



Bureau of Finance and Contracts

**I-93 Salem to Manchester
Exit 2 Interchange
Improvements Project
Benefit-Cost Analysis
TIGER III Discretionary Grant**

Prepared by:

**David J. Caron
Financial Analyst
New Hampshire Department of Transportation**

The following Benefit-Cost Analysis for the I-93 Salem to Manchester Exit 2 Interchange Improvements Project was prepared by the New Hampshire DOT as part of the TIGER III Grant Application. This project will widen 1.3 miles of Interstate 93, in each direction, between Exit 1 and Exit 2, by adding an additional highway lane, primarily to relieve commuter congestion.

Results of Cost-Benefit Analysis

Using the TIGER III guidance recommended discount rate of 7 percent for the Benefit-Cost Analysis (BCA) and a 3 percent rate as a sensitivity analysis, the I-93 Salem to Manchester Exit 2 Interchange Improvements Project will result in a positive return on investment. Table 1 highlights the results for the BCA.

Table 1 - Summary of Benefit Cost Analysis

Benefit-Cost Results - Discount Rate: 7%		Benefit-Cost Results - Discount Rate: 3%	
Category	Millions \$	Category	Millions \$
Present Value of Total Costs	\$ 41.5	Present Value of Total Costs	\$ 45.6
Present Value of Total Benefits	\$ 43.6	Present Value of Total Benefits	\$ 86.4
Net Present Value	\$ 2.0	Net Present Value	\$ 40.8
Benefit-Cost Ratio	1.0	Benefit-Cost Ratio	1.9

The New Hampshire DOT conducted the BCA for the I-93 Salem to Manchester Exit 2 Interchange Improvements Project using methods and parameters consistent with US Department of Transportation guidelines. All benefits in the analysis are estimated in 2011 dollars. The valuation of benefits uses a number of assumptions that are required to produce monetized values for non-pecuniary benefits. The different components of time, for instance, are monetized by using a “value of time” that is assumed to be equivalent to the user’s willingness to pay for “time savings” in transit.

Specifically, the BCA expresses benefits and costs monetarily in “present value” (PV) capturing the flows of benefits and costs over the project horizon. The most common metrics of benefit-cost analysis are the Net Present Value (NPV) and Benefit Cost Ratio (BCR). The NPV is the sum of the present value of future cash flows less the present value of the project’s cost including operations and maintenance expenditures. The BCR is expressed as the ratio of benefits of a project relative to its costs, both expressed in present-value terms. A BCR above 1.0 suggests that benefits exceed costs, in which case the projects create a positive return on investment. These, as with all other values used in the analysis, are taken from the United States Department of Transportation (USDOT) guidance on the preparation of TIGER applications.

Where USDOT has not provided valuation guidance or a reference to guidance, standard industry practice has been applied.

Project Benefits

The benefit-cost analysis for the I-93 Salem to Manchester Exit 2 Interchange Improvements Project measures three primary categories of benefits: time savings; fuel savings; and accident reduction.

Time Saving Benefits

The I-93 Exit 2 project will reduce the amount of time it takes vehicles to travel through the I-93 Corridor between Exit 1 and Exit 2. The area between the Massachusetts state line and Exit 1 currently has 3 lanes in both directions. However, the segment between Exits 1 and 2 have only 2 lanes. The highest level of congestion occurs during weekday evenings, for approximately two hours, in the I-93 Northbound lane. Due to the fact that a high percentage of commuters traveling I-93 Northbound use Exit 2 in New Hampshire, the traffic gets becomes so congested that it will back up over the state line and into Massachusetts. Widening the area between Exit 1 and Exit 2 to three lanes will give the commuters faster access to Exit 2 and since many commuters leave the Interstate at Exit 2, this will bring significant vehicular congestion relief to the remaining users continuing on I-93 Northbound after Exit 2.

The time savings was calculated using the 2011 Urban Mobility Report. More specifically, the data under the Boston MA-NH-RI Urban Area, the “Yearly Delay per Auto Commuter” is reported as 47 hours in 2010. NHDOT utilized the data for the Boston urban area, due to the fact that the 1.3 mile segment under analysis, Salem, NH, is considered part of the Greater Boston Area, per the United States Census.

