

Executive Summary
Estimated Impacts to Montana's Economy from
Increased Labor Income Earned by Existing and New Apprentices

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Apprentices in the Montana Department of Labor and Industry's apprenticeship programs earn significantly higher wages after the completion of their training program. A first-year apprentice earns roughly \$32,000 per year, with their wages increasing each year of the training program. After graduation, journeymen earn over \$52,700 annually – a gain of over \$20,700. The gain in labor income and increased productivity of the worker does not just provide benefits to the worker alone. The increased spending from the higher wage income also benefits the Montana economy as a whole.

This research evaluates a high and a low economic impact related to the gains in labor income due to the apprenticeship program. The high impact estimate assumes the recruitment of relatively unskilled workers into the apprentice program, thus maximizing the difference in wages before and after the training. The low impact provides the most conservative estimate of economic impact, providing a range and sensitivity analysis for the economic impact. This research finds that:

- Apprentices who have already completed the program will add between \$10.3 million to \$22.4 million of increased economic activity in 2015 due to the spending of their higher wages in the Montana economy. All Montana businesses and workers benefit from apprenticeship training.
 - This increased wage spending supports between 88 and 192 Montana jobs paying between \$3.1 and \$6.9 million in additional wage income.
- The passage of HB277 will further expand the economic impact of apprentice training in the Montana economy by between \$500,000 and \$1 million per year, supporting an additional 30 to 50 Montana jobs per year. These jobs and economic impact are additive, contributing more and more to the economy each year.
- By 2025, the passage of HB277 will generate an additional 232 to 390 jobs in the Montana economy because of the increased earnings of trained journeymen, adding between \$32 million and \$55 million of economic activity to the Montana economy.

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SUBJECT: ESTIMATED IMPACTS TO MONTANA’S ECONOMY FROM INCREASED LABOR INCOME EARNED BY EXISTING AND NEW APPRENTICESHIPS INCENTIVIZED BY HB 277

INTRODUCTION

The Montana Department of Labor & Industry (DLI) has requested the introduction of HB 277 to the 64th Montana State Legislative Session aimed at incentivizing apprenticeship programs administered by DLI. In general, the bill would provide a \$1,000 tax credit per apprentice per year to businesses that employ apprentices. Using assumptions largely derived by the DLI from internal records and input/output modeling, this analysis estimates impact to Montana’s economic output and related employment due to DLI’s apprenticeship programs along with the expected growth in apprenticeships due to the proposed tax credit, if implemented, over the next ten years.

METHODOLOGY & ASSUMPTIONS

The Montana Department of Labor (DLI) offers a variety of apprenticeship programs in the State. With this bill, DLI anticipates the expansion of apprenticeships into industries not currently participating in the programs such as the health care industry. Hereafter, “apprenticeships” or “apprentice” refer only to those administered by DLI that would be affected by the proposed legislation referred to above in the Introduction. “Journeyman” refers to someone who has successfully completed an apprenticeship and is now a licensed worker within the respective field; this definition refers to individuals both in the construction industry as well as other industries in MT.

Over the past 10 years of available data, the range in the total number of apprenticeships varied from 950 to a high of 1,450; in late 2014, there were approximately 1,100 apprentices in Montana DLI programs. DLI estimates there will be 1,400 total apprenticeships in 2015 with the number of new apprenticeships continuing to increase by 15 percent through 2018 due to the introduction of the \$1,000 apprenticeship program tax credit opening up apprenticeship opportunities in other industries along with the continued need for construction trade workers in Montana and the Department’s ongoing promotion of the programs. Assuming all apprenticeship programs are four years long, the estimated number of total apprentices by year of apprenticeship is detailed in Table 1 below.

