

Option C: Western cities have a near neighbor, near timeframe policy and eastern cities do not (for off-system projects)

This alternative is a slight alteration of Option A above, the difference being that in this option only the western cities along the corridor (Frisco and Plano) would participate in a revenue sharing policy, while the eastern cities (Allen and McKinney) would not. This option assumes that the excess revenue shared by the cities of Frisco and Plano would be used to fund local off-system roadway projects within these two cities as part of a near neighbor, near timeframe agreement.

Option D: Western cities have a near neighbor, near timeframe policy and eastern cities do not (for interchange at the DNT)

This alternative is identical to Option C above except that the excess revenue shared by the cities of Frisco and Plano would be used to fund the interchange with the DNT before funding any other local improvements.

Alternative #4 (Hybrid)
Freeway to Hillcrest – Toll Road to US 75

This alternative represents a hybrid of the options already discussed above. Under this option, the portion of SH 121 between the DNT and Hillcrest would be funded with traditional gas-tax dollars and would be opened as a freeway facility without any tolls. The portion of SH 121 between Hillcrest and US 75 would be pursued as a toll road through the CDA process mentioned previously.

Option A: With Revenue Sharing Policy for US 75 interchange

If the portion of SH 121 between Hillcrest and US 75 were implemented as a toll road, then excess toll revenue might exist which could be allocated to the funding of the direct connections with US 75. Since the western portion of SH 121 would not be tolled, there would not be any revenues collected to assist with the funding of the interchange with the DNT, and this improvement would have to wait and be funded. The tolls collected on the eastern portions of SH 121 would go to funding the interchange at US 75 since it would be the excess toll revenues collected on the eastern portions paying for that improvement.

Alternative #5
Free Main Lanes and Tolled Managed Lanes from the DNT to US 75

Another option to consider is the introduction of tolled managed lanes between the DNT and US 75 to provide the management and operational control of a tolled facility while still allowing a non-tolled freeway section as well. This option is based on constructing a freeway (non-toll) section while at the same time constructing a tolled managed-lane section either in the middle between the freeway lanes or on the outside of the freeway lanes. The typical design section for this option consists of two freeway lanes in each direction and two tolled managed lanes in each direction. It should be noted here that such a design will incur greater capital costs compared to the other alternatives as a result of the two additional limited-access lanes. The managed toll lanes could be implemented with a variable pricing structure which could charge higher tolls during the peak periods to maintain an acceptable level of service while providing some toll revenue to help offset the costs of construction. Since there would be a non-tolled freeway section, the managed toll lanes would not have the same revenue potential as Alternative 3 above, and would not produce as much excess revenue for the construction of local government transportation needs. The RTC may take a policy position in the future regarding the potential revenue sharing for managed lane facilities, but at this time, a consensus has not been reached on that policy language.

Option A: With Revenue Sharing Policy for the DNT and US 75 interchanges

The managed lane concept can be pursued and applied assuming that if and when excess toll revenue exists, those excess funds could be used to construct the interchanges needed with the DNT and the US 75 corridors. However, as stated previously, the toll revenue generating potential of a managed lane is not comparable to that of a traditional toll road, and it is possible that excess toll revenue from a managed lane might never exist. If that were the case, then the interchanges would have to be funded through some other means. Based on regional data collected from other toll road projects, it is estimated that a managed lane can produce approximately 16 percent of the toll road revenue of a traditional toll road.

Roadway Performance and Funding Option Estimates

This feasibility study report has identified the purpose of the study, the need for this analysis, the various roadway and funding options available, and this section of the report will outline the results of the technical process used to evaluate the various roadway and funding options. Much of the performance data presented in this report is based upon travel demand model forecasting results from the Dallas-Fort Worth Regional Travel Model, which is a planning tool used to help evaluate the impacts, compare alternatives, and quantify benefits of transportation investments. In this case, the model represents a planning tool to assist with the evaluation of the various alternatives and the traffic-related impacts to the transportation system. The various roadway alternatives and funding options will be discussed below and the performance results for each of these options will be provided.