In the absence of having the exact delay times in this segment of interstate during the peaks hours of the weekday congestion, the New Hampshire DOT determined it would apply a conservative estimated time savings of 18 percent of the yearly delay per auto commuter. This calculation equates to only 1.95 minutes saved per day, per vehicle. Although the New Hampshire DOT is confident that the estimated savings would actually be much higher, it was determined to apply a very conservative percentage, to show the project would be successful even if the time savings estimates were minimal. In fact, by estimating benefits based solely on pro-rated commuting time, the New Hampshire DOT has proved a positive BCA with considering the time savings associated with tourist travel, which, if included, would add significantly to the BCA benefits and not to its costs.

Using half of the mean hourly wage rate in New Hampshire of \$10.68/hr (\$21.37/hr x 50 percent), the value of travel time savings is estimated at \$1.80 million in 2016. Utilizing CPI data, NHDOT estimated the cumulative time saving benefits to be \$84.56 million.

Fuel Saving Benefits

The I-93 Salem to Manchester Exit 2 Interchange Improvements Project will also realize significant savings in the consumption of fuel for commuters. Using the 2011 Urban Mobility

Report and more specifically, the data under the Boston MA-NH-RI Urban Area, the “Excess Fuel per Auto Commuter” are reported as 21 Gallons. Applying the same conservative percentage utilized in the time savings calculation, the estimated fuel savings per vehicle was calculated at 3.78 gallons. Theoretically, one could apply a higher percentage of fuel savings since the relief of congestion would cause a drive to move a constant speed and thereby experience higher fuel efficiency. After careful consideration, the same rate was applied to maintain consistency in our conservative approach.

When multiplied by the 84,000 average number of vehicles, the fuel consumption is estimated to be reduced by approximately a 317 thousand gallons. In terms of the general economic benefit to drivers, assuming an average gas price of \$3.45 in FY 2011 and inflating the price on a yearly basis utilizing CPI, this would equate to an aggregate savings of approximately \$1.26 million beginning in FY 2016.

Relief of vehicular congestion due to the I-93 Salem to Manchester Exit 2 Interchange Improvements is conservatively estimated to save a total of \$60.13 million in fuel.

Accident Reduction

The I-93 Salem to Manchester Exit 2 Interchange Improvements will also decrease the likelihood and cost of accidents. The New Hampshire DOT obtained the summarized I-93 crash data from the consultant, CHA Companies, and analyzed ten years of crash data, from 2000 through 2010. The crash data under analysis specifically focused on the accidents that occurred between Exit 1 and Exit 2, or 1.3 miles in each direction. The ten year average was calculated, resulting in an average of 0.04, 2.57, and 5.91 accidents, per year, for fatalities, personal injuries and property damage, respectively.

In order to determine the estimated reduction in crashes, the New Hampshire DOT modeled accident frequency as a function of the Volume-Capacity Ratio. The Volume-Capacity Ratio for this urban freeway segment, at the current capacity, was calculated as 1.05 (84,000 vehicles/80,000 current capacity). Next, VC ratio with the improvement was calculated for an additional highway lane. Each lane adds 20,000 vehicles to the total capacity. When multiplied by both the North and Southbound directions, the result is an additional 40,000 vehicle capacity.