Table 1
Estimated Total Apprentices by Year of Apprenticeship
 10 Year Estimated Positions

Calendar Year	Year 1 Apprentice	Year 2 Apprentice	Year 3 Apprentice	Year 4 Apprentice	Total Apprentices	New Journeymen
2015	350	350	350	350	1,400	0
2016	403	350	350	350	1,453	350
2017	463	403	350	350	1,565	350
2018	532	463	403	350	1,748	350
2019	532	532	463	403	1,930	350
2020	532	532	532	463	2,060	403
2021	532	532	532	532	2,129	463
2022	532	532	532	532	2,129	532
2023	532	532	532	532	2,129	532
2024	532	532	532	532	2,129	532
2025	532	532	532	532	2,129	532

The four year programs have a sliding wage scale benchmarked to the number of apprenticeship hours worked/completed by the individual apprentice. On average across all types of apprenticeships, DLI assumes a first year apprentice will earn \$15.50 an hour or \$32,240 annually. A journeyman – someone who has successfully completed an apprenticeship – will earn \$25.35 an hour or \$52,728 annually in 2015; apprenticeships in their 2nd, 3rd, and 4th year earn 70, 80, and 90 percent of a journeyman’s wage, respectively. It’s also assumed both the starting apprenticeship and journeyman wage will increase 2 percent annually in future years. The estimated annual average wage earned by apprentices and journeyman are detailed in Table 2 below for the years 2015 through 2025.

Table 2

Estimated Annual Average Wage Earned By Apprenticeship Year
10 Year Estimated Outlay

Calendar Year	Year 1 Apprentice	Year 2 Apprentice	Year 3 Apprentice	Year 4 Apprentice	New Journeyman
2015	\$32,240	\$36,910	\$42,182	\$47,455	\$52,728
2016	\$32,885	\$37,648	\$43,026	\$48,404	\$53,783
2017	\$33,542	\$38,401	\$43,887	\$49,372	\$54,858
2018	\$34,213	\$39,169	\$44,764	\$50,360	\$55,955
2019	\$34,898	\$39,952	\$45,660	\$51,367	\$57,074
2020	\$35,596	\$40,751	\$46,573	\$52,394	\$58,216
2021	\$36,307	\$41,566	\$47,504	\$53,442	\$59,380
2022	\$37,034	\$42,398	\$48,454	\$54,511	\$60,568
2023	\$37,774	\$43,245	\$49,423	\$55,601	\$61,779
2024	\$38,530	\$44,110	\$50,412	\$56,713	\$63,015
2025	\$39,300	\$44,993	\$51,420	\$57,848	\$64,275

It is assumed workers enrolling in an apprenticeship program are earning more as an apprentice than in previous jobs or otherwise could because of the increased productivity value they provide to an employer due to their newly developed skill set.

Not all earnings of apprentices and journeymen are considered “new” wages because it’s assumed many first year apprentices held a Montana job prior to starting their apprenticeship. Therefore, only the increased earnings above what a non-apprentice type job pays and increased earning potential of finishing an apprenticeship (becoming an employed journeyman) are considered as the labor income impact to Montana due to the apprenticeship program; this is referred to as the *earning differential* between apprentice/journeyman and prior employment earnings due to the apprenticeship.

The average annual wage income earned by individuals prior to starting an apprenticeship is largely unknown. For this reason, a *high* and *low earning differential* between apprentice/journeyman and prior employment wage earnings is estimated based on two scenarios and sets of assumptions.

The DLI Research & Analysis Bureau estimates the average annual wage in the year prior to entering an apprenticeship to be \$29,600; this is based on the available actual wage data submitted through the State’s Unemployment Insurance system for the years 2000 to 2014. The *low earning differential* reported in Table 3 is calculated based on this assumption (calculation equals the respective figure in Table 2 minus \$29,600).

However, DLI anticipates pre-apprenticeship wage earnings may decrease in the future. As more apprenticeship opportunities become available across industries and marketing efforts expand, it is likely that many of the new apprenticeship positions will be filled by Montanans who were either unemployed or students prior to beginning their training and thus had a lower average annual wage. As such, the *high earning differential* reported in Table 3 assumes a new apprentice earned, on average, \$8.50 an hour (\$17,680 annually) prior to becoming an apprentice.

The reported wages in Table 3 represent the increase in an individual’s earning potential due to becoming an apprenticeship and subsequent journeyman based on assumptions from DLI discussed above.

