

## Method of Calculating Economic Impact

Using a Discounted Cost-Benefit Analysis.

IH 30 HOV/ Managed Lanes

Based off of a cost benefit model developed by NCTCOG staff, the IH 30 HOV/ Managed Lanes project should have a net positive effect on the economy of \$32.1 million annually and create 349 jobs when completed. During construction there will be a net benefit to the economy of \$60 million and 326 jobs over each of the two years of the project. This project will have a long-term return on investment of 499% and generate 125% in taxes as the project cost (assuming a 25% capture rate).

$$W_t = B_t - C_t$$

$$J = W_t / Y$$

$$B_t = (CO_2 * Z) + (\text{Hours Saved} * L) + (G_t * M) + (\text{Gas Saved} * P_G) + (\text{Lives} * \beta)$$

$$C_t = \frac{PV(1+r)^t * r}{(1+r)^t - 1}$$

$W_t$  = Net effect

$B_t$  = Benefits

$C_t$  = Costs

$G_t$  = Government Spending

$M$  = Multiplier

$r$  = Interest Rate

$t$  = time

$Y$  = Economic output per job.

$J$  = Total jobs created

PV = Present Value

$P_G$  = Price of Gas

$\beta$  = Economic Value of a human life

$B_t$  = Benefits will use available data on benefits to core economic activities (excluding real estate). Consideration has been given to the economic benefit of hours saved and pollution reduction. The long term benefits are \$38,588,565 annually.

$\beta$  = Economic Value of a human life is set at \$6 million according to TIGER grant application.

$C_t$  = Costs are based on just the TIGER funds of the project (PV) or \$80 million. These costs have been annualized to match benefits. The annual cost is \$6,446,912.

GasSaved = The total amount of gallons of gas saved as a result of the project. This project is predicted to save 3,629 gallons a day in fuel. This number is then multiplied by 250 to get the total saved.

$G_t$  = Government Spending is the actual amount of construction spending that occurs in any given period. For the IH35W/ IH820 project it is assumed to be \$40 million during each of the two years of construction. The total cost is \$80 million with land acquisition taken care of in previous phases.

Hours Saved = Total hours saved for the region each year after completion of the project will be 1,324,500 hours according to NCTCOG. This is based on a daily savings of 5,298 hours. No numbers exist for congestion created by the construction. Traffic is assumed to be unaffected by construction.

$L$  = The cost of 1 hour spent in traffic. According to the Texas Transportation Institute, the cost of 1 hour is \$15.47 per hour for personal transportation and \$102.12 for freight traffic. NCTCOG Traffic studies have found that approximately 10% of all traffic is freight traffic. The combined numbers are \$24.14 per hour saved.

Lives = Number of traffic fatalities prevented as a result of roadway improvements. There have been 2,119 wrecks in the project area with 17 fatalities between 2003 and 2008. This project is expected to reduce wrecks by 26%. This would save 0.737 lives per year or 22 lives over the next 30 years.

$M$  = this is the multiplier applied to construction spending. It is a made up number assumed to be 1.5. The range provided by the Congressional Budget Office for infrastructure projects is 1.0 to 2.5 over the short term.

$CO_2$  = Carbon Dioxide reduced. NCTCOG model found a decrease of 35.16 tons per day. This was multiplied by 250 to get an annual total.

$P_G$  = Price of Gas is set at \$2.10 per gallon of unleaded.

$PV$  = Total cost of the project in today's dollars. The total cost is \$80.

$r$  = The interest rate will have a significant effect on the outcome of the model. The lower the rate used the larger the benefits of the project. The model is set at 7% as required in TIGER grant application.

$t$  = Time is the number of years that will be used to price the project out over. The longer the period used, the larger the benefit of the project. The model is set at 30 years.

$Y$  = Economic output per job is the amount of Gross Domestic Product required to create one job. The White House Council of Economic Advisors set this at \$92,000.

$Z$  = the cost of 1 ton of Carbon Dioxide set at \$33. This number specified in the TIGER application.

Total Cost	Construction Total	TIGER Request	Hours Saved	CO2 (in tons/day)	Fuel Saved (in gallons)	Lives Saved	Cost of an Hour	Cost/Ton of CO2	Cost of Gallon of Fuel	Cost of Life Lost
80,000,000	80,000,000	80,000,000	5,298	35.16	3,629	0.737	24.14	33	2.10	6,000,000

Annual Cost	Net Benefits	Net Effect	Net Benefit of Hours Saved	Net Benefit of Pollution	Net Benefit of Fuel Saved	Net Benefit of Lives Saved
6,446,912.28	38,588,564.55	32,141,652.27	31,973,430.00	290,070.00	1,905,225.00	4,419,839.55

Years to Complete	Short Run Construction Benefit (Annual)	Jobs in Short Run	Jobs in Long Run	Total Short Run	Benefit to Cost Ratio	ROI (total economy)	Tax Revenue Replaced
2	60,000,000	326	249	652	5.99	498.56	124.64%

NCTCOG Presentation

[..\..\Roadway\\_Studies\TxDOT\\_Fort\\_Worth\DFW\\_Connector\\_\(Funnel\)\\_SH114\\_SH121\rtc2.ppt](..\..\Roadway_Studies\TxDOT_Fort_Worth\DFW_Connector_(Funnel)_SH114_SH121\rtc2.ppt)

TxDOT Fort Worth's website for DFW Connector Project

[ftp://ftp.dot.state.tx.us/pub/txdot-info/ftw/dfw\\_connector/fact\\_sheet.pdf](ftp://ftp.dot.state.tx.us/pub/txdot-info/ftw/dfw_connector/fact_sheet.pdf)

Texas Transportation Institute at Texas A&M Study on Traffic Congestion

[http://tti.tamu.edu/infofor/media/archive.htm?news\\_id=5206](http://tti.tamu.edu/infofor/media/archive.htm?news_id=5206)

Texas Commission on Environmental Quality funding methods

[http://www.ectausa.com/documents/07Wescott\\_001.pdf](http://www.ectausa.com/documents/07Wescott_001.pdf)