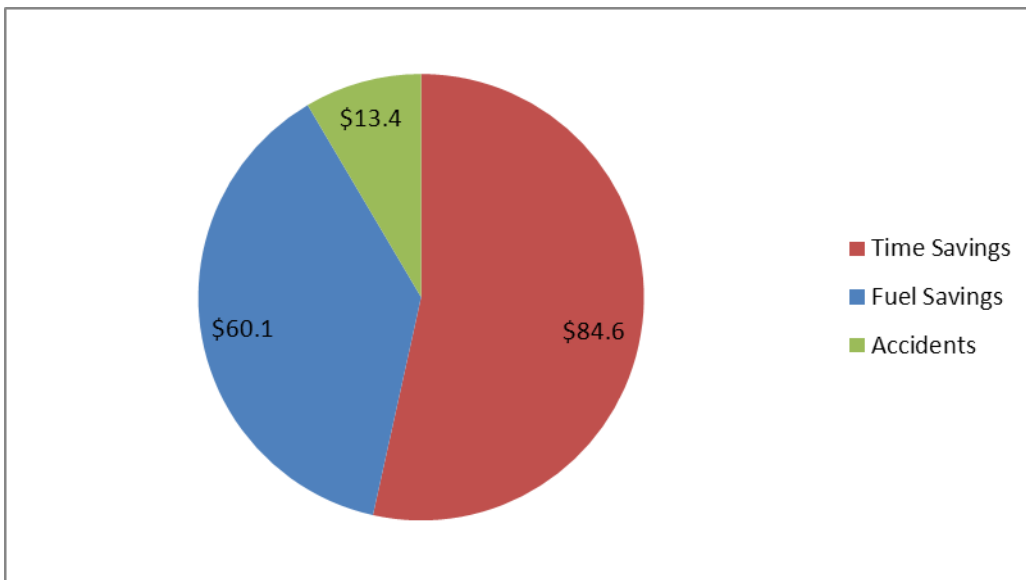
The VC ratio, after the interstate widening, is calculated at 0.70 (84,000 vehicles/120,000 future capacity). Finally, when the formula, as detailed below in Table 2, is applied, the proportional change in the accident rate is calculated at -19.19%.

Table 2: Volume-Capacity Ratio

$$A_R = \frac{3.0234 \left(\frac{V_1}{C_1} \right) - 1.11978 \left(\frac{V_1}{C_1} \right)^2}{3.0234 \left(\frac{V_0}{C_0} \right) - 1.11978 \left(\frac{V_0}{C_0} \right)^2} - 1$$

New Hampshire DOT applied the -19.19% estimated crash reduction to the 10 year average of crashes reported on the 1.3 mile segment between Exit 1 and Exit 2 to determine the estimated number of crashes for crash category. Each crash category was then monetized using the average cost of each type of accident from figures provided by US Department of Transportation and inflated using CPI figures. In the BCA conducted for this application, cumulative accident reduction benefits are estimated to be \$13.44 million. A summary table of the benefits is provided in Table 3.

Table 3: Summary Table of Benefits



Construction Costs

Construction costs include design, engineering, right-of-way (ROW) acquisitions, and estimated construction costs. The total construction cost is estimated at \$41.7 million with an additional \$5.3 million having already been expended on engineering, design, and ROW. The total cost of the project is expected to be \$47.0 million.

Operating and Maintenance Costs

The project will result in an increase in operating and maintenance costs due to the addition of a highway lane in both directions. Extrapolating this on an annual basis, by using actual expenditures in FY 2011 of \$18,091 per lane-mile, when multiplied by 2.6 lane miles (1.3 miles x North and Southbound directions) results in an annual operating and maintenance costs increase of approximately \$54.5 thousand in FY 2016. Inflating these costs using CPI data, over the 30 year period, results in an increase of \$2.59 million.

Summary of Benefit-Cost Results

The I-93 Salem to Manchester Exit 2 Interchange Improvements Project will result in total benefits of approximately \$158.2 million. When discounted by 7 percent, the Present Value of these total benefits is \$43.6 million. The Present Value of the total costs associated with this project is \$41.5 million; therefore the Net Present Value is \$2.0 million. The Benefit Cost Ratio is 1.0 at 7 percent discount rate. The Sensitivity Benefit-Cost Analysis resulted in a Benefit-Cost Ratio of 1.9 using a 3 percent discount rate. See Appendix 1 and 2 for benefits and costs on a per year basis. A summary table of the benefits and costs is provided in Table 4.