Table 3
Estimated Average Annual High & Low Earning Differential Due to Apprenticeship Program
 Estimated 10 Year Outlay

Calendar Year	Year 1 Apprentice		Year 2 Apprentice		Year 3 Apprentice		Year 4 Apprentice		Journeyman	
	High	Low	High	Low	High	Low	High	Low	High	Low
2015	\$14,560	\$2,640	\$19,230	\$7,310	\$24,502	\$12,582	\$29,775	\$17,855	\$35,048	\$23,128
2016	\$14,851	\$2,693	\$19,614	\$7,456	\$24,992	\$12,834	\$30,371	\$18,212	\$35,749	\$23,591
2017	\$15,148	\$2,747	\$20,006	\$7,605	\$25,492	\$13,091	\$30,978	\$18,577	\$36,464	\$24,062
2018	\$15,451	\$2,802	\$20,407	\$7,757	\$26,002	\$13,353	\$31,598	\$18,948	\$37,193	\$24,544
2019	\$15,760	\$2,858	\$20,815	\$7,912	\$26,522	\$13,620	\$32,230	\$19,327	\$37,937	\$25,034
2020	\$16,075	\$2,915	\$21,231	\$8,070	\$27,053	\$13,892	\$32,874	\$19,714	\$38,696	\$25,535
2021	\$16,397	\$2,973	\$21,656	\$8,232	\$27,594	\$14,170	\$33,532	\$20,108	\$39,470	\$26,046
2022	\$16,725	\$3,033	\$22,089	\$8,396	\$28,146	\$14,453	\$34,202	\$20,510	\$40,259	\$26,567
2023	\$17,059	\$3,093	\$22,531	\$8,564	\$28,708	\$14,742	\$34,886	\$20,920	\$41,064	\$27,098
2024	\$17,401	\$3,155	\$22,981	\$8,736	\$29,283	\$15,037	\$35,584	\$21,339	\$41,886	\$27,640
2025	\$17,749	\$3,218	\$23,441	\$8,910	\$29,868	\$15,338	\$36,296	\$21,765	\$42,723	\$28,193

This analysis considers both the impact to Montana’s economy from the increased earning differential of *all apprentices* and subsequent journeymen as well as only the *new apprentices* attributed to the tax incentive proposed in the respective legislation. Both scenarios assume that all apprentices who start an apprenticeship complete the four year program and become a licensed journeyman working in Montana.

Total All Apprenticeships

One impact analysis scenario considers the earning differential of *all* apprentices and journeymen participating and graduating from an apprenticeship program (see Table 1 above). Table 4 below details the total estimated earning differential of all apprentices and journeymen in Montana broken out by apprenticeship year for 2015 through 2025 assuming both the *high* and *low earning differential* discussed above.

Table 4
Estimated Total Earning Differential of All Apprentices & Journeymen
 Estimated 10 Year Outlay

Calendar Year	Year 1 Apprentice		Year 2 Apprentice		Year 3 Apprentice		Year 4 Apprentice		Journeyman	
	High	Low	High	Low	High	Low	High	Low	High	Low
2015	\$5,096,000	\$924,000	\$6,730,360	\$2,558,360	\$8,575,840	\$4,403,840	\$10,421,320	\$6,249,320	\$0	\$0
2016	\$5,977,608	\$1,083,852	\$6,864,967	\$2,609,527	\$8,747,357	\$4,491,917	\$10,629,746	\$6,374,306	\$12,512,136	\$8,256,696
2017	\$7,011,734	\$1,271,358	\$8,052,607	\$3,060,975	\$8,922,304	\$4,581,755	\$10,842,341	\$6,501,793	\$12,762,379	\$8,421,830
2018	\$8,224,764	\$1,491,303	\$9,445,707	\$3,590,524	\$10,465,863	\$5,374,399	\$11,059,188	\$6,631,828	\$13,017,626	\$8,590,267
2019	\$8,389,259	\$1,521,129	\$11,079,815	\$4,211,685	\$12,276,457	\$6,304,170	\$12,972,428	\$7,779,135	\$13,277,979	\$8,762,072
2020	\$8,557,045	\$1,551,552	\$11,301,411	\$4,295,919	\$14,400,284	\$7,394,791	\$15,216,658	\$9,124,925	\$15,575,069	\$10,277,910
2021	\$8,728,186	\$1,582,583	\$11,527,439	\$4,381,837	\$14,688,289	\$7,542,687	\$17,849,139	\$10,703,537	\$18,269,556	\$12,055,989
2022	\$8,902,749	\$1,614,235	\$11,757,988	\$4,469,474	\$14,982,055	\$7,693,541	\$18,206,122	\$10,917,608	\$21,430,189	\$14,141,675
2023	\$9,080,804	\$1,646,519	\$11,993,148	\$4,558,863	\$15,281,696	\$7,847,412	\$18,570,245	\$11,135,960	\$21,858,793	\$14,424,508
2024	\$9,262,420	\$1,679,450	\$12,233,011	\$4,650,040	\$15,587,330	\$8,004,360	\$18,941,650	\$11,358,679	\$22,295,969	\$14,712,998
2025	\$9,447,669	\$1,713,039	\$12,477,671	\$4,743,041	\$15,899,077	\$8,164,447	\$19,320,483	\$11,585,853	\$22,741,888	\$15,007,258