The graphics presented in Appendices B through M are associated with the alternatives described below. Each map shows the extents of the SH 121 corridor from the DNT on the west to US 75 on the east, and provides a graphical representation of the roadway system, including the freeways, tollways, frontage roads, and local thoroughfares. Local streets are not represented. Each of these facilities on the map is shown with a number above the link which represents the daily (24-hour) projected traffic volumes for the year 2025. The traffic volume number represents the total number of vehicles anticipated to be using that segment over a 24-hour period in the year 2025. This map also has a series of purple lines marked with either an A or a B and a number afterwards. These purple lines represent screen-lines, and show the total volumes for all the facilities being "crossed." These screen lines will be discussed in greater detail in the summary section of this report.

For each of the alternatives, a level-of-service (LOS) map is also provided showing the relative level of congestion on each roadway segment in the study area. LOS refers to a ratio that compares volume to capacity on a link-by-link basis, identifying the level of congestion using a color scheme ranging from green to red. Green segments represent an LOS value of "A, B, or C" which indicates a relatively uncongested facility. Yellow segments are associated with an LOS value of "D" representing a moderately congested facility, while Orange segments represent an LOS value of "E" indicating highly congested facilities. The red links refer to LOS "F" conditions which are indicative of stop-and-go conditions with very high levels of congestion on the roadway. This color coding scheme for LOS makes it easier to identify where congestion exists on the roadway system and the magnitude of that congestion, and makes it possible to compare alternatives to one another and shows the effects of congestion on the roadway system.

Typical Level-of-Service "F" Conditions

Alternative #1
Do-Nothing

As discussed previously, the Do-Nothing Alternative is a no-build scenario in which no further improvements are assumed to be made to the Collin County portions of SH 121 beyond what is either already funded or under construction at this time. The no-build alternative assumes that the Denton County portions of SH 121 are tolled, and in Collin County, the portion of SH 121 between the DNT and Hillcrest is modeled and assumed to be constructed and open to traffic as a traditional freeway section (no tolls), and from DNT east to US 75 a frontage road system is in place. The freeway-to-freeway interchanges at the DNT and US 75 are not included in this scenario. This alternative does include the grade separation already funded at Custer and SH 121. The travel model results for this alternative are provided in Appendix B and the LOS calculations are provided as Appendix C. The do-nothing alternative represents a baseline condition which the other alternatives can be compared against. If additional funding is not identified and secured, the do-nothing alternative could be the transportation system in place for the year 2025. It is important to point out that without additional improvements in the SH 121 corridor, much of the future travel demand must be accommodated through local streets which will greatly affect the residents in and around the SH 121 corridor, and will limit their access to the regional transportation system.

Alternative #2
Freeway from the DNT to US 75

This alternative is based on funding and constructing a traditional freeway section (no tolls) from the DNT to US 75 using a variety of funding methods, which have been discussed previously in this report. The freeway-to-freeway interchanges at the DNT and US 75 are included in this scenario, and the grade separation at Custer and SH 121 is included also because funding has already been identified and programmed for that improvement in the current TIP. The traffic volume forecasts for this alternative are provided in Appendix D and the related LOS analysis is provided as Appendix E. With a freeway facility in place, much of the traffic that was using the local arterial streets has moved onto the freeway corridor and local mobility and access is improved.

Alternatives #3 and #4
Toll Road from the DNT to US 75, and Freeway to Hillcrest – Toll Road to US 75

This alternative is similar to the freeway alternative above, except that tolls are now placed on the Collin County portions of SH 121 at the rate of 12 cents per mile. Two separate analyses were conducted to evaluate the effects of tolling SH 121 at the request of the local governments. The two tolling alternatives are as follows:

A) *Toll SH 121 corridor from the DNT to US 75; and*

B) *Freeway (no tolls) from the DNT to Hillcrest, Toll Road from Hillcrest to US 75 (Hybrid Alternative).*

Both alternatives above are based on funding and constructing the Collin County portions of SH 121 as a toll road through a CDA. The traffic forecast projections for the toll road alternative from the DNT to US 75 are provided as Appendix F and the corresponding LOS map is provided as Appendix G. The Hybrid Alternative, which assumes a freeway section from the DNT to Hillcrest and a toll road section from Hillcrest to US 75, is provided in Appendix H and I. These travel demand forecasts were modeled by NCTCOG and are based on the regional transportation planning process and incorporate assumptions and procedures used for regional planning purposes.