Table 4: Summary Table of Benefits and Costs

Benefit-Cost Results Discount Rate: 7%		Benefit-Cost Results Discount Rate: 3%	
Category	Millions \$	Category	Millions \$
Construction Costs	\$ 47.0	Construction Costs	\$ 47.0
Operations & Maint. Cost	\$ 2.6	Operations & Maint. Cost	\$ 2.6
Total Costs	\$ 49.6	Total Costs	\$ 49.6
Present Value of Total Costs	\$ 41.5	Present Value of Total Costs	\$ 45.6
Time Savings	\$ 84.6	Time Savings	\$ 84.6
Fuel Savings	\$ 60.1	Fuel Savings	\$ 60.1
Accidents	\$ 13.4	Accidents	\$ 13.4
Total Benefits	\$ 158.2	Total Benefits	\$ 158.2
Present Value of Total Benefits	\$ 43.6	Present Value of Total Benefits	\$ 86.4
Net Present Value	\$ 2.0	Net Present Value	\$ 40.8
Benefit-Cost Ratio	1.0	Benefit-Cost Ratio	1.9

References

Accident and Volume-Capacity Relationships for Urban Freeways

AASHTO "User and Non-User Benefit Analysis for Highways manual" (Sept. 2010)

BTS: National Transportation Statistics 2008 - Table 4-14.

http://www.bts.gov/publications/national_transportation_statistics/2008/index.html

CPI - Consumer Price Index, U.S. Department of Labor, Bureau of Labor Statistics.

<http://www.bls.gov/cpi/>

Distribution of Expenditures by Lane Miles, FY 2011, Bureau of Finance and Contracts, New Hampshire Department of Transportation.

ECI – Employment Cost Index, U.S. Department of Labor, Bureau of Labor Statistics.

<http://www.bls.gov/ncs/ect/home.htm>

HERS Technical Report, 2002.

<http://isddc.dot.gov/OLPFiles/FHWA/010945.pdf>

I-93 Salem to Manchester Summary of Crash Data 2000 to 2010 Data, Bureau of Planning and Community Assistance, New Hampshire Department of Transportation (Summarized by CHA Companies).

National Congestion Tables, Urban Mobility Report (2011).

<http://tti.tamu.edu/documents/mobility-report-2011.pdf>

National Highway Traffic Safety Administration.

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http://www.whitehouse.gov/omb/circular_default/

TIGER Grant Guidelines (USDOT).

<http://www.dot.gov/tiger/application-resources.html>

Supplemental Environmental Impact Statement (SEIS).