Table 5 on the next page aggregates the estimated total annual earning differential of *all apprentices* participating in DLI’s apprenticeship programs and the subsequent journeymen that have completed their apprenticeship. It’s assumed that apprentices who became journeymen in prior years are continuing to work and earn journeymen wages in the following years. Therefore, the estimated journeymen earning differential are cumulative over future years.

Table 5

Estimated Total/Aggregate Earning Differential of All Apprentices & Journeymen in MT

Year	High Wage Differential		Low Wage Differential	
	Total Earned	% Change	Total Earned	% Change
2015	\$30,823,520	--	\$14,135,520	--
2016	\$44,731,814	45.1%	\$22,816,298	61.4%
2017	\$60,103,501	34.4%	\$32,094,407	40.7%
2018	\$77,487,663	28.9%	\$42,356,847	32.0%
2019	\$96,288,079	24.3%	\$53,846,983	27.1%
2020	\$116,620,586	21.1%	\$66,675,961	23.8%
2021	\$138,207,799	18.5%	\$80,575,407	20.8%
2022	\$160,693,849	16.3%	\$95,201,295	18.2%
2023	\$183,629,621	14.3%	\$110,119,700	15.7%
2024	\$207,024,108	12.7%	\$125,336,474	13.8%
2025	\$230,886,484	11.5%	\$140,857,583	12.4%

New Apprenticeships Only

The DLI apprenticeship programs have continued to attract incoming apprentices on an annual basis. However, it’s assumed the number of first year apprenticeships will increase 15 percent from 2015 – 2018 due to the proposed apprenticeship tax credit expanding apprenticeship programs into other industries along with the growing demand for construction trade professionals and DLI’s continued effort to promote the programs.

Over the past 10 years, there has been an average of 1,200 total apprentices participating in a DLI apprenticeship program (Source: DLI). On average, that represents 300 apprentices split equally across the four years of apprenticeship training. For the purposes of this analysis, it’s assumed all new anticipated DLI apprenticeships over the average 300 per apprenticeship year are defined to be *new apprenticeships* and subsequent journeymen due to the implementation of the apprenticeship tax credit and other reasons stated above. Table 6 details the estimated number of *new apprentices* and subsequent journeymen for the next ten years in Montana.

Table 6

Estimated Number of New Apprentices Only by Year of Apprenticeship
10 Year Estimated Outlay

Calendar Year	Year 1 Apprentice	Year 2 Apprentice	Year 3 Apprentice	Year 4 Apprentice	Total Apprentices	New Journeymen
2015	50	0	0	0	50	0
2016	103	50	0	0	153	0
2017	163	103	50	0	315	0
2018	232	163	103	50	548	0
2019	232	232	163	103	730	50
2020	232	232	232	163	860	103
2021	232	232	232	232	929	163
2022	232	232	232	232	929	232
2023	232	232	232	232	929	232
2024	232	232	232	232	929	232
2025	232	232	232	232	929	232

Similar to the scenario analysis of *total all apprentices* above, the total or aggregate estimated earning differential of only the *new apprentices* and subsequent journeymen is calculated using the estimated earning differentials (Table 4 above) and estimated number of *new apprentices* and journeymen attributed to the new apprenticeship tax credit (Table 6 above); this is detailed in Table 7 below.