Traffic and Revenue Study

The toll road portions of this feasibility study were also carried out and performed by Wilbur Smith Associates (WSA/RBC Dain Rauscher), working under contract to TxDOT. The WSA team performed a Level 2 Feasibility Analysis as part of the Traffic and Revenue Study which evaluates the bonding levels needed to construct a toll road improvement and the anticipated levels of revenue which can be expected over time. The results of WSA's Traffic and Revenue Study are provided later in this report.

Effects of Higher Tolls for Trucks

For the toll road analysis above, it was assumed in the travel model that all vehicles would pay the same 12 cents per mile, including trucks. Currently, both the DNT and the President George Bush Turnpike charge a higher rate for trucks, typically three to four times the passenger vehicle rate. In order to test the sensitivity of tolls on trucks and the potential diversion of truck trips throughout the corridor, a model run was performed which applied a rate equal to 36 cents per mile for trucks (three times the passenger car rate). The results of this analysis are provided in Appendix J. It is important to note that when higher tolls are placed on the truck trips in this corridor, the number of trucks on SH 121 drops as the trucks tend to favor staying on the free frontage roads. The magnitude of trucks using local thoroughfares does not increase significantly as the frontage roads provide a more direct and non-tolled alternative.

A technical paper was developed which looks at different aspects of the toll collection system and the use of all-electronic toll collection systems and their applicability to this feasibility report. This paper, prepared by WSA, is included as Appendix K to this report.

Alternative #5
Free Main Lanes and Tolled Managed Lanes from the DNT to US 75

Another option considered was the introduction of tolled managed lanes between the DNT and US 75 to provide the management and operational control of a tolled facility while still allowing a non-tolled freeway section as well. This option is based on constructing a freeway (non-toll) section while at the same time constructing a tolled managed-lane section either in the middle between the freeway lanes or on the outside of the freeway lanes. Since there would be a non-tolled freeway section, the managed toll lanes would not have the same revenue potential as the toll road alternative above, and would not produce as much excess revenue for the construction of local government transportation needs. Funding for the freeway section would also have to be identified and secured since the managed lane portions would not produce the revenue needed to construct the entire facility, especially since the two additional limited-access lanes in the design compared to other alternatives adds greater capital costs. The travel demand model projections for the managed lane alternative and the corresponding LOS map is provided as Appendix L and M, respectively.

Freeway-to-Freeway Interchanges: Direct Connectors

Many of the alternatives identified above had financial funding options that included the freeway-to-freeway interchanges at the DNT and US 75. To provide a more seamless and streamlined connection, the inclusion of these direct connectors is important, although, based on travel model results, not all of the movements at both interchanges are as critical. Appendix N provides a line diagram map which shows the predominant interchange movements at the DNT and US 75 interchanges, and shows the movements which are most critical to consider to maintain the proper flow of the SH 121 corridor traffic at both ends of the study. To keep costs down, it is feasible to construct only the predominant interchanges needed initially and over time pursue securing the funding for the other interchange movements.

Traffic and Revenue Study Results

(As prepared by Wilbur Smith Associates and RBC Dain Rauscher)

The following information summarizes the feasibility study for the SH 121 Collin County Corridor. The boundaries of the study extend from the DNT to US 75. It was assumed that SH 121 will be an electronic toll facility.

Definition of Alternatives

The following geometric alternatives were evaluated for this study:

Alternative 3

- DNT to US 75 Tolled
- Number of Lanes: Six Lanes in Total

Alternative 4

- DNT to Hillcrest Tax-Supported (toll-free)
- Hillcrest to US 75 Tolled
- Number of Lanes: Six Lanes in Total

Figures 1 and 2 illustrate the access points and the mainlane and ramp electronic gantry locations for Alternatives 3 and 4. Sections on red reflect toll-free movements.