<http://www.rebuildingi93.com/content/environmental/seis/>

I-93 Salem to Manchester Exit 2 Interchange Improvements Benefit-Cost Analysis

Year	Period	Costs			Benefits				Present Value				Benefit-Cost Ratio
		Construction Costs	Operations & Maint. Cost	Total Costs	Time Savings	Fuel Savings	Accidents	Total Benefits	Discount Rate	Total Benefits PV	Total Cost in PV	Net Present Value	
Totals		\$ 47,000,000	\$ 2,594,226	\$ 49,594,226	\$ 84,568,466	\$ 60,137,594	\$ 13,447,579	\$ 158,153,639	7.00%	\$ 43,578,890	\$ 41,545,127	\$ 2,033,763	1.05
2011	0	\$ 5,300,000	\$ -	\$ 5,300,000	\$ -	\$ -	\$ -	\$ -	1.0000	\$ -	\$ 5,300,000	\$ (5,300,000)	
2012	1	\$ 8,100,000	\$ -	\$ 8,100,000	\$ -	\$ -	\$ -	\$ -	0.9346	\$ -	\$ 7,570,093	\$ (7,570,093)	
2013	2	\$ 14,200,000	\$ -	\$ 14,200,000	\$ -	\$ -	\$ -	\$ -	0.8734	\$ -	\$ 12,402,830	\$ (12,402,830)	
2014	3	\$ 14,300,000	\$ -	\$ 14,300,000	\$ -	\$ -	\$ -	\$ -	0.8163	\$ -	\$ 11,673,060	\$ (11,673,060)	
2015	4	\$ 5,100,000	\$ -	\$ 5,100,000	\$ -	\$ -	\$ -	\$ -	0.7629	\$ -	\$ 3,890,766	\$ (3,890,766)	
2016	5	\$ -	\$ 54,529	\$ 54,529	\$ 1,803,286	\$ 1,268,563	\$ 358,233	\$ 3,430,082	0.7130	\$ 2,445,601	\$ 38,878	\$ 2,406,723	
2017	6	\$ -	\$ 56,165	\$ 56,165	\$ 1,855,784	\$ 1,306,341	\$ 363,606	\$ 3,525,730	0.6663	\$ 2,349,343	\$ 37,425	\$ 2,311,918	
2018	7	\$ -	\$ 57,850	\$ 57,850	\$ 1,909,809	\$ 1,345,243	\$ 369,060	\$ 3,624,112	0.6227	\$ 2,256,915	\$ 36,026	\$ 2,220,889	
2019	8	\$ -	\$ 59,585	\$ 59,585	\$ 1,965,407	\$ 1,385,304	\$ 374,596	\$ 3,725,308	0.5820	\$ 2,168,163	\$ 34,679	\$ 2,133,484	
2020	9	\$ -	\$ 61,373	\$ 61,373	\$ 2,022,624	\$ 1,426,558	\$ 380,215	\$ 3,829,398	0.5439	\$ 2,082,939	\$ 33,383	\$ 2,049,556	
2021	10	\$ -	\$ 63,214	\$ 63,214	\$ 2,081,507	\$ 1,469,041	\$ 385,918	\$ 3,936,466	0.5083	\$ 2,001,100	\$ 32,135	\$ 1,968,965	
2022	11	\$ -	\$ 65,110	\$ 65,110	\$ 2,142,104	\$ 1,512,789	\$ 391,707	\$ 4,046,599	0.4751	\$ 1,922,510	\$ 30,933	\$ 1,891,577	
2023	12	\$ -	\$ 67,063	\$ 67,063	\$ 2,204,464	\$ 1,557,839	\$ 397,583	\$ 4,159,886	0.4440	\$ 1,847,039	\$ 29,777	\$ 1,817,262	
2024	13	\$ -	\$ 69,075	\$ 69,075	\$ 2,268,641	\$ 1,604,231	\$ 403,546	\$ 4,276,419	0.4150	\$ 1,774,562	\$ 28,664	\$ 1,745,898	
2025	14	\$ -	\$ 71,148	\$ 71,148	\$ 2,334,685	\$ 1,652,005	\$ 409,600	\$ 4,396,290	0.3878	\$ 1,704,957	\$ 27,592	\$ 1,677,365	
2026	15	\$ -	\$ 73,282	\$ 73,282	\$ 2,402,653	\$ 1,701,202	\$ 415,744	\$ 4,519,598	0.3624	\$ 1,638,110	\$ 26,561	\$ 1,611,549	