Table 7

Estimated Total Earning Differential of New Apprentices & Journeymen Only

Estimated 10 Year Outlay

Calendar Year	Year 1 Apprentice		Year 2 Apprentice		Year 3 Apprentice		Year 4 Apprentice		Journeyman	
	High	Low	High	Low	High	Low	High	Low	High	Low
2015	\$728,000	\$132,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2016	\$1,522,248	\$276,012	\$980,710	\$372,790	\$0	\$0	\$0	\$0	\$0	\$0
2017	\$2,467,267	\$447,362	\$2,050,664	\$779,503	\$1,274,615	\$654,536	\$0	\$0	\$0	\$0
2018	\$3,589,408	\$650,827	\$3,323,726	\$1,263,422	\$2,665,220	\$1,368,636	\$1,579,884	\$947,404	\$0	\$0
2019	\$3,661,196	\$663,843	\$4,835,394	\$1,838,041	\$4,319,801	\$2,218,291	\$3,303,537	\$1,981,022	\$1,896,854	\$1,251,725
2020	\$3,734,420	\$677,120	\$4,932,101	\$1,874,802	\$6,284,495	\$3,227,195	\$5,354,390	\$3,210,850	\$3,966,322	\$2,617,356
2021	\$3,809,108	\$690,662	\$5,030,744	\$1,912,298	\$6,410,185	\$3,291,739	\$7,789,626	\$4,671,180	\$6,428,634	\$4,242,223
2022	\$3,885,290	\$704,476	\$5,131,358	\$1,950,544	\$6,538,388	\$3,357,574	\$7,945,419	\$4,764,604	\$9,352,449	\$6,171,634
2023	\$3,962,996	\$718,565	\$5,233,986	\$1,989,555	\$6,669,156	\$3,424,725	\$8,104,327	\$4,859,896	\$9,539,498	\$6,295,067
2024	\$4,042,256	\$732,937	\$5,338,665	\$2,029,346	\$6,802,539	\$3,493,220	\$8,266,414	\$4,957,094	\$9,730,288	\$6,420,968
2025	\$4,123,101	\$747,595	\$5,445,439	\$2,069,933	\$6,938,590	\$3,563,084	\$8,431,742	\$5,056,236	\$9,924,893	\$6,549,388

Table 8

Estimated Total/Aggregate Wage Differential of New Apprentices & Journeymen Only

Year	High Wage Differential		Low Wage Differential	
	Total Earned	% Change	Total Earned	% Change
2015	\$728,000	--	\$132,000	--
2016	\$2,502,958	243.8%	\$648,802	391.5%
2017	\$5,792,546	131.4%	\$1,881,401	190.0%
2018	\$11,158,237	92.6%	\$4,230,289	124.8%
2019	\$18,016,782	61.5%	\$7,952,922	88.0%
2020	\$26,168,582	45.2%	\$12,859,048	61.7%
2021	\$35,331,473	35.0%	\$18,677,184	45.2%
2022	\$45,144,715	27.8%	\$25,060,136	34.2%
2023	\$55,154,221	22.2%	\$31,570,746	26.0%
2024	\$65,363,918	18.5%	\$38,211,570	21.0%
2025	\$75,777,809	15.9%	\$44,985,209	17.7%

Table 8 aggregates the estimated total annual earning differential of the *new apprentices* participating in DLI’s apprenticeship programs and the subsequent journeymen that have completed their apprenticeship. It’s assumed that apprentices who became journeymen in prior years are continuing to work and earn journeymen wages in the following years. Therefore, the estimated journeymen earning differentials are cumulative over future years.

Estimated Economic Impacts

In general, as people earn more money – such as becoming an apprentice or journeyman – their disposable income also grows. As disposable income grows, part of it is saved while another portion of that disposable income is spent on goods and services within the local economy; in this case, Montana’s economy. The heightened level of spending increases the demand for goods and services which, in turn, increases total economic output and employment within the State’s economy to fulfill the greater demand.

This analysis utilizes the Implan 2013 Montana State Input/Output Multiplier Model (the most current available) to estimate the impact to Montana’s economic output (value of goods and services) and employment due to the spending of the increased disposable income earned by apprentices and journeymen – the earning differential. The proportion of savings, spending, and tax liability on the earning differential is structurally estimated within the Implan model.

Estimating impacts using input/output modeling assumes constant returns per increased labor income dollar. In other words, prices are not affected in the model and the economic structure within the model region remains unchanged; these conditions are necessary for this type of model estimation. Each year was run individually within the model with projected inflation adjustments made for future time periods. All dollar figures reported are in the respective years’ dollars – essentially, estimated future nominal dollars.