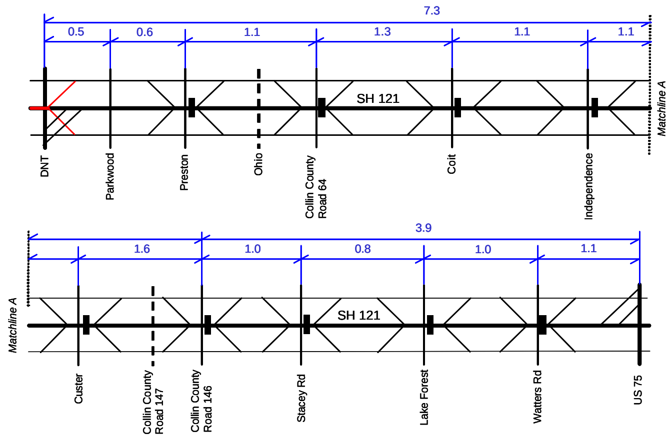


Figure 1: Alternative 3

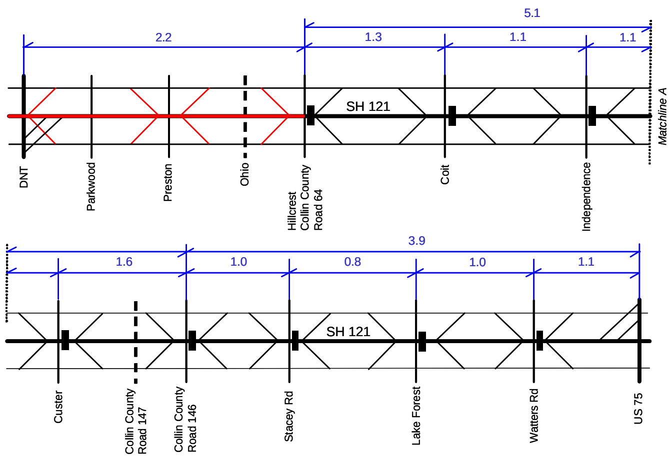


Figure 2: Alternative 4

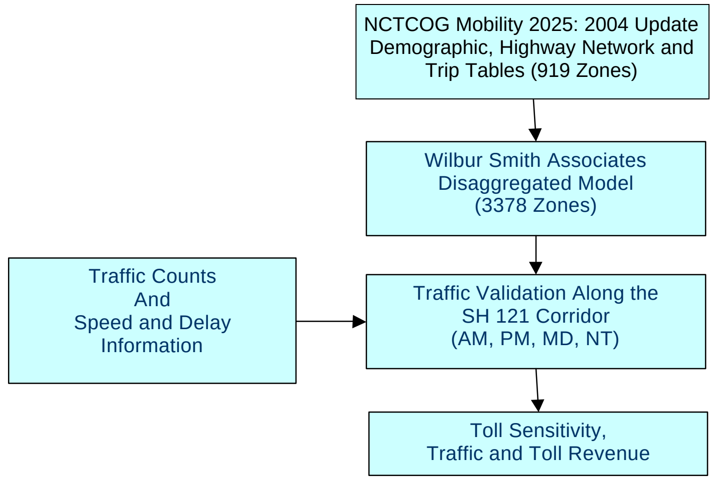


Figure 3: Traffic and Toll Revenue Process

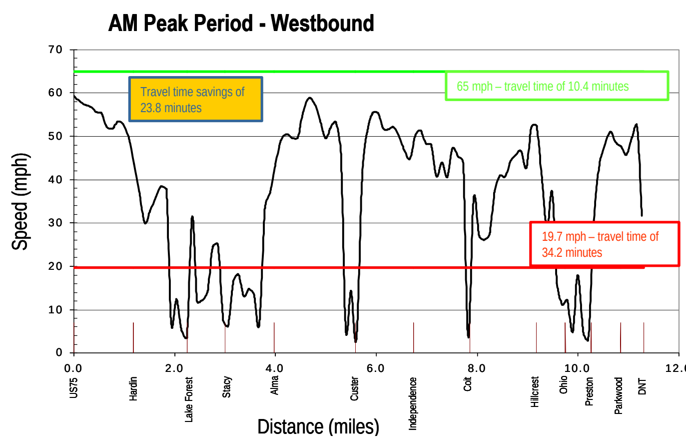


Figure 4: Existing Conditions

Traffic and Toll Revenue Process

Databases developed by NCTCOG for the Mobility 2025 - 2004 Updated were used to estimate traffic and toll revenue. Figure 3 illustrates the process.