2027	16	\$ -	\$ 75,481	\$ 75,481	\$ 2,472,599	\$ 1,751,863	\$ 421,980	\$ 4,646,441	0.3387	\$ 1,573,910	\$ 25,568	\$ 1,548,343	
2028	17	\$ -	\$ 77,745	\$ 77,745	\$ 2,544,581	\$ 1,804,033	\$ 428,309	\$ 4,776,923	0.3166	\$ 1,512,252	\$ 24,612	\$ 1,487,640	
2029	18	\$ -	\$ 80,077	\$ 80,077	\$ 2,618,659	\$ 1,857,757	\$ 434,734	\$ 4,911,150	0.2959	\$ 1,453,032	\$ 23,692	\$ 1,429,340	
2030	19	\$ -	\$ 82,480	\$ 82,480	\$ 2,694,893	\$ 1,913,081	\$ 441,255	\$ 5,049,228	0.2765	\$ 1,396,154	\$ 22,806	\$ 1,373,347	
2031	20	\$ -	\$ 84,954	\$ 84,954	\$ 2,773,346	\$ 1,970,052	\$ 447,874	\$ 5,191,272	0.2584	\$ 1,341,523	\$ 21,954	\$ 1,319,570	
2032	21	\$ -	\$ 87,503	\$ 87,503	\$ 2,854,084	\$ 2,028,720	\$ 454,592	\$ 5,337,396	0.2415	\$ 1,289,051	\$ 21,133	\$ 1,267,918	
2033	22	\$ -	\$ 90,128	\$ 90,128	\$ 2,937,172	\$ 2,089,134	\$ 461,411	\$ 5,487,717	0.2257	\$ 1,238,650	\$ 20,343	\$ 1,218,307	
2034	23	\$ -	\$ 92,831	\$ 92,831	\$ 3,022,679	\$ 2,151,349	\$ 468,332	\$ 5,642,359	0.2109	\$ 1,190,238	\$ 19,583	\$ 1,170,656	
2035	24	\$ -	\$ 95,616	\$ 95,616	\$ 3,110,675	\$ 2,215,415	\$ 475,357	\$ 5,801,447	0.1971	\$ 1,143,736	\$ 18,850	\$ 1,124,885	
2036	25	\$ -	\$ 98,485	\$ 98,485	\$ 3,201,233	\$ 2,281,390	\$ 482,487	\$ 5,965,110	0.1842	\$ 1,099,067	\$ 18,146	\$ 1,080,921	
2037	26	\$ -	\$ 101,439	\$ 101,439	\$ 3,294,427	\$ 2,349,329	\$ 489,725	\$ 6,133,481	0.1722	\$ 1,056,158	\$ 17,467	\$ 1,038,690	
2038	27	\$ -	\$ 104,483	\$ 104,483	\$ 3,390,334	\$ 2,419,292	\$ 497,071	\$ 6,306,697	0.1609	\$ 1,014,939	\$ 16,814	\$ 998,125	
2039	28	\$ -	\$ 107,617	\$ 107,617	\$ 3,489,034	\$ 2,491,338	\$ 504,527	\$ 6,484,898	0.1504	\$ 975,343	\$ 16,186	\$ 959,157	
2040	29	\$ -	\$ 110,846	\$ 110,846	\$ 3,590,606	\$ 2,565,530	\$ 512,094	\$ 6,668,230	0.1406	\$ 937,305	\$ 15,581	\$ 921,724	
2041	30	\$ -	\$ 114,171	\$ 114,171	\$ 3,695,136	\$ 2,641,930	\$ 519,776	\$ 6,856,842	0.1314	\$ 900,764	\$ 14,998	\$ 885,765	
2042	31	\$ -	\$ 117,596	\$ 117,596	\$ 3,802,708	\$ 2,720,607	\$ 527,573	\$ 7,050,888	0.1228	\$ 865,659	\$ 14,438	\$ 851,221	
2043	32	\$ -	\$ 121,124	\$ 121,124	\$ 3,913,413	\$ 2,801,626	\$ 535,486	\$ 7,250,525	0.1147	\$ 831,933	\$ 13,898	\$ 818,035	
2044	33	\$ -	\$ 124,758	\$ 124,758	\$ 4,027,340	\$ 2,885,058	\$ 543,518	\$ 7,455,916	0.1072	\$ 799,533	\$ 13,378	\$ 786,155	
2045	34	\$ -	\$ 128,500	\$ 128,500	\$ 4,144,584	\$ 2,970,974	\$ 551,671	\$ 7,667,229	0.1002	\$ 768,405	\$ 12,878	\$ 755,526	