RESULTS & DISCUSSION

As discussed previously, it is assumed workers participating in a DLI apprenticeship program are earning more while on the job than in previous jobs because of the higher productivity value they provide due to their newly developed skill set. A portion of those increased earnings – earning differential – are expended on goods and services in Montana’s economy increasing the value of overall economic output and total employment needed to produce and provide those goods and services.

Total All Apprenticeships

In 2015 it’s estimated between \$10.3 million and \$22.4 million of increased economic output will be demanded due to the impact of the earning differential spending by all current and prospective apprentices and graduated journeymen (Table 9). This is expected to grow at an increasing rate through 2020 and continue to increase at a steady rate thereafter when the heightened impacts from the initial three year growth in apprenticeship enrollment levels off.

Table 9
Estimated Yearly Impact to the Value of Output in Montana Due to Increased Earnings of All MT Department of Labor Apprentices & Subsequent Journeymen

Year	Impact Using High Wage Differential			Impact Using Low Wage Differential		
	Economic Output	Annual Change	Annual % Change	Economic Output	Annual Change	Annual % Change
2015	\$22,431,679	--	--	\$10,287,062	--	--
2016	\$32,599,110	\$10,167,431	45.3%	\$16,627,785	\$6,340,723	61.6%
2017	\$43,866,278	\$11,267,168	34.6%	\$23,423,963	\$6,796,178	40.9%
2018	\$56,641,824	\$12,775,546	29.1%	\$30,961,949	\$7,537,986	32.2%
2019	\$70,498,923	\$13,857,099	24.5%	\$39,424,967	\$8,463,018	27.3%
2020	\$85,530,673	\$15,031,750	21.3%	\$48,900,799	\$9,475,832	24.0%
2021	\$101,542,334	\$16,011,661	18.7%	\$59,199,372	\$10,298,573	21.1%
2022	\$118,280,375	\$16,738,041	16.5%	\$70,073,901	\$10,874,529	18.4%
2023	\$134,798,709	\$16,518,334	14.0%	\$80,836,596	\$10,762,695	15.4%
2024	\$151,567,238	\$16,768,529	12.4%	\$91,761,792	\$10,925,196	13.5%
2025	\$168,591,653	\$17,024,415	11.2%	\$102,853,196	\$11,091,404	12.1%

The increased demand for goods and services – economic output – in the Montana economy spurs the need for increased workers across industries in Montana. It’s estimated between 88 and 192 jobs earning between \$3.1 and \$6.9 million will be created or supported in Montana’s economy due to the earning differential spending by *all* DLI apprentices and journeymen in 2015 (Table 10 below).

Table 10
Estimated Yearly Employment Impacts to Montana's Economy Due to Increased Earnings of All MT Department of Labor Apprentices & Subsequent Journeymen

Year	Impact Using High Wage Differential				Impact Using Low Wage Differential			
	Total Jobs	Annual Change	Annual % Change	Labor Income Earned	Total Jobs	Annual Change	Annual % Change	Labor Income Earned
2015	192	--	--	\$6,948,866	88	--	--	\$3,186,717
2016	273	81	42.4%	\$10,084,358	139	51	58.4%	\$5,143,715
2017	360	87	31.8%	\$13,549,757	192	53	38.1%	\$7,235,376
2018	455	95	26.5%	\$17,468,850	249	57	29.5%	\$9,548,945
2019	555	100	21.9%	\$21,707,223	310	62	24.7%	\$12,139,285
2020	660	105	18.8%	\$26,290,991	377	67	21.5%	\$15,031,455
2021	767	108	16.3%	\$31,157,622	447	70	18.6%	\$18,164,952
2022	875	108	14.1%	\$36,226,884	519	71	15.9%	\$21,462,217
2023	981	106	12.1%	\$41,397,533	589	70	13.5%	\$24,825,428
2024	1,086	104	10.6%	\$46,671,595	657	69	11.7%	\$28,255,903
2025	1,188	102	9.4%	\$52,051,138	725	68	10.3%	\$31,754,988

Correlated with economic output, the projected growth trend in the total employment impact from the increased spending of the earning differential of all apprentices is projected to follow a similar trend. Through 2020 the total employment increase is expected to increase at a growing rate then level off thereafter.