SH 121 Existing Conditions

SH 121 experiences significant traffic congestion during peak hours. Figure 4 shows the westbound speed distribution on SH 121 during the AM peak period. On the average, a person traveling along the corridor from US 75 to the DNT would spend 34.2 minute, equivalent to an average speed of 19.7 mph as shown on red on Figure 4. A driver traveling the same distance at 65 mph would only take 10.4 minutes, equivalent to 23.8 minutes of travel time savings if SH 121 would be upgraded to freeway operation conditions.

Toll Sensitivity

The toll sensitivity evaluation helps decision makers to select a reasonable toll rate for a toll project. Figures 5 and 6 depict toll sensitivity for the proposed opening year 2010 and for 2025 respectively. The black dot represents the maximum toll rate allowed to charge for bonding purposes. The blue dot depicts a toll rate consistent with existing toll rates in the Dallas Metropolitan area and it is very similar to the toll rate selected by the Texas Turnpike Authority (TTA) of TxDOT for the 2004 SH 121 2004 Sketch Level Analysis.

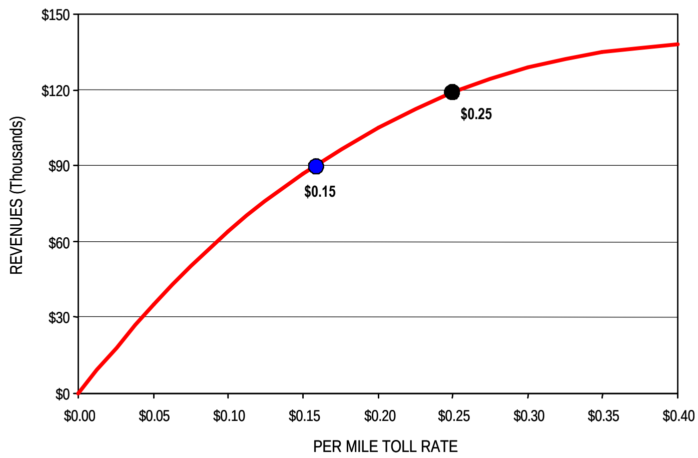


Figure 5: Year 2010

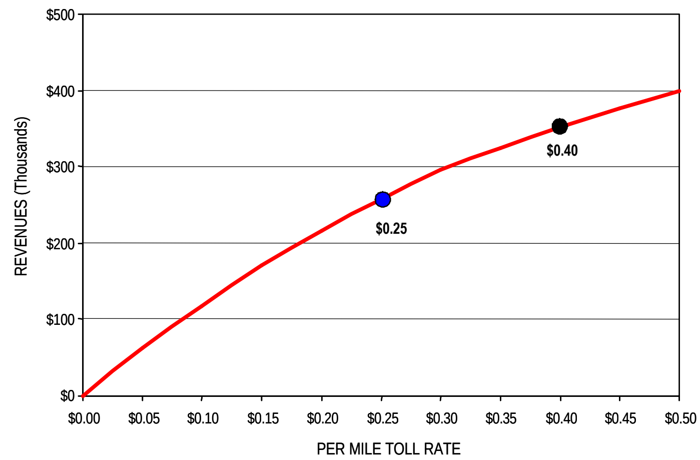


Figure 6: Year 2025

Figure 7 shows existing toll rates in several toll facilities in the country including the DNT and the President George Bush Turnpike (PGBT) in Dallas, as well as toll rates for future toll projects in Texas. It can be observed that the $0.15 per mile toll rate recommended in Figure 5 is within the range of existing and future toll rate for other toll projects in Texas.