I-93 Salem to Manchester Exit 2 Interchange Improvements Benefit-Cost Analysis

Year	Period	Costs			Benefits				Discount Rate	Present Value			Benefit-Cost Ratio
		Construction Costs	Operations & Maint. Cost	Total Costs	Time Savings	Fuel Savings	Accidents	Total Benefits		Total Benefits PV	Total Cost in PV	Net Present Value	
Totals		\$ 47,000,000	\$ 2,594,226	\$ 49,594,226	\$ 84,568,466	\$ 60,137,594	\$ 13,447,579	\$ 158,153,639	3.00%	\$ 86,368,484	\$ 45,577,858	\$ 40,790,626	1.9
2011	0	\$ 5,300,000	\$ -	\$ 5,300,000	\$ -	\$ -	\$ -	\$ -	1.0000	\$ -	\$ 5,300,000	\$ (5,300,000)	
2012	1	\$ 8,100,000	\$ -	\$ 8,100,000	\$ -	\$ -	\$ -	\$ -	0.9709	\$ -	\$ 7,864,078	\$ (7,864,078)	
2013	2	\$ 14,200,000	\$ -	\$ 14,200,000	\$ -	\$ -	\$ -	\$ -	0.9426	\$ -	\$ 13,384,862	\$ (13,384,862)	
2014	3	\$ 14,300,000	\$ -	\$ 14,300,000	\$ -	\$ -	\$ -	\$ -	0.9151	\$ -	\$ 13,086,526	\$ (13,086,526)	
2015	4	\$ 5,100,000	\$ -	\$ 5,100,000	\$ -	\$ -	\$ -	\$ -	0.8885	\$ -	\$ 4,531,284	\$ (4,531,284)	
2016	5	\$ -	\$ 54,529	\$ 54,529	\$ 1,803,286	\$ 1,268,563	\$ 358,233	\$ 3,430,082	0.8626	\$ 2,958,819	\$ 47,037	\$ 2,911,782	
2017	6	\$ -	\$ 56,165	\$ 56,165	\$ 1,855,784	\$ 1,306,341	\$ 363,606	\$ 3,525,730	0.8375	\$ 2,952,744	\$ 47,037	\$ 2,905,707	
2018	7	\$ -	\$ 57,850	\$ 57,850	\$ 1,909,809	\$ 1,345,243	\$ 369,060	\$ 3,624,112	0.8131	\$ 2,946,735	\$ 47,037	\$ 2,899,698	
2019	8	\$ -	\$ 59,585	\$ 59,585	\$ 1,965,407	\$ 1,385,304	\$ 374,596	\$ 3,725,308	0.7894	\$ 2,940,792	\$ 47,037	\$ 2,893,755	
2020	9	\$ -	\$ 61,373	\$ 61,373	\$ 2,022,624	\$ 1,426,558	\$ 380,215	\$ 3,829,398	0.7664	\$ 2,934,914	\$ 47,037	\$ 2,887,877	
2021	10	\$ -	\$ 63,214	\$ 63,214	\$ 2,081,507	\$ 1,469,041	\$ 385,918	\$ 3,936,466	0.7441	\$ 2,929,100	\$ 47,037	\$ 2,882,064	
2022	11	\$ -	\$ 65,110	\$ 65,110	\$ 2,142,104	\$ 1,512,789	\$ 391,707	\$ 4,046,599	0.7224	\$ 2,923,349	\$ 47,037	\$ 2,876,313	
2023	12	\$ -	\$ 67,063	\$ 67,063	\$ 2,204,464	\$ 1,557,839	\$ 397,583	\$ 4,159,886	0.7014	\$ 2,917,661	\$ 47,037	\$ 2,870,624	
2024	13	\$ -	\$ 69,075	\$ 69,075	\$ 2,268,641	\$ 1,604,231	\$ 403,546	\$ 4,276,419	0.6810	\$ 2,912,033	\$ 47,037	\$ 2,864,996	
2025	14	\$ -	\$ 71,148	\$ 71,148	\$ 2,334,685	\$ 1,652,005	\$ 409,600	\$ 4,396,290	0.6611	\$ 2,906,466	\$ 47,037	\$ 2,859,429	
2026	15	\$ -	\$ 73,282	\$ 73,282	\$ 2,402,653	\$ 1,701,202	\$ 415,744	\$ 4,519,598	0.6419	\$ 2,900,958	\$ 47,037	\$ 2,853,921	