New Apprenticeships Only

There has historically been an annual average 1,200 active apprenticeships within DLI programs; this represents 300 apprentices in each year of the progressive four year apprenticeship programs. DLI estimates there will be 1,400 total apprenticeships in 2015 with the number of new apprenticeships increasing by 15 percent through 2018 due to the introduction of the \$1,000 apprenticeship program tax credit expanding apprenticeship participation into other industries along with the continued need for construction trade workers in Montana and the Department’s ongoing effort in promoting the programs. The growth in apprenticeship participation starting in 2015 over the historic average (300 apprentices) is considered to be *new apprentices* and subsequent journeymen for the reasons stated above.

In 2015 it’s estimated between \$500 thousand and \$100 thousand of increased economic output from the heightened spending of the earning differential of only the *new* DLI apprentices and graduated journeymen (Table 11). Regardless of the earning differential assumed, Montana economic output is estimated to increase over the next 10 years as *new* apprentices move through and graduate from apprenticeship programs into more productive journeymen positions contributing to the Montana economy.

Table 11
Estimated Yearly Impact to the Value of Output in Montana Due to Increased Earnings of New MT Department of Labor Apprentices & Subsequent Journeymen

Year	Impact Using High Wage Differential			Impact Using Low Wage Differential		
	Economic Output	Annual Change	Annual % Change	Economic Output	Annual Change	Annual % Change
2015	\$529,799	--	--	\$96,062	--	--
2016	\$1,824,075	\$1,294,276	244.3%	\$472,826	\$376,764	392.2%
2017	\$4,227,664	\$2,403,589	131.8%	\$1,373,132	\$900,306	190.4%
2018	\$8,156,433	\$3,928,769	92.9%	\$3,092,251	\$1,719,119	125.2%
2019	\$13,191,287	\$5,034,854	61.7%	\$5,822,864	\$2,730,613	88.3%
2020	\$19,192,293	\$6,001,006	45.5%	\$9,430,951	\$3,608,087	62.0%
2021	\$25,958,305	\$6,766,012	35.3%	\$13,722,271	\$4,291,320	45.5%
2022	\$33,229,236	\$7,270,931	28.0%	\$18,445,773	\$4,723,502	34.4%
2023	\$40,487,574	\$7,258,338	21.8%	\$23,175,432	\$4,729,659	25.6%
2024	\$47,854,468	\$7,366,894	18.2%	\$27,975,593	\$4,800,161	20.7%
2025	\$55,332,412	\$7,477,944	15.6%	\$32,847,877	\$4,872,284	17.4%

The increased support of new Montana jobs due to the spending of a portion of the earning differential by *new* DLI apprenticeships becomes fully realized when the first journeymen related to growth in apprenticeships start participating in the Montana workforce – year 2019. After the maturation of growth in the apprenticeship program comes to fruition (starting in 2019), between 30 to 50 additional Montana jobs are supported annually moving into the future due to the increased spending of new apprentices and DLI journeymen (Table 12 below).

Table 12
Estimated Yearly Employment Impacts to Montana's Economy Due to Increased Earnings of New MT Department of Labor Apprentices & Subsequent Journeymen Due to Growth in the Programs

Year	Impact Using High Wage Differential				Impact Using Low Wage Differential			
	Total Jobs	Annual Change	Annual % Change	Labor Income Earned	Total Jobs	Annual Change	Annual % Change	Labor Income Earned
2015	5	--	--	\$164,121	1	--	--	\$29,758
2016	15	11	240.0%	\$564,268	4	3	400.0%	\$146,266
2017	35	19	126.8%	\$1,305,874	11	7	182.5%	\$424,144
2018	66	31	89.0%	\$2,515,517	25	14	120.4%	\$953,678
2019	104	38	58.4%	\$4,061,710	46	21	83.9%	\$1,792,910
2020	148	44	42.4%	\$5,899,455	73	27	58.7%	\$2,898,949
2021	196	48	32.5%	\$7,965,141	104	31	42.6%	\$4,210,592
2022	246	50	25.4%	\$10,177,442	137	33	31.6%	\$5,649,567
2023	295	49	19.9%	\$12,433,989	169	32	23.6%	\$7,117,321
2024	343	48	16.3%	\$14,735,667	200	32	18.8%	\$8,614,431
2025	390	47	13.7%	\$17,083,379	232	31	15.5%	\$10,141,483