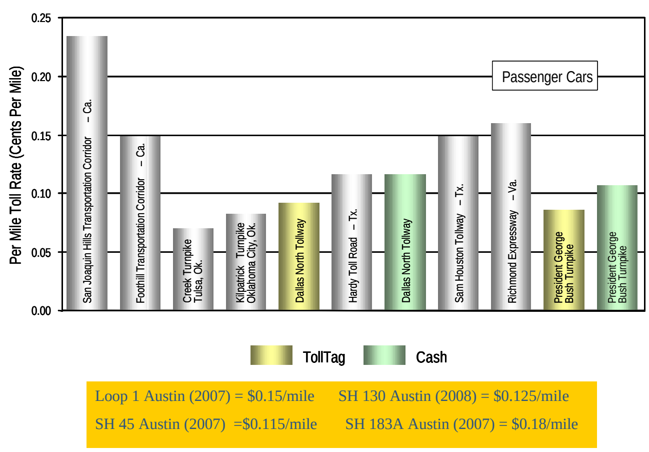


Figure 7: Toll Rate Comparisons

Revenue Assumptions

The following are general assumptions adopted to estimate the toll revenue for the SH 121 Collin County project:

- Opening Year: January 2010
- 40-year Estimates
- Electronic Toll Facility (No Cash Allowed)
- Ramp-up Period: Two Years (80%, 90%)
- Electronic Toll Participation:
    - 80% Opening Year
- Violation Rate: 5%
- Revenue Days Per Year: 336 days
- Truck Percentage: 5%
- Toll Rate Increase Every Five Years (3% Annual)

In this section only toll revenues for an opening year toll rate of $0.15 per mile are reported. Those Alternatives are referred as Alternative 3 and Alternative 4. *Because of the short timeframe of this study, NCTCOG and the WSA team had to work in parallel. NCTCOG assumed a 12 ¢/mile toll and the WSA team assumed 15 ¢/mile toll. Both NCTCOG and the WSA team conducted evaluations with higher toll rates assumed for truck vehicles.*

Toll Revenue

Figure 8 illustrates the potential toll revenue for a 40-year period that would be generated by the SH 121 Collin County corridor assuming an opening toll rate of $0.15/ mile. A driver will pay $1.70 and $1.35 for the entire trip for Alternatives 3 and 4, respectively. As stated before, Alternative 3 extends from the DNT to US 75 and Alternative 4 covers from Hillcrest Road to US 75.

Alternative 3 would generate $4.2 billion in revenue, representing 69 percent more than the revenue estimated during the 2004 TTA study. Alternative 4 would produce $3.2 billion during the same period, equivalent to 30 percent more than the revenue estimated during the 2004 TTA study.

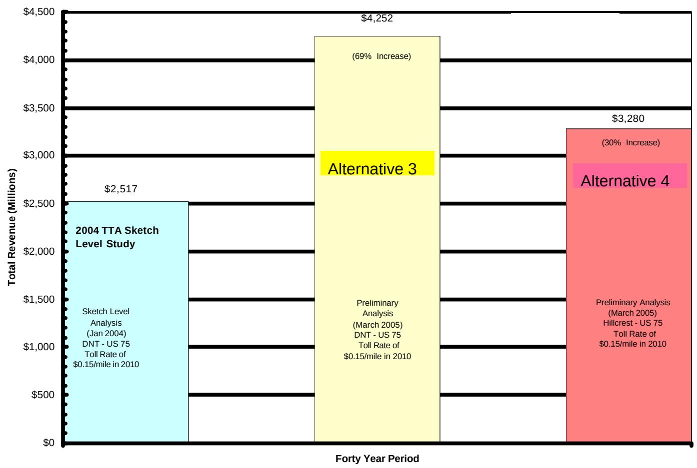


Figure 8: Potential Toll Revenue

Financing Evaluation

The financing assumptions considered in the analysis are the following:

- Bond Delivery: January 1, 2007
- Current Interest and Capital Appreciation Bonds
- Debt Structure: Mirroring Revenues
- Capitalized Interest: During Construction Period
- Interest Rate: Fixed, Approximately 100 Basis Points over Current Market
- Debt Service Reserve Fund = Average Annual Debt Service
- Total Cost of Issuance: 1.00%
- Bond Insurance: 2.25%
- Estimated Fund Earnings Rate: 2.50%
- Rating: "BBB" Category
- Coverage: 1.50x Senior Debt Service
- Bond Term: 40 years