2027	16	\$ -	\$ 75,481	\$ 75,481	\$ 2,472,599	\$ 1,751,863	\$ 421,980	\$ 4,646,441	0.6232	\$ 2,895,509	\$ 47,037	\$ 2,848,472	
2028	17	\$ -	\$ 77,745	\$ 77,745	\$ 2,544,581	\$ 1,804,033	\$ 428,309	\$ 4,776,923	0.6050	\$ 2,890,117	\$ 47,037	\$ 2,843,080	
2029	18	\$ -	\$ 80,077	\$ 80,077	\$ 2,618,659	\$ 1,857,757	\$ 434,734	\$ 4,911,150	0.5874	\$ 2,884,783	\$ 47,037	\$ 2,837,746	
2030	19	\$ -	\$ 82,480	\$ 82,480	\$ 2,694,893	\$ 1,913,081	\$ 441,255	\$ 5,049,228	0.5703	\$ 2,879,504	\$ 47,037	\$ 2,832,468	
2031	20	\$ -	\$ 84,954	\$ 84,954	\$ 2,773,346	\$ 1,970,052	\$ 447,874	\$ 5,191,272	0.5537	\$ 2,874,282	\$ 47,037	\$ 2,827,245	
2032	21	\$ -	\$ 87,503	\$ 87,503	\$ 2,854,084	\$ 2,028,720	\$ 454,592	\$ 5,337,396	0.5375	\$ 2,869,113	\$ 47,037	\$ 2,822,076	
2033	22	\$ -	\$ 90,128	\$ 90,128	\$ 2,937,172	\$ 2,089,134	\$ 461,411	\$ 5,487,717	0.5219	\$ 2,863,999	\$ 47,037	\$ 2,816,962	
2034	23	\$ -	\$ 92,831	\$ 92,831	\$ 3,022,679	\$ 2,151,349	\$ 468,332	\$ 5,642,359	0.5067	\$ 2,858,937	\$ 47,037	\$ 2,811,900	
2035	24	\$ -	\$ 95,616	\$ 95,616	\$ 3,110,675	\$ 2,215,415	\$ 475,357	\$ 5,801,447	0.4919	\$ 2,853,928	\$ 47,037	\$ 2,806,891	
2036	25	\$ -	\$ 98,485	\$ 98,485	\$ 3,201,233	\$ 2,281,390	\$ 482,487	\$ 5,965,110	0.4776	\$ 2,848,970	\$ 47,037	\$ 2,801,933	
2037	26	\$ -	\$ 101,439	\$ 101,439	\$ 3,294,427	\$ 2,349,329	\$ 489,725	\$ 6,133,481	0.4637	\$ 2,844,063	\$ 47,037	\$ 2,797,026	
2038	27	\$ -	\$ 104,483	\$ 104,483	\$ 3,390,334	\$ 2,419,292	\$ 497,071	\$ 6,306,697	0.4502	\$ 2,839,206	\$ 47,037	\$ 2,792,169	
2039	28	\$ -	\$ 107,617	\$ 107,617	\$ 3,489,034	\$ 2,491,338	\$ 504,527	\$ 6,484,898	0.4371	\$ 2,834,398	\$ 47,037	\$ 2,787,361	
2040	29	\$ -	\$ 110,846	\$ 110,846	\$ 3,590,606	\$ 2,565,530	\$ 512,094	\$ 6,668,230	0.4243	\$ 2,829,639	\$ 47,037	\$ 2,782,602	
2041	30	\$ -	\$ 114,171	\$ 114,171	\$ 3,695,136	\$ 2,641,930	\$ 519,776	\$ 6,856,842	0.4120	\$ 2,824,928	\$ 47,037	\$ 2,777,891	
2042	31	\$ -	\$ 117,596	\$ 117,596	\$ 3,802,708	\$ 2,720,607	\$ 527,573	\$ 7,050,888	0.4000	\$ 2,820,264	\$ 47,037	\$ 2,773,227	
2043	32	\$ -	\$ 121,124	\$ 121,124	\$ 3,913,413	\$ 2,801,626	\$ 535,486	\$ 7,250,525	0.3883	\$ 2,815,647	\$ 47,037	\$ 2,768,610	
2044	33	\$ -	\$ 124,758	\$ 124,758	\$ 4,027,340	\$ 2,885,058	\$ 543,518	\$ 7,455,916	0.3770	\$ 2,811,076	\$ 47,037	\$ 2,764,039	
2045	34	\$ -	\$ 128,500	\$ 128,500	\$ 4,144,584	\$ 2,970,974	\$ 551,671	\$ 7,667,229	0.3660	\$ 2,806,550	\$ 47,037	\$ 2,759,513	