Texas Department of Transportation - Dallas District

Level 2 Feasibility Analysis**	**SH 121 Collin County**	
April 2005	Alternative 3	Alternative 4
	Dallas North Tollway (DNT) to US 75 Tolled $0.15/mile ($1.70 entire trip)	**DNT to Hillcrest Tax-Supported - Hillcrest to US 75 Tolled $0.15/mile ($1.35 entire trip**
Net Revenues Available For Debt Service BEFORE Coverage - Over Life of Bond Issue - 40 years [(1)]	**$3,224,185,900**	**$2,416,773,200**
Average per Year (2010-2046)	**$87,140,159**	**$65,318,195**
Net Revenues Available For Debt Service AFTER Coverage - Over Life of Bond Issue - 40 years [(1)]	**$2,149,457,267**	**$1,611,182,133**
Average per Year (2010-2046)	**$58,093,440**	**$43,545,463**
Available Bond Proceeds	**$381,178,098**	**$282,041,709**
Results:		
Yield (Current market plus 100 bps)	**6.24%**	**6.25%**
Average Life	**22.9 Years**	**23.1 Years**
Final Maturity	**2046**	**2046**

[(1)] Based on preliminary estimates by WSA and HNTB.
[(2)] Based on preliminary estimates by TxDOT - Dallas.
[(3)] Utilizes CIBs and CABs to fill available revenue stream.

**Subject to refinement. Further study required for bonding purposes.

Figure 9: Potential Bond Proceeds

Financial Results

The financial analysis results were based on the revenue and expense inputs as provided by the Traffic and Revenue Study and operating and maintenance cost estimates. The results of this analysis are for comparative purposes only and do not necessarily reflect what actually could be derived from the bond market. Further refinement would be required to optimize the financial structure after discussions with rating agencies, insurers and underwriters prior to bond issuance based on the specifics of the actual issuer of the bonds. For this analysis, the issuer of the bonds is a "BBB" rated stand alone entity with no other projects or revenue streams available (i.e., a start up RMA).

Figure 9 illustrates the potential available bond proceeds based on the net revenues available for debt service after coverage for the 40-year period that would be generated by the SH 121 Collin County corridor under the 3 and 4 scenarios described above.

Alternative 3 could generate approximately $381.2 million in bond proceeds to be used at the time of closing the bond transaction. Alternative 4 could generate approximately $282.0 million in bond proceeds to be used at the time of closing the bond transaction. The difference between the two alternatives is $99.2 million in bond proceeds.

Figure 10 illustrates the potential available bond proceeds plus the yearly free cash flow that the alternatives will generate after they pay for the debt service on the bonds over the 40-year period studied. Due to the requirements of the bond market investors, rating agencies, and bond insurers, a coverage amount of revenues (estimated at 1.5 times debt service for this analysis) is required for the bond issue. This results in an estimated free cash flow after debt service in each year. A net present value is also shown to illustrate what the total bond proceeds and free cash flow would be worth in today's dollars; it does not indicate the amount of cash that would be available today. The only cash available today would be the Available Bond Proceeds. The Free Cash Flow (After Debt Service) would be available over the 40-year period after debt service is paid each year on the bonds.

Alternative 3 could generate approximately $1.5 billion in available resources over the 40-year period (which equates to about $707.9 million in today's dollars). Alternative 4 could generate approximately $1.1 billion in available resources over the 40-year period (which equates to about $505.7 million in today's dollars). The difference between the two alternatives is $424.2 million over 40 years (or about $202.2 million in today's dollars).

Texas Department of Transportation - Dallas District

LEVEL 2 FEASIBILITY ANALYSIS - Cumulative Summary of Available Resources*

	SH 121 Collin County	
April 2005	Alternative 3	Alternative 4
	Dallas North Tollway (DNT) to US 75 Tolled $0.15/mile ($1.70 entire trip)	**DNT to Hillcrest Tax-Supported - Hillcrest to US 75 Tolled $0.15/mile ($1.35 entire trip**
Free Cash Flow (After Debt Service)	**$1,121,165,630**	**$796,133,079**
Average Cash Flow per Year (2010-2046)	30,301,774	21,517,110
Available Bond Proceeds	**381,178,098**	**282,041,709**
Available Resources	**$1,502,343,728**	**$1,078,174,788**
Present Value Free Cash Flow (After Debt Service)**	**$326,711,403**	**$223,636,586**
Present Value Bond Proceeds to Fund Project**	**381,178,098**	**282,041,709**
Present Value Available Resources**	**$707,889,500**	**$505,678,295**

*** Subject to refinement. Further study required for bonding purposes.**

**** A discount rate of 5% is assumed on all present value calculations.**

Figure 10: Summary of Toll Feasibility

Conclusions

The travel model results of the SH 121 Feasibility Study are provided in the Appendices mentioned above as well as in the summary table provided as Appendix O. This summary table provides a travel model comparison of the Alternative #1 (No-build), Alternative #2 (Freeway), Alternative #3 (Toll Road), Alternative #4 (Hybrid Toll Road), and Alternative #5 (Managed Lanes). This summary table provides the average daily traffic volumes across the various screen lines as reflected on the traffic volume maps mentioned previously. These purple lines represent the screen-lines and show where the total traffic volumes for all the facilities are being summed together across that entire screen line.

The summary traffic volume screen line table provides an easy way to compare the various alternatives to one another in terms of changes to traffic patterns and the magnitude of traffic on the roadway system for each alternative. This provides a way of tracking large movements of traffic throughout the corridor based on changes to the type of the roadway, the operational characteristics of the facilities, the level of access provided, and the amount of roadway investment. Table 5 below provides additional summation of the modeled traffic volumes for each of the alternatives for four sections along the SH 121 corridor.

Table 6 was developed based on the information presented previously in this report, and using performance criteria derived from the regional travel

	Alternative #1 (No-Build)	**Alternative #2 (Freeway)**	**Alternative #3 (Tolls east of DNT)**	**Alternative #4 (Tolls east of Hillcrest)**	**Alternative #5 (Managed Lanes)**
DNT to Hillcrest	118,171	161,069	139,565	156,920	149,921
Hillcrest to Custer	61,767*	146,283	118,835	121,604	144,736
Custer to Stacy	47,379*	120,694	72,280	72,297	115,304
Stacy to US 75	46,607*	94,198	58,762	59,369	92,880

Table 5: Weekday Traffic Volumes (2025)
**Frontage road volumes used*

Regional Values	Alternative #1 (No-Build)	Alternative #2 (Freeway)	Alternative #3 (Tolls east of DNT)	Alternative #4 (Tolls east of Hillcrest)	Alternative #5 (Managed Lanes)
Vehicle Miles of Travel	218,792,951	219,131,966	219,325,826	219,236,750	219,156,485
Total Estimated Costs (Millions)*	$0	$311.4	$345.4	$345.4	$460.5
Excess Revenue Generation (Millions)*	$0	$0	$707.9	$505.7	$113.1[1]

Table 6: Alternative Comparisons

[1] An NCTCOG estimate based on other proposed managed-lane corridors within the Dallas-Fort Worth Region.

model and cost estimates provided by Turner, Collie & Braden, Inc., working under contract to TxDOT. This summary table provides a side-by-side analysis of each alternative against regional performance measures. The Alternative #2 Freeway Option has a benefit-cost ratio of 2.29 with no way of being funded in the near-term, and it generates no additional revenue for other mobility improvements. The Alternative #5 Managed Lanes Option has a larger capital cost compared to other alternatives due to the additional lanes required in the design, and this results in a marginal benefit cost ratio of 1.39. Alternatives #3 and #4 generate significant "excess revenue" with benefit-cost ratios determined by the specific projects selected for construction. Priority would go to SH 121 mainlanes, critical US 75/SH 121 interchange direct connections, critical DNT/SH 121 interchange direct connections, and yet-to-be determined additional facilities.